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A Walkthrough of the Canadian Video Game Industry: An Economic Geography Perspective on the Digital Entertainment Frontier

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Abstract

The video game industry has been examined since the 1970's, yet individual country analysis from an economic geography perspective has been lacking. It is the contribution of this dissertation to utilize the agglomeration economy and location theory literature in its application to the Canadian video game industry.

To understand this industry kernel density maps, standard deviational ellipses, and mapping processes were used to illustrate the dispersion and clustering patterns of studios in Canada. In addition, a Poisson regression was performed using count data of the number of video game firms in census metropolitan areas. The resulting data displayed strong clustering in the major trade cities of Vancouver, Toronto, and Montreal, with the Poisson regression showing a positive relationship between the two variables, population and number of video game studios.

The interview data revealed that this is influenced by a mix of urban hierarchy and financial aid. These two go hand in hand as often these areas with the highest population and therefore the greatest number of video game studios, have the most opportunities for this aid. Interviews also revealed the additional element of networking. While this is somewhat limited in some given locations, there are more instances of open communication in the smaller scale operations between developers.

The growth of the video game industry relies heavily on the branch economy that has developed overtime. While it is possible to apply the initial growth of the industry in Canada to the economic geography literature, this is reduced to initial stages of development and labour pools.

Key Terms: Economic Geography, Video Game industry, Canada, ARCGIS, Qualitative Methods, Agglomeration

Summary for Lay Audience

Canada is the third largest producer of video games in the world. From small independent studio successes such as *Cuphead: Don't Deal with the Devil* and free to play masterpieces like *Warframe*, to AAA game titles such as *Assassin's Creed*, Canada has become a powerhouse over the past few decades. The video game industry has been examined since the 1970's, yet individual country analysis from an economic geography perspective has been lacking. It is the contribution of this dissertation to utilize the agglomeration economy and location theory literature in its application to the Canadian video game industry.

To understand this industry, GIS mapping techniques were used to illustrate the dispersion and clustering patterns of studios in Canada. This was used in conjunction with interview data to further understand the trends of agglomeration as well as internal industry dynamics such as the creative process, competition, and financial aid.

The Canadian video game industry clusters in the major trade cities of Vancouver, Toronto, and Montreal. While this is influenced by urban hierarchy, these populations centers are more due to social factors where developers are from the area and have connections to the location. The greater influences, on a provincial level are the funding and tax incentive programs that are offered. While there are federal and provincial opportunities, these do not greatly sway location unless there is city-specific financial aid. This support that Canada offers is one of its greatest strengths, yet the process to obtain such aid is a lengthy and complex one.

Due to most production being project based, the video game industry is extremely mobile, and this has great implications for future growth in Canada Yet, in terms of utilizing the economic literature for such a purpose, it is reduced to initial stages of production and even that is reduced to understanding what attracts labour. The importance is in ensuring growth is within the confines of social aspects and community development, not entirely in the benefits of agglomeration economies.

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Table of Contents

List of Tables

List of Figures

List of Appendices

1 Introduction

Exciting new virtual boundaries and worlds have been created by the video game industry, and the industry's popularity has only skyrocketed due to an abundance of factors such as: new technologies, new multiplayer gaming formats, the rise of gaming communities, and increasing gamer interaction via social media (e.g. YouTube, Reddit, Twitch). Johnson & Woodstock (2019), give a glimpse of the rising success of the industry through the viewership of video games using Twitch, where "in 2016, there were 292 billion total minutes watched and 2.2 million unique streamers…who broadcast their activities on the platform, followed by over 350 billion minutes in 2017..." (pg. 671). Canada alone is home to 19 million gamers, (ESAC, 2015). From top selling AAA games like *Call of Duty*, to simple platform games such as *Super Mario* or *Limbo*, to the casual game of *Solitaire*. There are numerous genres, with numerous games, where nearly anyone can find a game that will be enjoyed.

With the increasing presence of the video game industry (see Figure 1) it has been extensively analyzed in certain disciplines, for instance, games studies and communication studies. The social, health, and computer sciences have also taken a great interest in the development of the video game industry and its impacts over the past two decades. Yet, geography is one of the disciplines that has yet to fully investigate this industry, where this dissertation will offer new insights to the video game industry in Canada.

While there has been much speculation that the industry has clustered in Vancouver, Toronto, and Montreal, it is this thesis' goal to test the hypothesis and provide evidence that there is indeed clustering within these three cities, and conjecture as to why this is occurring. While there is literature that does examine the clustering of industries, and which will be

explored within the pages of this dissertation, it is the application to specifically the Canadian video game industry that will be examined in terms of its location pattern.

The structure of this document is as follows: the establishment of the video game industry within the confines of geography. This will be centered around the agglomeration trends of video game studios in Canada's three largest cities: Vancouver, Toronto and Montreal. These will be analyzed by using GIS methods and mapping technology. This process is considered exploratory due to the Canadian video game industry not having been understood and examined in such a way within the field of geography previously. In addition to this exploratory quantitative analysis, there will be utilization of interview data to help understand the Canadian industry, in terms of is location patterns, from the viewpoint of its actors.

Ultimately, this work aims to answer the following question: How does the Canadian video game industry fit into the economic geography literature? This can then be broken down further to the following. First, does the neoclassical literature provide a sufficient foundation of understanding the industry using the conceptual pillars from neoclassical location theories: labour, transportation, and market locations? Second, how will the theoretical framework for this

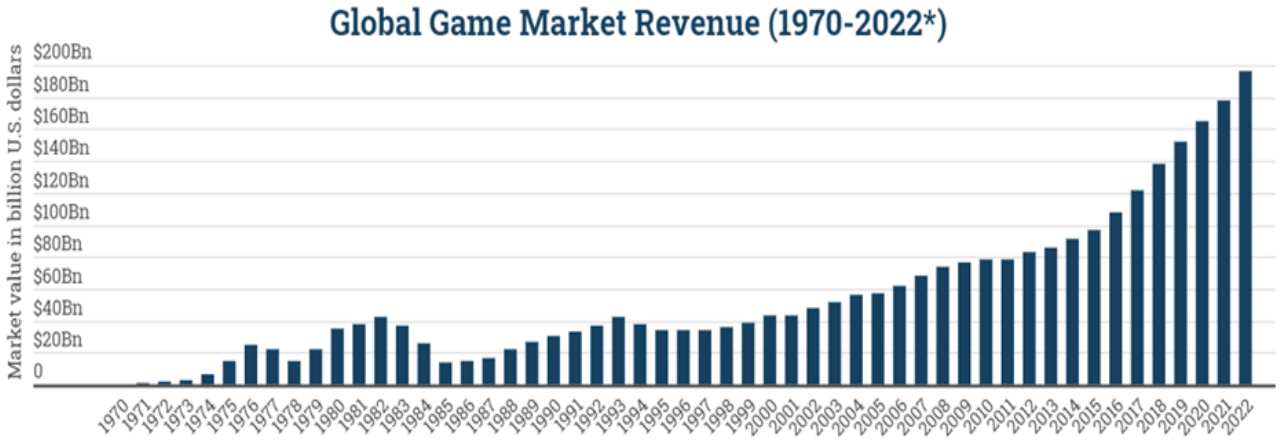


Figure 1 Video Game Industry Growth in Revenue (Nakamura, 2019)

dissertation shape the perspective of the industry? Finally, what is the ideal way to view the video game industry here in Canada? Based on what is discovered, is the neoclassical consideration needed to help examine the industry, or is there the need to utilize different concepts?

1.1 Contextualizing the Video Game Industry

The video game industry is relatively new but has become well documented over time due to its popularity. For a full engrossing history please consult Ervin (2017) or Geissinger (2018); for lighter reads, look to *A History of Video Games in 64 Objects* (World Video Game Hall of Fame, 2018) or *An Illustrated History od 151 Video Games* (Parkin, 2015). There are a few notable take aways from the broadest of strokes of the industry's history.

First, the growth of the industry is inherently linked to the advancement of technology, and a prime indictor is the generations video game consoles. As each generation is an ideal bookmark for the various chapters of the industry's history, at the time of writing this dissertation the ninth generation of consoles has been announced. Second, are the ramifications of the 1984 crash of the North American video game industry. Which was a result of lack of quality control, over abundance of video games in the market, and the rise of the personal computer; for a full explanation of the crash, consult Kent (2001) or Herman (2001). The importance of this event and the ensuing fallout lead to the introduction of a new power in North America. Specifically, this was the beginning of the dominance of the Japanese firm Nintendo in the video game industry for the subsequent decade. This dominance was due to Nintendo's business model of quality control and third-party licensing agreements, which lead to a tighter control on the releasing of games (Sheff, 1993; Harris, 2014; Ryan, 2011; Satterthwaite and Pfeffer, 2017). Third, the most recent years of the industry have seen the introduction and rise of mobile platforms, such as smartphones and tablets. These new platforms have quickly become the most accessible interfaces for not only consumers, but for developers as well due to the ease of creating and running a game for such a

platform (Hofacker et al., 2016; Feijoo et al., 2012). With the general highlights covered, the attention can now be shifted to the Canadian video game industry.

The industry in Canada is greatly influenced by the sprawl of companies from the United States and other countries establishing firms in Canada. It is during the latter half of the 20th century that Canada was attempting to entice foreign direct investment in specific sectors. At this time, it can be noted there is a starting point for the video game industry in Canada.

During the late 1960's and 1970's, the Canadian government was interested in attracting the Hollywood film industry. During these decades the video game industry was extremely young and without a dedicated organization to represent itself; it was grouped in with other industries that had various similarities. The video game industry then became classified under the information and cultural industry according to the North American Industry Classification System. To this day the video game industry remains under the same classification number: 511212. The first two numbers (51) indicate the video game industry is sub categorized under the information and culture industry. Since the video game industry was categorized under the film industry, there was opportunity to access the various financial programs that were being offered to the sector.

Table 1 Canada vs. United States comparison using 2017 stats from the Entertainment Software Association

	Canada	United States
Total number of studios	596	2,457
Total number of directly employed	21,700	65,000
Total employment	40,600	220,000
Amounted added to National GDP (USD)	$3.7 billion	$11.7 billion
Average salary (USD)	$77,300	$97,000

Source: ESAC (2017) and ESA (2017)

When film studios began entering Canada, the most logical route was through British Columbia, as British Columbia is directly north of California. This province was closely linked to the western economy of the United States due to its proximity, compared to the rest of Canada. This link is derived from trade that has been consistent between California and British Columbia, for example California currently relies on British Columbia for a significant portion of electric power (Government of Canada, 2017). Yet, the highlight of this relationship, for this dissertation, is the trade interaction focusing around advancing technology, specifically digital entertainment. British Columbia uses it beautiful landscape, skilled workforce, and diverse supporting firms in the technology sector as a selling point directly to the film industry (Gasher, 1995; Barnes & Cole, 2011)

The strong buildup of the digital art and entertainment sector allowed for a more attractive location for the international video game community to enter Canada. With this in place, the first large video game studio, Electronic Arts, came to Canada:

> "In the early 80's, video game pioneer Don Mattrick founded Distinctive Software (DS), the first in a long line of video game companies in BC. In 1991, EA acquired DS and rebranded it EA Canada (with Mattrick still at the head of the new company). This acquisition sparked a wave of spinoffs including Radical Entertainment, Relic Entertainment, and others. This initial cluster grew organically for many years, developing strong connections to sound and video producers and a whole ecosystem of support companies for the nascent video game industry" (Nordicity, 2015, pg.34).

The arrival of Electronic Arts is noted as the starting point of the Canadian video game industry (Nordicity, 2015; Nowak, 2010; Hussey, 2015). Yet, reports by the Entertainment Software Association of Canada provide an overview of the industries composition since 2011 (ESAC, 2011). The most recent report, at the time of this dissertation, indicates there are approximately 596 active studios in Canada (ESAC, 2017). There has been an increase from the 2015 report, where there were only 472 studios (ESAC, 2017). Data from 2017 will be utilized as the most up

to date and accurate accounts, at the time of writing this. The studios are dispersed amongst the provinces of Canada with no studios in the territories, and concentrated in British Columbia, Ontario, and Quebec. The working hypothesis of this research study is there is clustering in the large trade cities of these provinces.

In terms of employment, the Association points out that while the industry has generated approximately 40,600 jobs, 78% of the studios in Canada have less than 10 full time employees (Nordicity, 2017). The average salary has increased to $77,300 annually for these individuals (ESAC, 2017). With a workforce of less than 50,000 individuals the video game industry contributed $2 billion CDN in 2017 to the national gross domestic product (GDP).

When it comes to game development, a rudimentary understanding of how it operates is prudent for this dissertation; this is depicted below in Figure 2. What is missing is the important "pitch" step where the idea is presented before the financial investors for the game. This is an important step for two reasons. First, if there is no financial backing, the game will not be created. Second, the various options

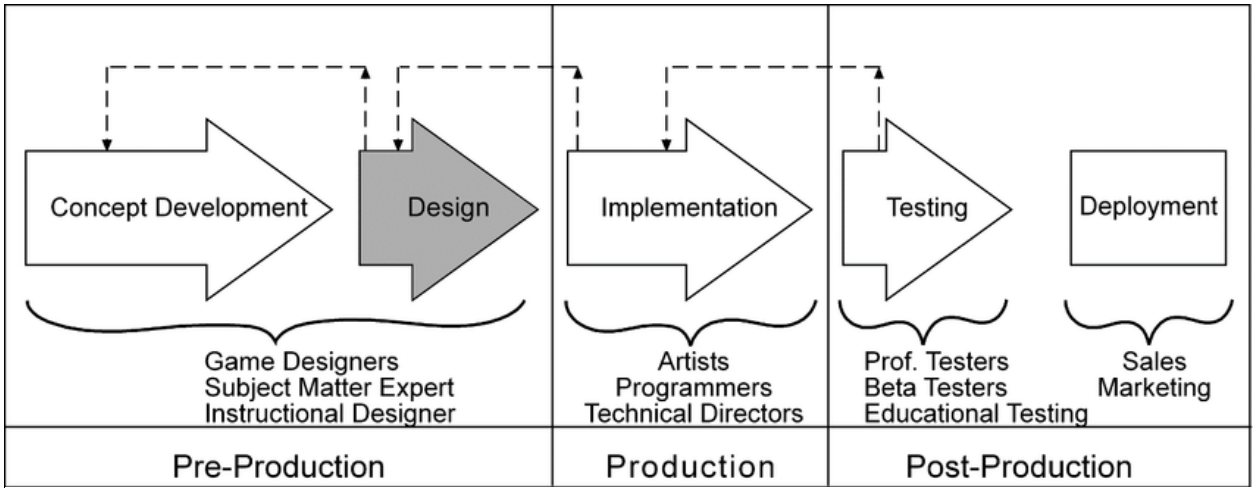


Figure 2 General Flow of video game production (Khowaja, 2017)

for games to be fund, such as Kickstarter, and while the traditional route of utilizing a publisher is still available; the online marketplaces allow for the additional opportunities to explore in regard to funding and distributing products (Ordanini et al., 2011; Planells, 2015). Again, this is important, as so often

many video game studios lack the finances to fund a project, especially since a high-profile game cost million to create.

This dissertation is not primarily concerned with the actual process of game development, but more so with the elements outside of production, including locations of studios in Canada (as the bases of location theory stems from the access to labour and resources) as well as access to finances (which can be included within the term resources). Therefore, the relevant video game literature that includes the studies that examine the clustering of the video game industry, which will be examined in the agglomeration chapter.

2 Location Theories and Agglomeration Economies

One of the earliest concepts of clustering was seen in the core-periphery model. This classic theory holds merit today when examining population distribution. Utilizing historical context, natural resource heavy locations lead to the foundations of large-scale cities due to the strategic and economic importance of such areas in the past. These locations of natural resources held great importance during the Industrial Revolution, where resource dependent industries would locate near their respective resources (Ottaviano and Thisse, 2004). As time marched onward, industries that were not as reliant on natural resources began to become more prevalent in the landscape. These industries began to drift away from this traditional conceptualization. Even today, there are still groupings and clustering in varying locations: some near resources, some in major trade cities, some in the middle of nowhere. Location theorists and economic geographers sought to explain this trend and, through careful analysis the groundwork for understanding this phenomenon lead to the agglomeration economies theory being developed.

This literature is a child of location theory and economics. The term ‘agglomeration’ refers to the phenomenon of population or firms being in close proximity to each other. At a

basic level, the geographic roots of the theory lie in the importance of understanding the *where*, with the economic perspectives providing the *why*. One of the largest links to economics that agglomeration theory has is the focus on the reduction of transportation costs. Transportation has long been a constant in location theory dating back to early Weberian location theory, where the majority of early theories were based on a trifecta of three different factors: resources, market, and transportation. These earlier theories built upon one another over time and as a more digital age has come about with advances in both telecommunications and transportation, some of the elements considered in these theories lose some relevance. For context, these theories must be briefly discussed. The works of Smith (1981) in his book *Industrial Location: An Economic Geographical Analysis Second Eds.* is an optimal resource and should be consulted for further understanding.

2.1 Early Concepts and Locational Interdependence

The earliest scholar to discuss location theory, the study of firm/plant site selection, was Alfred Weber in approximately 1909. By earliest, this refers to the first to be translated into English and therefore to be shared with a wider academic community. A majority of location theory literature began in Germany in the late 1800's and remained untranslated.

Weber focused on finding the optimum location; this being the spot where a firm could establish itself and have the benefit of least cost. To find such a unique location, Weber developed a conceptual framework that was built on threes. The first three were the assumptions made for his work: 1) the geographical basis for raw material is given; 2) the situation and size of place for consumption are given, meaning there are conditions for perfect competition (unlimited market scope and no monopoly), and 3) there are several fixed labour locations with labour immobile and in unlimited supply at a given wage rate.

It is important to consider the time when this theory was established, being the beginning of the 20th century. This will clarify certain factors, considering transportation technology was less advanced, as well as telecommunications. Once a factory or firm was built, the market had to be close by as the ability to reach further markets was not in full fruition.

Weber also had a second set of factors that influenced location: 1) transportation costs, 2) labour costs, and 3) agglomerative and deagglomerate factors (the push-pull factors). He used these factors to map and chart his location theory using location triangles and isodapanes. Weber's assumptions of location triangles, with two points being material locations and the third being the market with the firm somewhere in the middle, was merely designed to be a first attempt at understanding manufacturing location. It was his understanding of transportation costs and labour costs that were important in laying the groundwork.

With transportation costs, Weber stressed the importance of lowest transportation costs, where finding the location with the total ton mile involved getting materials to the firm and then the final product to the market was at its lowest. This was an important concept to grasp as this is a far more identifiable cost to target for a location than finding an optimum location based on profit. As the desire of finding an optimum location is lost in a myriad of factors both natural and anthropogenic, the quest to find the perfect spot to maximize profit is quite unknowable. It is much more practical to find a location of least cost, and as transportation cost can be a large financial drain it is much sounder to find an area where this cost is lower. During Weber's time period the main method of transportation was rail, where segments of track had uniform costs in the region for moving bulk. This dovetailed perfectly with Weber's theory, where uniform costs were a sound assumption at the city and regional levels of analysis.

While transportation cost does appear to be at the forefront of considerations, labour costs are equally important. Labour costs to Weber, were costs that could greatly sway a decision on the final location to the point of forgoing a transportation advantage that could be gained elsewhere. Using the isodopane as a tool for analysis, Weber suggested marking a critical isodopane, essentially a threshold where moving for labour costs does not outweigh the transport costs, as a method to circumvent this balancing act between the two. While transportation costs often win out with identifiable uniform cost across a region, therefore making the decision-making process more informed, the labour costs are more likely to be incentivized when there is more labour present within a given area. This is often characteristic of cities with a large population, and a characteristic of agglomeration tendencies.

The foundations laid out by Weber in the early 20th century would remain in place for decades to come and would be built upon. Palander (1935) took up the mantle that Weber began by attempting to answer the question of where production would take place given all the variables. Palander (1935) added the additional consideration of the actual price of the product and how that would affect the extent of the area where a firm could sell their goods. In short, the final price of producing and transporting the product would indicate how large the proverbial reach of the firm would be regarding market share (Palander, 1935). In addition to this element of price, Palander was one of the first to advocate for the factor of time. This was in regard to the fact that over time many factors that were attractive at one location would change over whatever temporal scale one could think of.

Greatly influenced by Palander, Edgar Hoover produced his first work in the late 1930's. By doing so he exposed the world not only to his work, but to the concepts that Palander helped established with Weber's work. This would be the third iteration of the location theories.

Hoover (1937) still upheld some of the old assumptions: perfect competition between producers and sellers at any location, perfect mobility of factors of production, transportation and production/extraction costs were the largest factors in location. As noted, the industries that would still be at the crux of the study were ones that were reliant on natural resources and processing of such material. The most important factor that has remained was transportation. Building off both previous theories, Hoover (1937) continued to promote the role of transportation and pricing of production and does this through his diminishing scale of returns. The main idea behind this is as the market begins to expand and move away from the source, the price will go up because of production and transportation. This will then hopefully incentivize additional firms to set up shop further away to service these new markets.

Hoover (1937), was one of the first to push for the idea that there could be multiple firms that serviced a larger market area. This is more likely if the cost was climbing rapidly the further the market was from the source. While Palander was also an advocate of this idea, Hoover was more inclined to create a working analysis and explanation for multiple service firms in further markets. With the pressure of freight cost ever present, to Hoover (1937), the best location for a firm was at a minimum transportation cost location. This does then keep in step with Weber's foundational work with the importance of transportation being a primary factor in plant location.

Before going any further, it is prudent to discuss Christaller and Lösch and Central Place Theory, as it was being developed alongside other location theories during this time and does have common themes. During the 1930's, Christaller published his book *Central Places in Southern Germany* or *Die Zentralen Orte in Süddeutschland*. The main thrust of his thoughts was the presence of centrality within a city and therefore a region. Later this would promote the

idea of the hierarchy of certain areas being more desirable. This idea of centrality bleeds into the idea of the best location for a firm to settle into, hence the parallels to location theories.

Christaller provided a model to give structure to the regional landscape (Böventer, 1969). This was done by building on similar trends for analysis, as Böventer (1969) explains Christaller's approach in plain language:

> "Christaller's analysis starts with the market areas of individual commodities (goods or services) on a homogeneous plain. Formulated in general economic terms, the size of the market area of a commodity is determined through the interaction of (1) the cost function of the commodity (in particular with regard to internal economics), (2) transportation costs (costs and toils of movements over the plain), and (3) the demand for the commodity" (demand function being identical all over the plain) (Böventer, 1969, pg.118)

With these in mind, the goal of the firm is to maximize its market area, and therefore will locate near larger populations, while at the same time attempting to remove themselves from other competing firms. This results in firms locating near other areas of a threshold population, a minimum population size to support services or industries to access these untapped markets. Ideally this would create a honeycomb like pattern across a region with each hexagon being a firm's market range. Representing the maximum distance, a consumer would travel for said services (Christaller, 1933). It is important to point out that Christaller was not entirely interested in firm or industrial location, he was more intrigued by "whether there might be laws that determined the number, size, and distribution of towns and cities" (Smith, 1971 pg. 99). What he provides to the literature is the introduction of what is explained as an interaction that "defines a theoretical hierarchical distribution of settlements" (van Meeteren and Poorthuis, 2017, pg. 123).

What can be extrapolated from Christaller's early theories is the beginning of the conceptualization of the urban hierarchy. In brief, urban hierarchy can be understood as a theory

that categorizes cites, villages, and townships based on population. Yet population is not the only basis for the conceptual pecking order. Additional elements such as economic power, infrastructure, and political power are also considered relevant factors to consider. The service and industry angle, however, was generally brought in with work by Christaller and Lösch, and they have remained relevant in discussion due to the measurements used in creating their theories, such as transportation, distance to market, and production costs.

While there has been a constant theme that revolves around the importance of transportation, a consumer's demand is a major variable that was introduced by August Lösch (1953). He attempted to tackle what he perceived as a chaotic economic system, that did have order and reason. Lösch stands out because he rejected the Weberian theory that laid the foundations for many theories up to this point. Lösch moved away from the least cost perspective and embraced the goal of finding the location of maximum profit.

While Lösch does reject the objectives of previous theories, he does keep some parallel assumptions that made analysis simpler but real-life applications somewhat difficult. These assumptions include: a broad homogeneous plain with an even distribution of raw materials, uniform transportation rates in all directions, an agricultural population that is evenly distributed, and consumers' taste, opportunities, and knowledge are all the same (Lösch, 1953). With these assumptions, Lösch attempts to show how economic activity should be arranged in a given circumstance to define a state of equilibrium (Lösch, 1953). The equilibrium of Lösch's theory and its application had to satisfy a few elements: 1) location of every individual must be as advantageous as possible in terms of profits for the producers and gain for the consumer, 2) production locations must be so numerous that the entire space is occupied, 3) activities are open to everyone and there are no abnormal profits, for they will be competed away by the entry of

new firms, 4) the areas of supply, production, and sales must be as small as possible so that the maximum number of firms can be reached, and 5) at the boundaries of the markets consumers are indifferent to whom they buy from (Lösch, 1953).

The way Lösch envisioned an equilibrium space economy unfolding through competition resulted in a hexagonal market area system with the boundary of a market area being the point where demand drops off due to the price being too high to compensate for the lack of quantity and transport cost (Lösch, 1953). While what Lösch offers in terms of theoretical analysis was unique for the time, especially when rejecting most of the work that had been laid out by Weber, it has been greatly criticized. Smith (1981) highlights these criticisms. Two major criticisms are that Lösch fails to consider spatial cost variations and that the ideal system he creates could only be developed with a heavy direction by state intervention.

With these early theories being developed, over time there would be a point where they could be grouped under a collective umbrella. This school of thought was eventually acknowledged as locational interdependence. The main focus of these works was creating a more grounded approach in which an imperfect or monopolistic competition could be considered. In addition, the more realistic concept of a market was brought in where there was no one definitive point that could be considered “the market”. Instead there were numerous markets or consumers that were evenly distributed throughout (Smith, 1981). This approach was unique when compared to the original founders as this placed more importance on the consumer. Before, there was an assumption that consumers had homogeneity when it came to taste. Locational interdependence breaks this mold. In this school of thought, the location of a firm is as always important as a firm’s location had to be close to the market for both control of the said market and the ability to sway consumer behaviour.

This was expanded in the works of Hotelling (1929), where he described the tug of war that two firms would have over one market area. While both firms sold the exact same product at the exact same price, what ultimately defined a firm's profits was the size of the market area. Hotelling's example was a beach. In a perfect world both firms would take an even slice of the area, thus receiving equal numbers of consumers. When the assumption of perfection is removed, what is observed is a constant struggle to push one firm to the side so that the other can dominate a greater area (Hotelling, 1929). What Hotelling provided was a very simplistic example and theory and he was heavily criticized by his peers. What is important is his theory and revisions given by others, such as Devletoglou (1960), is that the consumer was now regarded and solidified as an intelligent individual that need to be swayed to make a purchase at a given firm.

These new insights and the promotion of consumers were factors to be considered for theory advancement. The importance of transportation remained in the theories that followed. For Melvin Greenhut (1963), that importance needed a separate consideration. To Greenhut (1963), the factor of transportation was a crux element that needed to be considered void of any other variables due to its critical role in plant location. The logic behind this is entrepreneurs tend to economize on transportation costs if it comprises a large portion of total costs. Greenhut (1963) also considers the role of demand, more so in the elasticity of consumers' demand for a firm's product as a greater response from consumers will entice the reaction of more dispersion of production from a firm to serve as many of the consumers as possible. While there is the idea of firms dispersing to adhere to whims of consumers, Greenhut (1963) brings forth more elements and importance surrounding agglomeration, for while there is a great pull to spread out the firms to reach the consumers, there is also a multitude of attractive factors to remain in close proximity to other firms in agglomeration. There is more on this in the next

section, but it is important to point out the Greenhut was already considering these elements even when considering individual firm locations.

2.2 Of Industries and Agglomeration

It needs to be noted that location theory created the foundation and conceptual framework for the agglomeration literature. This is why the location theory literature was examined first in order to provide that context. As when considering agglomeration, it is important to contextualize the growth of the academic literature surrounding it. In the previous section, there was a brief overview of previous economic geography theories, whereas this section elaborates on the point that the time from the historical era to when literature is written does greatly influence that literature's perceptions to this day. When it came to the earlier understandings of location theory, there was a focus on traditional manufacturing sectors, as this was the driving force of 19th and 20th-century world economy.

However, technological advancements began to rapidly appear while manufacturing remained important. The new industries that began were based on these new technologies. It was during this technological evolution that the knowledge economy (or sector) appeared. It is at this point where the literary review of this dissertation must enter the late 20th and early 21st century, as during this time the work surrounding agglomeration economy became the most applicable approach to the study of the Canadian video game industry.

One of the geographic notions in the conceptual nature of agglomeration economies is clustering, specifically the grouping of industry in a location. This is the crux of this strand of economic geography and is focused on understanding why clustering has occurred.

Agglomeration economies can often be broken down into two broad categories for understanding: urbanization and localized.

Urbanization economies generally refer to the benefits that are derived from being present in a metropolitan area, while localized economies are when firms in closely allied industries are established closed to each other. Porter (1990) provides some brief conceptual elements of agglomeration and building off the earlier works of Hirschman (1958). Porter (1990) points out that this clustering of industries is often due to the perceived static benefits that draw firms to the location. In much earlier times, these static pull factors would be things such as rivers or sources of raw materials. These natural factors were paramount at the early age of industrialization and manufacturing as there was less sophisticated transportation technology to connect locations. Therefore, being close to source locations was key in development.

Moving forward in time and with the rise of manufacturing, there was the shift to what is more recently conceived as an industry cluster. As outlined by Porter (1990), a cluster in terms of an industry cluster, is a group of industries that are linked by a unique buyer-supplier relationship or similar skills and technologies. What can be seen here is the intertwining of traditional location theory and agglomeration economy, more so that one leads to the other.

As Ottaviano and Thisse (2004) explain, there are five points to be taken away from the literature surrounding location theory. The *first* is that the economic space is the outcome the various forms of returns increasing in distance and the different mobility costs associated with them. The *second* is the price competition linked to high transportation cost and land usage that result in the dispersion of production and consumption (Ottaviano and Thisse, 2004). Third, firms are then more likely to cluster in large urban areas where they can sell their differentiated

products where transportation cost are low. *Fourth*, cities are attractive to firms because they offer a large selection of specialized labour markets and for consumers, a wide variety of final goods. *Finally*, agglomeration is the final outcome of both the supply and demand side of the economic forces (Ottaviano and Thisse, 2004).

Again, location theory is deeply embedded in understanding agglomeration economies, and that importance must be restated. Without the concepts of location theory, there would not be a solid foundation for agglomeration economy literature.

Another way to view this is that the constant back and forth of supply and demand are the elements that make agglomerations. It then asks the question, what are consumers demanding that results in such a cluster? Yet, this is looking to the wrong people and in fact, the demand is coming more from a firm's side looking at what an area can offer. As mentioned earlier, a firm's reason for moving to a given location, or demand, would be natural resources and static benefits. Often areas with a high supply of such things were ideal, however, over time these natural benefits gave way to a demand for a more skilled workforce. Regions with high populations, and training institutions are sought out to tap the large supply of skilled labour that is needed to create quality products. This does move into the urban hierarchy literature, as often high-profile cities do have these elements that pull firms to the area resulting in industry clusters. Such cities or regions are known for a particular industry. For example, the financial centers in New York and London or the high fashion of Paris.

A definitive example of a high technology cluster can be taken from the works of Cooke (2001) and his exploration of the Boston, Massachusetts biotechnology cluster. In this geographic region the driving force was not inherently economics, but more health-related, in

this case specifically Gaucher's disease. As Cooke (2001) explains, the biotech firm Genzyme researched and developed a drug to combat this horrid ailment as "this disease wholly undermines the physical capability of the sufferer by rendering bones brittle, but unlike osteoporosis affects also the blood, spleen and liver, so that the patient requires full hospitalization on a permanent basis" (Cooke, 2001, pg. 947). A small blessing is that this disease does not hinder mental abilities. Over time a drug was discovered and able to return the victim to a fully functioning life (Cooke, 2001). The exact science of this drug, though extraordinary, is not the primary concern of this research's mention. It is the agglomeration and knowledge economy that came from the presence of firms such as Genzyme.

As Cooke (2001) notes, the company worked with the local senator to help sway federal level health committees as well as worked in cooperation with many of the local organizations such as the Massachusetts Biotechnology Council, to help generate a local Food and Drug Administration office in the area. This allowed continued linkage from the local to the federal level, permitting Genzyme to land support of the National Institutes of Health (Cooke, 2001). This momentum was even further enhanced by the already specialized services, not only biotechnology and health-related, but also legal and financial within the region that focus primarily on such topics. Cooke (2001) paints a very intriguing picture of an innovative regional system and an agglomeration economy that is not tied to the traditional ideals of manufacturing. It is these kinds of knowledge economy clusters that appeared in the late 20th century and see growth in the 21st century.

While these bold new industries arise with these exciting new technologies, they still adhere to the remnants of early theories. The takeaway here is laid out by Alfred Marshall (1920), an economist from the early 1920s who saw the plain logic in agglomeration. His work

greatly influenced agglomeration literature and his observations were well summarized by Ellison et al. (2010), particularly regarding the importance of transportation cost. While Marshall was one of the many to point out that firms would move to supply locations or to markets to save on transportation costs (Marshall, 1920); he also began theories that focus on labour pool developments and intellectual spillover. The factors of labour pools and supply/market locations have been analyzed since the time Weber in 1909, therefore there is a stronger understanding of these elements. In fact, they are quantifiable by using measurements such as transportation routes; rail for example, and populations census or surveys. Yet, intellectual spillover is more elusive when compared to the other factors.

Marshall (1920) began this thought that the learning curve for various skills in an industry is greatly reduced with learning from others in the same industry cluster. One paper of note is the work of Saxenian (1996), who points out the information exchange of firm leaders in clusters such as Silicon Valley. High-density locations are ideal for knowledge exchange, cities for instance. There is a higher chance to create networking opportunities and increase the speed with which ideas flow (Glaser and Kahn, 2001; Arzaghi and Henderson, 2008). In the works of Ellison et al (2010), they note the strongest flows of knowledge were through research and development in closely associated sectors such as plastic materials and synthetics to plastic products, tires and inner tubes, and industrial organic chemicals (Ellsion et al, 2010). This echoes earlier research done on industries that feed off of each other. What can be observed is that traditional theories surrounding agglomeration that date back to the early 20th century still have prevalence in the 21st century when it comes to clustering of similar industries. The traits described by Marshall (1920) still hold true.

If Marshall was ground-breaking in his observations surrounding agglomeration in the early 1900's, the same could be said for Paul Krugman who bookends this century with his own contributions. Krugman is a highly cited economist due to his papers and books on microeconomics and spatial economic agglomeration. For this research, it is paramount to note Krugman's contributions as his early contributions lead were intriguing "due to the fact that it offers an analytical approach to a wide range of related issues, including city formation, urban system and regional growth" (Fujita and Thisse, 2008). To see this mentioned paper please consult Krugman (1991), as it is noted to be the start of New Economic Geography, referring to the late 20th century of economic geography. One of the main takeaways from that paper, aside from Krugman "demonstrating that models of economic geography can be cute and fun" to lure economic geographers back to their roots, is his insights on agglomeration. First, Krugman paints a picture of the later 20th century, where there is more spending on goods and services not linked to agriculture, the modes of transportation have become more varied and therefore decrease transportation costs and finally, mass production is more present (Krugman, 1991). It is here that Krugman continues and explains that with these factors:

> "…the tie of production to the distribution of land will be broken. A region with a relatively large nonrural population will be an attritive place to produce both because of the large local market and because of the availability of the goods and services produced here. This will attract still more population, at the expense of regions with small initial production, and the process will feed on itself until the whole of the nonrural population is concentrated in a few regions" (Krugman, 1991, pg.487)

Some of the formulas and models put forth by Krugman (1991), do rely on traditional works of Marshall, focusing on labour and transportation costs. Yet he adds to the conversation on agglomeration that the firms, referred to as manufacturing in his paper, are inherently bound by their geographic range due to their limited economies of scale (Krugman, 1991). To circumvent this, firms will position themselves in areas of great demand, such as urban areas.

This allows transportation cost to be decreased, however demand for a firm's product will undoubtedly increase due to the concentration of a market close by (Krugman, 1991). It is these forces feeding into each other that result in an agglomeration, pointing to the additional element of economics of scales, which can have influence on location. Krugman's early works always used manufacturing, and while much can be gleaned from his research, the focus still be must be shifted to a more 21st century stance with new sectors on the rise.

This, in turn, speaks to the advent of the internet and the increase in the technological advancements in telecommunications. The 21st century saw the growth of a knowledge economy and creative/culture economies. It would be prudent at this point to go over these sectors, and what they have to do with the video game industry. Beginning with the culture economy or the creative economy, Scott (1999) provides a quick definition for this economy's compositions. It "comprises all those sectors in modern capitalism that cater to consumer demands for amusement, ornamentation, self-affirmation, social display, and so on. These sectors comprise various craft, fashion, media, entertainment, and service industries with outputs like jewelry, perfume, clothing, films, recorded music or tourist services" (pg. 807).

This economic sector has been on the rise for the past few decades and in response to this, many cities and countries have changed their policies to welcome and promote such industries (Kong and O'Connor, 2009). Moreover, the difficulty here is that cultural/creative economies do not necessarily behave like traditional industries like manufacturing (Florida and Kenney, 1990). Tschang (2009) explains that in solidarity activities, such as painting or other forms of artwork, this is really on the individual level, and the concept of a cultural economy establishes itself where the "culture" or "creativity" resides. This is why one would see artist alleys in cities such as Quebec City. The creativity thrives in that given area, and artists

begin to cluster at that location. On a larger scale at a more regional level, Silicon Valley is much like this as well. Cutting edge technology and innovative projects started to come out of the area and more like-minded individuals began to move into this area (O'Donnell, 2011).

The idea of creativity, while it was once more associated with the arts, in the 21st century has become tied to technological innovation. This is linked to the idea that a cultural or creative economy is intrinsically tangled with society, and in the 21st-century technology is now embedded into society and daily life. Therefore cultural/creative industries are now busting with technology. Bringing this back to the varying levels, while the individual may toil away and work as a single person "firm", it is much more profitable to form a firm to gain the economic influence or power in an industry. This is the more dominant body in the creative industry especially in the video game industry (Epstein, 2005). This is more due to the sharing of the workload and the chance to develop a long-lasting named studio such as Ubisoft, Electronic Arts, or BioWare. That is not to say that an individual cannot be profitable being a one-person team, a prime example of this is the hugely successful game *Stardew Valley*.

With the constant mention of technology and innovation, it is here where the creative economy and the knowledge economy find common ground and intersect. With these advancements, a more skilled labour pool is developed over time, and with it a knowledge economy is slowly born. The concept of the knowledge economy has been discussed since the latter half of the 20th century because of technological advancements and the increasing importance of information within the overall economic systems. However, there has yet to really be a coherent definition that encompasses what a knowledge economy is (Smith, 2002), but the main element that defines it can be extrapolated: knowledge.

In the works of Eraydin (2018), he explains the concept of knowledge based off the research of Dupuy and Gilly (1996). Knowledge which is built from experience that provides the foundation to the process of conceptual construction. From this, Eraydin (2018) further explains that the learning process is the comprehension of knowledge or the development of new knowledge. Why is this important? Understanding these two elements will greatly influence the understanding people have when it comes to the knowledge economy, as the most important material in this industry is that the human capacity for knowledge. Another way to look at this is the key factors the labour force has to offer are comprehension and innovation. The key is then getting such material to a firm.

Taking a moment to define knowledge, it is understood into two general streams: explicit and tacit. Explicit knowledge is tangible in its collection and then can be expressed with such elements as numbers and scientific formulas (O'Hagen & Green, 2018), for example, the number of eggs in a carton, where the eggs can be counted to confirm the number. The key here is their tangibility. In reference to the video game industry, the explicit knowledge present is the computer processing, products being sold, etc. Tacit knowledge is more abstract and is gained through experience and is extremely personal, as often it can be only learned through face-to-face communication or by simply being present (O'Hagen & Green, 2018). Placing this in the context of the video game industry and this study, tacit knowledge is what is being pursued, as this can be placed in different parameters. For example, as someone is playing a video game, they can learn through experience certain actions and reactions such as learning to outmaneuver an opponent. From the firm-side, tacit knowledge can be seen as knowing where to move the firm to or what game engines are ideal to work with for a project. While some of this can be quantified, the key difference is again experiential learning. This dissertation is concerned with

the tacit knowledge that can be gained from interviewees in understanding why studios are here and Canada, and their own experience within the industry.

Returning to the concept of the knowledge economy, the method of information transference is important when it comes to comprehension and innovation. While telecommunications have greatly accelerated the passing of information via email or video calls etc., there has been a noted externality that has occurred in the clusters of the knowledge and creative economies. This is knowledge spillover. This element, when compared to other benefits of clusters, is not tied in with monetary implications but intrinsically tied to technology and the importance of social bonds. Breshci and Lissoni (2001) provide excellent insights as they explain in these clusters' information travels more fluidly among local agents due to their close proximity to each other and the constant social connections that are being created and reinforced through face-to-face contact.

Through these social interactions innovation is diffused at a faster rate than that of scattered locations. This promotes the importance of space and therefore, geography in the knowledge economy (Breshi and Lissoni, 2001; Feldman, 1999). Breshi and Lissoni (2001) highlight another influence within these clusters and while there is evidence to support conversations between firms within the specific industry there is the role that universities play within these clusters:

> "employees and managers of firms near to universities (where leading-edge research is carried out), as well as close to a number of other innovative firms, will be the first to be acquainted with the results of important discoveries, or to obtain the accessory knowledge that is necessary to exploit those discoveries commercially, thus gaining an innovative edge over distant rivals" (Breshi and Lissoni, 2001, pg. 979-980).

While this does provide insight into the diffusion of ideas, there is a small matter in the definitive understanding of how the knowledge travels. While Breshi and Lissoni (2001) explain that "knowledge generated within innovative firms and/or universities is somehow transmitted to other firms" (pg. 980), the keyword is: somehow. This slight snag in understanding this key benefit of clustering has been dodged to an extent in the literature, however, some basic extrapolations can be made specifically for the video game industry.

First, is the ability to reverse engineer innovative products from competing firms. This is not a new method, but it is one method through which new consumer items can be dissected and understood by competing firms. In this method the innovation or knowledge is not a transmission due to geographic clustering, but a method of diffusion within an industry.

Second is the monitoring of consumer reactions to products via sales, or in the case of the video game industry reviews and community interests. The video game industry is positioned in a remarkably interesting situation when it comes to marketing and engaging the public. This is tied to both pre-release and post-production. When it comes to pre-release, a trend that has now become a staple in large-scale multiple player online games is the beta testing. It is at this phase in production when a game is operational but not perfect, and the developers allow a limited number of people to test the game. By doing this, developers can receive live feedback of the audience's inputs and thoughts on the game, as well as identify any issues or bugs within the game that need to be addressed. This can be viewed as free labour or immaterial labour (Dyer-Witheford and de Peuter, 2009). What is often overlooked is who is asked to come test video games in closed (private) or open (public) betas. While other developers from various companies would participate in a beta, it is also important to point out social media persons are actively sought out to test play the new games. This is because the video game industry is uniquely

geared towards social media promotion, through means of game trailers and gameplay videos on platforms such as YouTube.

What does this mean? The diffusion of knowledge or the diffusion of product knowledge is a guarantee in the video game industry. At a certain point, this seems like a redundancy as this happens with all products; however, the striking contrast is that this diffusion in the video game industry is done before the final product is released to the general public. By doing this, video game studios are able to create buzz and excitement for their game and showcase the many new innovations. Simultaneously, this information is widely available to the public by means of social media platforms. While this is an important part of advertising, it is also a way to reveal new innovations within the video game industry to firms, not only in a local cluster but on an international level as well.

When it comes to more traditional industries like manufacturing, the elements laid out by Marshall (1920) and other previous theories surrounding location theory, will ring true for the most part. However, with new industries such as the video game industry, that require only a computer to complete all elements of production and distribution, it can be put into place the dimensions/parameters to which agglomeration can compared to. In this dissertation, the physical boundaries for agglomeration is clustering of similar industries within a 30-kilometer radius from a specified point or firm. Why use this very specific numeric? It is heavily deduced in the simple logic of urban hierarchy. As every nation has a designated trade city or major city, it is prudent to work within the dimensions of the largest city within the nation of study, in this instance Canada. With Toronto being the largest city in Canada by area, this lays in the dimensions needed. The simple question of how long does it take to get from one end of the city to the other? Or what is the distance from one end to the other? As often transportation and time

are of the essence, leaving the city proper boundaries works against firms in that there is then the need to begin working out of the locale. This results in accessing different municipality labour pools and resources, plus adhering to different business and social networks that can be foreign to the firm. With time and transportation cost being every important in the workings of the 21st century industries, it is a priority to keep costs low when it comes to these factors.

This defining of agglomeration is all based on the previous concepts outlaid in the above sections. It is here that the dissertation has given an explicit numeric to work with, as this forces analysis to focus only micro level agglomeration rather than regional. This still boils down to the question that this dissertation seeks to answer: when it comes to the video game industry, why cluster?

In attempting to understand the driving forces of agglomeration, the recent literature can be consulted specifically referring to the external forces of specialization, competition, and diversity. De Groot et al., (2016) performed a meta analysis on the literature surrounding these external forces in order to create a census on the general trends of their influence on urban growth, and by extension agglomeration. From the work of de Groot et al., (2016) there are two main points that can be taken away; first, is that there are "…strong indications for sectoral, temporal and spatial heterogeneity of the effects of specialization, competition and diversity on regional growth…" (pg. 776). De Groot et al., (2016) then point out that this finding expresses "the need for research focusing on the dependency of the strength of agglomeration forces on the stage of development of region, but also of sectors" (pg. 776). On that note the research posed in this dissertation is aligned with this gap and will be attempting to isolate some agglomeration factors which are most desirable for the video game sector in Canada. Returning to de Groot et al., (2016) the second conclusion they have brought about is that "…the level of regional

aggregation matters for the strength with which the agglomeration forces are operational…" (pg. 776). Making it more prudent to ensure analysis are conducted on the correct level. Additionally, this can be reinforced with Conttineau et al., (2019), with their work on utilizing urban clusters to ensure that proper scaling is set when analyzing agglomeration.

This allows for a bridge into the literature surrounding creative industries and how agglomeration interacts with in, specifically, as more of the recent literature is attempting to understand why these creative industries are clustering. This is important for this dissertation as the video game industry falls under the category of creative industries, and the recent literature does provide some insight on their clustering trends. While there is literature on whether or not creative industries cluster, one of the earliest papers by Scott (1997) laid down the foundational framework and understanding of these clustering trends. Scott (1997) breaks down the reasoning for the clustering into two basic reasons: production and distribution. On the production side, elements such as dense networking that results from multifaceted industrial complex which are built upon a local labour pool with a wide variety of skills (Scott, 1997; Tao et al., 2019). For distribution purposes, it is the supportive firms, such as financial, that help creative firms with promotion and movement of their products (Scott, 1997; Tao et al., 2019). There have been case studies to showcase these trends, specifically with migrant patters of composers and artists. This work was done analyzing the 1800's with various artists moving into different locations and over time creating a creative cluster due to this historic migration (O'haen and Hellmanzik, 2008; Hellmanzik, 2010; O'Hagan and Borowiecki, 2010; Michell, 2016). These being more classical form of creative industries, what about a more contemporary creative industry like the video game industry?

In terms of analyzing the video game industry through agglomeration there has been studies done on varying countries. Darchen (2015) examined the Australian video game industry, where the industry will cluster to share information and labour. Yet, at the same time, Darchen (2015) also pointed out that the new telecommunication technology allows developers on the periphery of the country to still interact with the main agglomeration. Zabel et al. (2019) turn their sights to the German video game industry in terms of its agglomeration trends. To which they point out five factors, or constructs, that influence the clustering for video game studios: human resources, networking, media, public funding/infrastructure, and personal lifestyle (Zabel et al., 2019).

These two quick examples are resonating with the early works of Scott (1997), where production and distribution are the main influencing factors to clusters. The case studies shown are on the national or regional level, yet agglomeration can be examined on a local level as well. This allows a transition to a more microeconomic perspective. Which is highlighted by Jang et al. (2017), who focus on product innovation and of the importance agglomeration on that process, specifically, in the mobile gaming industry in Seoul. Jang et al. (2019). Their findings are intriguing as they point to sub clusters that occur within agglomeration that are of similar firms (Jang et al. 2019). Reinforcing the overall findings of agglomeration trends of similar sectors activity clustering tightly together (Jung et al. 2017; Autant-Bernard, 2001). Furthermore Jung et al., (2017) offer additional insight into this clustering tend as "…firms specializing in similar aspects of product innovation agglomerate geographically within a single cluster, possibly because sub-clustered firms perform more efficiently by capitalizing on knowledge spillover associated with new product development…" (pg.149). Again, showing that scaling is important, and that the reasoning behind clustering still remain consistent with Scott's (1997)

work. Jung et al. (2019) do point out that these effects are not evenly distributed among all firms, or districts, within a city. The impact from this is that new firms will gravitate towards the more fruitful areas that are competitively better. From this sample of articles there is already an understanding of the external forces of agglomeration. One of the originally papers, Scott (1997) that examined these forces, still holds true with of the recent research. That the biggest influence on agglomeration is with production and distribution factors (Fang and Yu, 2017; Gauberet, 2018; Gong and Hassink, 2017; Jang et al., 2017; Kerr et al., 2017).

The follow up question is then do Canadian creative clusters do this as well? There has been some work that seeks to answer this question, and some cities do stand out more than others in these analyses. Montreal being one of these cities, as it has become a leading location in terms of video games. This is due to multiple indicators such as numerous jobs and studios, with a large support gaming community (Cohendet et al., 2020). While there as been much literature in terms of analyzing the success of creative clusters in terms of their geographic locations in regards to co-locating or distinctive features (Scott, 2000; Grabher, 2001; Balland, De Vaan, and Boschma, 2013), or various other forms to which organized proximities can take (Torre and Rallet, 2005; Malmbery and Maskell, 2006; Malecki, 2010). Various authors have attempted to look beyond the aforementioned elements, and Montreal is one of the ideal case studies as it can not accredit all its success to simple location (Cohendent et al., 2020). Cohendent et al., (2020) point to the slow development of business ecosystem through the initial establishment of an anchor firm, in this instance it was Ubisoft Montreal. From that initial point Cohendent et al. (2020) explain:

> "Progressively, the initial impulse from the anchor firm, in combination with the mimetic behaviours of similar business ecosystems of other video game companies, the support of public initiatives as well as the growing involvement of diverse communities, led to the

> development of a ‘middleground’ representing a common local platform supporting mutual interactions and knowledge creation and sharing between these actors. This middleground, in turn, served as the major interconnector of the different business ecosystems and, ultimately, it supported the development of a large and complex ecosystem of innovation” (Cohendent et al. 2020, pg. 20)

This work helps to identify the important factors of location leaders and a supportive community to lift the industry. There is also the additional consideration of cross-fertilization of the film industry to help provide a solid foundation for the industry to grow (Pilon and Tremblay, 2013; Darchen and Tremblay, 2014; Gong and Hassink, 2017). It is these factors of cross-fertilization, location leaders, and community support, that have stood out in the literature when it comes to the Canadian video game industry. The works of Pottie-Sherman and Lynch (2019) point out a similar story on the east coast of Canada with Electronic Arts having a branch out in Prince Edward Island. On the opposite side of Canada, in Vancouver, the research does reflect the same factors that occurred in Montreal being the greatest influence (Siemiatycki et al., 2015)

2.3 Spatial Interaction

When digging into the geography discipline, there are numerous tools, models, theories, and paradigms to access and utilize for their various purposes. In this research there is a mix-method approach. The key quantitative element in this mixed methods approach is the examination of spatial interaction. In this section, the term spatial interaction and its relationship to the agglomeration literature are defined.

Spatial interaction has long been one of the more recognized applications of geographic analysis. This is, in part, due to its historical first application with Dr. John Snow and his study of a cholera outbreak in London England during the mid-1800’s. Quickly summarizing what occurred: Dr. John Snow, using a map of the London area began marking where cholera outbreaks developed and, over time, began to note clusters that were marked on the map. He was

then able to locate the source of the outbreaks due to the high concentration of clusters on his map, which then led him to a local well that was contaminated (Paneth et al., 1998). This can be seen as one of the more iconic instances of the application of spatial interaction.

In general, the interest and utilization of spatial interaction are in understanding the relationship between the origin and the destination point or points, plus the flow between them (Le Sage et al., 2007). Most often when this approach is used, there is a pairing of origin and destination points to the analysis. There are three ways in which these are observed. The first is the actual distance between the origin point and destination point, and how that distance helps or hinders interaction between the two. The second focuses on the origin point and its ability to generate flow outward. The third and final is the destination point's capability to be attractive. Traditionally, spatial interaction can be viewed as a formula in general, and below is an example of such an instance: $T_{ij} = C\ A(i)\ \ B(j)\ \ S(d_{ij})$

This can be explained moving left to right. T_{ij} is the mean interaction probability from point *I* and *j*, where *C* is the constant variable/term to which the analysis is focused on. This makes *A(i)* and *B(j)* origin and destination point respectively, with their weighted functions being attraction factors. Followed by *S*, the distance deterrence function which summarizes all effects of space on the interaction, and (d_{ij}) is the spatial separation from the origin and destination points. Now, in broad strokes, spatial interaction as a concept with its various models, has undergone various philosophical undertakings over the course of the past century and a half. For more of a detailed dive into such topics, one could turn to the works of Fotheringham et al. (2000) as a gentle introduction. However, they conclude the following when looking at the development of spatial interaction models over history:

> "we have witnessed the progression of models whose only justification was an empirical regularity and an analogy to gravitational attraction; to models derived from either non-behavioural or a spatial theories imported from other disciplines; and finally to models based on principles of spatial information processing, sub-optimality, hierarchical decision making and spatial cognition. Current research lies in consolidating and improving this latest framework" (pg. 234)

The history of spatial interaction and its models has been long intertwined with the quantitative revolution of geography during the late 20th century, resulting in the numerous models available today. In this research's pursuit of understanding the Canadian video game industry, there are a few elements that can be touched upon. The actual methodological approach, when it comes to utilizing GIS technology, is in the following section.

The first is retail location model, and this is brought to mention that while it is a useful model when looking into physical products, and its tie in with central place theory, It is not quite applicable to a high-tech 21st century industry, mainly the video game industry, and why this is so must be explored. The central place theory was mentioned, in passing, during the previous section with Christaller and by extension Lösch, but to briefly reiterate its key purpose is the establishment of a hierarchy around goods and services. The link to retail location model is the focus of consumer's desires, mainly the ability a firm's location to attract consumer within their given range:

> "Customers travel to stores and therefore the spatial interaction of the purchasers must be recognized as an important behavioral factor. The retail and trade area service location problem require knowledge of what customers want, where they are located, and that they have income that covers the price and market segment of the goods" (Fotheringham and Rogerson, pg. 419)

Returning to the spatial interaction model, consumer demand is an element that can be drafted into a formula; however, this is where there are some logical issues when working with the video game industry and the focus of this dissertation. First is the concern of this research

being on the studios establishing themselves within Canada, and not consumer behaviour. Second is in the last half decade, there has been a general increase in the digitalization of video games, meaning there is less of a physical product to attract consumers. Instead, this digital product now is easily accessible to the intended audience via internet download. Therefore thirdly, the only way that this type of theory would apply is analyzing firms that sell the physical copies games and consoles such as EB Games and GameStop which again, is not the focus of this dissertation but is still important to acknowledge this element.

2.4 Notes on Theories

Transportation can be seen as the connecting thread that has been consistent throughout the majority of location theory, as this was the only viable factor that had quantifiable grounds to build upon during the early years of the literature. Again, this is more due to the decades when this discipline came about. Regardless, it was that frame of mind that remained and reinforced the producer-heavy viewpoint that guided the literature for its adolescent years. The firm, as a singularity, had great power in terms of presence to the point wherever it was established, consumers in a given proximity would flock to only them. This basic perspective is somewhat archaic, but all theories and literature have rough beginnings in certain avenues. What was a great leap forward was the introduction of consumers, or the removal of the assumption of consumers being mindless drones.

This brought in an additional layer of complexity, as while one firm may have the ideal location in terms of access, it does not mean that they will have the desired traffic coming through their doors. With this is the changing the focus from that from a manufacturing heavy analysis to a more contemporary analysis is more suitable to modern day industries. The tie that binds this shift is technology, and the pronounced presence of clustering with non-manufacturing

industry to which the neoclassical literature is based upon. Technology itself will be an external driving force of change. Consider modes of transport: once, the train ruled supreme in regional delivery. Now, transport trucks have taken over due to the flexibility. The once small variety of rates now have surged to reflect the numerous trucking firms vying for competition. This bleeds into the literature surrounding clustering, mainly agglomeration.

Leaning on transportation and at times, labour wages, can be seen as a hindrance when it comes to 21st century industry including high tech and virtual industry such as the video game industry. One of the objectives of this thesis is the application of neoclassical literature in the modern world, and one of the noted short comings is the lack of focus or importance placed on non-market forces. This is in addition to the paradigms given are that solely placed on finding a location and not that of growing the firm beyond the initial stages. In an ever-technologically embedded world, where distance is shrinking and mobility is quickly becoming prominent, where does location theory rooted in 19th and 20th century manufacturing fit in this era? Its foundational knowledge is extremely important in understanding historical concentrations of firms that have led to current geographical areas being specialize. Therefore, this does provide the avenue to which the switch into agglomeration literature allowed for an understanding of continued growth of these areas in general.

Agglomeration, while bouncing off of its origins in location theory, is more prepared to look into how a firm can flourish within a geographically concentrated cluster of industries. As it tends to lean into networking and examining connections with the various actors within the cluster, at times this promotes the aspects that are not as prevalent with the neoclassical theories. These being the more social and unquantifiable factors that are embedded in being a part of a network. This is reason enough to bring up network theory as at a glance, it does underpin

agglomeration to an extent, and this is based on closer proximity. The larger contribution of dipping into network theory, with regard to this dissertation, is the additional understanding and process of developing a network. This is important, as this is the missing piece from neoclassical location theory to be applicable in the 21st century.

The crux here is the question: what causes the occurrence of networks? From a neoclassical and agglomeration standpoint, the answer would be restrictive to that of pure business interactions, this being most contracted and agreed upon business cooperation. While this is all good and conducive for economic boons, this can circle back to the question "If 21st century business can be done seamlessly across the globe, why cluster?" From a basic standpoint, there is a pseudo answer developed from with an understanding location theory and agglomeration literature, as explained in the previous chapter. Yet there is still a lack of material addressing the social elements that are more prevalent in the current decade.

In brief, when it comes to networking, one of the notable occurrences, is that similarities draw firms together into a network and this should not be surprising. This resonates greatly with agglomeration and geography in general when it comes to industrial districts. What networking brings is the aspect of transitivity. This refers to the linkage of firms, specifically the bonding of two firms to each other when they both had a separate firm in common. This can also be referred to as a triadic closure (Balland et al 2013). In essences, it is the concept of knowing someone that someone else knows and forming a network from that fact. Can this be applied to the video game industry? It is quite possible as there are various traits that can be perceived within certain clusters, and there are supportive firms and services present for video game studios. The data collection and analysis done within this dissertation will also address this question. There is also the additional consideration that network theory holds, of a pillar or a single firm causing a

powerful pull factor (Cassiman and Veugelers, 2002). This parallels the leader location concept, where certain industries will wait to see what a key firm will do next or have a very central firm be the focal point of a cluster.

Drawing similarities between location theory, agglomeration, and network and allowing the conversations between the theories and questions such as: Why locate at spot *x*? The response could then be because of firm *y* being located at point *x* because of *z*. The main observation here thus far, is that neoclassical location theory is ideal for describing and understanding why to establish at a given location. However, does it go beyond the finding of the location? Is it at this junction, once a firm is established, that networking and social elements can overcome the importance of location in terms of growth within the video game industry?

3 Methods

This research uses a mixed method approach. The two methods are GIS-based analysis and interviews, are discussed in greater detail in the following subsection. In general, the quantitative elements consist of GIS techniques to display the dispersion of the Canadian video game industry across Canada. There is additional quantitative analysis on the clustering in Canada's major trade cities: Vancouver, Toronto, and Montreal. These areas happen to coincide with the major concentrations of the overall Canadian economy therefore, these are ideal candidates for investigation. Semi-structured interviews are utilized for the qualitative aspects of the thesis. The aim is to have interviewees participate in a conversation surrounding the video game industry along the themes of the governance of the industry, the individual's and their company's role, the future of the industry, as well as the decision-making process of the location of the firm.

3.1 GIS Processes

The purpose of the quantitative methods detailed in this section is to provide empirical evidence that the Canadian video game industry clusters within certain areas. The Entertainment Software Association of Canada has done basic level studies on where the industry congregates (ESAC, 2014) in the provinces of British Columbia, Ontario, and Quebec, specifically in the three major trade cities and provincial capitals: Vancouver, Toronto, and Montreal. For this research, the Association has agreed to provide their most recent findings from their last nation-wide data collection completed in 2015. This data provides this research with approximately 380 firms, which translates into 380 data points. While there are roughly 472 active studios in Canada at the time of writing this dissertation, the given 380 gives this study 80% of the complete population which is a sufficient sample size. The remaining 92 firms are a compilation of additional middleware, visual, audio, and support firms in accompaniment to other smaller game development studios.

This portion of the research consists of separate maps with calculations providing supplemental data through GIS processes resulting in a coherent map displaying the dispersion patterns of the Canadian video game industry. To begin, the establishment of a base map for this study is created. This first map is a deliverable promised to the Association in compensation for their cooperation in providing the baseline data. This map is a simple point data map, showing the positioning of the 380 points across Canada. This allows the casual identification of points that do not follow the generalized grouping within the three major trade cities. Also, to note, the point data will be geocoded to the rooftops of the street addresses of the video game studios. This was done using the X and Y coordinates taken from the postal codes that corresponded with the studio's public information.

It is in the second set of maps where the three cities become the focus, as within this set these cities undergo first order analysis with the provided data. The database will be sub-divided by studios in the respective cities of Montreal, Toronto, and Vancouver. The method used at this stage is the kernel density process which is underlined by the concept that a given pattern "has a density at any location in the study region-not just at locations where there is an event" (O'Sullivan and Unwin, 2010, pg.68). The purpose of this mapping technique is a first order analysis directed towards the intensity of points in a given area, with the density of points is calculated "by counting the number of events in a region, or kernel, centered at the location where the estimate is to be made" (O'Sullivan and Unwin, 2010, pg.68). The analysis is ideal due the nature of the current research in that there is a discernable pattern in the dispersion of the video game industry in Canada. However, there is an unknown to the true density of the industry within the given regions . Furthermore, the resulting map highlights any notable outliers that fall outside of the perceived clustering within the cities.

The overall process of the kernel density analysis is akin to a heat map; whereas a heat map has areas of high temperatures becoming the focal point and highlight an area, this principle is applied to a kernel density. The concern for a kernel density analysis is the intensity of points referred to as the density in the study area. The similarity with a heat map is the final product of the process which results in a map of the study area highlighted in specific colours to indicated concentrations of the factor in question. The sector of the study region that has the highest density of points becomes highlighted with the colour scheme. For example, this region could be represented with the colour red which is then surrounded by a colour denoting low density, for instance, blue. However, it is important to point out there are challenges faced with using kernel density analysis, primarily the bandwidth or search radius. If the value for this radius is too high

or low, the results are skewed showing either extreme concentrations or the opposite. To overcome this, the Mean Integrated Squared Error method is used as this is "a measure of discrepancy between the kernel probability density estimate and the true probability density estimate" (Fotheringham et al., 2000, pg.148). As well the datasets for each of the three maps will be greatly reduced in regard to the bandwidth, being as only the data points that will be used are the ones that fall into the cities of Vancouver, Toronto, and Montreal. Therefore, the radius can be reduced to show true clustering in conjunction with the standard deviational ellipse.

The third set is the nearest-neighbour process, which is used to further solidify the findings and confirm clustering. The result is a significance test that indicates whether or not the data points are clustering, random, or dispersed. In this instance, it is the second order intensity analysis that is used, as nearest-neighbour analysis has two different approaches. The first is event-event distance, which measures the distance between points. A random point is chosen and the distance from that point to next closest point is measured (Bailey and Gatrell, 1996). The second approach is point-event distance. This is similar to event-event distance. In this instance a random point is created, and all points are measured in distance from the newly created point. In this dissertation, the event-event is utilized, and the results are then compared to complete spatial randomness. In short, this method is done by comparing the distance from point to point, and the closer the points are to each other the more it is likely the cluster is occurring. This finalizes the quantitative research of this project, and as well confirm or deny if there is clustering within the major trade cities. Similar to the previous analysis, the separated databases for Vancouver, Toronto, and Montreal are used.

This will then be followed by a standard deviation ellipse. This is done for the major clustering areas. This method is used on the premise of interpreting some basic spatial interaction

functions as well as using the method for its intended purpose since one of its first reiterations this being: “delimiting the area of occurrence in a manner in the data itself and is not arbitrary” (Lefever,1926, pg.94). The standard deviation ellipse is informative in this study in seeing if there is some orientation within clusters, as well as providing some visual insight into if these cluster or centering along a certain district within a city. Standard deviational ellipse was devised by Lefever, and as Yuill explains:

> “Lefever’s original definition of the standard deviational ellipse was relatively simple…first determine the mean areal center of the point set of axes for the distribution. The standard deviational statistic (σ) was then calculated orthogonal to each axis…and plotted as a vector originating at the mean areal center, the scalar length being equal to the value of σ…The axes were then rotated about the mean with the standard deviation being calculated for each new position of the axes” (Yuill, 1971, pg. 28).

While simple in design and performance, it did receive some criticism specifically by Furfey (1927). He explains that there is some questionability to the overall shape when these vectors are calculated with data points that are in a more linear dispersion (Furfey, 1927). In the end, Furfey (1927) saw that the standard formula for the ellipse was not an ideal visual showcase of spatial distribution. Over time this equation would be reworked and become more functional in terms of the robustness. To view such advancements, it is advised to consult the work of Yuill (1971), as he offers insight on the updated versions of Lefever’s (1926) original work and the works of Gong (2002).

Before moving on, it is important to point out one of the insights offered by Yuill (1971), and that is the actual shape of an ellipse and what it offers. This can be broken down into the following utilities: the visual representation of area data, displaying average location plus dispersion, and then being able to show the orientation of the data set (Yuill 1971). Aside from the display of the data and the direction of the dispersion, the orientation is a unique factor of the standard deviation ellipse. When this is calculated for the region, all points must be accounted

for within the given study area. If this is not done, the ellipse will provide little insight due to its accuracy in the shape and orientation that it develops. When it comes to the dataset for this dissertation the data is complete to the year of 2015, making the accuracy and certainty of the final product very accurate for the modern video game industry. This is especially so because the industry here in Canada has already gone through the early stages of development and is now more solidified since the larger firms have established themselves years before the data set ends. The intention of applying the standard deviation ellipse is to determine the orientation of the clusters in Montreal, Vancouver, and Toronto. A point of fascination is to determine if there is a given district or even collection of streets where the video game industry can be seen clustering in the given cities, as well as to confirm the resulting distribution created from the kernel density map.

Lastly, there will be a Poisson regression analysis. This will be utilized to test the hypothesis of whether or not there is an actual correlation between city size, using population as a surrogate factor, and the number video game studios in a city. In other words, if the city is larger in terms of population, will there be more video game studios in the city. The Poisson analysis is ideal as data set will be truncated, and there will be no negatives, along with the destruction being discreet.

3.2 Semi-Structured Interviews

There are four reasons why interviews are utilized for research purposes: to fill a knowledge gap, to investigate complex behaviours/motivations, to collect a wide range of experiences, and finally, to employ a method that acknowledges and respects the individuals being interviewed (Dunn, 2010). Following these ideals, the justification for the interview process in this research is the need to fill a knowledge gap. As mentioned earlier, there is little in

the geographic literature about the video game industry. The consultation of individuals in varying roles is optimal to create foundational knowledge, as well as information needed for this research.

There are various styles of interviewing. The approach for this research utilizes elements from both structured and semi-structured styles. Structured interviews are noted for their strict guidance and rigorous proceedings. This is useful for a formal approach and there is a time limitation in place, as well as discussion specific questions that need to be directly addressed. While there are benefits, the shortcoming to this approach is limited flexibility. This can cause gaps in knowledge due to missed opportunities in pursuit of topics that are not within the confines of the interview guide. In addition, van der Zee et al. (2002) point out that the structured interview process does not allow for much autonomy due to the rigor. There is a lack of attention to the interviewee's needs or concerns being addressed as well. Van der Zee et al. (2002) also note that the structured interview may emit a cold and calculating situation, and may alter the results in adverse ways especially when it is observed that interviewees "are more favourably disposed to interviewers who are attentive, warm, and socially perceptive" (van der Zee et al., 2002). Despite these drawbacks, the advantages are significant when it comes to rapidly collecting specific information in a short period of time.

Turning to semi-structured interview there are parallels that are drawn from structured interviews such as the interviewer adherence to a guide. However, there is the presence of flexibility that is notably absent in structured interviews. Allowing the freedom to move away from the guide (Cohen and Crabtree, 2006), the topic at hand can be covered in greater depth both in terms of information and perspectives. The openness and fluidity provided by unstructured interviews creates a situation where the communication is set as a conversation

where both parties are equal participants. This allows room to create spur of the moment questions and can allow the interview process to deviate from the topic based on the desires of the participants (Keller and Conradin, 2010). The outlined interview questions can be viewed in Appendix A.

The questions are positioned to draw out critical information about the firm to better understand why the location was chosen. The first set of questions are for documentation of who is being interviewed and their position within the firm. As for the firm itself, the questionnaire is interested in the firm's history, specialization, and role it plays within the industry. This is all baseline data that can be referred to later on when examining agglomeration trends. For the majority of the questions, they are posed to be very narrow as the purpose is pulling out specific information from the individual. For example: Is this (the firm in question) the headquarters or branch? Others allude to the movement of the firm (if it has moved), and why the given location was in Canada.

At this point, the interest of the questionnaire shifts to the overall Canadian video game industry. From its influence or impact on individual firms, as well as the individual's opinion on Canada in terms of its ability to aid firms in the video game industry and attract investors/other firms. Additional questions posed to the interviewee revolve around the betterment of the Canadian industry, and what criteria or comparative is/should be used to measure the growth of the industry. It is these questions that are open ended and allowed for in depth responses.

For the interview process, interviewees are selected by their position within the firm. It is ideal to select individuals in decision making roles and upper management. The firms that were approached is also important, as it would be most fruitful to select a mix of firm sizes. For example, the small-scale firm with only 10 employees may offer a different perspective than a

larger firm with 100 employees. Furthermore, this would also reflect the focus of the firm; small firms often develop mobile apps and games, while large firms like Ubisoft Montreal create larger multi-million-dollar games such as their own franchise *Assassin's Creed*.

To compile the interviews, they are recorded via an audio recorder, allowing for a complete account of the interview when compared to note taking over the roughly one-hour interview process. This enables the interviewer to be attentive and actively engage the interviewee without distraction.

The approach when coding the transcribed interviews is to pull out key themes around four different topics, which were integrated into the questions for the interviews. First, is the image of the Canadian video game industry, this is in term of who the biggest players are, along side what the international image of Canada is. Second, government presence, in reference to funding and other financial boons that can be accesses by studios. Third, understanding the reasoning behind choosing the studios' location, in terms of either local or national levels. Fourthly, the general discussion on the strengths and shortcomings of the Canadian video game industry. With these overarching themes/categories, the information gained from the interviews can then be organized under them; and then further dissected from commonalities within each grouping.

4 Results

4.1 Quantitative: Maps and a few things to note about the maps

In this section, there are three sets of maps: the first is a time lapse of the growth of the video game industry over three decades, looking at each decade. Second is the hot spot/heat maps showing areas of clusters, and finally, the spatial deviation ellipse map which reconfirms

the heat map analysis. In addition to the maps, a nearest-neighbour analysis was done in the areas of highest concentrations to further confirm clustering of the studios.

To start the analysis, the national level time lapse maps will be viewed. What can be observed first is that the video game industry in its early decades does reside primarily within Vancouver, Toronto, and Montreal. This should not come as a surprise, as this dissertation surmised early on that this would be the case during the beginning stages of growth for the video game industry here in Canada. While the period of 1980-1999 is not entirely noted as the origin of the Canadian video game industry, it can more or less be viewed as a build up with the laying of a foundation. There was not much presence of the Canadian video game industry on the international stage, until 1990 when Electronic Arts came to Canada. Yet, once their presence began, there is the noted concentration of the major trade cities as often the video game studios would flock to cities like Vancouver, Toronto, and Montreal.

During the next decade, 2000-2009, there is a dispersion that agrees with industrial theory (Henderson and Ono 2008; Davis and Henderson, 2008), where there is growth of smaller concentrations of the industry outside the typical hubs within a nation. In Canada, there is the slow growth of a cluster out on the East Coast beginning in the late 1990's, with continued expansion and concentration leading into the 2000's. Here was a point where the establishment of the dominance of Nova Scotia as a satellite cluster due to the multiple studios that have set up shop in Halifax. These are mostly mobile games, small independent studios, and virtual reality firms. It is during the period of 2000-2010, where there was the most expansion across Canada, especially outside of the original clusters which became reinforced from 2010 to present.

Turning the attention to the hot spot maps, noted in Appendix B, these highlight the largest concentrations of the video game industry in Canada in Vancouver, Toronto, and

Montreal. For these maps, the greater areas of each city were taken into consideration for a full examination of the dispersion of studios, allowing identification of the high concentrations via heat maps. While all three exhibited a specific area of increased clustering within their given major city boundaries, each city had a unique aspect to their final heat map.

Moving West to East, Vancouver was mapped at an enlarged area due to the proximity of Vancouver Island because of some studios located there. Being there are only a few, Vancouver Island was not included in the Greater Vancouver area heatmap as it distorted the result. The heart of Vancouver obviously held the majority of the firms. Furthermore, as predicted, the downtown Toronto area was where the concentration occurred. What is peculiar about this is that the firms that are in this tight cluster form a diagonal line in the downtown core area along main roads such as Queen and Bloor street. These are also in close proximity to the entertainment district and Chinatown. Finally, Montreal's cluster was focused in the downtown area as well. These clusters are further solidified through the standard deviational ellipse maps noted in Appendix C, which highlight the true clusters of the areas.

These trends of clustering in the downtown is not surprising, as the video game industry is very much a young person's industry. Many of the studios will utilize the downtown core as a marketing pull to attract young professionals, hoping the excitement and unique lifestyle will be enticing for incoming applicants. This is not an unfamiliar tactic when it comes to drawing in employment, though it is more relevant due to the perceived younger workforce as excitement can be used to pull in this labour demographic.

4.2 Nearest Neighbour Analysis

Table 2 Nearest Neighbour Analysis Summary

Measurement	Vancouver	Toronto	Montreal
Mean Expected Nearest Neighbour Distance (m)	1251.915757	2449.158424	1037.244585
Mean Observed Nearest Neighbour Distance (m)	889.621592	2486.109337	668.104637
Nearest Neighbour Ratio	0.710608	1.015.087	0.644115
Z Score	-4.565324	0.168298	-5.655426
P Score	0.00005	0.866349	0.000000

To further confirm the presence of clustering in Vancouver, Toronto, and Montreal, the straightforward calculations of the nearest neighbour was completed. ArcGIS was applied, and the most important numeric values are the expected and observed mean distance, the Z and P scores, and finally the nearest-neighbour ratio. These measurements complement each other and solidify the finding of whether the given points within the study area are clustered, random, or dispersed. For context in understanding Table 2, the expected and observed mean distance has the final calculated value working on a scale of less than or greater than one, in other terms, the nearest-neighbour ratio. If the index is greater than one, the observed mean distance points to a dispersion pattern; however, if it is less than one this means the opposite and there is in fact clustering.

With these guidelines in place, it can be seen in Table 2 that all of the observed mean distances measured in meters, are less than one kilometer for two of the three cities. Therefore,

there is clustering of video game studios within Vancouver and Montreal. Toronto on the other hand does have more of a random pattern being neither cluster nor uniform.

To explain the difference with Toronto's point pattern, the following must be considered. First, the geographic area of Toronto has a larger urban sprawl than the other two cities. Second, Toronto is a hub for independent developers, meaning that these smaller studios often use the lead developers home address as a headquarters. By doing so, the results for the nearest-neighbour analysis lean towards a more dispersed pattern, as smaller studio headquarters may be located in more residential sectors of a city.

4.3 Poisson Regression Analysis

During the quantitative analysis, there was the need to test correlation of large urban centers and video game studios. The hypothesis being that large urban centers of high populations attract more studios than areas of low population. In this analysis the Canadian census metropolitan areas were used as defining areas of the aforementioned high population. The data of the metropolitan areas and their population was collected from Statistics Canada, with the most recent data available being from 2016. The listing of video game studios this study has been using was then combined with the Statistics Canada data. Where the number of studios in a given metropolitan area were counted, with these factors a Poisson regression was created to compare population to the number of studios in the metropolitan area.

The Poisson regression is unique as the dependent variable follows the Poisson distribution. The defining features are the knowledge of the occurrence of events as well as the understanding that these events do not change through time, or the rate at which these occur do not change (Rogerson, 2010). Therefore, Poisson regression is appropriate when the dependent

variable (y) is count data. In this instance it is the number of studios in the metropolitan areas. The resulting scatter plot can be noted in Figure 4.

The graph displays three notable outliers, where are more than 20 studios in separate metropolitan areas being Vancouver, Montreal, and Toronto. When the Poisson regression was

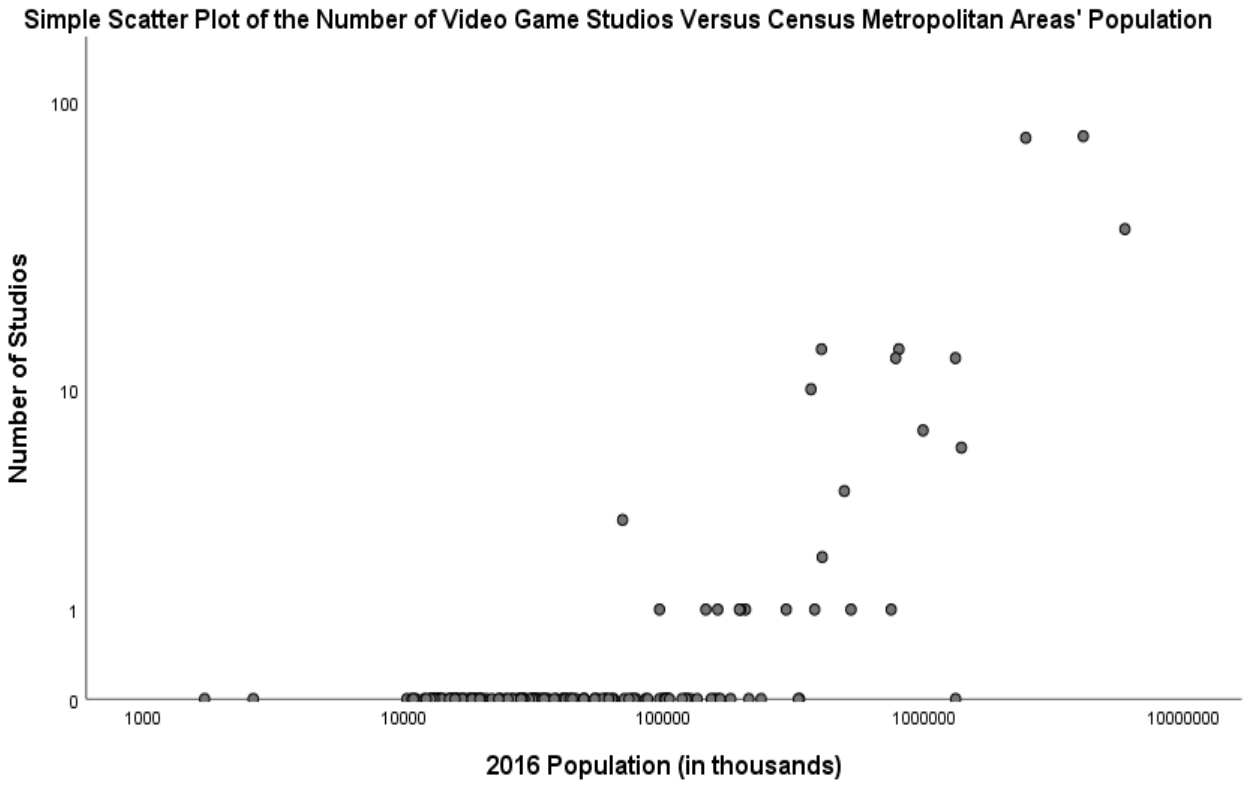


Figure 3 Scatter plot comparing number of studios versus metropolitan population

performed, the resulting Omnibus test indicted a *p*-value of .000 showing a statistically significant model. This is designed as a ratio test of whether or not the independent variables improve over the intercept-only model where there is no independent variable, translating to there is great influence that population holds. This is reinforced as the Beta coefficient is positive: as the population increases so does the number of studios, noted in the coefficient *p* value being 8.249E -7. In short, when using the Poisson Regression Analysis, it can be noted that there is some relationship between increase population and an increase number of studios.

4.4 Interviewee Results

While it is important to map and quantify this research, there is only so much that can be gleaned from mapping and statistics. While the analysis provides concrete infographic and statistical results showing the clustering that is present in the three major cities of Canada, it is prudent to dive deeper than the illustrations provided by the maps. This is done to achieve a deeper understanding of the industrial clusters through conversations with stakeholders within the video game industry, employees of video game studios.

For the most part, the interviewees that were contacted and responded were individuals within the upper management of the studio. In some cases, they were community operators/media coordinators whose specific role is to interact with consumers and the gaming community. Other times, the founders of game studios, or directors were able to sit down and share their knowledge and perspectives on not only their own studio, but the entire Canadian industry.

The following section focuses on the results collected from the interviews and extensive surveys that were conducted. Having been able to talk to close to 30 participates ranging from community directors, production directors, to founders of studios, the high-level individuals that were being sought out for conversation were found. This provides a rich conversation full of insights surrounding not only their studio and its history, but the overall Canadian industry. The participants brought in considerations concerning methods of analysis for future growth, as well as the unique structure present here in Canadian studio support.

In general, the interviews followed a predetermined path. The first section focused on the foundations of the studios: the reason why the studios have remained in Canada, how the interviewees began in the industry, and as well the working process the studios discussed in

when producing a game. In conjunction with this, the benefits of agglomeration were engaged with the topic of cooperation on a local level with other studios to see if the free flow of information between firms was a harmonious process. This was followed by a discussion of the unique nature of the video game industry here in Canada including the financial support that is offered. The final section turns attention to conversations focused on the future of the Canadian industry and its strengths and weaknesses. What can be done to bring in more investors or spur local development? How do we measure success in terms of the Canadian video game industry in the future decade? These questions were designed to help paint a picture of what Canada is and could be, most importantly surrounding ideas of measurement for studies and considerations when engaging this topic in the future.

It is important to gauge the perspectives the studios have on the historical settings of the Canadian video game industry. Responses were a little lack luster, but when it came to their own firm's history, participants were easily able to give a detailed origin story of the studio. When it came to the overall Canadian video game industry, the participants gave responses that are akin to muddy waters: "As far as I understand the Canadian industry started in Montreal, Toronto and Vancouver, but specifically Montreal with games from Ubisoft or Eidos. Probably sometime in the later 90s or mid 2000s" (Wil). However, what was consistent was the pointing out of Quebec and British Columbia as starting points:

> "…one of the few things I know that is in Quebec- that's one of the places where in Canada, we had the first few studios that started in the early 90's...and they were doing PC stuff and eventually jump on board making their own IP for the police station. Then the studio decided to move to Montreal, because the other schools did not teach video games, like the art of making video games at that time, and Montreal is a much bigger city, and it makes sense for them to move because they wanted to grow, and it was so hard to find qualified people that they figured they would have a chances [sic] to grow in Montreal. So, when they did that, they had a big impact for Quebec City because many people just did not want to move, and some where really into it they knew what they were

> doing, and that's how a couple of studios were found in Quebec City and it grew" (David)

David points out one of the humble origins of the video game industry in Canada and what is often seen in industry-based clusters. This is the trend of similar industries developing over time due to the knowledge and skills that are present within the cluster. Much of the industry here in Canada, based on various discussions with interviewees, comes from these types of humble origins. Where the would-be studios were developing programs and codes for other industries or firms that lacked the technical skills to create such things. At the same time, the more common image of the Canadian video game industry has its beginnings with the establishment of EA Canada in Vancouver, which helped launch the larger AAA studios in Canada. This picture is supported when various interviewees point out that the majority of the large influencers in terms of the Canadian video game industry remain these AAA video game studios that are foreign to Canada. This was pointed out again by David (2019) who not only mentioned a studio but certain key cities

> "Ubisoft is really big and influential, I would like the studio to be a Canadian but it's not, but I prefer to have Ubisoft here, the more players we have the healthier the industry is. So that's really big player, other than that in Montreal, and Montreal is so big, Montreal studio of Ubisoft is bigger than the entire industry in Quebec City, they hire more people they are over 2000" (David)

On that note there were several mentions of key players and cities that were consistently mentioned in the interviews:

> "EA Sports in Vancouver, Ubisoft in Montreal, and Bioware in Edmonton. Afterwards, Vancouver exploded with the tax credits, and a bunch of other studios started sprouting (with a lot of Ex-EA employees). Montreal also had a mini explosion, just from the success of Ubisoft Montreal. Toronto is starting to become a major player with Ubisoft Toronto having created a studio here due to the massive tax credits that they got" (Teddy)

Teddy from is one of the many that pointed to already present clusters within Canada and the strong firms that reside within such locations. While there has been a strong development

of such large-scale firms, over time there has been a steady increase of smaller independent video game studios. This increase in studios, both AAA and indie, has had an effect on the Canadian industry:

> "I think the release of big hits like Assassin's Creed were influential in expanding Canada's industry. I would say that today's indies are often Canadian, and a game of the year contender was Celeste, a Canadian indie game" (Wil)

The number of these small independent studio surpasses that of the AAA game studios (ESAC, 2018). This is more or less due to the creation and consistent advancement of such support as the Ontario Media Development Corporation. This organization is pointed out by Vanessa (as one of the influential presences in Ontario, which began to aid in video game studios' development roughly in 2012. What is important to note, and is again mentioned by Vanessa, is the organic nature of such support institutions as they have "been responding to changes in the industry, which is great as without continual improvements, it would be difficult to respond and adapt" (Vanessa). This is an important element, as there are often conversations surrounding the rapid fluidity of the video game industry. There is an understanding of how the overall growth of the video game industry has occurred and how that has trickled down and morphed the industry here in Canada. Mukul is one of the interviewees that expressed such an opinion, pointing to the constant changing environment surrounding console game production, and the relative ease of mobile game development. This has led to a rapidly changing industry and workforce, which has only been enhanced due to the effortlessness of such technology being shared. This is again echoed by Vanessa , "the major drawback is that as the market shifts so quickly, something that was relevant when the project was pitched may not be as relevant on release".

With this in mind, Canada as a collective has been able to respond with the development of multiple programs and organizations that aid in the funding of the video game studios here in Canada such as the aforementioned Ontario Media Development Corporation. However, upon speaking to the interviewees on the topic of government funding, there is a general consensus on the funding here in Canada, as expressed by David:

> "I just wanted to work in the video game industry. Without even knowing that Canada was a nice place to work in this industry or – I just happened to do it – and over time I realized damn we have some much support around here it's just so great. And yeah, I often talk about the support, but because there is the support there's family, there's an industry, there's people, there' school programs, there's people who have been doing it along time and give advice and are here to help"

On a provincial and even local level, interviewees point out the dynamics that give them reason to stay, in Canada:

> "We've had a lot of support from communities in Ontario making games, and it's been a quality that we really think has made a difference in the success of our company. The mentality of helping each other out is really important as the industry grows and matures" (Vanessa)

Moving outside of the traditional cluster, interviewees in Winnipeg point out Canada's vibrant culture is ever present across the map:

> "…it's a pretty good city culturally, like we have an amazing music scene, we have a renowned theatre, singing ballet, all the arts are really like a strong cultural influence here. And I think we let ourselves go here, and every scene is kinda smaller here, a smaller place, but we have a very active game developer community and a lot of surprisingly intellectual people here" (John and Rachel)

What many of the interviewees agreed on was the large benefit that being in Canada has: funding. Canada has uniquely presented and positioned itself to be a country that has developed a fruitful landscape in which video game studios can potentially grow very strong. As David continued, he pointed out that the funding landscape of Canada does vary from province to province. While the federal level funding is quite present and large, the true strength of the

Canadian funding opportunities comes from the provincial, and even municipal level, such as the Catapult competition in Quebec City:

> "They have 50,000 dollars as the prize and it's in the form of a contest, so only small companies apply to that, so if you make over 300,000 a year you are not eligible… So, half the points are they look at the game that you make, and the other half is like the business part of it. So, is it a good game? Is the team able to finish it, release it, and to make money off it? Then they give money to support, and it comes also with an office for a year that they pay for you and everything, so it's really great. It's not a crazy amount of money, but 50,000 really changes a lot of things, and because it's in the form of a contest…it gives a really big confirmation from the industry if you can win…" (David)

David continued to point out another very unique funding opportunity offered in Quebec City, where the local government incentivizes studios to update buildings and set up shop in a specific area:

> "…Quebec has older buildings and stuff. So, if you move - if you get inside a new office and decide to invest in the infrastructure of the building, to put better internet cables, better electricity, new chairs, and stuff like that. You can apply and they [Quebec City Municipality] pay like 15 percent, I think, of the bill to modernize everything if your office is like within this corner of the city. Where they want all the studios to be actually. It's an incentive to be in a specific area, which is what I think is the one magic thing about Quebec City. We are in one of the corners, and if we go to the other corner, it's a 10-minute walk, and I will cross about 12 different studios if I am walking there"

This strong support system is something that is again agreed on and may be in part due to the healthy economy that Canada currently has at this point in time:

> "Canada we're wealthy enough country we can actually throw resources at something and not worry if it goes to waste, and that's how the gaming industry works as well you got to go resources as well and maybe it will get wasted and maybe it won't get wasted. Because I think we are a nurturing environment like that" (Mukul)

> "Currently there is support and various levels for funding, for travel and marketing, concept development, production, etc., and in some cases, tax-relief agreements. The former helps smaller companies, and the latter helps larger ones" (Benjamin)

While there is this perceived fertile land of opportunity for start-up video game studios, there were some drawbacks that were pointed out by various interviewees. One of the first is the image of the Canadian video game industry:

> "Because publisher get more attention, there aren't any Canadian publishers, I think the Canadian contribution to games can sometimes be minimized. I mean look at Next Level Games that I worked at, of course their games are published by Nintendo, but Nintendo is huge everyone knows Nintendo. No one wonders, "I wonder what set of programmers made this game and I wonder where they were located?", all they think about is "its Nintendo, its Mario! Cool!", right? (Ryan)

It is this issue of the presence of a AAA studio which can be overpowering when compared to smaller indie studios within the industry, especially in Canada:

> "You think there are so many large games, AAA games that are made in Canada, but I don't think anyone outside of the industry in Canada even knows that they are Canadian made. It's not like "Assassin's Creed made in Canada!", no one knows that or Splinter Cell or whatever, I think Watch Dogs was another one that was recent. So, it's like yeah no one really knows that it was made here, I feel like we are kinda of missing that, there is not like a really big Canada – like Bioware is the closest I think to that big Canada identify like studio. And I think that has gotten away now a bit, they have been bought by EA and been distributed like a lot of stuff now. So I don't know I feel like there's not enough big like flag in the ground Canadian thing, but I mean that's probably true, I think cause I am plugged in I know where a lot of the games are being made but I don't think gamers really care. I think that's apart of it too, unless you are making something very about Canadian, I don't think it really matters…" (David)

What is then seen is this struggle between the large and small studios fighting for consumer attention and sales. In addition, there are intriguing elements in the landscape of the Canadian video game industry, where there is variation in the major hubs of the industry. These are subtle in their presence but are worth noting due to the apparent focus, or commonalities, that the firms in these clusters share, particularly within the independent studios in these settings:

> "…the core of the gaming industry is still having the big publishers and their studios in different cities. It still feels like that is – like the indie community is getting interesting because I feel the indie community has a different identity in each of the cities as well. Toronto is different than Montreal, Montreal is more, I would say, the more productive well that's not a good word for it, they are more business ordinated. So the indies in Montreal are actually are trying to make money as businesses, and I feel like the ones in Toronto are much more art driven, where you'll see more experimental stuff come out of Toronto where they are not necessarily trying to make money with what they are doing they are exceptions like Chappy and stuff like that in Toronto, and they are fairly large and doing well." (Mark)

This may not due to the industry's cluster, but more so the environment the cluster is stationed in. This may cause a bleed through effect:

> "Our large cities all share vibrant and experienced art, music, and creative communities, who are often self-organizing and determined. Our multiculturalism also provides a very diverse workforce and entrepreneurial pool, which increases the potential reach of Canadian games content" (Benjamin)

What is slowly being assembled here is the understanding of why the video game studios have positioned themselves in Canada. The general trends seem to be aligned with the financial benefits that are evident here; however, there are hints of underlying influences that sway companies to stay and grow.

> "Canada's differences from America will always make it unique in comparison, and while the industry here may not have the same money behind it, the talent is still - think of the Canadian industry like film. There are so many great Canadian actors that end up moving to the states for work, but games don't need to physically move somewhere to be made, so I think there's opportunity here still" (Wil)

It could very well be cultural difference that influences the industry here in Canada that provides a unique landscape that entices not only locals to establish firms within the boarders, but foreign firms and immigrants:

> "My personal likes or hobbies or interest will influence the games, now since we are an immigrant country that will bring a lot of different cultural ideas into the game. After I had been here for awhile, I start to like the local cultural, all the memories, I like the – all the nature you see, it's such a difference. If I live Asia maybe the background become more urbanized, even without purposefully think about the surrounding of the nature feelings of Canadian great is actually in the game" (Ming)

This paints a picture of the importance of the culture present in Canada and that the physical climate itself is significant to the perspective of an industry: "Canada has a great combination of a high standard of living, a talented labor pool, and terrible weather, seriously… the long winters are great for maintaining extended focus on large creative projects" (Scott, 2019). This also leads to an attempt to understand what sets Canada apart from its

American counterpart, and also what makes a recognizable location for the video game industry on the international stage. As mentioned by one of the interviewees: “Speaking with international people at the annual Game Developer’s Conference in San Francisco, there is a general awareness and positivity regarding the videogame industry in Canada” (Quintin). There are also various perspectives on the industry in Canada from the developers themselves:

> “I think that Canada has a distinct culture - which focuses less on the over the top gun heavy games that are common in American or AAA studios and more on story and game play. Also due to the fact that Canada has a history of supporting the creation of Canadian content in movies, television, music, and video games also leads to a more creative culture” (Paul)

While speaking with the interviewees, there was much talk surrounding the positives concerning the industry in Canada. It was important to have interviewees point out elements that may be viewed as a challenge when it comes to the Canadian video game industry. One of the first things that came under fire was the funding process, the very thing that makes Canada unique, as “these programs allow the studio to focus on producing the game with less worries regarding funding” (Vanessa). At the same time interviewees were quick to point out the entry or access issues: “The support currently is great, as well as more training or workshops on running successful studios, as smaller independent studio heads may not be as familiar in leadership, accounting, legal matters, etc.” (Vanessa).

The idea that there is this unfamiliarity when it comes to the paperwork and processes that accompany grant and funding applications seemed persistent when engaging with interviewees. As Teddy points out “…they’re very complicated though, and for us, we have to work with other companies like Deloitte in order to fill all the proper paperwork. There’s also a lot of additional overhead work that you have to do on your end to properly mark all your expenses, and it gets quite detailed”. While this issue seems to be one that can be mitigated by

hiring outside aid or speaking to other fellow developers. It is lengthy to partake in such a process, and as Ming phrases it "The government wants to make sure who you are and what your project is about, they need the paper work, but for smaller scale it is busy enough to make a game and you have to spend time to do it. Working on a proposal and budgeting is – it does take time". Ryan illustrated this with his experience and thoughts on the matter:

> "So, it's this kinda weird thing, where I know I qualify, I get it we have been accepted two years in a row I am quite sure of it, but I need the consultant because they know how the government wants it worded. So, there is this sort of bureaucracy involved that's a little strange, they government even sent auditors to me, and I've talked to them, explained what I was doing, and that's great. But don't you think that would be enough? Like, you came and saw what I was personally working on, why the paperwork and the wording has to be so precise? I am not quite sure; I think that could be simplified. But hey I am very glad it exists; it makes hiring Canadians much more attractive than other wise – you know if I wanted a cheap programmer, I could hire someone from India, let's say right? But this makes it really great and attractive hire local, or at least Canadian local , programmers and stuff, which I think that's sort of the point right? It's great, it helps the local economy, local business, it's fantastic, so there's paperwork, there's hoops to jump through, but I still think it is a great thing to have for the industry"

In addition to this, there were other elements we were made aware of regarding dipping into the funding organizations available, most importantly concerns and words of caution:

> "It's important that the games that you make -well you get a profit out of it. So, if everything you do is subsidized, 15, 75 percent, if you pay only 25 percent of everything your business model just doesn't work, it's just very dangerous. And sooner or later the public funds will stop coming in, and they'll lose faith in your ability to make a profit and it can become a dangerous place because you're not supposed to make money with public funds…We have to be careful when going to international things, there are so many funds that are available we have to make sure we only apply to one for every show that we do because if we apply to two I can make money that way. Like the show costs me 5000 and I get 7000 from public funds and that's illegal, so you don't do those kinds of things. And it would help if they had a standardize way of tracking those things, so that I could be sure that I really don't go do those things by accident, in terms of abuse" (David)

The funding in the industry, when it comes to start-up, small scale studios, or independent studios, is important in the long run. As these grants often determine if there will actually be a long run, for the sustainability of studios is a priority that should be and is being

pushed for. Several of the interviewees voiced this, like Benjamin , “I believe both federal and provincial governments should focus on initiatives that help grow the games industry, so that companies larger than two or three people have a better chance of success”. This was also echoed by Quintin from Jitterware:

> “I believe funding should be through a reviewed investment system. Since it’s a loan that encourages repayment, taxpayers will not be supporting everyone who wants to make a game but selected companies with displayed potential either new or established. The goal would also to create more local Canadian jobs”

These responses highlight the issues of small companies versus larger companies, a theme that will be explored, For the interviewees, this had a prevalent and very real impact on their day to day lives. The presence of the AAA game studios outshining the independent studios was mentioned early on, to the point where the Canadian video industry is presented by such games. It is here where the issues are more concrete in terms of grant application, where independent studios must carefully perform a balancing act of risk and reward:

> “Like you really have to, as a businessman, you really have to put your mind set into not apply to those things ever or just like – for instance the CMF [Canada Media Fund] is really really nice but they take half of your money, right? So if you can’t afford to pay for the next one, well you maybe you should take a break and start growing your company, you have seven different employee you can’t afford, you have to get different employees that fits with the money you have and take 100 percent of your own funds, that you don’t have to share, it’s a lot more healthy that way right?” (David)

This will open up an area of discussion in the next section, but at this point we can see that funding at the larger scale can be favoured more towards the AAA studios from the perspective of independent studios. As these large-scale studios have more of a presence in the minds of consumers, but also have the background and financial success of past ventures to make investor and organizations more likely to approve them for funding. There was an additional note made by Ryan as well, concerning the spin off jobs created to help developers with the mass of paperwork:

> "I mean I have heard criticisms of those programs being the only ones that benefitting are the consultants doing the paperwork. Because…the government created an industry of people to manage the paperwork the government created, and that's a valid criticism. It's hard too because like we were accepted, we submitted two claims for two years, accepted both times, but it's weird because one reason we go with a consultant is that if you don't word it in a way they want, they'll reject it"

Paperwork and careful wording, as always, seem to be the make or break for most grant applications, funding ventures, and Ph.D. dissertations. If paperwork and bureaucracy are some of the driving forces for the industrial growth here in Canada, are there additional factors that can be noted or changed to aid in that growth?

When posed with this question, interviewees were quick to respond with their insights. Rebecca with Digital Extremes points to more open communication between developers, for aid in understanding more of the business side of the industry. This is most important for start-ups and smaller studios, to have the chance to "solicit the big and small studios for best and worst experiences from the business side. Most game developers are not interested in operations and business, and these things can hamper creative talent on the smaller side" (Rebecca).

Other interviewees echo this observation and support local development to aid in growth, and even "supporting local community groups who rally developers and talent together, and who self-manage to champion Canadian creators can help to build a stronger workforce" (Benjamin). Benjamin also points to elements outside of the industry and to the education system itself as "improved education that targets the large swath of approaches to game design…would also provide human resources for potential employers." Education is noted as an ideal place for an initial liftoff for this industry, due to the Canadian video game industry being so heavily saturated in the knowledge economy. There is much to be said when interviewees are giving statements along the line of what is needed such as: "more training or workshops on running

successful studios, as smaller independent studio heads may not be as familiar in leadership, accounting, legal matters…" (Vanessa). Again, interviewees picked up on this and offered insights:

> "Smaller collaborations can make tiny teams succeed eventually. However, a lot of the time it's easy or faster to team up or be taken advantage of by larger company. It would be amazing to have companies stay and work in Canada not for tax benefits, but to generate smaller studios. Some type of collaboration and support system like an incubator. A union perhaps? But this could stifle some ideas if a single corporation was in charge of multiple studios. Free and purchasable spaces and tutorials are always an amazing place to start" (Quintin)

While this promotion of education and the exchange of knowledge is paramount in the development of the industry, Benjamin points out another factor that needs to be addressed to aid in development:

> "One of the biggest challenges is marketing and awareness, as well as talent retention. Many game companies are small and work with contractors or part-time employees due to unpredictable revenue models. Having a way to attract talent and to be able to compete with other employers with benefits and tax incentives would relieve the burden faced by these small companies" (Benjamin)

While at the same time, there is a push for the local level and an independent studio uprising, the importance of AAA video game studios is not lost on some of the interviewees and the role these studios play:

> "…the reason Montreal is succeeding so well is because they got those bigger studios. I would love to see more in Toronto, I think that would directly impact us, cause even if we are not working at the studio it encourages more senior talent to move to the city and eventually spill out of the city, you know what I mean? It's kinda like AAA studios are very nice for training people how to work in the industry and so it gives you have more opportunities to hire more people. Especially over what kind of studio, because that's already kind of true as our employees are more senior, who have family and have been working in the industry and appreciate the fact that they can work from home but like 3 out of 4 of our employees have 10 or more years of experience. So, it's really nice to be able to hire more senior people as a studio and having more of those people in this area would make that easier, so I think a big way to do that is having more AAA studios." (Mark)

With the AAA games studios in Canada being present and being noted as a lifeforce of the industry, what are the best ways to bring in more of that proverbial energy? First is that "continual support in terms of funding is crucial to the stability and success of game studios. In a hit-based industry, studios should be focused more on making their product excel instead of the constant pressure of finding funding for their projects" (Vanessa). This approach is attractive for the larger studios who not only dip into the funds, but also do not need to rely on them to keep the lights on. This access to funds by such larger players does rock the proverbial boat for the other smaller studios who need funds for their initial ventures.

Longevity of studios is a great concern to many of the interviewees when discussing success in the industry. How does a studio achieve that longevity? While there is much discussion on the funding offered, some do warn against the heavy reliance on such grants to keep a studio open:

> "I believe that business should be made off money through customers to sustain long term growth, and I am not interested in doing something that would be money now, but business might be killed as soon as those grants are gone. I think other businesses do get hit by that, but I also think it's a part of their business model, they are ok doing a couple of years then moving on to something else, not being able to get it up that's just the nature of the business" (Mukul)

The risk and reward balance seemed to be prevalent in many of the interviewees, mostly in Ming, who had been in the industry the longest out of all the contacts made:

> "If there is a young one thinking 'should I go into the video game industry'. I actually would hesitant to tell the young man 'yeah go for your heart, go for the video game'. When I was young I would not hesitant I would say 'jump in'. After 30 years I compare to my friends they are CEOs somewhere and they have great content. For me I know a few people who have games, but can't publish them and are getting old and getting disconnected from the industry…" (Ming)

What he alludes to is that because of the hi- based driven industry that entertainment software is, passion alone may not be enough. A studio is first and foremost a business. Mukul of MoKool Apps knows this and explains: "to be honest I think you have to focus on making

more sales and I think that's a big thing personally…", the focus of profit will have an effect on the type of game being produced. Mukul continues this by explaining his thoughts on creating a game for the right market and how sometimes it is a challenge:

> "The problem is that we talk to people that have been doing this for a while or a long time and are hardcore gamers some of them wouldn't consider Candy Crush a real game. But Candy Crush is a game that's making a lot of money, right? It doesn't have like levels, deep story and like all that kinda stuff that makes a real game that used to be. Now basically swiping things on it, and as the market has changed – you've been asking me about the video game market I am gonna move to the player market for a second – you gotta realize before mobile came out its this big [hand gestures] now it's this big [hand gestures], and that big is including your grandmother, your aunt, or anybody out there or 8 year kids that are just playing. So, you gotta include a lot of other people that were never in the gaming market before. So, I definitely think the video game market needs to look at. And that's the thing we got into casual games because – ok you play Temple Run right? – Temple Run is something an 8 year old can pick up or a 43 year old, that's not really something that – but you talk to avid gamers or hardcore gamers they are not going to consider that to be a real game, just because its missing a lot of the elements of what a game used to be. So, I think the video game market is changing, so I think you need to look at that as well."

Aside from balancing the risk and reward of funding grants, there is also the pressure of appeasing consumers so that there can be a profit, and not having to rely on the grants. The crux then seems to be, as always, the financials of a studio especially when starting out and attempting to release a new game. This does bring the conversation back to the funding, and while the grants seem to be a very strong pull factor for the industry here in Canada, many interviewees took a moment during the interview to explain their stance on how to improve the funding system of the industry. As mentioned before, the funding opportunities available are all viewed in a positive light by interviewees for the most part, except for the previously stated paperwork and lack of support when it came to advertising, which seem to be constant.

When looking at all that had been discussed surrounding the growing strength of the industry, it seemed important to ask what measurements or observations would be most viable to

monitor and confirm that Canada is moving in the correct direction. Some such as Glenn expressed a more observational standpoint:

> "I don't have any sort of scientific or data-driven basis for my opinion, but I think one can have a look at the state of games in Canada and see that things are very healthy. Ubisoft, Electronic Arts, WB Studios, BioWare, Rockstar Games – all industry giants, all based in (or having key locations in) Canada. Studio MDHR has just released Cuphead to incredible sales success and critical acclaim. I've had the opportunity to attend conferences like GDC and meet people working at Canadian studios, and the representation we see at events like these is incredible"

Being able to monitor the presence of the video game industry is an optional way to view the progression of the industry on a year to year basis, especially to monitor the studios staying open, including the smaller scale studios and independent developers:

> "I would say the strength of the smaller studios. If smaller studios are able to maintain themselves to stay in business, and ideally move away from needing the support of the funding from other sources, that would be the biggest measure of success for me. You got these studios, they got ten people, they are consistently making money with their own products, they are not relying on funding from the government or the publishers in order to be successful, I mean that would be the best case" (Mark)

The sustainability of firms is most likely the leading measurement that can be utilized and many of interviewees seem to be in agreeance with this. Yet, there is an issue in getting that kind of information out there to investors and developers. While the leading organization in Canada, the Entertainment Software Association of Canada or ESAC, does produce reports, it is important to note that after reading these reports over there are some minor elements that should be addressed. This is discussed in-depth in the next chapter. It is worth mentioning that the reports produced by the ESAC are year-end reports promoting the positives and can be misleading. For example, they attempt to point out some elements like the total number of studios in Canada, they do not mention the sustainability of such studios or how many closed. These important factors are not mentioned due to those factors being bad press.

Returning to the matter at hand, there is an addition consideration and that is the basic use of profits as a definitive measurement of growth:

> "I would look at profits I think, I think profits would be the best way to look at it, and I think that maybe cause we have so much support from the public sector I would like to see all this investment that we have millions of millions of dollars invested every year into the industry. I would like to see how much, like if you see the profits minus the investments from the public, like how much positive do we yield from that? That would help me to sleep better I think, because when I see other developers from abroad, they just don't get any support at all. Like when they make a few bucks, they can be really proud because it's all theirs, when I am making a buck I really hope – I am just looking to pay taxes – like we get so much support that I hope we get enough profits to give back everything and we can pay back everything. But I am really not sure if every studio has this concern, so if I could see that average then yeah that would be great for us, that would be nice" (Mark)

> "I think company profits allow for companies to experiment, you have to realize the app industry is not even 10 years old and that's the biggest video game market right, now right? So, a lot is changing and they need money to experiment...so I think sales are a strong indicator but deep pockets that allow you to do really cool things that will allow the industry to grow, and we are in a good place for that" (Mukul)

A more consistently used and more widely accepted measure is profit. This is more likely due to the bottom-line perspective of business models, and the fact that sales keep the studio doors open. Regardless, the profit margins are the focus of many, which may be overstating the obvious. At the same time, the retention of talent is another element for consideration. The job creation on the local level is being noted by interviewees: "I think local jobs is great…if you had to look at the video game industry then yeah you'd want to growth more offices locally, you probably want to growth more jobs local…" (Mukul). The push is for the local job development as this retains talent within the country, and the interviewees expressed such concern:

> "I would think people, in the beginning it was 'let's work for America, let's work for British' that's fine, but now we need the worker here working on the project. If I have a company, a 10 million company here, and also in Nam, I bring in a profit for Nam but I don't bring all my people here, I educate my people here…employment has to be in Canada. But that is very hard for industry developer, but that's not cheaper, and that's where the government comes in. When you link it with education and skills, I think it is worth it" (Ming)

These are more traditional viewpoints of observing growth, and while they likely apply, one of the interviewees pointed out a different observation concerning the artistic impacts and growth of the industry:

> "in a sense it is hard to measure because, any creative industry, it'd be hard to measure quantitatively the results. If someone big, like you see this in more traditional forms of art, great painters are appreciated way later. Well the government was looking 'oh are we making any great painters?" and they'd be like "no, they are all poor and not making anything', and then all of a sudden later on their work is worth millions of dollars. There is some, I believe, contribution that games make to the artistic fabric of the country or the world that is hard to measure. Even if your game could sell horribly, but it could have an impact that is hard to measure beyond the finances, right? But one way, I think, that will be easy is just, maybe, percentage of workforce in gaming, in making games or interactive entertainment if you want to sort of broaden it" (Ryan)

While there is an understanding that the video game industry is first and foremost revolving around entertainment software, there is a variety of components that comprise the industry that have multiple uses. There has to be the realization that the video game industry and its outputs are not merely restricted to video games:

> "I believe that video game is a great asset to almost any country, so behind video games is artificial intelligence, right? So, a lot of high tech and it can go to medical, go for agriculture or manufacturing it's all software behind it, it's not just video game, video game is the surface. When I make those simulations, you have to see how each solider has to find a path or something that's all algorithm behind. So, once you build one industry here you build around it, but also its digital, its clean, again its clean and free to ship". (Ming)

When discussing the growth of the industry and its components, the conversation eventually led to a discussion around the future of the video game industry of Canada. After conversing with each of the contacts, this question was always asked at the very end to offer insights on the progression of the industry in the coming years. The comments made were always very telling of the hopeful. Some saw it as "a huge and difficult question. There are so many streams of game development, that it's impossible to project a single path. Our hope is that it expands to include a more diverse group of developers, and form is used in non-entertainment

uses as well, including data visualization, public policy" (Benjamin). Others were more practical in their understanding of the AAA studio's presence in Canada and "it ends up being cheaper for studios to maintain their studios here, so I think that's gonna be fairly consistent going forward. I think that's the biggest concern, if all the bigger studios closed down then there would be a legitimate concern in Canada" (Mark)

The workforce, for some, was an interest for the future, "You need people who are very hungry to learn, how are very motivated and driven, so you don't need people with a big portfolio or years of experience – if they have an eye for design and they are hungry, that's all it takes to get people off the go, and we have done that with, I wanna say, two dozen people over the years. So, helping people out as you go, but there is definitely a value I think" (Mukul). There was always talk of the positive growth of the industry:

> "honestly, I just see it getting bigger and better, like I said I think we have the right chemical mix to make the magic here in terms of what we do across the spectrum of games. That's console, PC games, you know mobile games…So I think across all these sort of industries that relate we can talk about a broader spectrum of gaming, I think they will continue to increase and get better over time….I think that still the future of Canada in gaming is very strong in terms of developers making great games, and also independent developers making small games. There is no reason a small game can't be massively successful in time, so I think that will continue as well. The more that the government helps people easily that can be a great help, and I think that over time actually gaming is becoming a lot more commonplace, and I think that fact is only going to help making the game industry continue to grow and sort of leverage that fact excessively with international demand for it" (Ryan)

There does not seem to be a negative view of the Canadian video game industry's growth in the future. It was very hard not to share the enthusiasm of the interviewees when they shared their personal stories of how they got into the industry, and through hard work, released their first big project. The comments on their success, for example, Rebecca's excitement concerning Digital Extreme's flagship game: "Warframe had its best year ever in 2017 – exclusively made in Canada! We've had to do a lot of international travel to support this success, but we've grown

in Canada and brought lots of international talent to join us. Canada is growing more appealing for many people, especially Americans!" As a follow up she added "We have a strong educational pipeline for capable creators in the games industry. Our software prowess will continue to grow as technology more seamlessly blends into seemingly all aspects of life. From mobile games, next-Gen consoles, we'll see indies and AAA entries increase from Canada!" (Rebecca). The promise of the video game industry does seem to be bright and positive at this point in time. It is supported by not only the government's varying levels of funding, but also all members of the industry who are enthusiastic in its prospects and their own. Does this then mean there is an atmosphere of cooperation amongst the industry's develop community? Is there much collaboration?

When asked this, interviewees were quick to point out as exemplified by Vanessa , "mostly on the PR and marketing side, and localization companies". For those reading who are unaware of what a localization company is, it is a firm that specializes in its home country's language and censorship/rating board. Essentially these firms translate the game's text, and audio if there is voice acting, to the local language as well as ensuring the game meets the rating laws of the country along with sometimes adhering to cultural elements. A more familiar example would be within in the film industry, especially with anime. As the shows are brought over from Japan to North America, they are then translated into English by hiring new voice actors for the characters. Often these companies are the more cited ones when it comes to collaboration and third-party assistance, however additional components such as music were also cited as additional partners in production. To note the interviewees who were working in app developed, some reported to be working with larger companies, for example, having "partners at Google

and Apple that we work closely with, as well as ad networks; we work in free-to-play, so ad support is included in all of our games" (Glenn).

With the qualitative data presented, there can be the beginning of the formulation of some common trends and understanding when linked to the quantitative analysis. With all interviewees working in the same industry there is a certain degree of guarantee of similar answers on given questions or even a general agreement with their responses, which has been noted.

In summary, what can be observed is the following: when it came to the history of the Canadian video game industry, there were few that could pin point exact origin stories, yet when it came to the current standings of the industry here in Canada there was much depth and insight given. This included not only explaining what Canada's strengths are, but what can be done to improve the nation's standing on the international scale in terms of growth and increasing the resilience of the local industry through growth by the suggestions given from interviewees. Furthermore, there were some interesting takes on how to monitor growth within the industry. These mainly focused on factors such as profits, local growth, and increased presence of AAA game studios.

However, a majority of the conversation seemed to rotate around or even consistently come back to the funding opportunities and programs for the industry here in Canada. While this was a heavily debated topic, when looking at all of the results, there were similarities in the results. First, the video game studios in Canada are well supported and very fortunate when it comes to funding application, grants, and tax incentive programs. Second, while these unique chances are available, the process of going through the paperwork and filling out the application needs to be addressed or streamlined for ease. Third, the need for more diverse funding, more in terms with getting support for elements of production outside of overhead costs and utilities.

This includes elements such as marketing and traveling to conferences to help aid in the increase of presence on the international stage.

5 Discussion

5.1 What does the Canadian video game industry look like?

What are the defining characteristics of this industry in Canada, and how does that aid in its growth? First, building solely off what was explained in the interviews, the largest contribution is the support that is given here in Canada. This can be broken into two parts: economic/financial and social support.

Economic support is likely the most tangible and attractive of the two, and the most likely for attracting foreign studios into Canada. This exists on three levels: federal, provincial, and at times municipal/local. For example, the referenced Canada Media Fund is a federal level grant where $1 million dollars CDN is available to a video game studio. However, many of the interviewees were quick to point out the caveat that 50% ownership of the project was retained by the Canada Media Fund. In addition to the Canada Media Fund, there are more opportunities for studios to partake in the tax breaks and funding applications; as mentioned there are varying levels, for a brief glance at some programs see Appendix 4.

Yet for a discussion more aligned to the aims of this thesis In a general sense, when it comes to traditional location theories and pull factors, it was restricted to three factors: material source, labour, and transportation. It is prudent to try and apply this to the video game industry, based on what can be derived from the results as this is what this thesis is attempting to explore.

When considering the material and looking at the video game industry there are numerous, yet at the same time, few inputs. This lies heavily on the economies of scale or the

scope of the project being set forth by the studio. If considering hardware as an input, such as technological devices, this does limit the range on the international stage to countries that have a strong enough economy to supply their population with such technology. Furthermore, a majority of towns and cities have some store or service that can allow consumer/firms to get such technology, and if not locally, through shipping companies such as Amazon. Considering this: what then is the follow up material to consider? If the tools are not location dependent, then what materials are considered for the video game industry? Looking back at the most commonly referenced input, this would be the human labour.

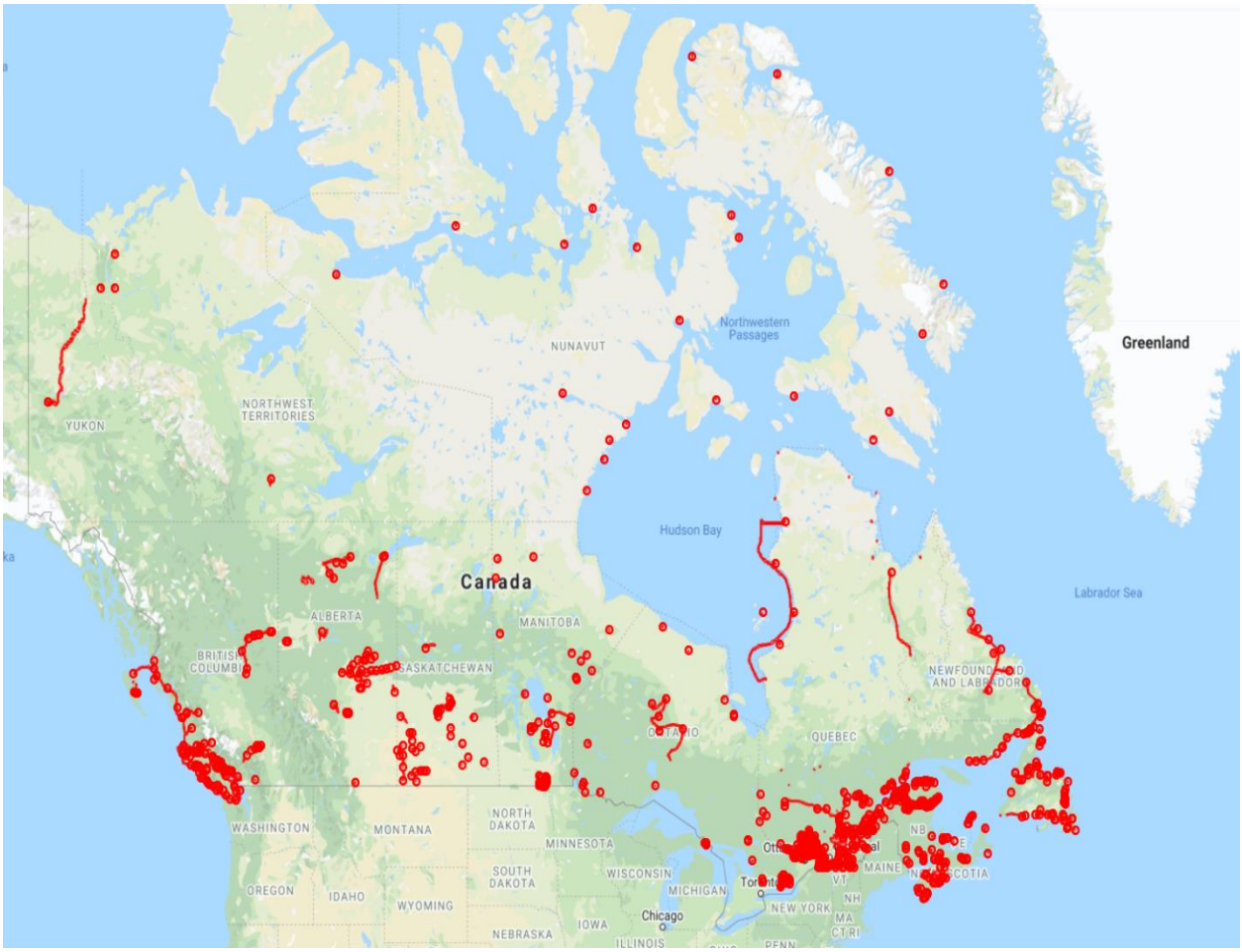
In regard to the type of human labour, when it comes to the video game industry it is not traditional blue-collar work. The most common and basic level jobs in the industry require some degree of computer programing or technical savvy background, usually through college or university. This is simply due to the technologically intense work that is done in any studio in this industry. Games cannot be created without these high-level programs and the knowledge to work them. What can then be extrapolated here are a few observations. First is the intense presence of a knowledge economy where there are no real resource or material inputs. This is excluding workspace and all the elements linked to office space for now. This then leads to the second observation: transportation costs are also absent. Both of these observations are essentially linked to each other due to the video game industry being a weightless industry.

With virtual products such as video games, this greatly reduces transportation costs and nearly eliminates it completely aside from commuting. This is also noted with numerous of the interviewees having a home office, as they are able to work virtually, and this did enable more contract work from locations such as Romania. At the same time, it also greatly increases market size and the need for marketing. In the video game industry, a studio is not competing for a local

market but on an international scale from launch. This is unlike traditional industries like manufacturing where over time international shipping becomes low enough to justify the transportation cost. In the video game industry, a firm must compete with every other firm for their given gaming platform on an international level. Furthermore, once the advent of mobile devices came about, there was another surge of developers and studios to compete on such platforms. As a side note, often personal computers and mobile platforms are sought after by independent developers due to the bar to entry being lower than that of console. This is due to the public marketplaces that are available online, such as Steam, where developers are much more easily able to advertise their games and have consumers digitally download their game. Bringing in the data from the interviews, the access to such an interface allowed for a workaround for some of the interviewees, as having the option to utilize a different platform for releasing their game, such as Steam or Google Play, was a much more financial feasible option. These different options are ideal as they do not impose steep fees that would occur should they go through with a high-level publisher.

If the product is weightless and the transportation cost can be reduced to near null, does that then put all the focus on the labour as the most attractive factor to consider? The research explored throughout this dissertation states that yes, this is the most important factor when considering location in a traditional location theory perspective. Yet at the same time, because of the need for a highly skilled work force, there are some restrictive elements when it comes to location. There must be a sufficient infrastructure to support the high technological demands of the firm, meaning internet access at the bare minimum. This presents an opportunity to showcase Figure 5, which displays Statistics Canada data showing the internet service, in terms of availability, across Canada (2020)

Figure 4 National Broadband Internet Service Availability, marked in red



Source: StatsCan, 2020

There is a misconception that over time society has begun to access satellites for their internet needs. In truth, there is still the heavy reliance on these cables for almost all of the data transference when it comes to telecommunication. With this in mind, there can be the additional extrapolation that the various nodes of the internet, being points of contact on the coast where the cables are transferred from submarine cables to more recognized power lines, can be locational factors influencing firm location to an extent. The importance being that a firm should be establishing itself close to a city where the cables come to shore and are then dispersed across the interior of the continent/country. This allows for a closer connection to international data

transfers. This is of utmost importance when time is a crucial factor. It is also prudent to point out that developed nations will have additional stations to carry the information across the country. As a casual observation, this does make certain countries more viable for not only the video game industry, but high-tech sectors in general.

It can be reiterated that there is in-fact one material input, internet access, which then translates to access points or areas with reliable internet. There is an intriguing remark that can come from some abstract thinking: are the cables in fact the transportation mode of the video game industry? Arguable from a shifting of perspectives, there is some logic to this. Consider the following: the video game industry runs on electronic transfers, online interactions, online advertising, and online updates; therefore, how does the file or goods, get from the studio or studio's server to the consumer's home computer or platform? The internet, of course. In and of itself, the internet is an information superhighway comprised of compressed data traveling at great speeds along converters across countries, and thanks to submarine cables, oceans as well. It is a unique thought that should not be dismissed if one were to apply it to the early location theory models. It also supports itself in an urban hierarchy as often, high-level cities usually have internet access. If this is pursued, it does bring the thought process full circle: now that internet is so widely accessible in a majority of countries and is now a staple commodity/material that is quite affordable, why do studios establish themselves in the clusters identified by the generated maps of this study?

The answer is two-fold. First, with the already presented literature for interpretation that was stated in the earlier chapters, and second with the interviews. To begin, recall that the video game industry in Canada is a subject of growth via location leader, and in 1990 Electronic Arts bought up a software firm called Distinctive Software. It is from that point forward there was

growth of a video game industry cluster in British Columbia, specifically in the Vancouver area. Furthermore, this research/author would like to point out that this area was the best and most logical entry point for the video game industry into Canada due to Vancouver's linkage to the California movie industry. While the tax incentive programs that were created by the federal and provincial governments were important and still are, in terms of growth, the most important factor for location was present. This was labour, or in this instance local talent and parallel industries. This is echoed in Montreal, with the difference that the province being bilingual was an attractive factor for European firms, specifically Ubisoft from France (Pilon and Temblay, 2013).

One of the biggest pulls of Vancouver and Montreal to this day, is its large film industry which again is linked to the tax incentive programs and subsidies. This is the underlying attraction factor for many film studios (Grandadam et al., 2012). As explained in the earlier works by Gasher (1995), "the opportunity to qualify for 'national' subsidies and tax concessions has been a principal lure for Hollywood location activity internationally". Over time, there was a development of this film industry in the Vancouver area, and part of this was due to the appropriate timing. Lukinbeal (2004) explains that there was an explosion in the film industry from 1984 to 1997, generally caused by the increased demand and production of television series. It is here where the intersection of the video game and film industry can be noted, and in that, the most common linkage aside from the utilization of the same funding and incentive programs, are the audio and visual firms.

These firms specialize in elements such as: voice recording, audio/music recording, special effects, computer generated imaging, sound board, and motion capturing, just to name a few. These firms were already in place and well established by the time Electronic Arts entered

Canada. There was already a strong foundation and support system for the video game industry. If there is a very viable field, the crops will grow and for the video game industry, this is a true analogy. It is not hard to understand why the video game industry and the film industry are often interlinked (Vang and Chaminada 2007; Cohendt et al, 2018; Cohendt and Simon, 2007; Johns, 2006; De Vaan et al, 2013; Grandadam et al, 2012). This does bring in a point of discussion of the role AAA game studios have in Canada. These large AAA studios have power not only in terms of finances, but also in being the necessary spark to start a video game cluster by means of location leaders.

When looking at the concept of location leader, it can be described as something akin to the game of chicken where firms are waiting for one or another to make the first move to establish themselves in a new locale, yet all are hesitating in case the area proves to not be ideal or not perform adequately in terms of revenue. This is because no firm wants to be the one to lose out due to unprofitability or a misstep (Smith, 1981). Firms want to go in assured that there will be success, and it often comes down to waiting for one of the larger firms to enter an area first. In the case of the Canadian video game industry, it was Electronic Arts that helped pave the way in Vancouver. The real driving point of having AAA game studios in Canada is not just restricted to the revenue, but training and studio creation. Throughout the interviews there was much discussion of the AAA studios. The more practical impacts of these studios are in two parts when it comes to sustainability of the video game industry here in Canada. First, is the obvious presence that these multi-million-dollar studios bring, including jobs and profit. The second and perhaps more important impact is the training that these studios offer.

This connection between AAA game studios and independent studios is very much akin to asking the chicken-and-egg question. In the beginning, video game studios often started as

small independent studios that grew over time. Other times some were a branch of larger companies: Sony, for example. In the early years of the Canadian video game industry, AAA game studios can be seen as a very important factor for the development of the independent video game studio scene. This was echoed by the interviewees, not through directly stating there is a correlation, but more so by hearing how the developers entered into the industry. More often than not, their first jobs were working for large corporations. One interviewee, for example, worked for Nintendo and then shifted over to running his own studio. What AAA video game studios provide is hands on experience and an incubator for learning. This is not uncommon, where individuals who are green to the industry take on entry level positions at large scale companies such as Electronic Arts, Nintendo, Square Enix, or Ubisoft. It is here where the ins and out of the industry can be learned in a relatively "safe" environment and an income can be made.

Colleges and universities have taken great strides in developing very comprehensive programs for those gunning to be game developers with hopes of making the next big hit such as *The Witcher 3: Wild Hunt* or long-standing classics like *The Legend of Zelda: Ocarina of Time*. The best experience is offered working with these AAA studios. This contributed to a learning and understanding of the industry from an internal viewpoint ranging from team dynamics, hitting milestones, and dealing with investors, to the work environment itself. All of these are learning experiences for entry level developers. This is why the importance of the AAA video game studios must be stated. As Dyer-Witherford and de Peuter (2009) explain, these studios act as anchors for the industry. To add to this, this research points to these not as only as anchors, but AAA games studios are the pillars and support beams that make a video game industry in Canada possible.

When considering the composition of the Canadian video game industry in the beginning of this research, there was an understanding that foreign AAA games studios were, and still are heavy influences on the industry here. However, what was not realized until speaking to interviewees and while completing additional research, is that the face of the Canadian video game industry is primarily these foreign video game studios. This is not an exaggeration when looking at the employment statistics provided by the Entertainment Software Association of Canada.

As noted in the earlier chapters this organization explains that roughly 62,000 people are employed in the video game industry, but it must be noted that this number is misleading as only 21,700 are directly employed. The remaining 42,600 are indirectly employed in this industry (ESAC, 2017). In monetary value, the workforce contributed approximately 3.7 billion Canadian dollars to Canada's GDP in 2018 (ESAC, 2017). Remember that the Canadian video game industry is decades behind the United States and Japan in terms of start-up time. For comparison, the United States has a workforce of more than 220,000 and generated 30.4 billion American dollars in revenue in 2017 (ESA, 2017). Regardless, the industry is quite profitable. While the revenue and contributions are exciting numbers to gloat and parade about, what is more important is ownership. What needs to be pointed out is where the employment in Canada is in terms of the video game industry. Thankfully, the Entertainment Software Association of Canada does not shy away from these facts. According to the Association, in 2017 there are approximately 596 active video game studios is Canada. It is key to point out that there is a concentration of the video game industry within certain provinces, with 521 of studios residing in only 3 provinces. This observation made by the ESAC was confirmed through this dissertation. Furthermore, the number of full-time workers reflects this with 19,700 of the 21,000

full-time jobs being in British Columbia, Ontario, and Quebec. This is displayed below in Box 3. This does include an estimated number of firms in the capitals of each province, based off the data collection of the GIS processes.

While 83% of these studios are owned and controlled by Canadian stakeholders (ESAC, 2017), the workforce does not reflect this as 86% of employment of said workforce is in foreign video game studios (ESAC, 2017), most of whom are of the AAA statues.. When looking at the data, specifically the interviews, there was the constant identification of the largest players of in the Canadian video game industry being foreign AAA studios. The most noted were Ubisoft from France, and Electronic Arts from the United States; both are powerhouses in the international industry in their own rights; yet their presence in Canada does all for the additional consideration of perspective of branch economy.

Table 3 Breakdown of Top Provincial Concentrations

Major Provinces with Video Game Studios	Number of Studios	Estimated number of Studios in provincial capital	Estimated number of full-time employees
British Columbia	152	69	5,900
Ontario	171	35	3,800
Quebec	198	70	10,000

5.2 Branches, AAA, and the work of Sonn and Lee

In a sense, Canada suffers from a branch economy syndrome when it comes the video game industry. This notion is more attuned to more traditional manufacturing firms and turning to Sonn and Lee (2012) for their insights, these kinds of firms are supported for their ability to

alleviate unemployment. Sonn and Lee (2012) discuss several issues with branch plant economies when engaging in the classical literature and the more contemporary research. At this point it is prudent to go over their analysis and synthesize a comparison to the Canadian video game industry.

The first two points of Sonn and Lee (2012) are as follows: one, the quantity and stability of jobs, and two, the quality of the jobs. When approaching these points, it is already apparent that it is ideal to take a step back from the Canadian video game industry for a moment along with the influence of AAA studios and quickly pose Sonn and Lee's (2012) points by asking: what is the quality and stability of jobs in the video game industry? While Sonn and Lee's (2012) perspective on quality of jobs pertains to the divide between low skill and high skill jobs and the opportunity to advance such skill, in the context of the video game industry, quality will be considered something else. This is due to the already high skill threshold the industry has, therefore requiring the perspective offered by Sonn and Lee (2012) to be altered a bit due the divide being null. Therefore, quality is linked to the working environment. For analysis purposes, it is far more insightful to investigate the numerous sources written by those in the industry, as well as the thoughts given by the interviewees of this research. Working in the video game industry is not similar in any regards to a blue-collar job and in fact requires post-secondary education in one of the STEM (science, technology, engineering, math) disciplines if one wishes to "physically" work on and build a game. Yet, once an individual finally steps through the doors into their first studio, or boldly launches their own studio, what is the environment like?

Chaotic, energetic, passionate, and stressful are just some of the terms one could use to describe the working conditions of the video game industry, and that is on a good day. This is the image that was painted when consulting the passages and chapters of Jason Schreier's book

Blood, Sweat, and Pixels. As working in the video game industry has become something akin to a high-powered bullet train over time. A train where there are only two stops, and any stops in between might well be a crash with huge explosions, and very few survivors if handled poorly. This may be a very grim picture to draw, but it is one worth telling as this industry is a high-octane one with its own mile markers imposed that are external to any studio, and that is not even including dates such as Christmas. To better illustrate this, consider this passage from Schreier (2017) during his introduction to stories he is about to share with the reader:

> "It's tempting to think, while reading these stories, that these games were all made under abnormal sets of circumstances. That these people were just unlucky. That the developers of these games might have averted hardship if they had followed industry standards and avoided common pitfalls, or if they had made smarter decisions from the get-go. Here's an alternative theory: *every single video game* is made under abnormal circumstances." (pg. XVI)

In traditional industry, there is this adoption of Fordism policies and concepts at some point, which is appropriate for manufacturing. Fordism is designed to cut down cost, making production streamlined. They can only be applied to manufacturing and industries up to the mid to late 20th century. When attempting to fit a video game studio's process into Fordism, it does fall flat. Though the research conducted speaks for itself when interviewees were asked about their processes when it came to developing a game.

At time some responses show a kind of process that occurs in an orderly fashion: "Pitches come from our creative lead, though all team members are welcome to share ideas when they present themselves. Studio management determines which titles to determine time and resources to and development proceeds at that stage" (Glenn, 2019). Other times respondents truly reflected on the ups and downs of the production process:

> "it has been really hectic to be honest…we sat down told ourselves 'hey we can do a 2D platformer right? That's something we can do so let's do a 2D platformer right? Yeah, we

> like platformers and stuff let's do that'. And we wanted to do the game really quickly, that was our ambition, was to make one small game just to release something, our ambition wasn't even to make money on it, just to go through the process once as a team and learn from that. It was supposed to be a learning experience. But then a couple months into it we really liked the concept and saw that it could go much further than what we were envisioning, so we decided to take the longer path. And yeah, I think we blew like deadlines after deadlines until it was released actually" (David)

Furthermore, some showed careful consideration in the thought process when it came to mapping out a new project, and one respondent wrote:

> "In terms of how we decide which direction to take with our projects, we're weighing how much we want to realize an idea, can we stay motivated? With relative strengths and weakness of the team building it, are we realistically positioned to do it competitively? And market factors, is there a big enough gap in the market to justify the budget of the project?" (Scott)

What can be taken away is there is some general flow when it comes to process of making a game, yet the process varies from firm to firm. Why is there such variation? This has to do with the size of the studio and managerial style. This is reflected in the qualitative results with the smallest studio being a one man show, to the largest having 300 employees. This research was able to at least have a representative sample size. What is more important is there is the adherence to traditional managerial styles. When a studio exceeds a certain threshold of employees, there is the need to develop heads of departments (also known as leads) in order to maintain cohesion within the studio. This is not usual, nor should it be a surprise, as the division of labour is a cornerstone of maintaining order in a business. Returning to the issue of variation of studio size, there are the insights that can be gleaned that do echo traditional ideals. For example, a smaller team being leaner is more flexible to respond to the market, yet at the same time does not have the power of AAA studios.

Switching gears to the idea of quantity of jobs, there is much to be said when looking at the timeline of game development. Let it first be said, and this does reverberate throughout the

interviews and data, that there is always the chance to open one's own studio. There are no barriers for those who want to do this and have the skills. Yet, it also takes steep investment and there are risks in doing such things. Letting the focus shift to the quantity of job offers in the current marketplace, jobs are plentiful in the video game industry with there being offers every year for programmers, level designers, animators, artists at large AAA companies. Why is that?

It is due to the flow of development. During times of creating a new intellectual property there is a ramping up of staff, where there is hiring of the aforementioned positions to help move along productions. There are many moving parts to games and many hands are needed to create a AAA game of high caliber. The hiring process for AAA studios may offer permanent positions to incoming employees to keep new them on for the long run. However, there is a common trend that after a project is completed there is a decrease in the number of employees on said game, as once the production is completed and released to the public, the focus is then keeping it maintained.

This being said, independent studios will often lean on contract work, and often out of country for those willing to work at a lower salary, as the financial power is not on par with AAA game studios like Ubisoft or Electronic Arts. At AAA studios, employees will be moved to a new project within the studio to keep as much as possible in house, while independent developers will ensure that the contract worker's time ends after release to keep post-production costs down.

In short, the jobs in the industry very much exist, however a stressful work environment will be present in terms of quality of the job. To note that the quality of the work has gotten much better since the early decades of the video game industry, where using any means necessary to meet deadlines were employed. Luckily, times have changed, and the quality of the

working environment has greatly improved. Despite this, there is one element that will always remain in the video game industry called “crunch”. For those reading who are unfamiliar with crunch, it is simply a time in production towards the release dates, where employees will have to work excessively to complete a working game. The final working version is referred to as the gold master. This can translate into 100-hour work weeks, and this has become a part of the industry culture as well as an accepted fact of the game development process. Is this sustainable? Is an industry built upon on crunch, on stressful periods of time sustainable? This is a loaded questioned and therefore the answer is: yes and no.

Yes, the industry can be sustainable if studios continue to produce games that sell as this industry is a hit-based industry. Games that do well are claimed to be “Game of the Year” and hailed as masterpieces, and their presence has greatly changed the landscape of video games. Studios can strive to create numerous best-selling games; this will spur more development and pay the bills. This is no different with AAA studios, and their presence here in Canada helps generate an industry, and a successful one that thus far is sustainable in terms of future growth.

However, if we scale down the view to individuals and their jobs within studios, is it sustainable? First, as mentioned, as long as AAA studios continue to put out games that are selling, permanent jobs will continue, and job loss will not occur. This is a basic understanding of success, however, is the working environment sustainable for the people? If one is willing to put up with the high stress and demand, then yes; however, this can also affect an employee’s personal life as there is much material (see *Blood, Sweat and Pixels* by Jason Schreier) on how the high demands of the video game industry have caused issues in this regard when not managed properly. What is then created is an industry of make or break? In regard to the branch economy of AAA games, there is no signs of breaking yet but there have been missteps in the

industry these past few years with consumer demand and the quality of the product coming from AAA games. Should the AAA game studios leave Canada, would the employees be left in the dust? To this, a speculation can be made, that it would be doubtful as the industry requires highly trained individuals with a set of skills that can be universally applied due to the rise in technology. Furthermore, the research and development done at video game studios is very much an applicable technology to various sectors. Which brings in Sonn and Lee's next point of research and development.

When it comes to the research and development, Sonn and Lee (2012) are more concerned with the jobs within that given division. As "the significance of R and D extends beyond the obvious and immediate number of R and D jobs. That is because R and D within the region may directly and indirectly spillover to local firms, thereby triggering their innovation" (Sonn and Lee, 2012, pg. 247). Focusing strictly on the research and development done within studios, there is a certain inevitability that comes with the video game industry. At some point, there will be the development of similar technology due to the exposure of the final product to the masses and with these, new ideas for different game mechanics or gameplay.

For example, in the early 2000's, first person shooters were introduced to the idea of only having two inventory slots. For those reading and unfamiliar with this concept, this is referring to the ability for a player to have with them with more than one weapon in their arsenal. As a majority of the AAA first person shooters, before the early 2000's, allows the player to have a seemingly endless supply of places to holster weapons. In games such as *Doom,* the player could have six large weapons and all the ammunition somehow stowed on their character. This was during a time where realism was not a priority, so unrealistic parameters were commonplace. Therefore, in 2000 when *Halo* came out on the Xbox, the restriction of only having two weapons

on their person was introduced to the masses, and from this there was a shift. Players now had to be semi-tactical with what weapons they picked up. This new angle of a simple game mechanic was quickly adopted by other AAA game studios because it added an additional layer of gameplay that was quite simple to implement.

This quick instance shows that knowledge spillover is quite dominant when it comes the video game industry, in terms of "stealing" game ideas. However, Sonn and Lee (2012) point to another aspect of developed nations being that they are able to plan for branch firms, as "regional planners have started recognizing the importance of establishing a R and D function within the region. Consequently, science parks and other similar policy tools became the new orthodoxy within regional policy" (pg. 247). Developed nations are able to create centers for research and development for incoming firms to access, therefore keeping such activities within the country. Furthermore, it is an attractive pull factor for firms to establish the research and development in such areas that can support it, as "in the less-developed regions of a country, where the branch plant syndrome is a genuine concern, branch plants conduct either no R and D or only R and D of a lower grade" (Sonn and Lee, 2012, pg. 248). Tying this back to the video game industry, do these points have merit?

A common thread is the high level of skill required for this industry, and the development process itself is innovative. It can be said that the video game industry will naturally gravitate to developed nations for this exact reason. The respondents themselves answered this when asked if they had to move the studio, where would they go? Aside from saying they would stay in Canada; the optimum places were all in developed nations such as the United States or Japan. In addition, it is important to note that a majority of the operations are done in-house, even the research and development on game engines for AAA games and their studios. For those reading

and unfamiliar, a game engine is "a piece of software used by game developers in the creation of video games. It speeds up and simplifies the process by providing a development framework, tools, and reusable assets. Their design can be limited to an individual gaming platform or operating system, or alternatively, they may work across several" (Bossom and Dunning, 2016 pg.93). If all matters pertaining to the development process are done in house, is there really an issue of spillover? Yes, but in a positive light, recalling that one of the interviewees, Ming, mentioned the following:

> "I believe that video game is a great asset to almost any country, so behind video games is artificial intelligence, right? So, a lot of high tech and it can go to medical, go for agriculture or manufacturing it's all software behind it, it's not just video game, video game is the surface. When I make those simulations, you have to see how each solider has to find a path or something that's all algorithm behind. So, once you build one industry here you build around it, but also, it's digital, it's clean, again it's clean and free to ship"

The knowledge spillover when it comes the video game industry, is a beneficial element as the technology can be multipurpose and utilized elsewhere. In the Canadian context, the Entertainment Software Association of Canada reports that in 2017 50% of the studios in Canada "indicated they created at least one process innovation in 2017" (ESAC, 2017, pg.11). By innovation process, the Association is referring to "the implementation of a new or significantly improved production process, distribution method, or supporting activity" (ESAC, 2017, pg. 11). From that 50%, roughly 22% "indicated that their products had been used for nonentertainment purposes" (ESAC, 2017, pg.12). For the most part these refer to educational tools in both schools and workplace environments. The respondents from Winnipeg echoed this by explaining they completed a project where they "were working on the virtual welding simulator, that was a project that was funded by economic development and diversity certification, through a company called the Centre of Education and Work" (Rachel and John). It is here, where innovation and

application can be seen with the video game industry in conjunction with other industries that wish to utilize unique training and teaching tools, the innovative spillover can be viewed as a positive. This in-turn does respond to an additional concern that Sonn and Lee (2012) point to, and that is the lack of spillover. It is clear, that the video game industry does the complete opposite of this and distributes its unique talents into other industries when the chance arises, and if the studio is willing.

With elements such as spillover and local labour pool driving the video game industry in various ways, when it comes to the branch economy there is another factor that these studios seem to sidestep due to the weightless nature of the video game industry. These are the local linkages that tie the studio's activities to the region or city of establishment. Sonn and Lee's insight on the matter is that, from a policy maker's perspective, a firm will need materials and resources in order to create products. It is the hope that these firms would utilize the local resources in order to energize business, especially at the small and medium size level, for the firms within the hosting country (Sonn and Lee, 2012).

This is beginning to become repetitive when the same point must be made in terms of the video game industry's weightlessness, yet this is a consistent point. Unless the consideration for utilities such as, power and WIFI are considered resources, which they will not be nor should they be as such luxuries are near universal in developed nations. The video game studios do not have any materials that can considered inputs when compared to the traditional sense of branch economies where the focus was manufacturing. However, it can again be examined through human capital being the most applicable in terms of a resource. If labour is being considered in earnest, then there are situations where studios will utilize the local labour pool. For example, one of the interviewees, Rebecca, attained her position through an internship at the studio she

was then hired at. It is in these instances where the real pull of a labour pool can be seen, especially in areas with educational institutions that specialize in fields of interest to the video game studio. For example, the video game design courses at Sheridan College, University of Toronto, and Laurier Brantford to list a few.

Furthermore, there are some restrictive factors as firms have a point where their in-house capabilities drop off and must be outsourced. Often smaller studios will seek out eternal contracts that are financially feasible as hiring local may not be an option for the studio's budget. However, when a firm can outsource locally, they will, as indicated by the interviewees. This is mostly pertaining to elements which they are unable to do themselves. Particularly with public relations, marketing, and most importantly, if the studio is shipping their game to international markets, they will work with a localization company.

With all these critiques of the branch economy, particularly relevant to the video game industry in Canada are the government incentives offered. It is constantly mentioned throughout that the video game industry is one of the freest flowing industries. Aside from the unrestrictive factor of internet access, there are few factors that can attract an industry to a given location outside the ones discussed.

The government incentive programs that have been discussed are some of the main pull factors for studios in Canada. Sonn and Lee (2012) are concerned with the exploitation of such programs and consider this a factor when considering branch economies. They frame it in a very specific way, for if the "incentives are the primary reason for firms to invest in that region, then the branch plant may merely exit the region or threaten to do so whenever the incentives expire" (pg. 250). With this very specific viewpoint, it would seem that the video game industry does not adhere to exploitation in the branch economy perspective. This is due to branch economies being

a concern in developing countries where the foreign direct investment may be the life blood of the given area. When that concept is turned to the Canadian video game industry, there is another misstep as Canada does not rely on the video game industry to keep the economy afloat. Even the government programs which the video game industry access are usually multi-industry programs, with the film industry, most notably, being able to dip into the same pot as the video game industry.

In the compilation of branch economy literature synthesized by Sonn and Lee (2012), the parallels that have been drawn are undermined by the disconnect that the video game industry brings when using the branch economy lens. It is important to remember that through this analysis the literature was, and still is heavily focused on manufacturing and other primary/secondary industry sectors (Belderbos, and Capannelli, 2001; Crone, 2002; Greenaway and Wakelin, 2001; Yamin and Sinkovics, 2009; Sonn and Lee, 2012). This makes the video game industry inherently a hard fit for the branch economy even though it has been demonstrated that the industry in Canadian is primarily composed of foreign studios. All the studios with the largest budgets and the largest number of employees, are studios that have their headquarters outside of Canada.

The bottom line is while the industry itself can move with fluidity, it is still subject to the great attraction of financial incentives, in which Canada is a vigorous participant. Like branch economies, the video game industry must go where the resources are plentiful though unlike the traditional manufacturing plants, the studios need highly skilled human capital. In fact, they thrive on the creative process of the human imagination to create exciting new games. It is a hit-based industry there is the danger of going under due to bad performance in sales and overall reception of a game, leading to the threat of these titans leaving Canada. The divergence the

video game industry has from the manufacturing industry is the spin off/independent studios coming from the Canadian AAA video game studios. This has resulted in an additional of the industry that has slowly been on the rise and thriving in the past few years. While the independent studios do not have the power that the AAA studios possess, it is still enough to solidify a video game industry in Canada. This creates a strong linkage to the region, enough that the sector has risen with the establishment of AAA game studios in Canada.

The Canadian video game industry does exhibit branch economy-like characteristics because of the strong presence of foreign studios. There is very little collateral damage seen at this point in time due to the following reasons. First, Canada is a developed nation that does not rely on these studios for its livelihood; and second, the industry's main resource is the labour and not a physical material when compared to that of traditional manufacturing. The third point is that the labour required is a highly skilled workforce where their unique talents are employable in other fields. Finally, fourth, the workforce has the ability to begin their own independent studio for which the bar for entry is quite low. The fifth and final point is that because of the low bar of entry, a grassroots video game industry has greatly increased its presence over time. The Canadian video game industry has created a unique sector that is entirely Canadian born and bred. These factors are what set Canada apart from such worrisome implications that branch economies have had in the past and present in developing nations.

5.3 Old and new industries

One of the most basic understandings of geography is that things that are closer together are more likely to be related, and one way to verify this is through spatial interactions. This dissertation follows this stream of thought by utilizing GIS techniques and spatial statistics to confirm the clustering of video game studios in Vancouver, Toronto, and Montreal thereby

acknowledging that the close proximity of the video games studios equates to the commonality that these studios are related by means of their desire to locate at the given area, in this case cities.

With the concept of urban hierarchy as a guiding tool, there are some obvious considerations and notes that have been discussed in this work. From development of high-tech clusters, to the more social elements like the higher standard of living in Canada, there have been many explanations as to why the industry has situated itself in the unique distribution that it currently exhibits. When it comes to understanding spatial interaction, specifically the flow of goods, services, and information, there are some insights that can be leaned on. The data collected from interviews and research has led to the conclusion that the behaviour of spatial interaction in the Canadian video game industry, and by some extension the international industry, is extremely different and stands apart from traditional understandings of how an industry locates itself and operates within its home region.

This has already been touched upon in previous sections, but this section points out the difference present in the Canadian studios when it comes of flows. When considering what has already been laid out, there is now an understanding as to why video game studios come to Canada, and why they stay. What has not been a point of conversation is the flow between firms, and the products.

Macro-level movements are the point of interest with funding and financial transactions set aside. The largest factor contributing to this is the entry into the market itself once a firm has entered into production. It is at this moment where the competition is no longer limited to the local area of the firm. Video game studios are never truly in local competition as their product is distributed public and the entire international market has access to the new game. The flow of

goods and services from a video game studio, in this decade, are bound to a macro-level movement. To an extent, one could argue that the observation of spatial interaction could be applied to flow of the more dominant raw materials: the employees of the studio, as they come and go to work. However, that is more or less redundant based a few of the findings.

Considering the varying situations of studios ranging from independent developers to AAA, each situation dictates the interactive place of employees. If it is a small-scale studio, they are more likely to work from a small office space or from home and outsource to international contractors as their wages are lower. With the independent studios, there is still a strong workflow that continues to link to the international. Perhaps the greatest reason this will be a strong tie for Canada to the international and macro-level is the lack of publishers in Canada for video games, and the branch economy that is the makeup of the leading studios here.

While this refers to basic business practice of the movement of goods and services, there are still elements that can be viewed in terms of flow that can be directed toward micro-level events within a city. This is more abstract, as what can be viewed as the intercity interaction and knowledge transference, which may be somewhat challenging to measure. Throughout the interviews, there was discussion surrounding competition and cooperation. It was at this junction that both these talking points had elements to note. First, when it comes to competition, the strongest response is what has been pointed out by this dissertation: there is much competition from day one that often developers do not worry about their competition as it will always be there en masse. The focus is then on differentiating themselves to stand out above the competition, considering the variety of games present within the industry. Compared to the steel industry for example, where the product is steel, just in different forms for utility, video game developers must compete with varying genres which have their own unspoken parameters and

vying for entertainment must propose a unique experience. Second, and pertaining more to this section, is the matter of cooperation.

It is hard to imagine cooperation in such a competitive industry as the entertainment software one. However, there are instances of such cooperation that present themselves in certain regions, to which there is an element of geography. One of the more commonly noted examples exhibited was with the contacts in Winnipeg, and which they spoke of a more relaxed environment where there seems to be a more friendly feel to the video game community to the point where troubleshooting and bug fixing can be completed with the aid of a local developer, due to this knowledge spillover and informal network that aids all members. In this sense, the informal cooperation that is found within the community creates a unique culture within this geographic area through means of shared industry experiences. It is also important to note that the Winnipeg video game industry is not nearly as large as in the other major cities of Vancouver, Montreal, or Toronto.

While informal cooperation can be seen as a loose interpretation of knowledge spillover, what is concrete in this research is that the clustering of the video game industry has resulted in unique social elements. These social elements vary depending on the size of the studio, as there seems to be a trend of smaller studios having increased interaction between each other. This can be exemplified through David's comment regarding other studios in Quebec City, where his studio, Bishop Games resides: "But on a more equity bases we are a more of a collaborative kind of studio, we prefer to consider other studios our friends than our enemies, and it pays off a lot more that way" (2019). It is often a source of comradery, as a few of the interviews explained that it was not unusual to go to the local pub after work and be joined by other independent developers. As a personal observation, when conducting field work at the Enthusiast Gaming

Live Expo, often the independent developers were excited to not only show their wares, but to meet other small-scale developers and converse on troubleshooting and the overall process. This is not to say that large AAA studios do not engage in this comradery; however, the large-scale studios do have more restrictions on the freedom of knowledge leaving the studio.

With these studios clustering together and sharing knowledge to an extent, is there an increase in innovation or the development of a new network? With the data collected there can be some insight. The video game industry is based on innovations at intervals of every eight years or less, and this is generally dependent on hardware and software manufactured. The trends of video game console launch dates can be used as pseudo-measurement to gauge these intervals. For instance, the upcoming consoles for Sony and Microsoft were revealed his past summer (at the time of writing), announcing their release date within late 2020 or early 2021. The current generation of consoles were released in 2013, putting the interval at roughly eight years. The innovation process in terms of devices and the platforms shifts during this cycle, forcing developers to keep pace with the changes during this time. It can be said that the innovations occur with the applications of these new technologies. While these technologies seem to make leaps within a decade, the geographically locations have, for the most part, remained in areas where they have generally been for the past few decades. In the video game industry's case, the next products can be considered the next steps in innovation, and once the new consoles are available for widespread consumption, developers are able to utilize these new tools upon release to create new games, creating a cycle of boom with the introduction of a new system, then a lull before the release of the new console (Johns, 2006). This circles back to the notion that geography is not a must as long as developers have internet connection, yet there is still

clustering for this high-tech industry, as it does tend to make a home for itself in areas of high population, or on the bones of old industries.

The notable clustering of certain technological sectors are usually ones that feed into each other like Silicon Valley. The Canadian video game industry is not inherently bred from the savvy tech cluster as is its American counterpart. The industry here, as mentioned throughout, was based in the film industry and what can be seen is that the video game industry situated itself in Canada within cities that had a high concentration of film industry and supporting sectors. This is not due to location of innovations; this is due to tax breaks and financial incentive programs which the video game industry has access to. Fast forwarding to today's industry, they are the still concentrated there but it is not due to the need to be at these locales. As the industry became more and more online and, in the cloud,, there seemed to be less and less a need for geography for this industry, especially since the programs for financial aid can be accessed and applied for online as long as the studio can prove it is in the province of application.

With this in mind, is clustering that ideal way to look at the video game industry here in Canada? The data presented within the confines of this dissertation shows that clustering in major cities shows no real advantage unless a studio hits a certain threshold in regard to their size, to the point where the pull factor of the "city living" is used to entice new labour or there are city specific grant programs. Most of the work and business can be conducted online or in the cloud and the importance of geography seems to be ebbing away to the virtual world.

Another perspective to consider is that of networks. With the mention of the informal industry community and knowledge spillover, the best way to consider the clustering of is perhaps thought best through the interpersonal relations. While there is this irrefutable evidence of clustering, there seems to be a lack of interaction in the traditional sense in terms of industry

where firms establish themselves near material or market sources for the video game has little need to do so. As a majority of its work is done virtually, there will always be access to the to these factors as long as there is internet access.

When looking to relations or network ties, it is important to note the synthesis of the literature that is offered by Taube et al., (2018) in that the social network theory has two viewpoints: one that focuses on the embeddedness and cohesions, and the other on the holes and short comings of the networks (see also: Coleman, 1988; Uzzi, 1998; Burt, 1992; Granovetter, 1973). Taube et al. (2018), explain:

> Scholars taking the former view argue that denser network ties reflect trust, thereby enabling network actors to corroborate the same knowledge and to collaborate. The latter stream argues for networks characterized by structural holes, in which focal network actors with non-redundant network ties bridge previously unconnected actors, to provide focal firms with novel information and knowledge. (pg. 2)

From what has been gathered from the research data, it is assumed that the video game industry clusters have networks that fall into the first ideology, which promotes the community feeling noted in Winnipeg. In addition, the role of AAA game studios can also be seen as a contributing element to this as often employees will leave working for AAA game studio and start up their own studio. Such start-ups add to the city's potential number of studios and active actors.

What has occurred over time is an industry that does situate itself in traditional locations in terms of economic geography literature. It does not behave in adherence to the literature's overarching concepts of locations, instead taking cues from more social elements such as networking and knowledge spillovers in the studios cluster. Furthermore, the video game industry is more likely to settle down in locations in Canada that have tax incentive programs. While the programs are federal and provincial, various studios still opt for major trade cities and

these are often the large-scale AAA studios. From that point, there is a dispersion of smaller studios that are birthed from experienced former employees of these AAA studios, usually a few years after the AAA was established. The flow of this industry varies from international levels with its good and services, to the internal motion of larger studios providing experience and training for the next generation of independent studios, that in turn support each other with informal networks.

5.4 An Observation

When it comes to economic geography and the video game industry, there have been considerations mostly in regard to being in the creative and cultural sector. While this is not the priority of this dissertation, as the focus has been on the application of foundational location theory onto the video game industry, it does merit a conversation regarding the industry within the underpinning network concepts that has been skirting around much of the discussion.

To begin, what are cultural industries and creative industries? The already present issue is the inherent struggle to define and separate these two, as this conundrum stems from the two always being grouped together in various officially recognized classification systems. For instance, in the North American Classification System, the video game industry falls under the information and cultural category. However, there is always a buzz around creativity of industries is this subcategory, specifically in the way production occurs. Looping back, the question can then be reiterated as what is the difference between the two industries? What makes it troublesome is the constant blending of the two, more so with government departments such as the Department of Culture, Media, and Sport in the United Kingdom. Both industries regard innovation through the creative process of the work force (Boccella and Salerno, 2016), and both take the entertainment industry to be in their realm (Peltoniemi, 2015). In addition, there is also

the concept of symbology in terms of interpretation and meaning presented to only a select community that resonates within both industries (O'Conner, 2015). For the sake of this dissertation, the innovation shall be the crux of the matter as creative industries tend to lean more heavily on the technology to aid in the process of production, where cultural industries can begin to dip into religious aspects like sacred sites. While sticking to the technological divide, can video games have a cultural element to them to the point where they can be considered more of a cultural product? Can video games be inherently cultural? While these posed questions are not the intended subject of this dissertation, and in fact have entire disciplines dedicated to answering them. The remained of this section is not to be considered an attempt to answer these questions but merely an observation coupled with what has been discovered through the research conducted for this dissertation.

There are more clear-cut products that have strong elements of culture infused into the very core of them: food, art, and religious items can be considered to be on top of this list. These items can have cultural significance from their conception, while video games on the other hand as a collective do not quite share this. In essence, the question to be examined in future research is: can video games be considered inherently cultural? Or is the culture created after creation? It is very much the analogy of the chicken and the egg debate; however, there is a much stronger position for video games to be placed within the creative industry along with the financial boon of being labelled as such.

There is much to be said and that has been said about creative industries and their intertwining with cities (Evans, 2009; Florida, 2003; Kong 2009; Mommaas, 2009; Taylor, 2009). Of the three cities discussed at length within the pages of this dissertation, Montreal is the most cited one in this regard (Cohendet and Simon, 2018; Desilie, 2019). The data and

information provided within this dissertation supports this as well. One of the main thrusts of this research is understanding why there is clustering in key Canadian cities. This has been answered to an extent through the data provided, and Montreal is an ideal to discuss the underpinning that is present within this research. Montreal can be viewed and dissected quickly with the guiding principles of location theory with the video game industry in mind.

The city of Montreal is well connected in terms transportation, with numerous highways surrounding and traversing the city, the international airport, and the waterways making Montreal a hub. None of the data showed this a reason for studios to set up shop in Montreal, even though it is an added bonus. Being that the work of a video game studio is virtual, making the world and work at one's fingertips, the question loops back to why Montreal? It then must lean on the main factor of labour, as it is one of the few elements that can be relied on for explanations.

Initially, urban hierarchy can be applied in understanding the draw to Montreal as it is a high population center and has many of the conveniences that come with a good infrastructure. More importantly, the labour pool that is needed for the video game industry is already present in Montreal due to the high concentration of creative industries within the city. Whether this is due to the longstanding creative firms in film and audio/visual or the many educational institutions, Montreal has a strong support system to nurture creative industries. Montreal's significance comes from the numerous successes it has had in the past with creative industries, and the government support for it; however, there is an additional element of the unique culture of Montreal (and by extension Quebec), due to the French culture heavily embedded in the daily life of the city. This greatly appealed to European firms seeking to expand beyond their own border, and while this has been discussed already there is a different but somewhat parallel

perspective to consider with the works of Balland et al (2013) regarding networks. For the research put forth by Balland et al (2013) brings into light three drivers of interfirm network formation: “structural endogenous networks structures, proximity mechanisms, and individual characteristics” (p,746). In other words: infrastructure, clustering, and leaders. The point of discussion here will be on the final point of individual characteristics.

When examining the idea of individual characteristics, Balland et al (2013) understand this in their research as experience and the size of a firm. Within the video game industry, these two factors feed into one another which in turn brings in the true underpinning observation of the purpose of this section: cycles. As there is an inherent cycle that is created in the video game industry when considering factors such as creative industries, networks, and location theory.

First is the establishment of a cluster. This is done via agglomeration in cities such as Montreal that have attracted much in terms of the film industry. This in turn allows the video game industry to follow suit, as there are many parallels between the two industries. Eventually, a large and experienced studio will enter the city. In Montreal it was Ubisoft from France. The obvious attributes of Montreal’s similarities to France were the driving force for establishing a branch firm. What is important is that once Ubisoft established itself in Montreal, this created a location leader. One with the experience and the financial backing as a testament to their success. This attracts young bright-eyed members of the work force to apply and work for such a prestigious studio. After years of working at Ubisoft, the once young employees are now veterans with experience and knowledge, enough so that leaving Ubisoft and starting an independent studio is not a pipedream. As the individual has now created a network through the years, whether it be knowing other people who would be willing to join the new independent studio or having the knowledge to navigate the funding route. It is here where the cycle becomes

cruel, as there is such fierce competition within the industry. However, should the independent studio actually succeed they too shall become a location leader over time with such individual characteristics that echo Ubisoft.

It is this cycle that shall repeat. The video game industry is more a creative industry due to this cyclical nature. To which Balland et al (2013) and others note (Grabher, 2001; Storper and Venables, 2004), that "Creative industries are inherently characterized by cycles of fads and fashions and the constant demand for novelty, which gave rise to the project-based organization of production, continuous renegotiation of value(s) and the importance of local buzz" (pg.742).

This brings in the observation for future research: the slow removal of middle-sized firms. As this cycle continues there is the slow disappearance of the middle-sized firms. This could be related to the numerous purchases by large AAA studios of successful smaller studios therefore not having the chance to reach that size of middle classification, with a 50-100 employee range. What is concerning is that this creates a vacuum in industry here in Canada where not only the labour force will be a part of non-Canadian AAA studios, but the entire Canadian video game industry identity may become non-Canadian, all due to the cycle of growth and success.

6 Conclusion

6.1 The Canadian Video Game Industry, Synthesis of Findings

This dissertation's purpose was to view the video game industry here in Canada through the economic geography viewpoint and determine how this mobile industry fits in with the traditional literature, and how it interacts within those parameters. With the extensive discussion in the previous sections, there is a synthesis of the main points.

First, there is clustering of the video game industry here in Canada with the main locations of the highest concentrations are in Vancouver, Toronto, and Montreal. This is not surprising and is expected based off the concept of urban hierarchy. What is interesting are the outlying regions where there is clustering. These regions are mostly on the East Coast of Canada. There is a majority of small independent companies that focus on app development or PC games, and some of these are subsidiaries of larger AAA studios such as EA and Ubisoft.

The second finding is the unique characteristic of the Canadian video game industry as a branch economy. While there are numerous studios in Canada, a large majority of them are independent and Canadian owned and operated, the more pronounced studios in Canada are in fact foreign AAA studios and publishers. Analysis determined that at this time and due to the healthy economy, branch economy syndrome will not harm the overall Canadian video game industry. However, it does have an implication for the identity of the industry here in Canada. The face of the Canadian industry in terms of games is primarily these AAA foreign studios. While there are local studios that have found great success such as BioWare with the *Mass Effect* trilogy, and StudioMDHR with *Cuphead*, there is still the overwhelming and consistent presence of large studios such as Ubisoft, Square Enix, and Electronic Arts that have become a dominant force in Canada. This is mostly due to the tax incentive programs, quality education, and positive standard of living that is offered here that draws all sizes of studios.

The third point is the social elements that seem to set Canada apart and offer a unique work landscape. The overall acceptance and ability to become a video game developer is an opportunity that is offered here, in conjunction with the funding programs that allow for start-ups to have aid through their first few years. More important is the development of networks that are present at varying levels of the video game industry. As the scale or size of a studio decreases,

there is an increase in the likelihood of casual interaction. The instance of networking and knowledge spillover is palpable, and future research is required.

The fourth point is about labour and innovation. The largest difference when it comes to the video game industry and other traditional industries, is the very heavy emphasis on the importance of the worker. As the industry becomes increasingly grounded in the virtual, it is here where the innovation of employees to utilize technologies to create a unique product allows studios to stand apart from the competition. As well, the video game industry has become a strongly mobile industry where the only definitive factor that can ground a studio to a given location is labour, aside from internet access. This in turn creates an industry that is heavily saturated in the social elements of a decision-making process when compared to that of economic decisions.

Growth and expansion are at the forefront when it comes to success. The increase of profits and presence is something that can be viewed over time when examining an industry, and the video game industry is no different. Referring back to the quantitative results, there was an observable growth over time and discernible clustering in given areas. This growth has been a positive in terms of Canada's standing on the international stage of electronic entertainment. Being the third largest producer of video games is no small feat, but does Canada have the ability to move itself to higher standings? How can the continued success be monitored? To fully answer these questions there must be moment of stepping back where there is a consideration of what Canada currently represents for video game developers, and by extension what Canada represents as a gaming nation.

The first consideration has been covered extensively throughout this dissertation, but to quickly reiterate: Canada offers a haven for those wanting to develop video games and is

especially attractive for foreign and local studios because of the financial support offered in the country. Canada is a nation where becoming a video game developer or being a part of a studio is a viable option for an income and by extension, lifestyle. While this is no different from the United States, it was the noted culture of accepting and welcoming of developers in Canada. What does this all mean? In brief, Canada has set itself up for positive growth, if only based on the numbers provided by the Entertainment Software Association of Canada.

There is a better measurement that needs to be considered in terms of longevity and sustainability of the Canadian video game industry, and that is the life span of firms and percentage of financial support received after the initial launch period, the life cycle and working environment of the video game industry. It is a hit-based industry where from day one a studio is not competing with local firms but an entire international industry. Therefore, for positive growth there needs to be an assurance that firms establishing themselves are able to support themselves after a five-year period or after first launch of a flagship project. Additional research should be conducted regarding the life expectancy of video game studios here in Canada, and such data should be used to further bolster the attraction of the industry, as well as to understand the short comings. The Canadian video game industry is poised to become a great nation for developers with the support of the consumer ever present here in Canada and on the international level. The video game industry is here to stay. Yet the question remains as to whether or not it can flourish and rival in power to that of its American counterpart.

To conclude, let the original questions for this dissertation be answered. Does the Canadian video game industry fit into the economic geography paradigm? Yet, this can be viewed through the dispersions of the industry falling into urban hierarchy, stemming from the understanding of attractive location factors. These being the diverse labour pools; seemingly

endless access to markets via the internet which is enable due to the healthy infrastructure that the major trade cities offer; and coupled with high standard of livings. The next question was the on the outcome of this dissertation's perspective on the industry in Canada. This is answered though the observation of the fruitful working landscape, yet this has resulted in a branch economy which is the real finding on a macro level. With all the power and influence coming from foreign firms via their branch studios in Canada, the harm will not be in terms of production or revenue, but in fact in the struggle for the Canadian identity is in its own video game industry. The final question posed at the beginning of this dissertation, was what is the best perspective to utilize when examining the Canadian video game industry? The neoclassical conceptual perspective that was present in this dissertation was ideal at unveiling factors that interviews deemed important for location; albeit ones that were not economic but more social ones. As the earlier synthesis points out, this perspective is optimum when examining why to locate at a given spot, yet for understanding the growth of the Canadian video game industry a more social or network perspective must be used.

6.2 Final Thoughts and Future Research Opportunities

As the intended purpose of this dissertation has been reached, there is still room for lingering questions, or areas of research to be stated for further pursuit. In general, the focus of research on the video game industry should be done in a network analysis approach to some degree. This is due to the more social elements of the industry, as the success of a studio is tied to the game's community and following, which should also be an area of investigation for future research.

Aside from the aforementioned analysis focusing on the longevity of a video game studio in Canada, which needs to be a priority in future research. There should also be network

approaches of seeing the linkages with AAA studios and independent ones. This would be useful in terms of looking at previous employment as the factor of analysis, and also further aid in solidifying the concept of AAA studios being anchor points and training wheels for fresh members of the work force. This could also be tied into the supporting industries as well, examining the linkages with video game studios to local firm, in terms of local knowledge or resources being used.

Yet at the end of the day, a video game console or a video game itself is not a necessity, it is a luxury. It is a device that has seduced the consumers into believing that it is a staple in daily life. It offers that escape unlike any other that can be offered in the tangible world, and that is its biggest ploy, being able to offer a virtual world that is not restricted to the Earthly domain and can be accessed at the push of a button. To see the future of the video game industry, one must understand the importance of what it is to not only those who work in the sector, but those who participate in it, from the consumers and the professional gamers, to those seeking to further the stories of the video games. A video game is not simply a toy, but a labor-intensive story to which developers invite players to participate in an undiscovered world into which consumers eagerly dive headfirst. The video game industry is not so much an industry as it is a massive international virtual community who greatly enjoying diving into the creative minds of its members.

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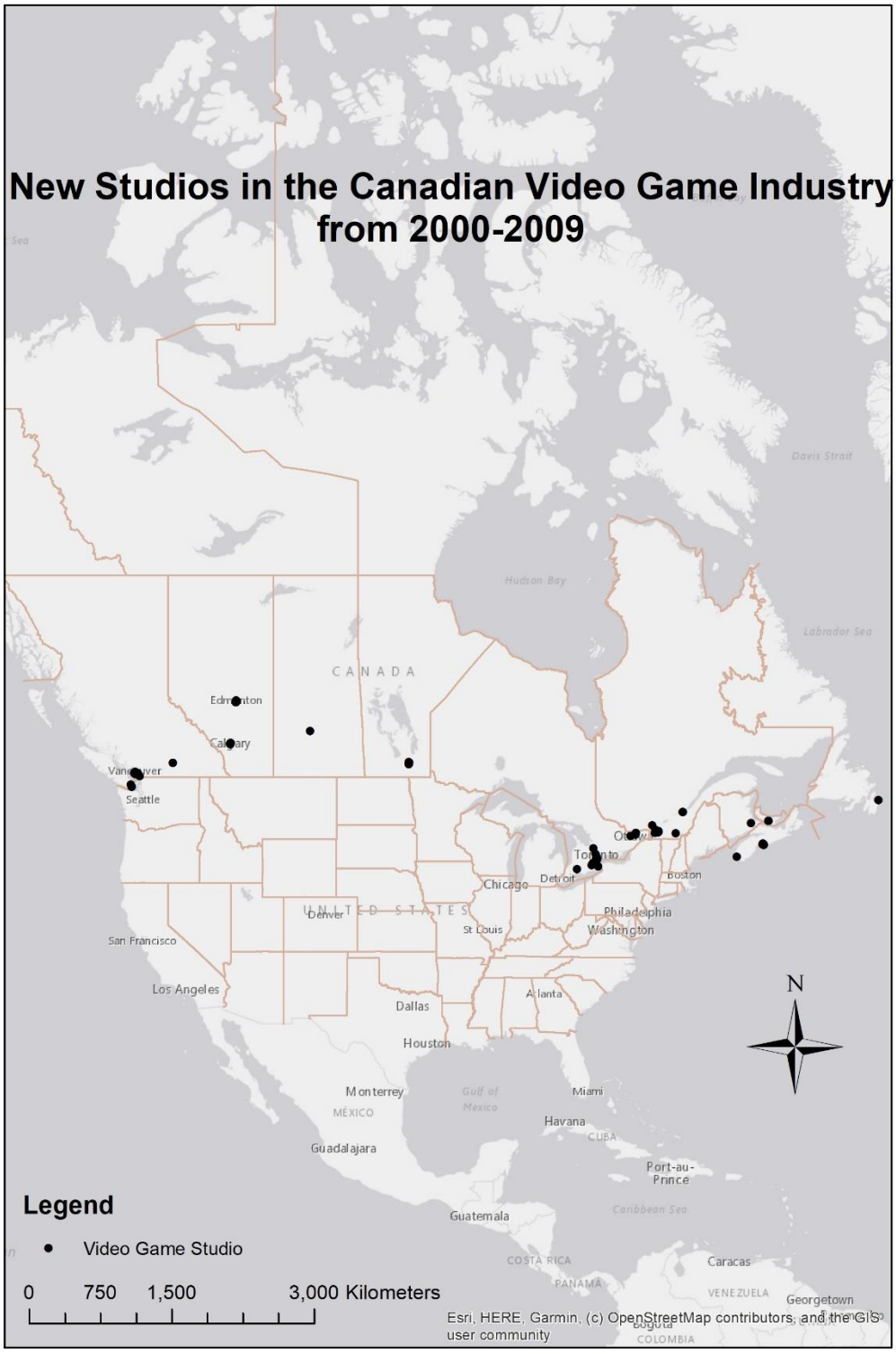
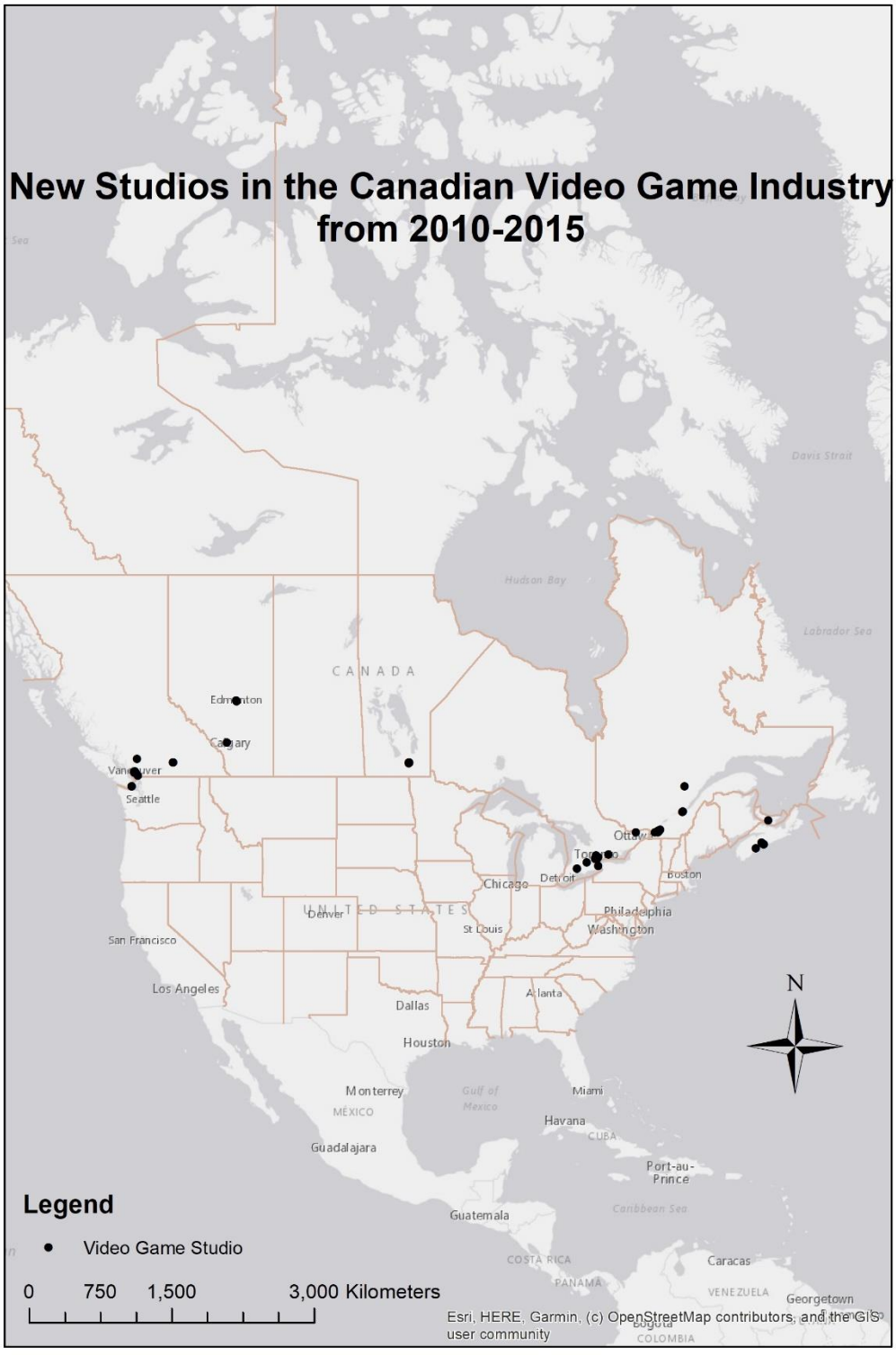
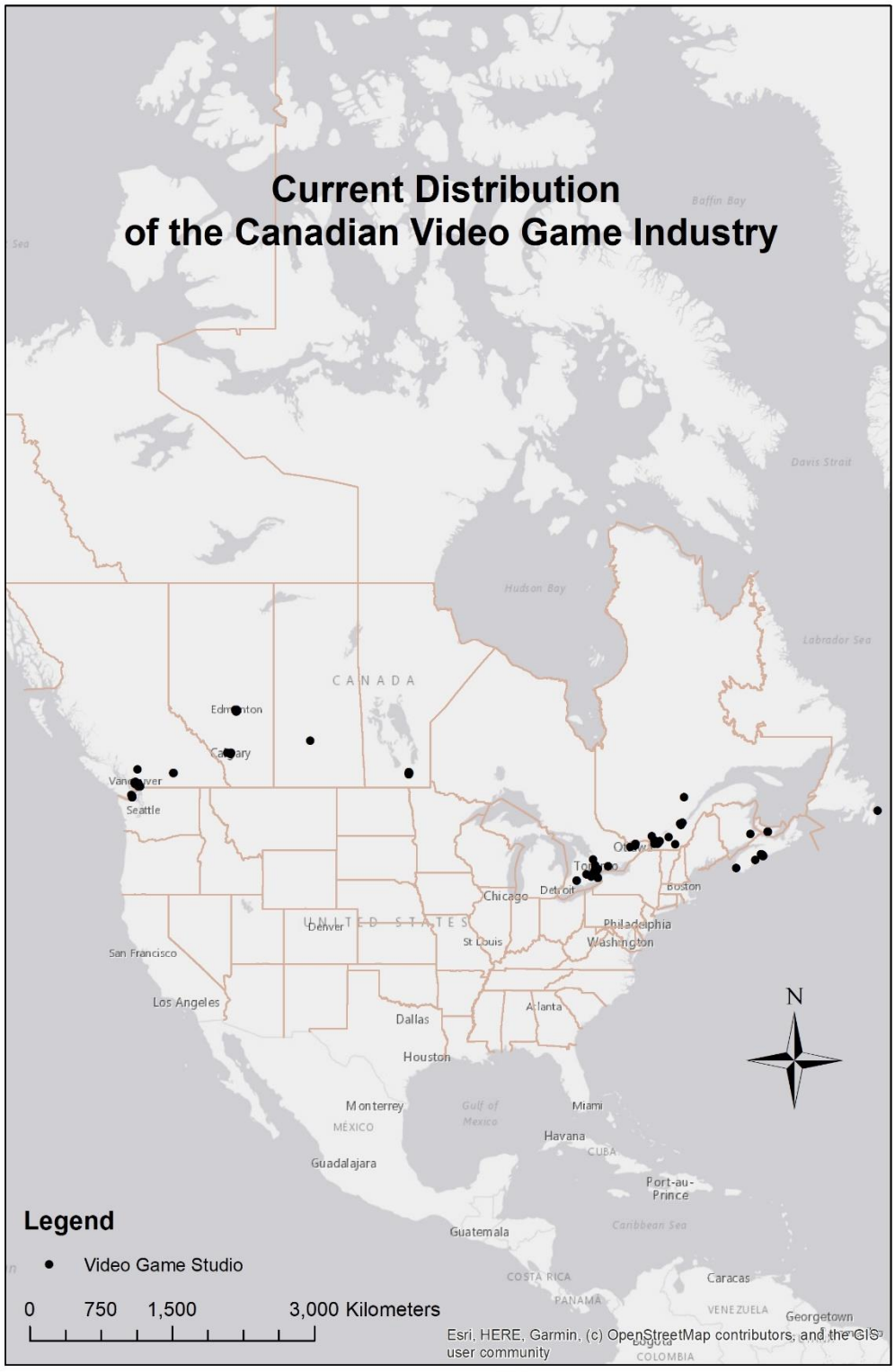
8 Appendix

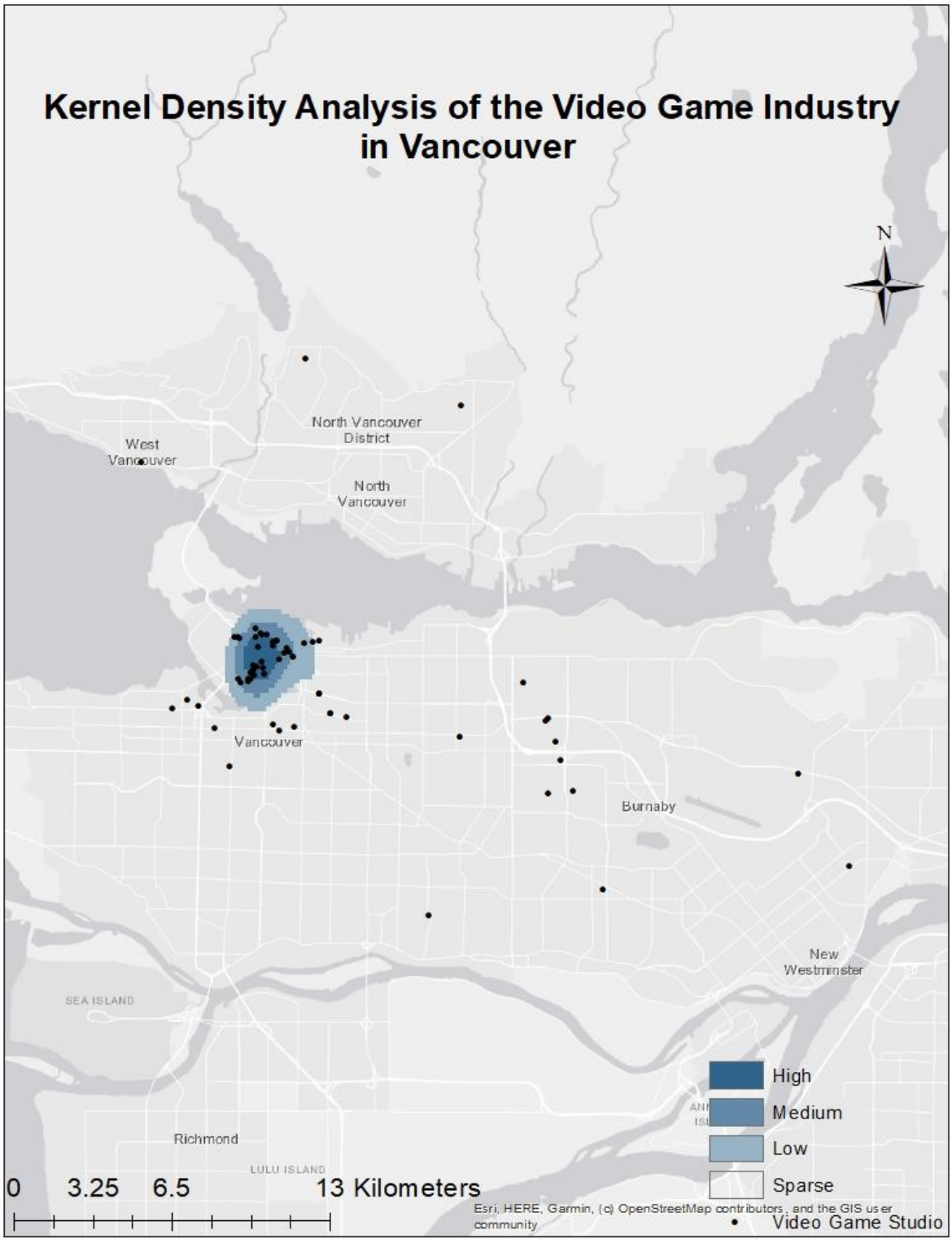
8.1 Appendix 1: Time Lapse of Video Game Studios via Point Map

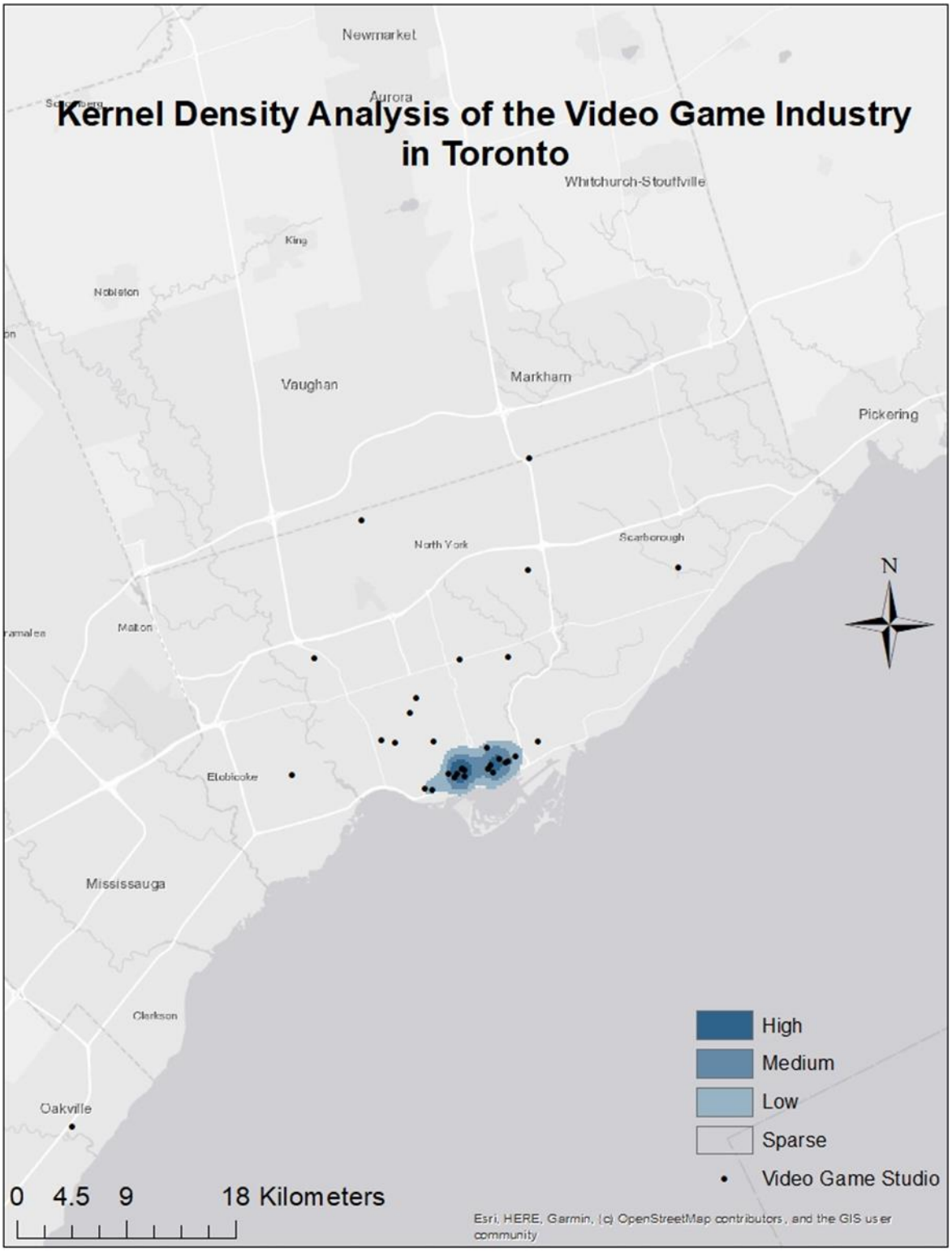

New Studios in the Canadian Video Game Industry from 2000-2009
Davis Strait
Hudson Bay
Labrador Sea
CANADA
Edmonton
Calgary
Vancouver
Seattle
Ottawa
Toronto
Detroit
Chicago
Boston
Philadelphia
Washington
UNITED STATES
Denver
St Louis
San Francisco
Los Angeles
Atlanta
Dallas
Houston
Monterrey
MÉXICO
Gulf of Mexico
Miami
Havana
CUBA
Guadalajara
Port-au-Prince
Caribbean Sea
Guatemala
COSTA RICA
PANAMA
Caracas
VENEZUELA
Georgetown
COLOMBIA
N
Legend
Video Game Studio
0 750 1,500 3,000 Kilometers
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

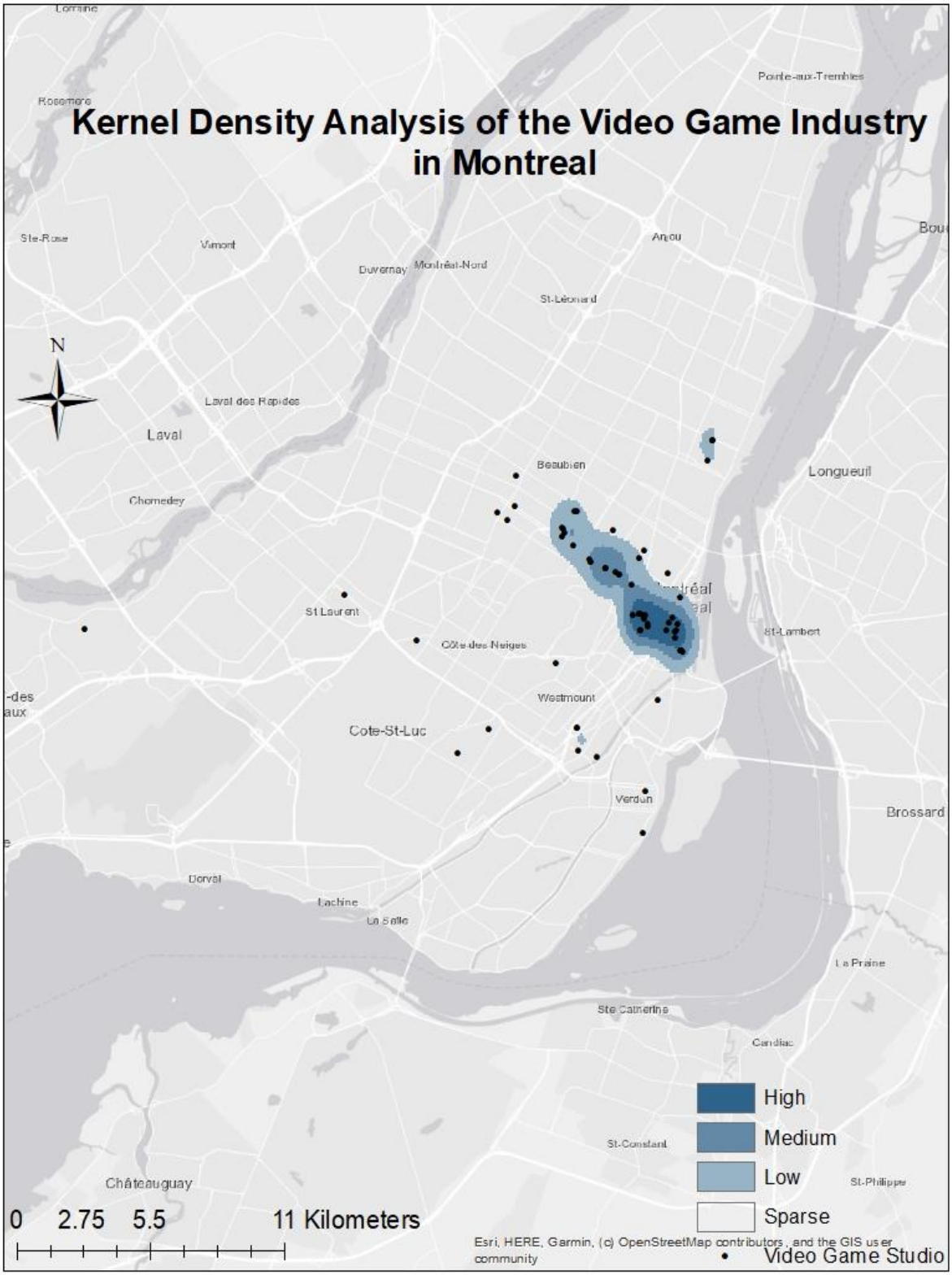

New Studios in the Canadian Video Game Industry from 2010-2015
CANADA
UNITED STATES
MÉXICO
CUBA
COSTA RICA
PANAMA
COLOMBIA
VENEZUELA
Davis Strait
Hudson Bay
Labrador Sea
Gulf of Mexico
Caribbean Sea
Edmonton
Calgary
Vancouver
Seattle
San Francisco
Los Angeles
Denver
Dallas
Houston
Chicago
Detroit
St Louis
Atlanta
Philadelphia
Washington
Boston
Ottawa
Toronto
Monterrey
Guadalajara
Miami
Havana
Port-au-Prince
Guatemala
Caracas
Georgetown
N
Legend
Video Game Studio
0 750 1,500 3,000 Kilometers
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community


Current Distribution
of the Canadian Video Game Industry
Baffin Bay
Davis Strait
Hudson Bay
Labrador Sea
CANADA
Edmonton
Calgary
Vancouver
Seattle
Chicago
Detroit
Boston
Philadelphia
Washington
Denver
St Louis
San Francisco
Los Angeles
Dallas
Atlanta
Houston
Monterrey
MÉXICO
Gulf of Mexico
Miami
Havana
CUBA
Guadalajara
Port-au-Prince
Caribbean Sea
Guatemala
COSTA RICA
PANAMA
Caracas
VENEZUELA
Georgetown
COLOMBIA
N
Legend
Video Game Studio
0 750 1,500 3,000 Kilometers
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

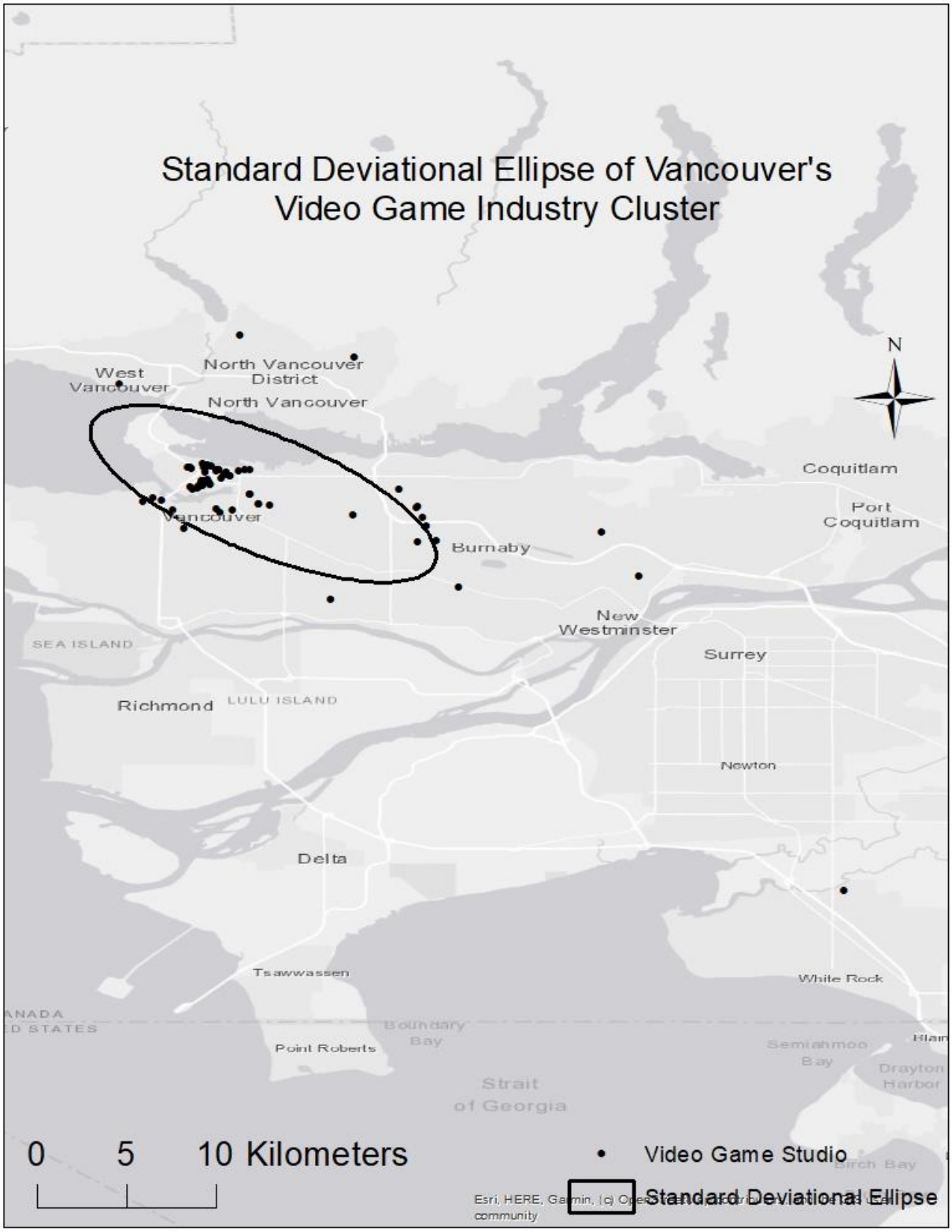
8.2 Appendix 2: Kernel Density Analysis

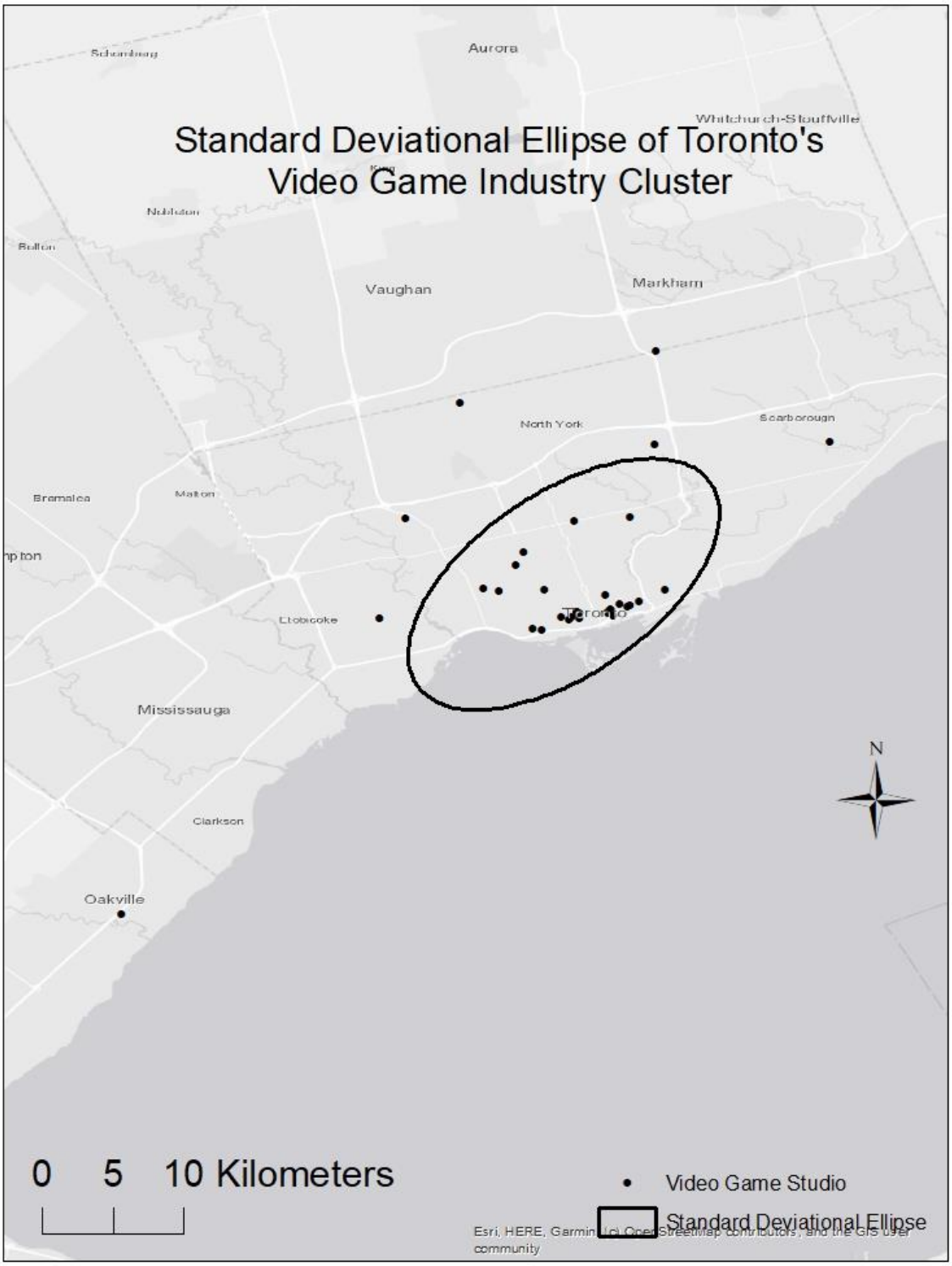


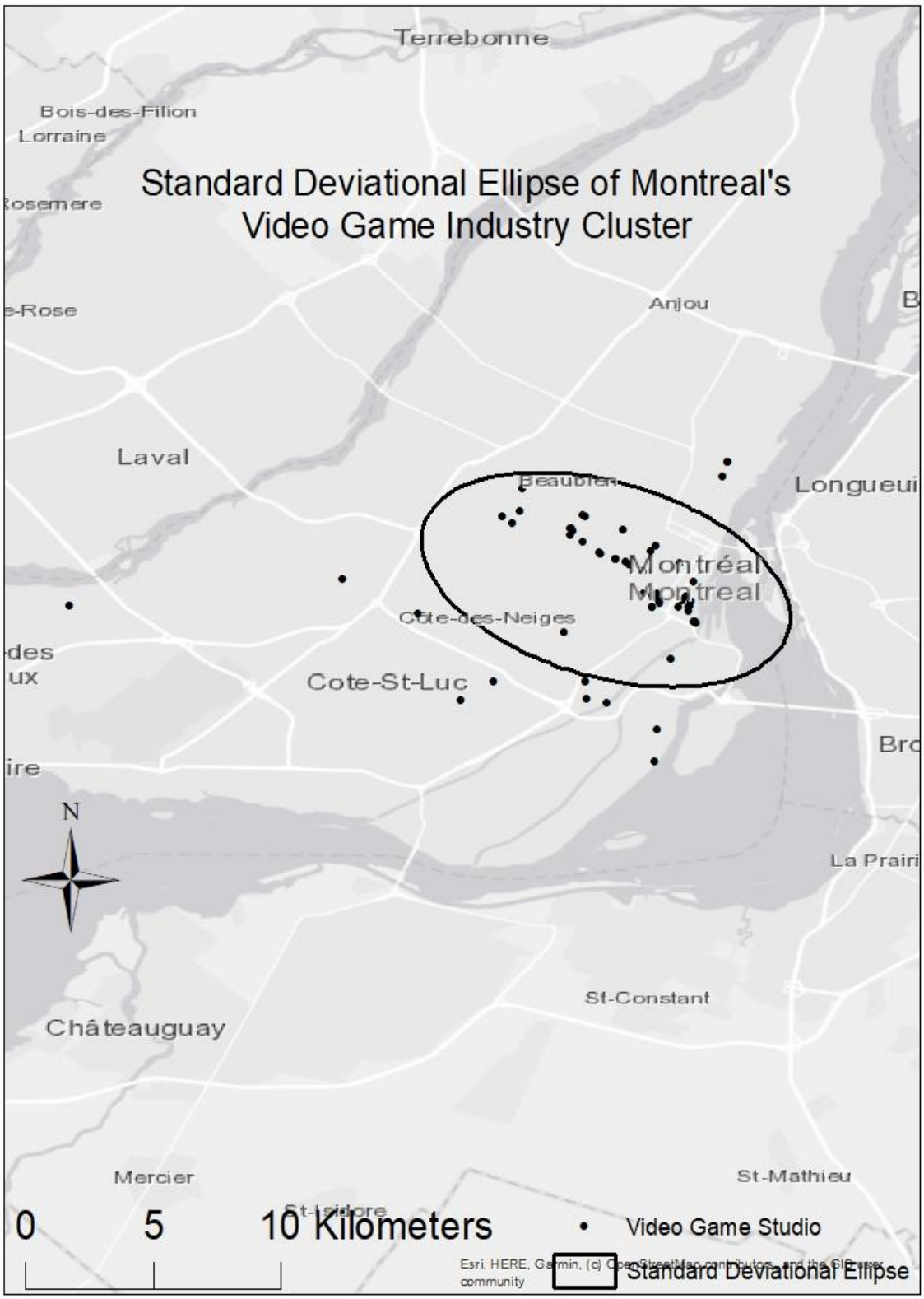

Kernel Density Analysis of the Video Game Industry in Toronto
Newmarket
Aurora
Whitchurch-Stouffville
King
Nobleton
Vaughan
Markham
Pickering
North York
Scarborough
Malton
Etobicoke
Mississauga
Clarkson
Oakville
N
High
Medium
Low
Sparse
Video Game Studio
0 4.5 9 18 Kilometers
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community


Kernel Density Analysis of the Video Game Industry in Montreal
Lorraine
Pointe-aux-Trembles
Rosemere
Ste-Rose
Vimont
Duvernay
Montréal-Nord
Anjou
St-Léonard
N
Laval des Rapides
Laval
Beaubien
Longueuil
Chomedey
St Laurent
Côte-des-Neiges
St-Lambert
Westmount
Cote-St-Luc
Verdun
Brossard
Dorval
Lachine
La Salle
La Prairie
Ste Catherine
Candiac
St-Constant
St-Philippe
Châteauguay
High
Medium
Low
Sparse
Video Game Studio
0 2.75 5.5 11 Kilometers
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

8.3 Appendix 3: Standard Deviational Ellipse Maps




Standard Deviational Ellipse of Toronto's Video Game Industry Cluster
Aurora
Vaughan
Markham
North York
Scarborough
Mississauga
Oakville
Clarkson
Bramalea
Malton
Etobicoke
Toronto
N
0 5 10 Kilometers
Video Game Studio
Standard Deviational Ellipse
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community


Standard Deviational Ellipse of Montreal's
Video Game Industry Cluster
Terrebonne
Bois-des-Filion
Lorraine
Anjou
Laval
Beaubien
Longueui
Montréal
Montreal
Côte-des-Neiges
Cote-St-Luc
La Prairi
St-Constant
Châteauguay
Mercier
St-Mathieu
St-Isidore
N
0
5
10 Kilometers
Video Game Studio
Standard Deviational Ellipse
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

8.4 Appendix 4: Example of Financial Programs in Canada

Government level of opportunity	

Federal	• Bell Fund Performance Accelerator (75% pf the cost of the project, or $75,000)
	• Canadian Media Fund
	  ○ Experimental Stream ($1.2 million CAD cap)
	  ○ Partnership Stream (up to $30,000)
	• National Research Council
	  ○ Industrial Research Assistance Program (60-80% of internal labour costs and subcontractor expenses)
	• Scientific Research and Experimental Development (35-45% of wages, overhead, materials, and others)
	  ○ Retroactive tax credit for completed projects

Ontario	• Interactive Digital Media Fund
	  ○ Production and Concept Definition (50% of the project budget)
	  ○ Global Marking Development (50% of costs, up to $15,000)
	  ○ Marketing Support (limited to only the IDMF project, $75,000 and cap at 75% of activity cost
	  ○ Industry Development (dependent on application)
	• Ontario Interactive Digital Media Tax Credit
	  ○ Compensates for eligible Ontario labour marketing and distributions
	  ○ No limit on 35% on labour cost
	  ○ $100,000 cap for marketing and distribution expenses
	• Ontario Centres of Excellence
	  ○ SmartStart Seed Funding (50% of eligible expenses or $30,000 in early stage funding, for youth 19-29)

Quebec	• Quebec Multimedia Tax Credit (37.5% refundable tax credit)

	• Tax Credit for E-Business (credit equal to 30%, 24% refundable and 6% non-refundable, of eligible salaries)
British Columbia	• British Columbia Digital Media Credit (17.5% refundable credit) • British Columbia Renaissance Capital Fund

8.5 Appendix 5: Questionnaire

- For the sake of documentation can you state the following:
    - Your name and little about how you got into the video game industry, as well as how long you have been involved in the industry?
    - What is the Company/studio you are currently affiliated with?
    - What is the Position/role and responsibilities?
    - And the Length of time you have been working in the video game industry
- Details on the current company you are employed for
    - What are the specializations of the company (what games, platforms)
    - Approximately what is the number of employees at this studio
    - Is this the headquarters or a branch?
        - What specific role does you company play within the video game industry?
        - Who are your may competitors?
- History of the Company
    - In what city was this company establishment and the year
    - Has your company moved? Increase/deceased in size?
    - What are the reasons that the company has set up shop in Canada? In this specific province?
- Notable projects completed?
    - Current Projects? If you are able to discuss?
    - What is the process your company goes through when creating a project?
        - What companies do you work in collaboration with?
            - Is it done all in house?
- The Government support in Canada is varied, are you involved in any of these programs?
    - If so what are the pros and cons?

- Is there a reason why you believe that makes Canada unique in the culture of gaming or in the industry? Or is there something else?
- What are the reasons your company would move?
    - Out of this city and country?
    - Where would you go?
- What can make the Canadian video game industry stronger in terms of:
    - Attracting investors, other companies to come to Canada
    - For the already present studios and firms, what could the Canadian government do to improve their growth and productivity
- How do you know that Canada's video game industry is growing strong and what/how are you comparing it?
- Final thoughts

9 Curriculum Vitae

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Post-secondary Education and Degrees:

Laurier Brantford
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2009-2012 Honours B.A.

Wilfrid Laurier University
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Murphy, Brenda., Chretien, Annette., and Morin, Grant (2017) Maple Syrup Value Systems and Value Chains: Considering Aboriginal and Non-Aboriginal Perspectives. In Bullock, Ryan., Broad, Gayle., Palmer, Lynn., & Smith, Peggy (Eds.) *Growing Community Forests* pgs 268-309. University of Manitoba Press