

Canada's Video Game Industry in 2017

Final Report

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Executive Summary

The Size and Structure of the Video Game Industry in Canada

In 2017, there are 596 active studios in operation across Canada, a significant increase since 2015 when 472 studios were identified. Of those companies, most are located in Quebec and Ontario. Most (78%) of the video game companies in Canada employ fewer than 10 Full-time Equivalents (FTEs). In 2017, those video games companies generated an estimated \$3.2 billion from all sources of revenue, with 49% coming from sales of video game products. At the same time, 75% of the industry's total revenue in 2017 originated from outside of Canada (i.e., export revenue).

Canada's video game industry generated a total of 40,600 FTEs of employment in the Canadian economy in 2017, an increase of 11% over the employment generated by the industry in 2015. Of those jobs, the industry *directly* employed approximately 21,700 FTEs, which represents a 6% increase over the 20,400 FTEs of direct employment reported in 2015. Firms that employ more than 60 FTEs account for the clear majority (68%) of industry employment and it remains concentrated in intermediate and senior positions.

The overall average salary for a full-time worker in the video game industry in Canada was \$77,300 in 2017, up 8% from \$71,300 in 2015.

Canada's Video Game Industry's Output

Video game companies in Canada collectively completed about 2,100 video game projects in 2017. The largest proportion of those projects were for web (31%) and mobile (29%) platforms, which represents a significant change from 2015 when 65% of completed projects were for mobile platforms. This change is likely indicative of an increasingly crowded mobile market, leading video game companies back to other, somewhat less competitive platforms.

Family-oriented games accounted for the largest portion (26%) of projects completed by video game companies in Canada in 2017 (which were the second most popular genre in 2015), followed by serious games which represent 15% of all reported completed projects.

Though the number of console game projects completed is relatively low, this segment continues to command much larger budgets than projects on any other platform. That said, the average budget for console titles has decreased 26% from 2015 to an average project budget of \$12.5 million. At the same time, the team sizes and development time for console titles have also decreased since 2015 (by 26% and 16% respectively). Mobile budgets, team sizes and development time have not changed significantly since 2015.

When examined as a portion of all project expenditures incurred in 2017, console games still command the lion's share (89%) of total production spending despite representing such a relatively small portion of completed projects. This finding shows that while web and mobile projects may be numerous, they continue to represent a small share of the industry's overall expenditures.

The Economic Impact of the Video Game Industry in Canada

The Canadian video game industry spent approximately \$2.6 billion in 2017. As with the previous report, the majority of expenditures (about 65%) were spent on fees, wages and benefits paid to permanent, temporary and freelance labour. In total, the industry spent about \$1.7 billion on labour in 2017 (up 6% from 2015).

The video game industry's *direct* contribution to GDP in Canada in 2017 was just over \$2.0 billion. The industry also generated roughly \$716 million in indirect-impact GDP and \$992 million in induced-

impact GDP. The total GDP generated by the video game industry in 2017 was just over \$3.7 billion (including direct, indirect and induced impacts), a 24% increase over 2015.

Methodological Note

The data presented in this study is drawn principally from an online survey of Canadian-based video game companies conducted by Nordicity between April and June 2017. Information from other sources is cited accordingly.

Regarding references to dates, any reference to data from 2017 is from the 2017 Industry Survey and could refer to data related to the 2016 fiscal year or the current state of business in 2017. Similarly, any reference to data from 2015 refers to data reported in the *Canada's Video Game Industry In 2015* report, published in 2015. Data from the 2015 report may refer to data related to the 2014 fiscal year or the current state of business in 2015.

Regarding any analysis comparing results across company size, the 2017 results are split across five size categories instead of three, in order to add more nuance to the analysis. The additional categories were created by splitting the 2015 Standard (5-99 employees) category into three categories: i) Small (5-25 employees), ii) Medium (26-59 employees), and iii) Large (60-99 employees). In addition, the 2015 Large (100 or more employees) category was renamed Very Large with the same definition. The Micro (0-4 employees) category has remained unchanged from how it was defined in 2015.

Additional detail on the methodologies used in the creation of this report can be found in Appendix A: Methodology.

Glossary of Terms

Video game company: A company directly involved in the development, publishing, and/or sale of video game products; and/or the provision of services directly related to the development, publishing or sale of video game products. In the context of this report, “video game company” is used interchangeably with “video game firm” and “video game studio.”

n-values: The number of respondents to a survey question, which is often used in the data analysis related to that question.

Direct GDP: The economic activity generated directly by the video game industry.

Indirect GDP: The increased economic activity generated by business sectors broadly associated with the video game industry in Canada—i.e., sectors that are supplying goods and services to companies in the industry.

Induced GDP: The increase in economic activity attributable to re-spending of labour income within an economy by workers at the direct and indirect levels. In other words, people employed at the direct and indirect level take home salaries and re-inject that income into the economy through their day-to-day spending.

Direct employment: Those people employed by a video game company.

Spin-off employment: Employment resulting from economic activity generated by business sectors broadly associated with the video game industry in Canada and the economic activity attributable to re-spending of labour income within an economy by workers at the direct and indirect levels. In other words, employment related to the indirect and induced economic impact of the video game industry.

FTE: Full-time equivalent is a measure of employment that can mean, for example, that three part-timers each working a third of a year make up 1 FTE.

Labour income: Salaries and benefits paid to employees of video game companies.

Business unit: A producing unit that can be a part of a larger corporation or a business in and of itself.

Project: In the context of this study, a project refers to a product or service that has been introduced into the marketplace. A project can be anything from a full game to a significant DLC add-on, or service projects such as developing a game engine or a quality assurance engagement. In addition, it should be noted that one product (i.e. one game) could be counted as two (or more) projects if multiple firms developed and/or provided services toward the development of that product.

Product innovation: The market introduction of a new or significantly improved good or service with respect to its capabilities, user friendliness, components or sub-systems. This can include substantively new or significantly improved forms of gameplay, multiplayer interaction, and/or level design.

Process innovation: The implementation of a new or significantly improved production process, distribution method, or supporting activity.

1. Size and Structure of Canada's Video Game Industry

The global video game industry continues to grow at a rapid pace, with a recent estimate showing that total revenues generated by the industry reached US\$101.1 billion in 2016 (a 10% increase over 2015), and are expected to surpass US\$108 billion by the end of 2017.¹ Canada's video game industry is well positioned in this globally competitive industry, maintaining a reputation as a hotbed of game development that punches well above its weight and takes credit for some of the most successful blockbuster titles.²

The following section provides an overview of the size and structure of the Canadian industry, including a look at employment in the industry.

Methodological Note

The data presented in this study is drawn principally from an online survey of Canadian-based video game companies conducted by Nordicity between April and June 2017. Information from other sources is cited accordingly.

Regarding references to dates, any reference to data from 2017 is from the 2017 Industry Survey and could refer to data related to the 2016 fiscal year or the current state of business in 2017. Similarly, any reference to data from 2015 refers to data reported in the *Canada's Video Game Industry In 2015* report, published in 2015. Data from the 2015 report may refer to data related to the 2014 fiscal year or the current state of business in 2015.

Regarding any analysis comparing results across company size, the 2017 results are split across five size categories instead of three, in order to add more nuance to the analysis. The additional categories were created by splitting the 2015 Standard (5-99 employees) category into three categories: i) Small (5-25 employees), ii) Medium (26-59 employees), and iii) Large (60-99 employees). In addition, the 2015 Large (100 or more employees) category was renamed Very Large with the same definition. The Micro (0-4 employees) category has remained unchanged from how it was defined in 2015.

Additional detail on the methodologies used in the creation of this report can be found in Appendix A: Methodology.

1.1 Number of Companies

One measure for the size of an industry is the number of active companies operating within it. Using secondary research, Nordicity and the ESAC identified 472 active companies operating across Canada in 2015. Repeating a similar methodology in 2017, a total of **596 companies** were identified,

¹ Newzoo (2017); "The Global Games Market Will Reach \$108.9 Billion in 2017"; April 20, 2017; <https://newzoo.com/insights/articles/the-global-games-market-will-reach-108-9-billion-in-2017-with-mobile-taking-42/>

² Financial Post (2017); "Canada Takes its \$3 Billion Video Game Industry Seriously as it Pushes Sector to New Levels"; March 13, 2017; <http://business.financialpost.com/technology/canada-takes-its-3-billion-video-game-industry-seriously-as-it-pushes-sector-to-achieve-powerhouse-status/wcm/8fbce51b-a445-4e63-984a-99ed3ea447f5>

representing an increase of 26% over the two-year period. The bulk of that growth took place among Small (5-25 employees), Medium (26-59 employees) and Large (60-99 employees) companies which lumped together increased in number by about 29% over the past 2 years.³ There was also a significant increase (25%) in the number of new Micro firms that emerged since 2015.

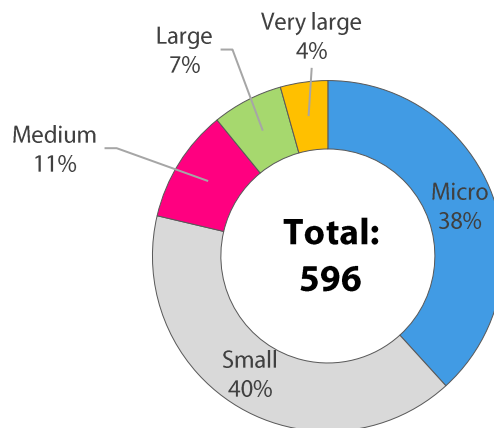
The following table and chart show the distribution of Canada's video game companies by company size (as measured by employment). It should be noted that the Very Large category includes a small number of outlier companies that generate a significant share of total employment and expenditures in the industry.

Table 1: Number of companies (by firm size)

Firm size	Number of Companies
Micro (less than 4 employees)	228
Small (5 to 25 employees)	241
Medium (26 to 59 employees)	62
Large (60 to 99 employees)	39
Very large (more than 100 employees)	26
Total	596

Source: estimates based on ESAC 2017 Industry Survey and Nordicity secondary research

Figure 1: Number of video game companies, by size (universe)



n=596

Source: estimates based on ESAC 2017 Industry Survey and Nordicity secondary research

³Note that the Small (5-25 employees), Medium (26-59 employees) and Large (60-99 employees) categories in the 2017 analysis are, when lumped together, equivalent to the 2015 Standard (5-99 employees) category. In 2015 there were 265 Standard companies. In 2017, the combined number of Small, Medium and Large companies was 342.

Micro and Small firms make up most of Canadian video game companies, together accounting for 78% of all active companies in Canada. This distribution is similar to what was reported in 2015, where Micro firms made up 39% of all companies and Very Large firms accounted for only 5% of all companies.⁴

1.2 Geography of Canada's Video Game Industry

The table below shows the distribution of companies across Canada in 2017, as compared with companies active in the video game space in 2013 and 2015. As the table indicates, Canada's active video game firms are primarily located in Quebec, Ontario and British Columbia, something that has not changed over the past five years.

Table 2: Geographic distribution of companies (# companies)

Province	2017	2015	2013
Quebec	198	139	97
Ontario	171	108	96
British Columbia	152	128	67
Rest of Canada	75	97	69
Total	596	472	329

n=596

Source: estimates based on ESAC 2017 Industry Survey and Nordicity/ESAC secondary research

As indicated in Section 1.1, there has been significant growth in the overall number of active companies in the Canadian video game industry. That growth is primarily concentrated in the three biggest game development provinces; Ontario, Quebec and British Columbia all show considerable growth in the number of companies during this period. In contrast, the rest of the country has seen some contraction, where the total number of active companies dropped from 97 in 2015 to 75 in 2017. Some of that contraction comes from companies closing. However, some of it is also likely due to companies merging or being acquired by larger firms. For example, in Halifax Frontier Development closed in early 2015.⁵ Later that same year Ubisoft acquired Longtail Studios.⁶ The net outcome in terms of company count is that the city lost two studios and only gained one back. However, a smaller number of companies does not necessarily indicate that the industry in those regions is suffering or shrinking per se. Fewer companies does not necessarily mean less production activity or less employment. Indeed, as indicated in Section 1.2.1 below, in the Canadian video game industry the majority of industry employment is attributable to a small number of Very Large companies.

⁴ Note that the Large category used in 2015 was renamed as the Very Large category in 2017. However, the definition of the category (100 or more employees) remains the same.

⁵ The Chronicle Herald (2015); "Game Developer Frontier Closes in Halifax, 18 out of work"; January 27, 2015; <http://thechronicleherald.ca/business/1265706-game-developer-frontier-developments-closes-in-halifax-18-out-of-work>

⁶ CBCnews.ca; "Ubisoft acquires Halifax-based Longtail Studios, adds 10 jobs"; October 15, 2015; <http://www.cbc.ca/news/canada/nova-scotia/ubisoft-halifax-video-games-1.3270003>

1.3 Employment

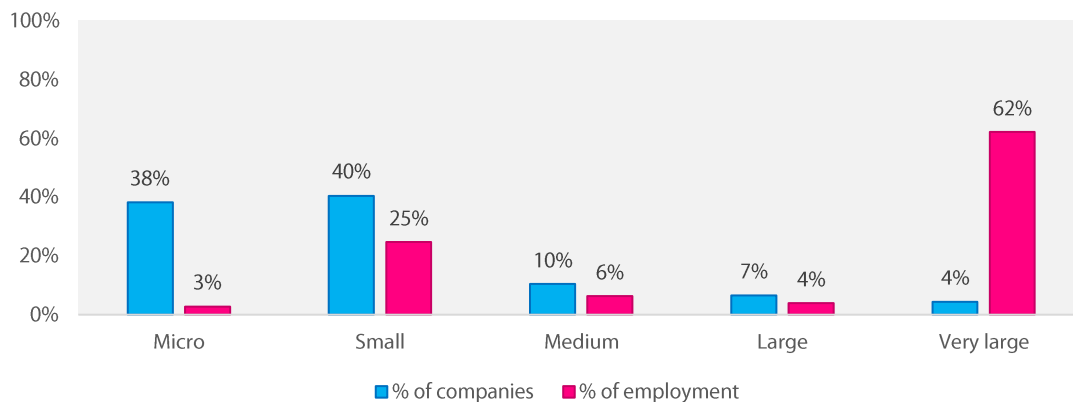
Another, arguably better, approach to measuring the size and health of an industry is by the number of people it employs. The following sub-sections outline the direct employment (people employed by video game companies), spin-off employment (employment stimulated by the video game industry), and the average salary levels present in Canada's video game industry.

1.3.1 Direct Employment

According to the results of the 2017 Industry Survey, the video game industry employs an estimated **21,700 Full-Time Equivalents (FTEs)**. This figure represents a 6% increase over the industry employment in 2015, which was at 20,400 FTEs. It is likely that most of the growth in employment is attributable to an increase in the number of Small, Medium and Large companies in the industry. As discussed in Section 1.1., the industry saw the greatest increase in number of companies in the Small, Medium and Large categories.⁷ By contrast, the 2015 report indicated that most of the industry growth in terms of number of companies occurred in the Micro size category. As such, it is likely that the increase in employment is driven by a combination of Micro start-ups experiencing growth between 2015 and 2017 and new, larger firms emerging onto the scene over the past two years.

Looking at the industry's structure from a different perspective, however, it shows that most of the industry's employment can be attributed to the small number of Very Large companies, as was the case in 2015. Indeed, as mentioned in Section 1.1 above, the Very Large category includes a small number of outlier companies with very high employment levels. The chart below compares the distribution of video game companies by share of employment and share of total companies.

Figure 2: Share of employment versus share of companies, by size



n=69

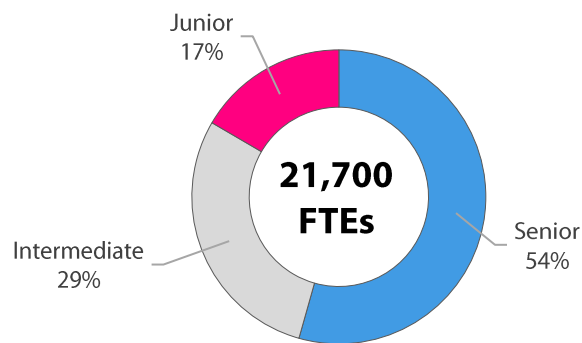
Source: ESAC 2017 Industry Survey

⁷ Note that in 2015 the Small, Medium and Large size categories were measured together under the Standard category (5-99 employees). As such, we only know that the combined number of companies in the Small, Medium and Large categories is greater than the number of companies counted in the Standard category in 2015. We cannot know which of the sub-categories grew the most.

That said, it appears that the industry's workforce has become somewhat more evenly distributed than was the case in 2015. Where in 2015 89% of the industry's workforce was employed by Very Large companies, those companies now only account for 62% of the total industry workforce in Canada. This shift is likely related to the significant increase in the number of Small, Medium and Large companies operating in Canada, in contrast to 2015 when Micro companies accounted for a greater share of the new companies entering the industry. As a result, the Small, Medium and Large companies now take up a greater share of the total workforce (35% collectively) than in 2015 when they collectively only accounted for about 10% of the industry's total employment.⁸

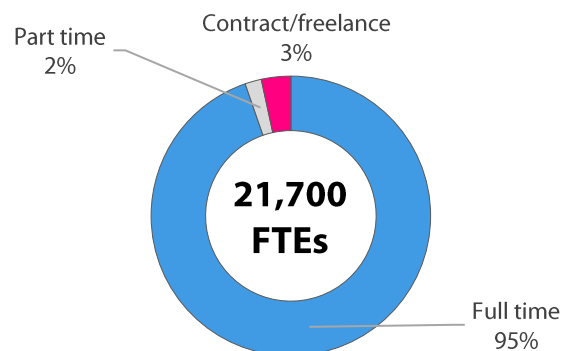
The following charts provide a breakdown of the video game industry's workforce by level of seniority and by mode of employment (e.g., part-time, full-time or contract/freelance).

Figure 3: Employment by seniority



n=69
Source ESAC 2017 Industry Survey

Figure 4: Employment by mode of employment



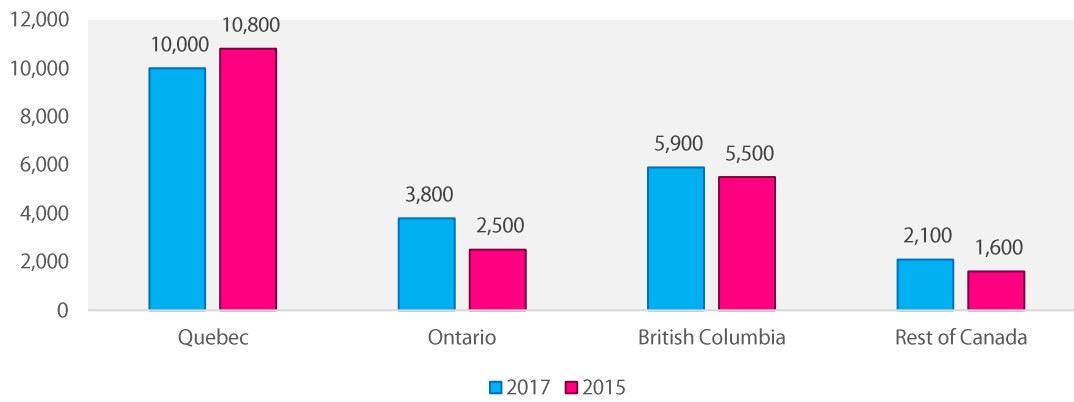
n=69
Source ESAC 2017 Industry Survey

⁸ Note that in 2015 the Small, Medium and Large size categories were measured together under the Standard category (5-99 employees).

According to Figure 3, more than half of the Canadian video game industry workforce is employed in senior-level positions. This structure could be explained by the fact that the industry is made up of almost 80% Small or Micro-sized firms. Smaller firms tend to be made up of leaner staff that hold senior titles and positions and they do not typically employ many (if any) junior positions. As a result, it is likely that the majority of the employment generated by those smaller firms is in senior roles, which could be helping to drive the high proportion of senior-level employment in the industry.

From a regional perspective, the vast majority of employment in Canada's video game industry is concentrated in three provinces (Quebec, Ontario and British Columbia), as depicted by the following figure.

Figure 5: Employment by Key Province



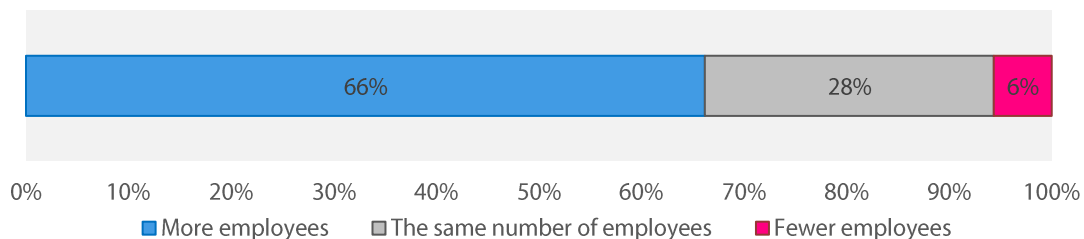
n=71 (2017), 68 (2015)

Source ESAC 2017 Industry Survey, ESAC 2015 Industry Survey

As the above chart shows, while overall employment has risen since 2015, that employment has moderately shifted towards Ontario, which now accounts for 17% of employment in Canada's video game industry (up from 12% in 2015). This increase does not appear to stem from any single large studio in Ontario, but from the growth in the number of active small and mid-sized video games firms (see Table 2). At the same time, the slight decline in employment in Quebec is more likely due to cyclical variance in employment than to a contraction of the industry in that province.

The figure below illustrates the frequency of responses to the question of whether video game companies experienced a change in the size of their workforce.

Figure 6: Change in employment since 2015



n=71

Source ESAC 2017 Industry Survey

According to Figure 6, video game companies in Canada experienced notable employment growth over the last two years, suggesting that the increase in the size of the industry's workforce is being driven, at least in part, by company growth. In fact, the majority of companies (66%) reported that they currently employ more people than in 2015. In addition, only 6% of respondent companies reported that they employed fewer people in 2017 than in 2015.

1.3.2 Spin-off Employment

The video game industry also generates significant indirect and induced employment impacts throughout the Canadian economy (i.e., spin-off employment).⁹ The following table (Table 3) presents the direct employment, indirect employment (i.e., in industries that supply Canada's video game industry), and induced employment (i.e., those jobs that are created by the spending of video game industry workers). It also notes how those impacts have changed since the previous study that Nordicity conducted in 2015.

Table 3: Employment, 2015 to 2017

	Employment 2015 (FTEs)	% Increase 2015-17	Employment 2017 (FTEs)
Video game industry ¹⁰	20,400	+6%	21,700
Indirect impact	6,900	+28%	8,800
Induced impact	9,200	+11%	10,200
Total impact	36,500	+11%	40,600

Source: Nordicity estimates based on ESAC Industry Survey 2015 and Statistics Canada input-output tables

As illustrated above, the total employment generated by the industry has increased drastically more than direct employment. This discrepancy is largely accounted for by the rising cost of video game production (see Section 2.1.2 and 3.1), which increases spending in other sectors of the economy, and thus the indirect impact. Another potential factor is that the video game industry has significant compensation packages, which increase the amount spent in the wider Canadian economy, and thus the induced impact.

1.3.3 Average Employee Salaries

According to the results from the 2017 ESAC Industry Survey, the overall average salary for a full-time worker in the video game industry in Canada in was approximately **\$77,300 in 2017**, which represents an 8% growth in average salary from \$71,300 in 2015.

There is some variation among average salary by size of company. For example, salaries at Medium firms (employing between 26 and 59 people) are higher than the industry average, as shown in Table 4.

⁹ A definition of "spin-off employment" can be found in the Glossary of Terms.

¹⁰ Direct impact, as detailed in Section 1.2.1

Table 4: Average salary by company size

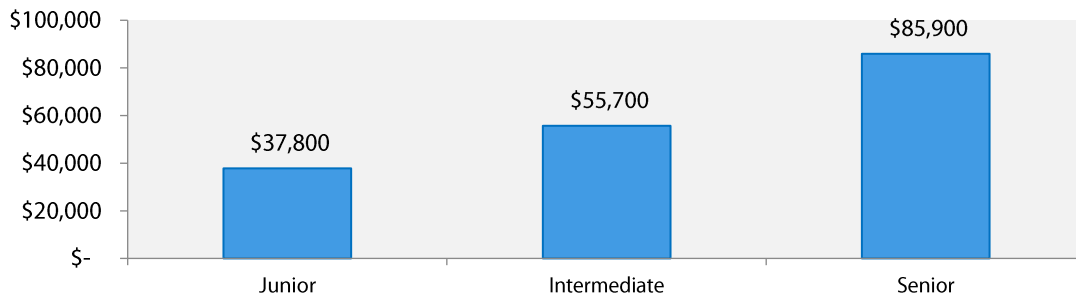
Company size	Average salary
Micro	\$65,400
Small	\$66,300
Medium	\$90,800
Large	\$77,300
Very Large	\$80,500
Total	\$77,300

n=70

Source: ESAC 2017 Industry Survey

Looking at variations in average salary by job seniority, a familiar pattern emerges. These findings closely parallel the average salary data from 2015.

Figure 7: Average salary by seniority

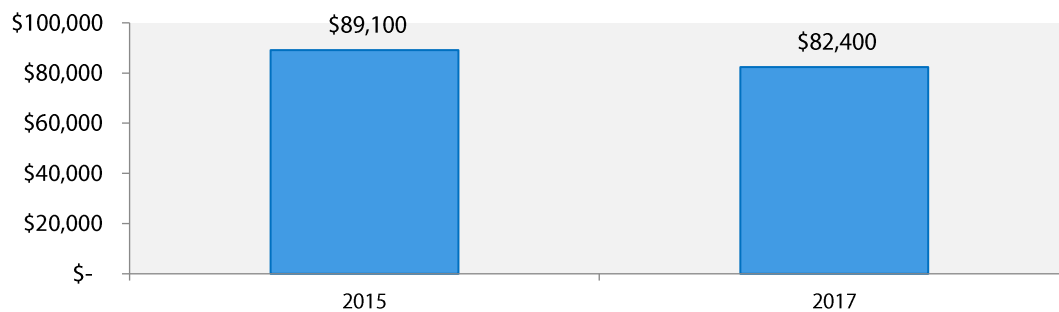


n=69

Source: ESAC 2017 Industry Survey

In addition to average salary, it is instructive to look at the effective cost-per-FTE paid by companies for their employees. This number includes non-wage compensation paid to employees, including benefits and bonuses. The following chart compares the effective cost-per-FTE from 2015 and 2017. Overall, it has declined slightly, from \$89,100 in 2015 to \$82,400 in 2017, which implies that although salaries have risen slightly over the last two years, there has still been a modest decrease in non-wage compensation (e.g., bonuses) and/or benefits paid to employees over this time.

Figure 8: Effective cost-per-FTE



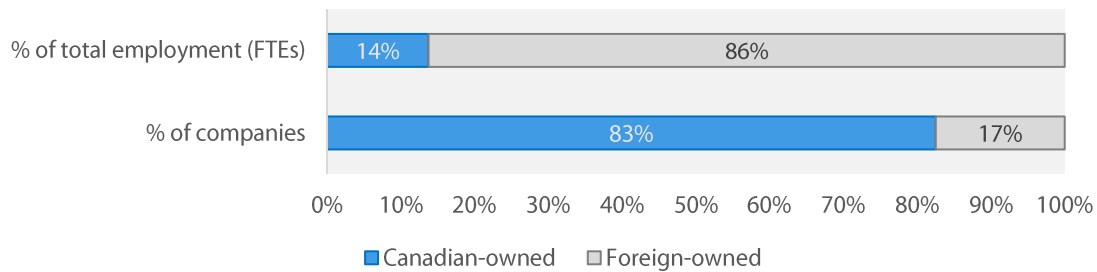
n=69 (2017 data), 68 (2015 data)

Source: ESAC 2017 Industry Survey and ESAC 2015 Industry Survey

1.4 Company Ownership

This sub-section examines the structure of the Canadian video game industry by company ownership. The following chart shows the distribution of company ownership across two dimensions: share of total companies, and share of total employment.

Figure 9: Company ownership, by share of companies and share of total employment (FTEs)



n=103
Source: ESAC 2017 Industry Survey

Much like in 2015, Canadian-owned companies make up the largest share of companies in the video game ecosystem (83%), but foreign-owned companies account for the vast majority of total employment in the industry (86%). In 2015, the share of employment attributable to foreign-owned companies closely paralleled the distribution shown in 2017. As discussed in Section 1.3 above, two years ago, a small group of Very Large firms accounted for 89% of total employment in the industry but in 2017 that same category only accounted for 61% of employment. At the same time, 88% of the industry's workforce in 2015 were employed by foreign-owned companies and that has not changed materially in 2017 (where they account for 86% of industry employment). This phenomenon could indicate that a significant portion of the new Small, Medium and Large firms that have emerged onto the scene over the last two years, and that now account for a relatively larger share of employment than in 2015, are foreign-owned companies recently entering the Canadian industry.

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2. Canada's Video Game Industry Output

The following section provides an overview of current trends in the global video game industry and describes the volume and structure of development activity in Canada more specifically. The section first examines the number and types of projects video game companies completed in 2017 as well as the resource cost associated with different types of projects. It also explores innovation activity among Canadian video game companies.

2.1 Global Trends in Video Game Development

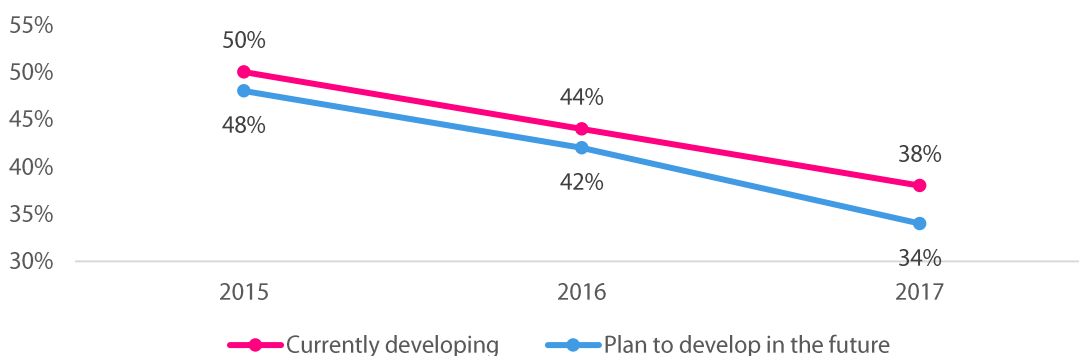
Canada's world-class talent and targeted financial incentives have helped to create a vibrant digital media and video gaming ecosystem, with a healthy mix of highly innovative small and large companies. As mobile development steadily slows down and companies begin to come back to more traditional platforms and diversify the platforms they are working with, new opportunities are taking shape with the potential of Immersive Reality technologies (Virtual Reality/Augmented Reality/Mixed Reality) and Game Video Content.

Mobile game development still in decline

In 2015, Nordicity reported that mobile game development was in a slow but steady decline globally and that Canadian developers largely attributed that decline to an overcrowded market in which it was becoming increasingly difficult to compete.¹¹ Two years later, that downward trend in global mobile development has continued despite the fact that consumer spending on mobile games is increasing.¹²

According to the GDC's annual State of the Industry survey, 38% of developers reported that they were currently developing a game for a mobile platform, compared to 50% in 2015. In addition, fewer developers are planning to develop mobile games in the future; 34% of companies indicated that they planned to develop a mobile game in 2017 versus 48% in 2015 (See Figure 9 below).¹³

Figure 10: Global mobile development activity (at GDC 2017)



Source: GDC State of the Game Industry Report (2017)

¹¹ Nordicity (2015); [Canada's Video Game Industry in 2015](#)

¹² Global revenue from mobile games increased by over 21% from \$30.4 billion in 2015 to \$36.9 billion in 2016. Newzoo (2016); Global Games Market Report 2016.

¹³ GDC (2017); State of the Game Industry 2017 and GDC (2015); State of the Game Industry 2015

That said, there is a general sense in the industry that the mobile platform may yet see a new lease on life as immersive reality grows. There is a general perception in the industry that the mobile platform is the most viable for mass consumer adoption of VR/AR/MR.¹⁴ Indeed, GDC's 2017 survey of game developers reported that 77% of video game developers believe that AR/MR will win greater market share than VR.¹⁵ They also reported that a third of respondents said that mobile would be the dominant immersive technology in the next five years and 43% said it would be the dominant immersive platform in 20 years.¹⁶ The fact that Oculus Rift failed to meet expectations regarding consumer adoption in its first year in the consumer market along with Pokémon Go's runaway success in 2016 (the game reached US\$800 million in revenue in just 110 days¹⁷) have largely contributed to this perception.¹⁸ In addition, social media platforms such as Snapchat (with their 2017 release of the World Lenses feature)¹⁹ and Facebook²⁰ are experimenting with AR features, further supporting the notion that the mobile platform might be the key access point for mass consumer adoption of VR and AR technologies.

Virtual, Artificial and Mixed Reality

While 2016 was supposed to be the coming of age for VR/AR/MR, the platform has failed to live up to the hype that preceded its big entrance into the mainstream consumer market. For example, SuperData reported that global revenue from VR software and hardware sales in 2016 reached US\$1.8 billion,²¹ which fell short by about 2/3 of their original prediction that the industry would generate US\$5.5 billion in 2016.²² But consumers were less enthusiastic to adopt VR as was hoped and a number of factors might have contributed to that fact. One of the main barriers that is cited with regards to mass consumer adoption is the requirement for expensive VR kits or systems as well as the need to wear a headset.²³ In addition, content is perceived as a barrier, either because of the lack of choice or because the content that does exist is not as captivating as it could be. Motion sickness is also perceived as a major barrier by most video game developers.²⁴

Despite these challenges, the global video game industry seems to maintain optimism that VR/AR/MR has potential as a long-term sustainable business. According to GDC's 2017 survey of the industry,

¹⁴ Digi-Capital (2017); "Apple and Facebook to drive mobile AR over 1B users and \$60B by 2021"; June 2017; <http://www.digi-capital.com/news/2017/06/mobile-ar-to-top-a-billion-users-and-60-billion-by-2021/#.WWmNNYjvIX>

¹⁵ GDC (2017); AR/VR Innovation Report 2017

¹⁶ GDC (2017); State of the Game Industry 2017

¹⁷ App Annie (2017), [2016 Retrospective](#)

¹⁸ App Annie (2017), [2016 Retrospective](#); SuperData (2016), 2016 Year in Review: Digital Games and Interactive Media

¹⁹ TechCrunch (2017), "Snapchat introduces World Lenses – live filters for just about anything", April 18 2017, <https://techcrunch.com/2017/04/18/snapchat-introduces-world-lenses-live-filters-for-just-about-anything/>

²⁰ CIO (2017), "Facebook's plan to own (and destroy) your smartphone with AR", April 24 2017, <http://www.cio.com/article/3191809/mobile/facebook-s-plan-to-own-and-destroy-your-smartphone-with-ar.html>

²¹ Superdata (2017), "Can't Stop, Won't Stop: 2016 Mobile and VR Games year in review"

²² The Economist (2017), "A reality check for virtual headsets", July 8 2017, <https://www.economist.com/news/business/21724863-vr-has-been-more-about-hype-substance-will-change-reality-check-virtual>

²³ Ibid.

²⁴ GDC (2017); AR/VR Innovation Report 2017

75% of developers responded “yes” when asked if VR/AR presented a sustainable business over the long term. Indeed, that optimism is echoed in the industry’s development activity in the immersive reality space. For example, GDC’s State of the Game Industry report states that 23% of video game developers were currently working on a VR game in 2017, which is an increase of 7 percentage points from 2016 (16% percent of developers reported that they were currently working on a VR product that year).²⁵

Commercial applications for video game products

So-called serious applications for video game technology is not a new concept. That said, new opportunities are emerging for video game technology use outside of entertainment applications. The most promising of those new opportunities lies in VR/AR/MR technology.

The primary focus of current VR/AR development is still entertainment. Indeed, GDC’s 2017 VR/AR Innovation Report indicates that 78% of developers working on immersive reality projects are focusing on Games/Entertainment.²⁶ In addition, recent research conducted by the Canadian Film Centre and Nordicity indicates that 83% of Canadian developers working in the VR space are currently focused on Entertainment use cases. However, the report also indicates that Canadian VR companies are eyeing more diversification in their use cases for the future, primarily in K-12 education, live events, and professional development and training.²⁷

Indeed, sectors like Manufacturing and Design; Healthcare, Rehabilitation and Therapy; Commercial Flight Simulation and Training; and Defense Training are among those that are actively adopting VR/AR technologies.²⁸ And while these sectors have already been experimenting with immersive technologies, consumer-facing versions of the technology are at a much more affordable price point for mass enterprise adoption, creating a significant opportunity for VR/AR developers. For example, in the first year that VR/AR headsets hit the market, commercial adoption represented just over 20% of the global market share for VR/AR headset sales.²⁹

Another emerging commercial application for immersive technologies is in consumer experience and marketing, where brands and retailers can provide immersive, interactive virtual experiences with their products either at home or in-store through AR.³⁰ One of the best examples of this type of enterprise application is [Sephora’s Virtual Artist](#) app that allows consumers to test different shades of makeup and styles of makeup application on their face in a virtual environment.³¹ Indeed, GDC’s VR/AR Innovation report from 2017 indicates that 19% of developers working on immersive reality

²⁵ GDC (2017); State of the Game Industry 2017

²⁶ GDC (2017), “AR/VR Innovation Report 2017”; GDC (2017), “State of the Game Industry 2017”

²⁷ CFC Media Lab with OMERS Ventures and Nordicity, [Pulse on VR: A Living Ecosystem](#), accessed July 2017.

²⁸ Deloitte University Press (2017), “For more companies, new ways of seeing”, April 8 2017, <https://dupress.deloitte.com/dup-us-en/focus/signals-for-strategists/augmented-and-virtual-reality-enterprise-applications.html>

²⁹ IDC (2017), “Worldwide Augmented and Virtual Reality Headset Market Expected to Grow at a Compound Annual Rate of 58%, Reaching 99.4 Million Units in 2021”, March 16 2017, <http://www.idc.com/getdoc.jsp?containerId=prUS42371517>

³⁰ Deloitte University Press (2017), “For more companies, new ways of seeing”, April 8 2017, <https://dupress.deloitte.com/dup-us-en/focus/signals-for-strategists/augmented-and-virtual-reality-enterprise-applications.html>

³¹ The Verge (2017), “Sephora’s latest app update lets you try virtual makeup on at home with AR”, March 16 2017, <https://www.theverge.com/2017/3/16/14946086/sephora-virtual-assistant-ios-app-update-ar-makeup>

products were focusing those products on Branded Experiences, while 11% were focusing on Retail/Commercial.³²

Electronic Sports and Game Video Content

Game watching is another trend that is generating significant buzz and showing continued growth. Game watching includes: i) Game Video Content (GVC)—which is typically user-generated uploaded video and used primarily for previewing a game before purchasing or learning new gameplay tricks and skills; and ii) Electronic Sports (or eSports)—which is competitive video game playing by professional players that is streamed for live audiences on dedicated platforms such as Amazon's [Twitch](#) and Google's [Youtube Gaming](#). Global revenue generated by GVC reached US\$4.4 billion and boasted a global audience of 682 million viewers.³³ Meanwhile, eSports had a total global audience of almost 214 million and generated revenue of roughly US\$0.9 billion dollars.³⁴

In addition to having an impact on how developers think about the audiences for their games – considering what the *viewing* experience is in addition to the gameplay experience - GVC and eSports also present significant opportunities for the industry with regards to audience development and monetization. Most notably, media companies have taken notice of the growing audience for eSports, which is successfully competing for viewers with PrimeTime TV, traditional live sports channels and other television streaming services.³⁵ The sale of media and digital streaming rights presents a huge revenue generating opportunity for developers as evidenced by the US\$300 million deal signed in 2016 between Riot and BAMTech (jointly owned by MLB and Disney) for the streaming rights to *League of Legends* tournaments.³⁶

Other revenue streams that are proving successful in eSports include merchandising, paid bonus content (e.g. virtual engagements with professional players), live events and micro-transactions such as the purchase of skins to customize the experience.³⁷

2.2 Video Game Development Activity in Canada

Over the course of the past year, game companies in Canada initiated almost 2,800 projects, and completed over 2,100 projects, an increase of about 67% over 2015. The following charts illustrate the distribution of those projects across various platforms and genres, according to what respondents reported in the survey. It is important to note that there is no correlation between the particular projects that are initiated or completed as reported in each year, given that development cycles for different projects do not align perfectly over a 12-month period. For example, most console and PC games typically have a development cycle that is longer than one year.

As Figure 11 illustrates, video game companies in Canada initiated far more projects for mobile than the other platforms in 2017. Mobile also accounted for the second largest number of total projects completed in 2017, only slightly behind Web browser which accounted for the largest number of

³² GDC (2017); AR/VR Innovation Report 2017

³³ SuperData (2016), 2016 Year in Review: Digital Games and Interactive Media

³⁴ SuperData (2016), 2016 Year in Review: Digital Games and Interactive Media

³⁵ SuperData (2017), [Market Data: Gaming Video Content](#)

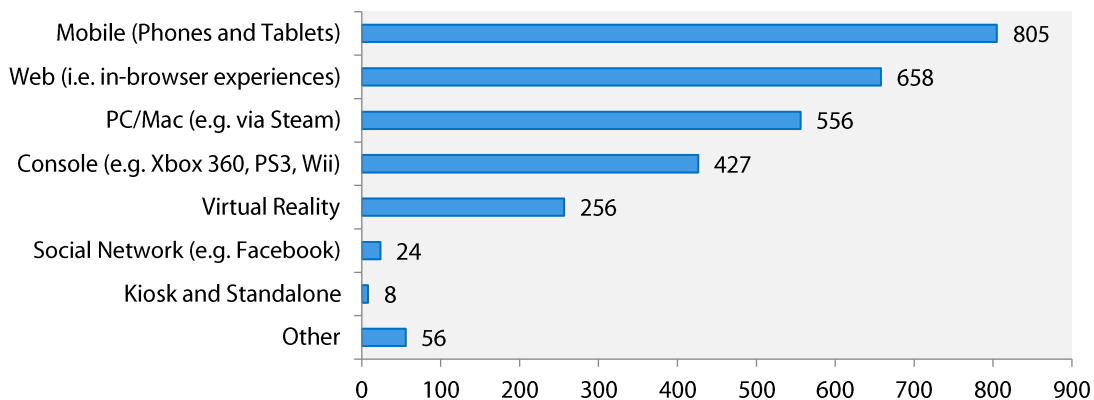
³⁶ Engadget (2016), "MLB and Disney pick up 'League of Legends' streaming rights", December 16 2017, <https://www.engadget.com/2016/12/16/bamtech-riot-games-league-of-legends-streaming-deal-wsj/>

³⁷ Business Insider (2017), "Esports is far from fulfilling its revenue potential, but growing steadily", May 10 2017, <http://www.businessinsider.com/esports-is-nascent-but-growing-steadily-2017-5>; DigiDay (2017), "How eSports are pioneering new media models", December 1 2016, <https://digiday.com/uk/facebook-live-revenue/>

completed projects (See Figure 12). PC and Console projects represent the third and fourth greatest number of initiated and completed projects in 2017.

Notably, Canadian video game companies reported initiating over 250 projects for Virtual Reality (VR) platforms over the past year (see figure 10), which indicates that the industry is starting to accelerate its production activities on this relatively new platform. As shown in Figure 12, however, far fewer VR projects have been completed. This discrepancy is likely a reflection of the nascent nature of the VR platform, which has only started to come of age over the past year or so with the first consumer-facing VR hardware devices emerging onto the market.

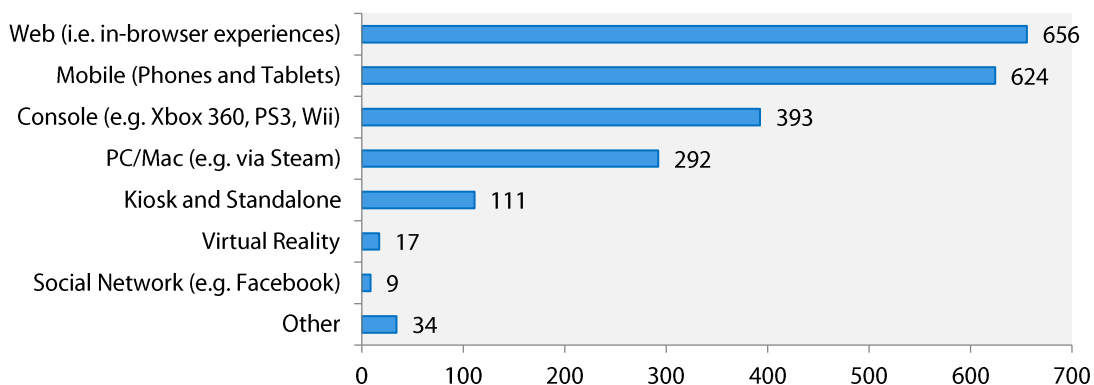
Figure 11: Total number of projects initiated in 2016, by platform



n=67

Source: ESAC 2017 Industry Survey

Figure 12: Total projects completed in 2016, by platform



n=64

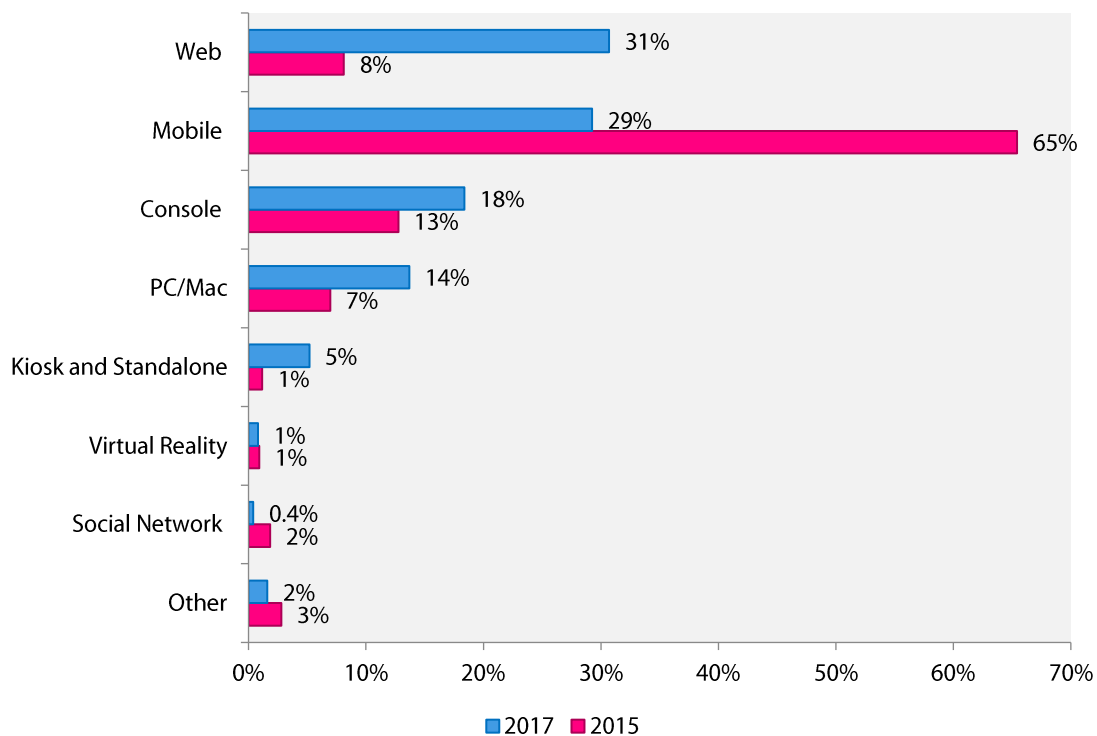
Source: ESAC 2017 Industry Survey

While mobile platforms still account for the greatest number of projects being initiated and the second greatest number of projects completed by game companies, it represents a much smaller share of the total number of projects completed by Canadian video game companies than in 2015. In 2015, mobile accounted for 65% of projects completed, which represented the largest share of completed projects that year. By contrast, in 2017 mobile only accounted for 29% of all completed projects (see Figure 12). These figures indicate a continuation of the shift away from mobile

development back toward more traditional platforms that was identified in the 2015 edition of this report as well as greater diversification in the platforms companies are using. Globally, the return to traditional platforms has been even more pronounced. For example, PC was the most frequently selected platform by respondents to the GDC State of the Industry survey, with 45% of developers indicating their last game was released on the platform and 53% reported that they were currently developing products for the platform.

As discussed in section 2.1 above, the decrease in mobile activity is most likely the industry's response to an overcrowded mobile market in which it is increasingly difficult to compete. In addition, the increase in PC and Console projects likely reflects a redirection away from mobile back to traditional platforms, largely catalyzed by the launch of new generation consoles in 2016, such as the PS4 Pro and Xbox One S. Finally, the huge shift towards web browser projects may be driven by companies wanting to tap into the ever-growing and much-discussed eSports and Game Video Content markets.

Figure 13: Share of total projects completed, by platform (2017 and 2015 compared)

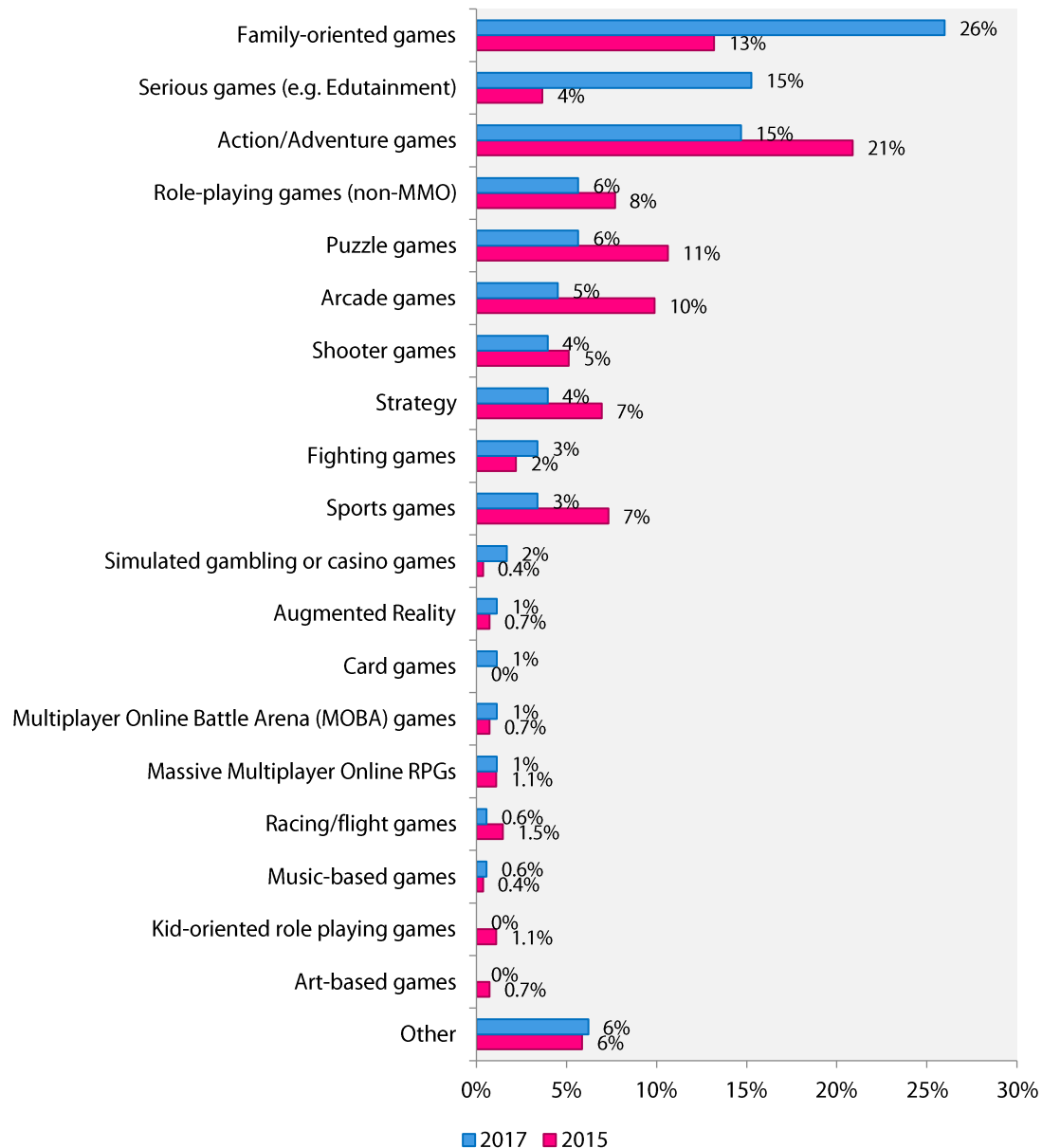


n=64 (2017 data), 60 (2015 data)

Source: ESAC 2017 Industry Survey and ESAC 2015 Industry Survey

The following chart shows the distribution of projects completed by Canadian video game companies across genres.

Figure 14: Share of total projects completed, by genre



n=64 (2017 data), 60 (2015 data)

Source: ESAC 2017 Industry Survey and ESAC 2015 Industry Survey

As seen above, the largest share of the projects completed in 2017 were in the family-oriented genre, representing 26% of all completed projects. Serious and action/adventure games share the second largest share of total completed projects in 2017, as reported by video game companies. This distribution differs slightly from that in 2015, when action/adventure represented the largest share of

completed projects. However, the most notable difference is the jump of serious games from just 4% of completed projects in 2015 to 15% in 2017. This shift hints at a broader change occurring in the video game industry, with the increasing application of video game technologies for non-entertainment purposes (also known as enterprise applications), as discussed in section 2.1 above.

2.2.1 Project Resources

The results from the 2017 Industry Survey indicate that contrary to the earlier trend, the cost of producing video games seems to have decreased significantly since 2015. Indeed, as Table 6 indicates below it seems to take far fewer resources overall to complete projects across all platforms. The only platform that has not shown a decrease in financial cost is mobile, where the average project budget has effectively remained the same as it was in 2015. Considering the increased number of projects being completed and the fact that companies seem to be continuing to move away from mobile back to more traditional PC/Mac and Console platforms, it is likely that they have managed to re-enter the traditional platforms at a lower budget point.

Despite being a nascent platform, virtual reality projects appear to have undergone a step change in their cost, time to produce, and in the team size required to work on them, becoming much cheaper to make, with fewer people, and in shorter timeframes. Part of the answer to this may be that VR companies are having to produce less of their own bespoke hardware and software solutions, meaning they can devote more of their workflow to content production³⁸. These kinds of changes may be indicative of an industry still undergoing maturation and rapid development, but that has not yet fully reached the mainstream.³⁹

Table 5: Average project resources, by platform (2017 and 2015 compared)

Platform	Budget	Change from 2015	Team Size	Change from 2015	# of Days	Change from 2015
Console	\$12,536,957	-26%	40	-26%	405	-16%
Mobile	\$497,051	-1%	6	-37%	172	-9%
PC/Mac	\$2,454,848	-22%	13	-18%	503	+49%
Web	\$30,833	-95%	2	-71%	57	-67%
Virtual Reality	\$91,889	-51%	2	-46%	22	-81%

n=64 (2017 data), 71 (2015 data)

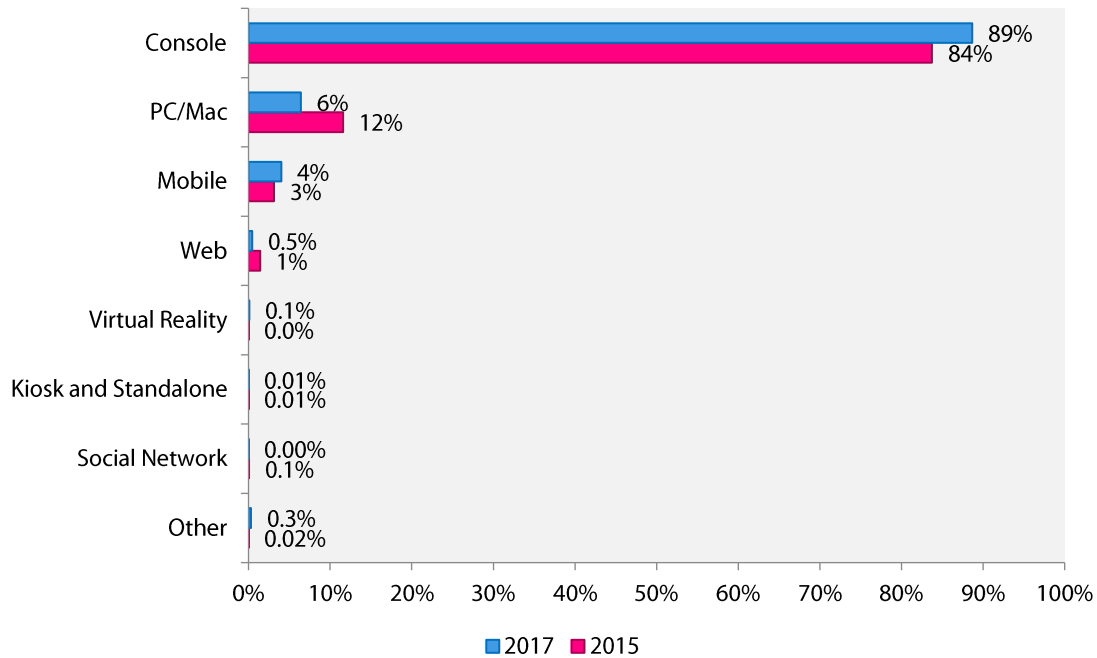
Source: ESAC 2017 Industry Survey and ESAC 2015 Industry Survey

As shown in Figure 15, game consoles once again represent the vast majority of total project expenditures in 2017, followed by PC/Mac and then mobile, showing very little change in the size of those shares since 2015. Given that the number of projects completed on the Console and PC/Mac platforms has increased it is not surprising that the share of total project spending attributed to those platforms has also gone up significantly.

³⁸ Companies are creating a wide array of VR products for their internal use: <http://pulseonvr.ca/source-embed/?post=265&resource=1>

³⁹ On average, VR companies in Canada expect the industry to be mature in about 5 years: <http://pulseonvr.ca/source-embed/?post=265&resource=4>

Figure 15: Share of total project budgets, by platform (2017 and 2015 compared)



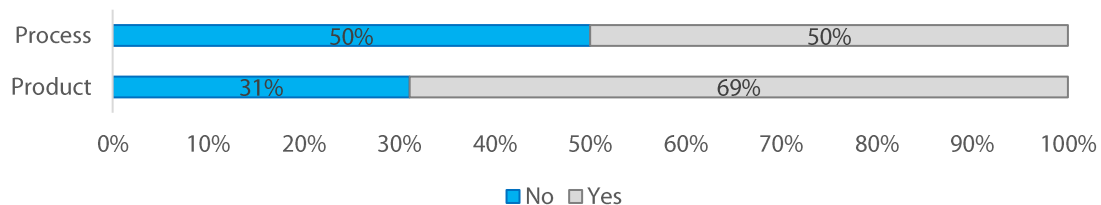
n=64 (2017 data), 71 (2015 data)

Source: ESAC 2017 Industry Survey and ESAC 2015 Industry Survey

2.2.2 Innovation Activity

Canadian video game companies are actively engaging in innovative product and process development. The following chart shows the total incidence of product and process innovation among respondent companies. 50% of companies indicated they created at least one process innovation in 2017, while 69% indicated they created an innovative product. When asked to specify what types of innovative processes or products they had developed, the most frequent responses were: Digital distribution platforms or processes, innovative development processes (e.g. pipeline innovations, open development, and “lean” product development models), game engine technology innovations, developing new or innovative gameplay in specific genres, and VR/AR projects.

Figure 16: Incidence of product and process innovations, overall



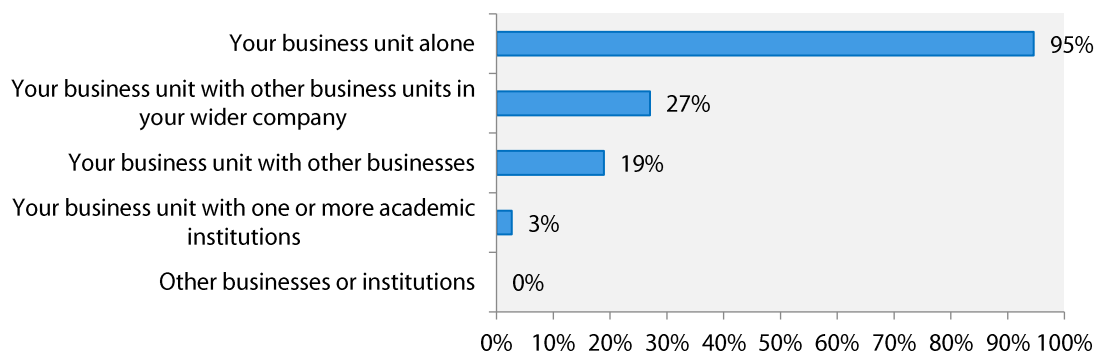
n=74

Source: ESAC 2017 Industry Survey

In addition, Canadian video game companies indicated that they spent about 19.6% of their operating expenditures on average on research and development (R&D) activities in 2017. Companies also reported that about 60% of their revenue on average was generated by innovative *products*.

Among those companies that indicated they created a *process* innovation (i.e., a significantly improved production process, distribution method or supporting activity), nearly all respondents reported this process improvement occurring within their business unit alone. Around a quarter (27%) reported working with other business units within their wider company, and around a fifth (19%) with other businesses. Only a small fraction of process improvements came about through collaboration with academic institutions.

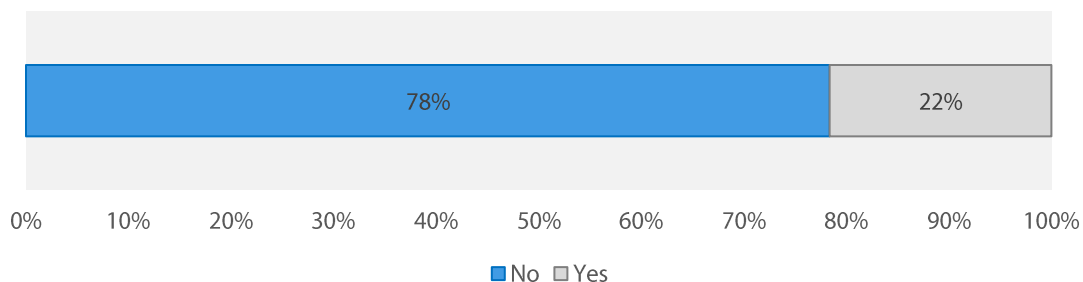
Figure 17: Process innovation collaborators



n=37
Source: ESAC 2017 Industry Survey

Among those companies that indicated they created an innovative *product*, 22% of respondents indicated that their products had been used for non-entertainment purposes (See Figure 16 below). As discussed in section 2.1, there is a growing market for enterprise or commercial applications of video game products, largely being pushed along by advances in VR/AR and adoption of immersive reality technology in those sectors.

Figure 18: Incidence of non-entertainment use of game products

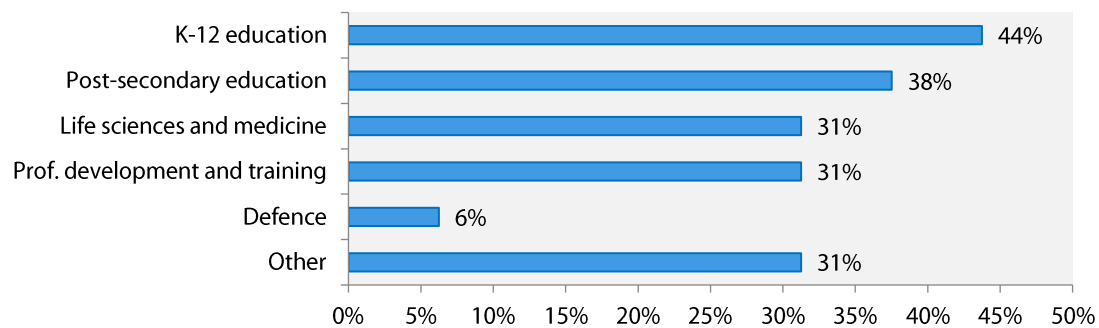


n=74
Source: ESAC 2017 Industry Survey

When asked about what types of enterprise applications their products are used for, the most frequently selected applications appear to be in e-learning either for K-12 or Post-secondary education, or for professional development and training. Life science and medicine were also among the most frequently selected non-entertainment applications of companies' products. Indeed, several

companies indicated that their products are being used for healthcare applications, primarily for therapy and rehabilitation. Once again, these non-entertainment applications for video game products echo the non-entertainment sectors in which VR/AR/MR is being adopted with the highest frequency (see Section 2.1 above).

Figure 19: Non-entertainment use: Industries that have used respondents' products



n=16

Source: ESAC 2017 Industry Survey

As such, it is clear that innovation in the video games industry can be expressed both in terms of product development and process improvement. Moreover, that innovation tends to occur within video games companies (rather than with research partners) and is typically (though not exclusively) targeted towards the video games industry itself.

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3. Economic Impact of Canada's Video Game Industry

The following section outlines the additional impacts that the video game industry has on the Canadian economy, including short-term impacts on labour income and gross domestic product (GDP), and longer-term impacts.

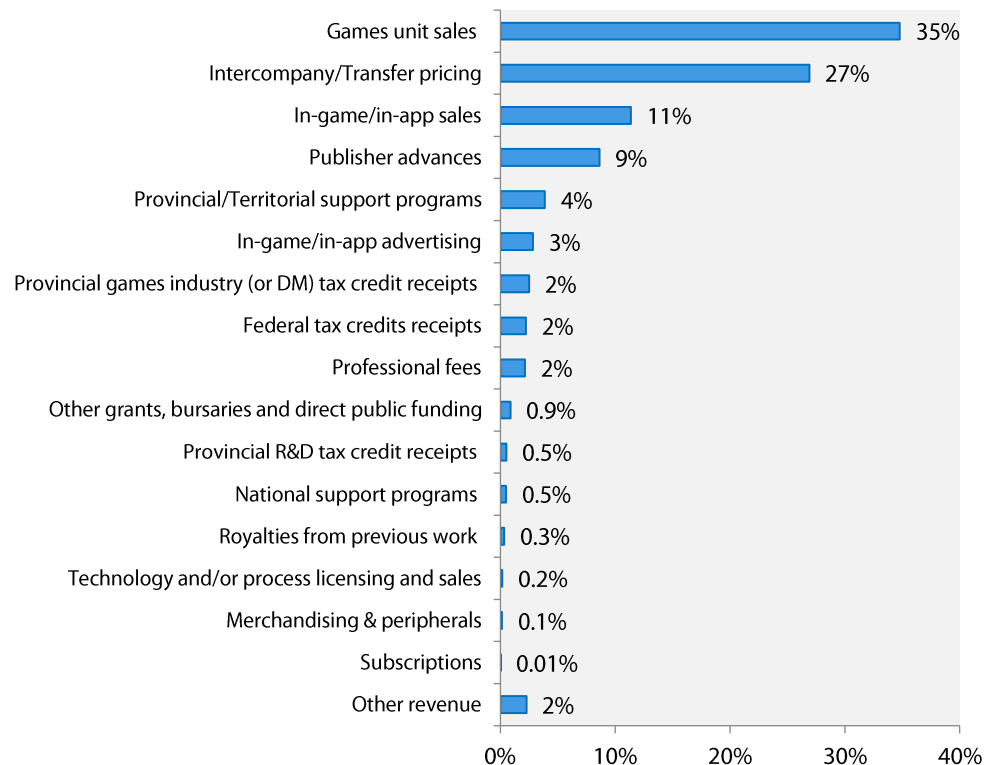
3.1 Revenue and Expenditure Characteristics

The following sub-section briefly examines where Canadian video game companies are earning their revenue and what their biggest expenses are.

3.1.1 Revenue

Total revenue among video game companies in Canada in 2017 is estimated at **\$3.2 billion**. That revenue was generated primarily by Games unit sales and Intercompany/Transfer pricing. In-game and in-app sales also represent a significant portion of video game company revenue, which is unsurprising given that mobile games represent about 37% of total global video game revenue, largely driven by in-app purchases.⁴⁰ A detailed breakdown of Canadian video game companies' revenue by source is presented in the following chart.

Figure 20: Revenue breakdown by source (% of total revenue)



n=79

Source: ESAC 2017 Industry Survey

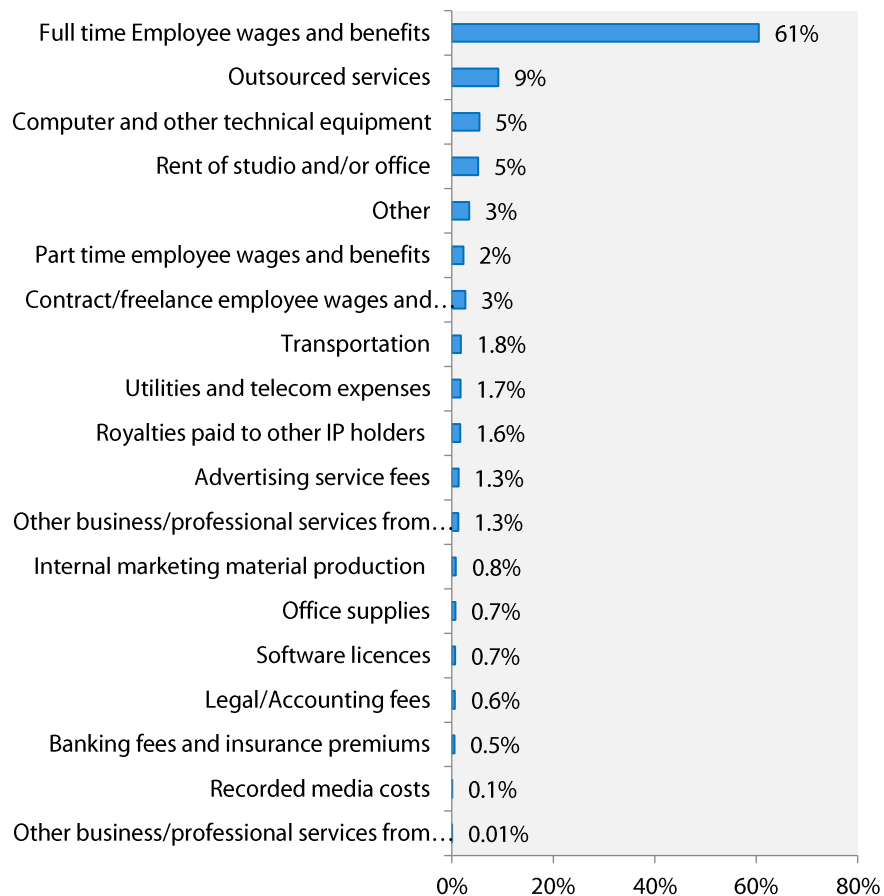
⁴⁰ Newzoo (2016); Global Games Market Report 2016.

3.1.2 Expenditures

Given that the video game industry in Canada is composed of several integrated studios (which cannot account for their revenue as a separate business unit), company expenditure is the most reliable indicator of the size of the video game industry in Canada. Canadian video game companies **spent a total of \$2.6 billion in 2017**, a modest increase over 2015, where the total expenditure was \$2.4 billion. The combination of the increase in the number of video game companies operating in Canada as well as a greater number of projects being completed by Canadian video game companies likely accounts for the increase in total expenditure for the industry.

The following chart summarizes how those expenditures are broken down on average across different spending categories.

Figure 21: Expenditure breakdown by type (% of total expenditures)



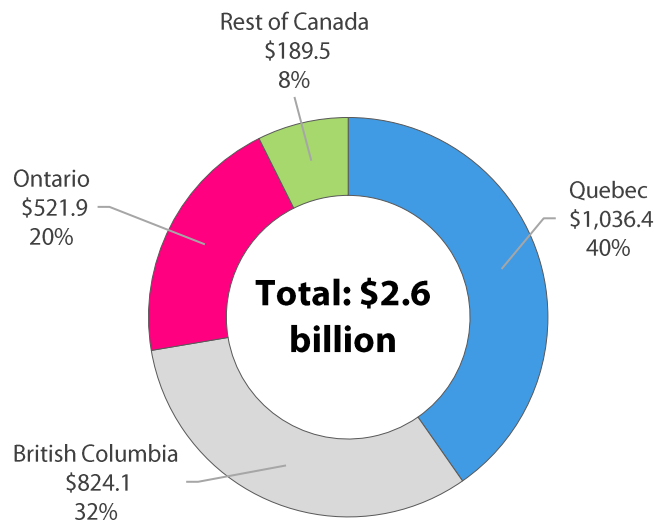
n=76

Source: ESAC 2017 Industry Survey

As in previous years, the bulk of video game companies' spending was on labour. Indeed, 65% of company spending on average went to fees, wages, compensation and benefits paid to permanent, temporary and freelance labour in 2017. This figure shows a slight decrease in the share of spending on labour from 2015, when 74% of company expenditures went to labour costs.

From a regional perspective, the distribution of expenditures roughly follows that of employment (as labour costs account for the majority of expenditures). The following chart illustrates this regional distribution.

Figure 22: Expenditures by Key Province (in millions and as a % of Canadian total expenditures)

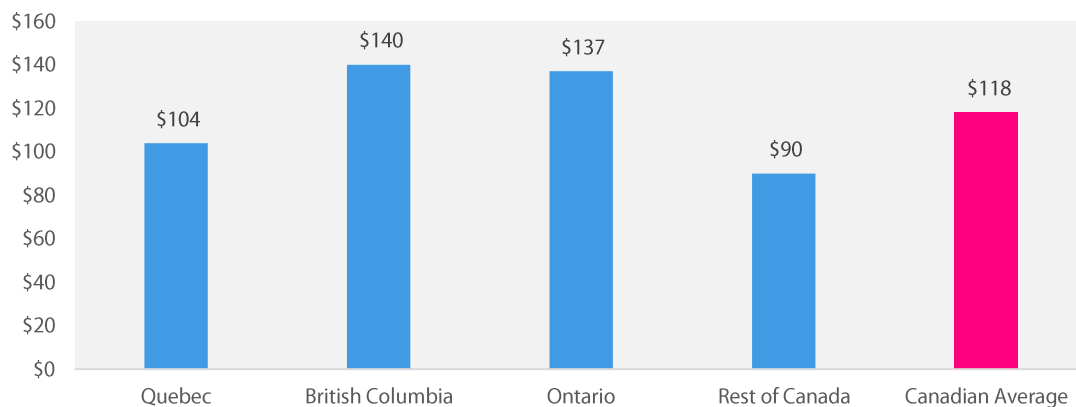


n=76

Source: ESAC 2017 Industry Survey

When compared to employment (Figure 5), one can observe some differences in the costs of operating a video games company across Canada, as depicted below.

Figure 23: Expenditures per FTE (in \$000s)



Source: Nordicity analysis of ESAC 2017 Industry Survey

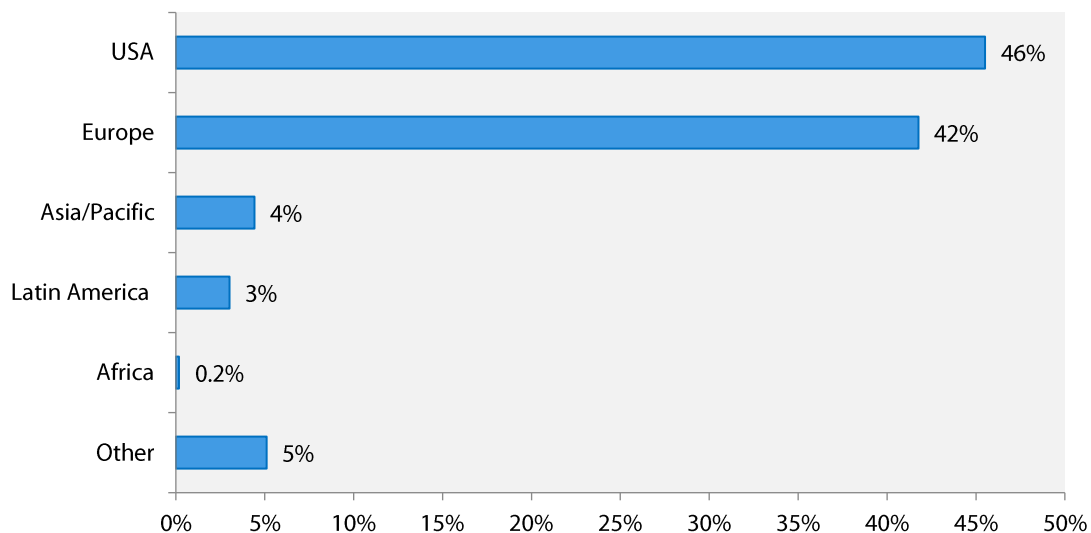
Per FTE, it is most expensive to operate a video games company in British Columbia (19% more than the Canadian average), and least expensive outside of the major development centres (24% less than the Canadian average).

3.1.3 Export Revenue

Canada's video game industry is primarily an export-driven industry. Indeed, the domestic market is very small given the relative size of the population compared to other markets (such as the United States, Europe and China), despite the fact that the vast majority of Canadians are connected and engaging with video games to some extent in their daily lives.⁴¹ At the same time, Canada needs to tap into an ever-growing global audience in order to compete with rival video game hubs around the world.

In 2017, exports account for 75% of all revenue generated by video game companies in Canada. The following chart shows the breakdown of this export revenue, by market, in 2017. The United States and Europe are by far the Canadian industry's primary export markets, together accounting for 86% of all export reported revenue.

Figure 24: Sources of Export revenue



n=69

Source: ESAC 2017 Industry Survey

While this data is not directly comparable to export data reported in 2015 (which focused on the share of video game *sales revenue* that originated from outside of Canada), it is clear that a significantly smaller portion of export revenue was generated from Asia/Pacific in 2017 than in 2015 (where it accounted for 23% of video game sales revenue). This change may be linked to the industry's shift away from the mobile market (see Section 2.2).

⁴¹ ESAC (2016); [Essential Facts 2016](#) - Newzoo (2016); Global Games Market Report 2016 – CRTC (2016); [Communications Monitoring Report 2016](#)

3.2 Labour income

The majority of the economic benefit generated by the video game industry arises through the labour income (i.e., salaries and benefits) earned by industry employees as well as the labour income associated with indirect and induced impact employment.

In 2017, workers employed in the video game industry in Canada collectively earned a total of just under \$1.7 billion in direct labour income. With the indirect and induced employment generated by the industry the video game industry generated over \$2.5 billion in total labour income for Canadian residents in the same year.

This total labour income represents an 11% increase over 2015, meaning that Canada's video game industry has put almost a tenth more money into the pockets of Canadians than in 2015.

Table 6: Labour income, 2015 to 2017

	Labour income 2015 (\$M)	% Increase 2015-17	Labour income 2017 (\$M)
Video game industry ⁴²	\$1,568	+7%	\$1,681
Indirect impact	\$316	+28%	\$403
Induced impact	\$423	+11%	\$468
Total impact	\$2,307	+11%	\$2,553

Source: Nordicity estimates based on ESAC Industry Survey 2017 and Statistics Canada input-output tables

3.3 GDP Impacts

GDP refers to the total value added generated by a company or industry in the development and production of a good or service. In the video game industry, GDP can be estimated by summing the labour income of workers in Canada, plus an allocation of the operating surplus (i.e., operating profits earned directly from the development of video games – as opposed to property or financial assets – which accrue to Canadian residents).

Nordicity estimates that the video game industry's direct contribution to GDP in Canada in 2017 was approximately \$2.0 billion, as shown in Table 9. The industry also generated roughly \$716 million in indirect-impact GDP and \$1 billion in induced-impact GDP. The total GDP generated by the video game industry in 2017, including direct, indirect and induced impacts, was over **\$3.7 billion**.

This GDP impact represents a 24% increase from the total impact on the Canadian economy in 2015. For context, the Canadian economy (as a whole) grew by approximately 4% over the same period.⁴³ In other words, the impact that the video game industry generates has grown significantly faster than the wider economy.

⁴² Direct impact, as detailed in Section 1.2.1

⁴³ Measured as change in expenditure-based GDP, per: Statistics Canada, CANSIM, table 380-0064.

Table 7: GDP impact, 2015 to 2017

	GDP impact 2015 (\$M)	% Increase 2015-17	GDP impact 2017 (\$M)
Video game industry ⁴⁴	\$1,567	+29%	\$2,022
Indirect impact	\$550	+30%	\$716
Induced impact	\$898	+11%	\$992
Total impact	\$3,015	+24%	\$3,730

Source: Nordicity estimates based on ESAC Industry Survey 2015 and Statistics Canada input-output tables

3.4 Other Impacts

The preceding sections have examined the contribution that the video game industry made to the Canadian economy in 2017. However, for an innovative knowledge-based industry such as video game development and publishing, which is also characterized by a large group of fast-growing small- and medium-sized enterprises (SMEs), the economic benefits also extend into future periods. In other words, the expenditures on video game development, which occur today, not only generate wages and GDP in the economy today, but also provide the foundation for higher economic growth in the future. For the video game industry, there are two channels through which these long-term economic impacts can occur: (i) dynamic effects and (ii) spillover effects.

Dynamic effects

For the present context, the term dynamic effects is used to describe the persistence that accompanies the growth of the video game industry. As the video game industry grows in Canada, its labour force becomes more skilled and productive, and thereby able to generate higher economic returns in the future than it would have otherwise been able to achieve. Furthermore, many video game companies in Canada are small businesses, and therefore, poised to grow into larger companies that can serve global markets in the future.

As reported in Section 1.1, approximately 38% of video game companies in Canada are Micro-sized with fewer than five employees (Figure 1). This represents an increase of 23% in the number of Micro-sized firms since 2015. While not all of these micro-sized start-up and emerging companies will survive, many will, and those surviving companies are likely to grow and generate even larger economic benefits in the future. This pattern of growth underlines the importance of policies in place today—such as tax credits—that foster the formation of micro-level enterprises in the video game industry and encourage those companies to take risks and invest in skills development.

Spillover effects

A knowledge-based industry such as video game development can also generate a host of economic spillovers that benefit other sectors of the economy, such as education, health or the general digital media sector. These spillover benefits are in addition to the economic benefits generated through the wages and GDP realized within the industry itself and by its suppliers.

The development of video game content often involves creative, technical or even business-model innovation. And unlike most products and services, the innovation embodied in the development of video games can benefit other sectors of the Canadian economy. For example, as discussed in sections 2.1 and 2.2.2, the innovative processes used to develop video games can be applied to the

⁴⁴ Direct impact, as detailed in Section 1.2.1

development of digital media applications for online learning, e-health or other forms of screen-based entertainment. When innovation by one company—such as a video game development company—benefits other companies or sectors, innovation spillovers occur. When these innovation spillovers occur, the private returns in terms of sales and GDP that the company or innovation-generating industry earns may understate the overall contribution to the economy, since part of the economic benefit is actually realized by other companies or sectors.

Innovation generates spillover effects through three key channels: (i) market spillovers, (ii) network spillovers, and (iii) knowledge spillovers.⁴⁵

Market spillovers include the benefits accrued to consumers and other downstream users of innovative products and services following the commercialization of those products and services.⁴⁶ Network spillovers occur when the economic benefits of specific communications platforms are captured by firms other than the developer of the platform.⁴⁷ For example, in the VR industry, almost all content is currently produced for entertainment purposes. As the industry matures, however, companies expect that applications for VR technology will become much more diversified, leading to just these kinds of spillover effects.⁴⁸

Knowledge spillovers, however, are probably the most relevant channel through which the video game industry can affect other sectors of the Canadian economy. Knowledge spillovers occur when one firm's development of an innovative product or service facilitates further innovation at other firms or in other sectors. Knowledge can be transferred through publication or commercialization (i.e. public release and reverse engineering). However, for the video game industry, perhaps the primary route for spillover effects is through the movement of human capital.

Video game companies can impose legal and non-legal restrictions on their IP (i.e. they can protect and license their video game IP); however, there is often tacit knowledge that cannot be fully restricted and is of value to other firms or sectors. When skilled workers (i.e. human capital) move from firm to firm or sector to sector, this knowledge can spillover.

Knowledge spillovers through human capital can have a geographic dimension, since workers are more likely to find employment in the proximity of their existing jobs. This geographic dimension to human capital movement and knowledge spillovers is often cited as one of the key factors in the development of innovation clusters such as Silicon Valley. In the context of the Canadian video game industry, the geographic dimension to human capital implies that it can also generate economic benefits for other digital media sectors, when skilled workers in the video game industry move into these other sectors.

In summary, the movement of human capital between Canada's video game industry and other digital media sectors means that part of the economic benefits associated with the video game industry—those benefits derived from innovation in the video game industry—would show up in those other digital media sectors through the development of new applications.

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⁴⁵ Adam Jaffe, Economic Analysis of Research Spillovers: Implications for the Advanced Technology Program, a report prepared for the Advanced Technology Program, 1996, downloaded at <http://www.atp.nist.gov/eao/gcr708.htm>, on November 26, 2010.

⁴⁶ Jaffe, 1996.

⁴⁷ Jaffe, 1996.

⁴⁸ Current and future use case of VR technology: <http://pulseonvr.ca/source-embed/?post=265&resource=4>

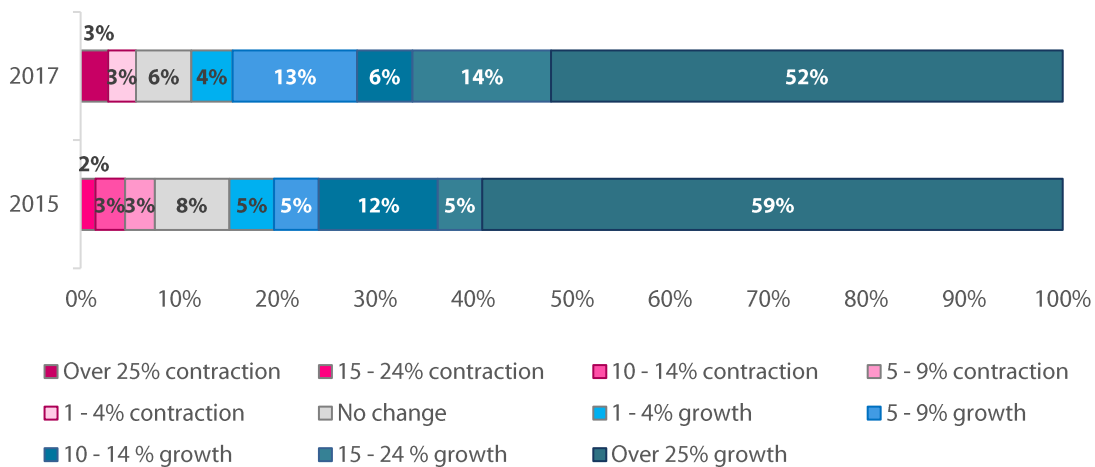
4. Future Outlook

This final section outlines video game companies' views on the future of the video game industry in Canada, including an analysis of the industry's perception regarding growth over the next year or two and a discussion of key barriers and opportunities.

4.1 Future revenue growth

Given the growth experienced by the industry as illustrated in the preceding sections, it should not be surprising that Canada's video game companies have positive outlooks. Indeed, 89% of all respondent companies indicated they anticipate revenue growth over the next two years, compared with 86% in 2015.

Figure 25: Anticipated revenue growth over the next two years



n=71 (2017 data), 66 (2015 data)

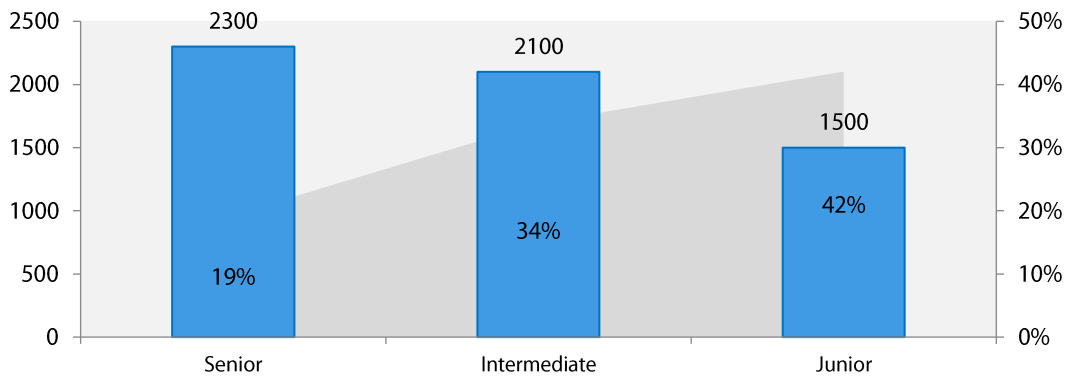
Source: ESAC 2017 Industry Survey and ESAC 2015 Industry Survey

For the expected rate of growth to occur, it is likely that Canada's video game companies will need to hire new employees and continue to innovate. The next two sub-sections expand on these expectations.

4.2 Future Demand for Talent

The results from the 2017 industry survey indicate that the industry is also set to continue to grow from an employment perspective. The chart below shows that companies are planning on growing their workforce at all levels of seniority over the next 12-24 months. In particular, industry demand for more experienced talent will be the greatest. For example, the industry predicts that it will need to hire over 2,300 senior level employees over the next two years.

Figure 26: Planned new hires over the next year (aggregate and as a percentage of 2017 employment)



n=71

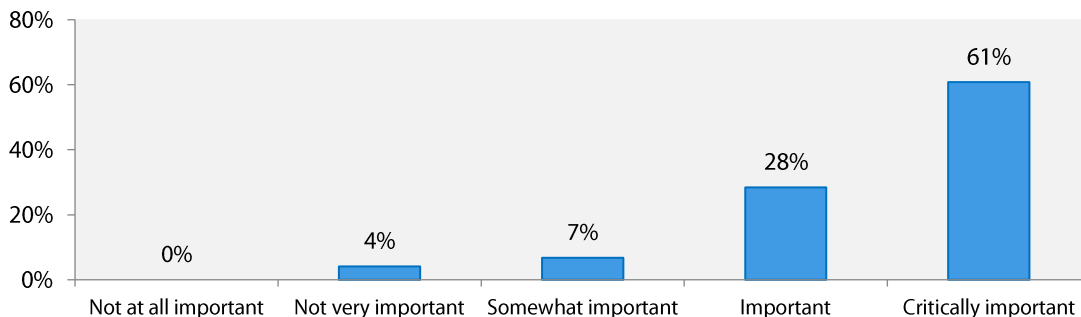
Source: ESAC 2017 Industry Survey

As a share of the existing industry labour pool, most of the growth is expected to be at the junior level (42% of the existing employment at that level). This level of growth, in total, suggests that the industry expects Canada's video games labour force to grow by a combined 27% over the next year.

4.3 Barriers and Opportunities

As discussed in section 2.2.2, the majority of Canadian video game companies are engaging in innovative product or process development. When asked how important innovation was to the overall performance of their company, respondents overwhelmingly indicated that it was either important (28%) or critically important (61%). Initiatives that help facilitate and support innovation and experimentation among video game companies are perceived to be critical to the growth and success of both individual companies and the industry as a whole.

Figure 27: Importance of innovation, (all companies)

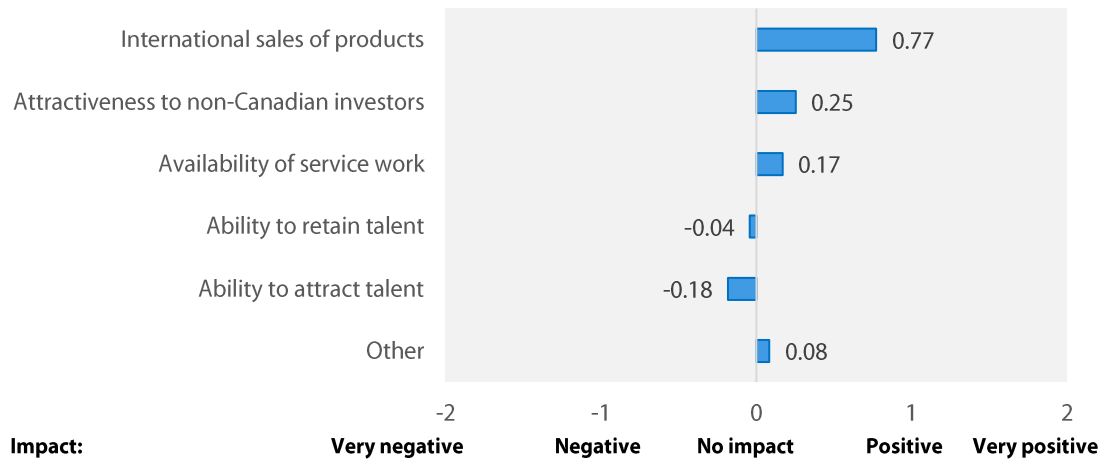


n=74

Source: ESAC 2017 Industry Survey

When asked about how the exchange rate of the Canadian dollar impacts their business, respondents to the survey indicated that the exchange rate had the most positive impact on international sales of Canadian video game products, but had the most negative impact on Canadian companies' ability to attract talent.

Figure 28: Impact of the Canadian dollar exchange rate on business



n=71

Source: ESAC 2017 Industry Survey

Given the importance of export revenue to Canada’s video game industry – and the global nature of the industry itself, it seems that being located in Canada has a positive impact on the competitiveness of video game companies.

As this section illustrates, Canada’s video game industry is poised for continued growth – from both a revenue and employment perspective. It is also likely that much of that growth will stem from the industry’s continued innovation in the entertainment space and beyond.

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Appendix A. Methodology

A.1 Data Collection

The data presented in the above report was collected through two major components: a literature review, and an online survey.

Literature Review

In our review of the relevant literature for this report we began by focusing on the most recent data available in the context of the Canadian video game industry. This included extensive research of publicly available data sources, as well as reports prepared by other experts in the field. Five main themes were then identified according to which we summarized our findings:

1. Software development and platform evolution;
2. End-user migration patterns;
3. Financing statistics and tax credit analysis;
4. Global market size; and,
5. Labour market statistics.

Once summaries were prepared for each of these key themes, secondary data was compared against the primary data from the survey to ensure consistency. After compilation of the secondary data was complete, it was integrated into the rest of the report providing context and additional depth to the raw data and statistics that form the core of this report.

Online Survey

For this study, much of the data presented was derived from the results of an online survey that Nordicity conducted between April and June 2017. Prior to deploying this iteration of the survey, Nordicity and ESAC developed and expanded the list of video game companies to which the survey was distributed to a new universe of 596 companies (up from a total of 472 companies in 2015). In this context, a “video game company” was defined as “a company directly involved in the development and/or sale of video game products; and/or the provision of services directly related to the development and sale of video game products.” The survey was also distributed through industry association newsletter, direct outreach to video game companies and via social media channels. Upon closing the survey, Nordicity had received responses from 104 video game companies.

Of those 104 responses, 76 firms were able to provide detailed financial data. As this financial data lies at the heart of this exercise (e.g., because it is the primary input into the economic impact analysis), Nordicity used these 76 responses to estimate the degree to which the sample collected reflects the universe of video game activity in Canada.

A.2 Data Analysis

A survey will only ever capture a portion of the potential respondents. Having collected the online survey data, the first step was to estimate the degree to which the sample reflects the the universe of video game activity in Canada. In effect, the survey sample needs to be “grossed-up” to the size of the universe. In this case, that meant extrapolated data from the 69 firms that supplied employment data to the 596 companies in the final list of potential respondents. In the video game industry, firms range in size from a few employees to several hundred employees, with a very small number of outlier companies whose employment is in the thousands.

Following the approach taken in 2015, Nordicity split this gross-up exercise into three parts: one for firms under 5 employees (“Micro”), one for firms with between 5 and 99 employees (“Standard”), and one for firms with 100 or more employees (“Large”). In order to provide more granular reporting on company size, the “Standard” companies were further split into three parts, creating a total of five sizes of company, as outlined in the table below. Within the aggregate Standard companies, the gross up was effected across all companies at once. To do so, Nordicity first classified the 596 companies into the three groups of firms, based on a review of their websites.⁴⁹ The survey sample was then similarly segregated—and a gross-up factor was calculated for each group. The following table illustrates this process further:

Table 8 – Gross-up Methodology

Size of Firm (by employee)	2017 Reporting sizes	Number of Firms in Universe (A)	Number of Firms in Sample (B)	Gross-up Factor (A/B)
Large (100+)	Very Large (100+)	26	13	2.00
Standard (5-99)	Large (60-99)	39 (342)	5(44)	7.77
Standard (5-99)	Medium (26-59)	62(342)	8(44)	7.77
Standard (5-99)	Small (5-25)	241(342)	31(44)	7.77
Micro (<5)	Micro (<5)	228	10	22.8

As the above table illustrates, the survey was most representative for larger firms. However, these firms typically account for the bulk of the economic activity in the video game industry. Accordingly, Nordicity is confident that the collected sample provides a reasonably accurate depiction of the video game industry in Canada.

With these gross-up factors—and a segmented survey sample—in hand, Nordicity was able to estimate the revenue generated and expenditures incurred by large, standard and micro-sized firms. These estimates were then summed to arrive at the national totals reported.

Mean weighted median average:

To gross up revenues and expenses from the sample, Nordicity applied the gross up factor for each bucket to the *median weighted mean* of revenue/expenses observed in each part of the sample.

A *median weighted mean* is calculated as the mean average of: the median average⁵⁰ and mean average⁵¹ of revenue/expenses within each bucket. This approach produces a hybrid value that equally weights two types of averages:

⁴⁹ If no employment data was available on a company’s website, it was left as a standard firm.

⁵⁰ Median averages were calculated by assuming a linear distribution of revenues/expenses within each revenue/expenditure range; that is, if the median company was found to be the second of five to report revenues in a range from \$1 million to \$1.99 million, the median value would be calculated as \$1 million + (\$1.99 million – \$1 million) × ((2 – 1) ÷ (5 – 1)) = \$1.25 million. This process mitigates the sensitivity of the median average to quantized steps in midpoint values (which make no difference in a mean average).

⁵¹ Mean averages were calculated based on the midpoint of ranges through which revenue/expenditure data were collected using the survey instrument.

- Mean averages reflect the overall magnitude of revenue/expenditures observed in each bucket, and
- Median averages are more representative of the distribution of revenue/expenditures within each bucket.

Broadly speaking, this approach is more conservative than using a pure mean average because the contribution of the median will offset the contribution of companies that earn or spend (sometimes orders of magnitude) more than their peers, even though they correspond to the same size definition (which is based on employment).

The following is a list of other notable methodological considerations related to the analysis of survey data:

- Other industry data, such as the industry average salary was estimated using a weighted average. For example, firms were asked to provide average salary data for three levels of seniority (junior, intermediate, senior). First, average salary levels were developed for each type of employee at each size of firm (micro, small, medium, large, very large). These averages were then weighted by the relative employment in each type to arrive at a single average salary for each size group. These company size-based averages were then combined (and weighted by the relative employment of each size group) to arrive at a final average salary.

A.3 Economic Impact Analysis

The economic impact modelling drew upon data from the online survey, secondary sources and Statistics Canada's Input-Output (I-O) tables, to derive estimates of **direct**, **indirect** and **induced** impacts of the video game industry on the Canadian economy in terms of employment (i.e., full-time equivalents [FTEs]), labour income (i.e., wages, salaries and benefits) and gross domestic product (GDP).

The **direct impact** refers to the employment, labour income and GDP generated within the video game industry itself, and is largely in the form of wages and salaries paid to the industry's workers. It also includes operating surplus (i.e., operating profits [return to shareholders] and sole proprietors' income) earned by companies and the value of depreciation of capital assets. To estimate the direct economic impact we compiled data from the online survey on industry activity (i.e., operating revenue and expenditures, total wages and salaries, average salaries) and a representative breakdown of cost structures for the video game industry. These data were used to estimate labour income and employment. To estimate direct GDP, the ratio of operating surplus to labour income in for Canada's software publishing industry (15.17%) was obtained from Statistics Canada's I-O and used to estimate the amount of operating surplus to add to the estimate of labour income in order to derive an estimate of GDP.

The **indirect impact** refers to the increase in employment, labour income and GDP in the industries that supply inputs to the video game industry (e.g., utilities, real estate, telecommunications services). The conversion of data for industry activity into estimates of the indirect economic impact required an I-O model of the Canadian economy. Nordicity used Statistics Canada's I-O tables to construct a model that could be used to estimate the indirect economic impact. This model took into account the pattern of re-spending by the video game industry's supplier industries, and the degree to which these supplier industries' purchases leaked from the Canadian economy in the form of imported inputs. This I-O model was used to derive estimates of indirect employment, labour income, and GDP.

The **induced impact** refers to the increase in employment, labour income, and GDP that can be attributed to the re-spending of income by Canadian households that earned income at both the direct and indirect stages of the economic impact. Because Statistics Canada I-O tables only permit one to estimate the indirect impacts of an industry, sector or economic shock, Nordicity developed and applied a custom induced impact economic multiplier to derive estimates for this analysis. This multiplier was based on Nordicity's estimates of the marginal propensity to consume (MPC) and marginal propensity to import (MPM) for Canada. The derivation of the MPC and MPM were based on data for household spending and international trade available from Statistics Canada.

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