The Kootenay Technology Sector Assessment 2020

APPLIED RESEARCH & INNOVATION
Selkirk College

KAST KOOTENAY ASSOCIATION FOR SCIENCE & TECHNOLOGY

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Acknowledgements

The Applied Research and Innovation Centre (ARIC) would like to thank our key industry partners, the Kootenay Association for Science and Technology (KAST), and Mitacs Accelerate for funding this project. The contributions from local technology companies who participated in the survey and the virtual interviews are greatly appreciated. Additionally, we gratefully acknowledge the support from the Selkirk Technology Access Centre (Jason Taylor), Columbia Valley Community Economic Development (Ryan Watmough), Revelstoke Idea Factory (Hayley Johnson), and Innovate BC (Rose Hoeher) for helping connect with local technology businesses.

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As the Executive Director of KAST, Sean is responsible for building strong relationships with funders, economic development partners, the entrepreneurial community, and other stakeholders. Throughout the Kootenays, he identifies and evaluates emerging opportunities in key sectors, and works to create projects that will leverage regional resources.

Sean served in the Canadian military as a combat engineer and worked extensively in the ski/snowboard industry. He has spent two decades in the roles of game designer, executive producer, and creative director for video game companies such as Electronic Arts, Ubisoft, Warner Bros., Walt Disney, and his own Rossland-based company, Planet Fiction Studios.

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As a researcher at ARIC and instructor at Selkirk College, Ines fulfills her passion for teaching and mentoring. When supervising or teaching, she promotes creative problem-solving, research methods, critical thinking and enjoys supporting and collaborating with other researchers and her student team.

Ines earned her Ph.D. in Environmental Science as a computational hydrologist and has a Masters Degree in Applied Math. Her research interest includes social and environmental questions, data science, and computational modelling of biological or physical nature. Her curiosity can take her in many directions, and she embraces learning new things. Recent research projects include the City of Castlegar's Communication report, Hydrological Recovery Analysis, Kootenay Rocky Tourism Sentiment report, and The Kootenay Technology Sector Assessment 2020.

This research project was fulfilled by ARIC intern researchers - Kim Pham, Katie Swinwood, An Tang - supervised by the faculty researcher Ines Schrottenbaum.

Executive Summary

The Kootenay Technology Sector Assessment Report (2020) describes the Kootenay region tech sector and gives insight into its contribution to BC's economy. While the sector has seen consistent growth for many years, the region faces unique challenges.

Most technology businesses in the region are small, with an average annual revenue of $515,057, and due to size, research and developement investments are also comparably low. Like the rest of the province, local tech businesses face scale-up challenges and see limited equity investment.

The regional technology sector employs an estimated total of 3,426 full-time workers with an additional 512 part-time and casual employees. Wages reported for the Kootenay region are below provincial wages within the sector; yet surpass the industrial average. The majority of the local tech workforce is 35 years and older, and companies report finding skilled staff to be one of the most prominent challenges for the region.

"During the COVID-19 pandemic, employees in the Kootenay region were the least likely to have lost their jobs, with less than on employee laid off per business on average."[5] In the Kootenay tech sector, three-quarters of all tech businesses were able to assure job security, and 19% of companies increased full-time staff during the pandemic, showing the local sector's resilience. The regional tech industry also saw a notable number of new tech start-ups over the last year.

For 2019 the Kootenay tech sector reports a combined direct ($405 million) and indirect ($120 million) economic impact for the sector with a total economic impact of $525 million. Even though the region's tech sector poses a small contribution to the provincial economy, it also demonstrates immense potential. Government support, financing programs, and procurement chains could help local tech business go from concept to execution.[2]

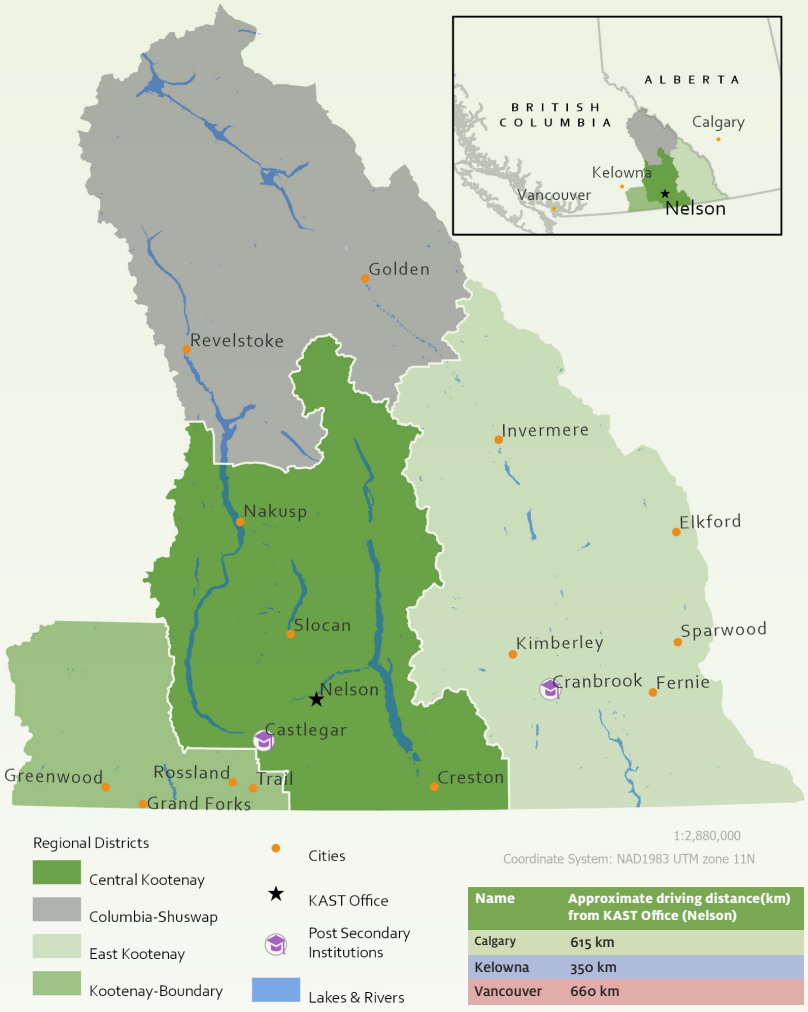
The future of the Kootenays tech sector is looking bright. Businesses project an increase in revenue of 21% for the upcoming year. Many companies report expansion plans within the next three years, and 62% of all businesses look to increase staff numbers over the coming three years.

Despite its unique challenges, the Kootenay technology sector is thriving, and advanced manufacturing, cleantech, and cannabis are promising candidates for future growth. Close collaboration with policy-makers and local stakeholders could unearth untapped potential and elevate the region's tech sector to contribute significantly to provincial success.

Introduction

One of the fastest-growing industries in British Columbia (BC) is the technology (tech) sector. Its rapid growth in rural areas is evident, as technology empowers the rural economy to be more competitive in the marketplace. In the Kootenays, many companies have integrated technology into their operations, and there is a noticeable presence of start-up businesses within the tech sector.[1] However, businesses in rural communities face unique challenges that we see further amplified during the COVID-19 pandemic. Therefore, a better understanding of what the Kootenay tech sector will need to thrive is vital to retain and attract businesses in this region.

The Kootenay Association for Science and Technology (KAST) and Selkirk College's Applied Research and Innovation Centre (ARIC) have been working together to measure the tech sector's impact and its economic health within the region.



Name	Approximate driving distance(km) from KAST Office (Nelson)
Calgary	615 km
Kelowna	350 km
Vancouver	660 km

For this report, the Kootenay region includes businesses located within the three regional districts of the Kootenays (Central Kootenay, East Kootenay, Kootenay Boundary), and the two municipalities of Golden and Revelstoke, in accordance with KAST's operational area. A business is considered tech if the company relies on technology, develops technology, or uses technology to drive its revenue.

Information collected through an online survey helps assess the tech sector's business climate in the region and gives an overview of the local workforce. The survey paints a picture of the tech sector's state, exploring business structure, financial health, the impact of COVID-19 and highlighting benefits and challenges unique to the location. Survey results provide vital information for economic impact analysis and outlook, helping guide future economic and community development strategies that strengthen and expand the regional tech sector.

Methodology

The Kootenay technology sector's assessment is based on a regional survey, interviews, and data from other relevant reports. The Kootenay Technology Survey, conducted in the Fall of 2020, was advertised over multiple channels to tech firms within the targeted geographical areas. A total of 136 firms participated in the survey online and 11 completed the survey through virtual interviews. As a result, a total of 147 businesses participated.

When calculating descriptive statistics from the survey data, outliers were removed using the interquartile range analysis[i], but all data are included in the graphs. All data shown in this report are rounded to the nearest decimal.

Other main sources for information and data are the Profile of the BC Technology Sector (2019 edition), the British Columbia Technology Report Card (2020), and BC Stats data, providing high tech definitions and provincial economic indicators. Data in these reports were derived from 2018 BC Statistics and refer to the Kootenays. This data does not include the municipalities of Golden and Revelstoke. Data collected from the survey include the three regional districts and Golden and Revelstoke (KAST operational area).

For quantitative questions in the workforce, economic impact, and projected outlook it is essential to know the total number of technology businesses operating in the Kootenay region. The Profile of the BC Technology Sector reports 243 high-tech businesses for the Kootenays. The 243 high-tech businesses have at least one employee in addition to the owner. The BC Tech Profile also records an additional 1.81[ii] self-employed operations for every business with employees. When combining companies with employees and self-employed firms, the Kootenay region is home to an estimated 683 tech businesses.

[i] The interquartile range analysis points out extreme values, or outliers, that deviate significantly from other observations in a distribution.

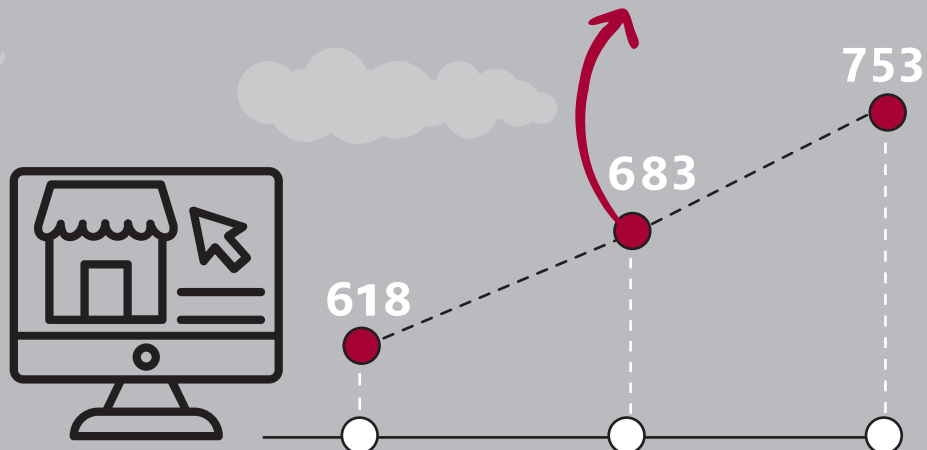
[ii] technology sector, there were 10,941 firms with at least one employee and 19,763 firms without employee. Thus, a ratio of 1.81 was computed (19,763 / 10,941), which means for every business with employees, there are 1.81 self-employed businesses.

The Kootenay Technology Sector

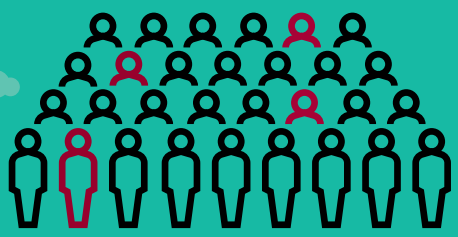
SNAPSHOT

$525,358,263

TOTAL ECONOMIC IMPACT



NUMBER OF BUSINESSES



NUMBER OF TECH EMPLOYEES

3,426

FULL-TIME WORKERS

512

PART-TIME AND CASUAL WORKERS

TECH SECTOR'S AVERAGE ANNUAL WAGES

$62,832
Kootenay Technology

$90,480
BC Technology

$50,440
BC Across All Industries

$148,252
United States Technology

Kootenay Technology Sector Profile

British Columbia's technology sector has generated nearly $18 billion in GDP in 2020 and has become one of the province's key economic drivers. Although BC's high-tech sector is concentrated in the more populated areas, like the Mainland/Southwest (68%) and Vancouver Island and Coast (15%), the Kootenay region saw the second greatest increase in businesses at a growth rate of 8%.[2] Increasing business counts suggests the potential for continued regional growth and expansion of the sector. Thus, a better understanding of what the Kootenay tech sector needs to thrive is important for the regional economic health.

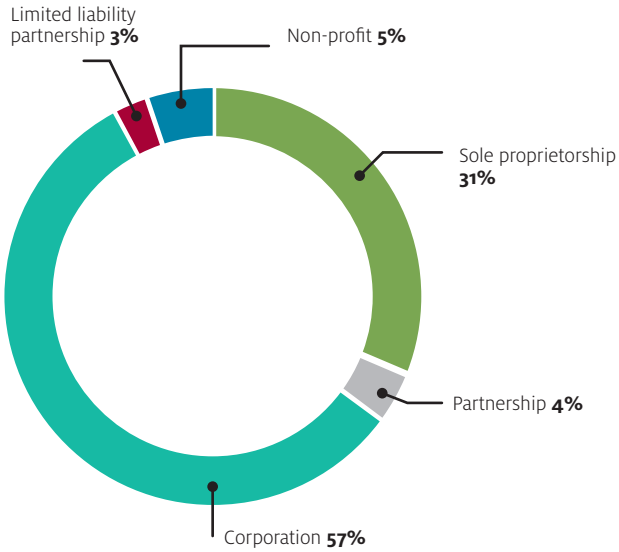
A total of 147 firms participated in the Kootenay Technology Survey in the Fall of 2020, providing information that informs the region's technology sector profile.

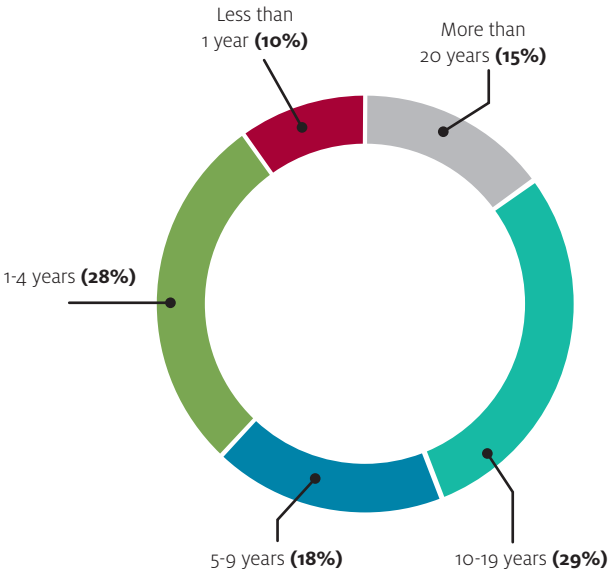
BUSINESS STRUCTURE

Legal Status

Technology businesses in the Kootenays are most likely corporations (57%) and sole proprietorships (31%), which includes self-employed status. In contrast, the Okanagan region recorded sole proprietorships as low as 6%.[3]

The Kootenay region's proportion of sole proprietorship affirms a popular trend of entrepreneurship in the area. Moreover, half of the survey participants reported their businesses to be home-based.





Years in Operation

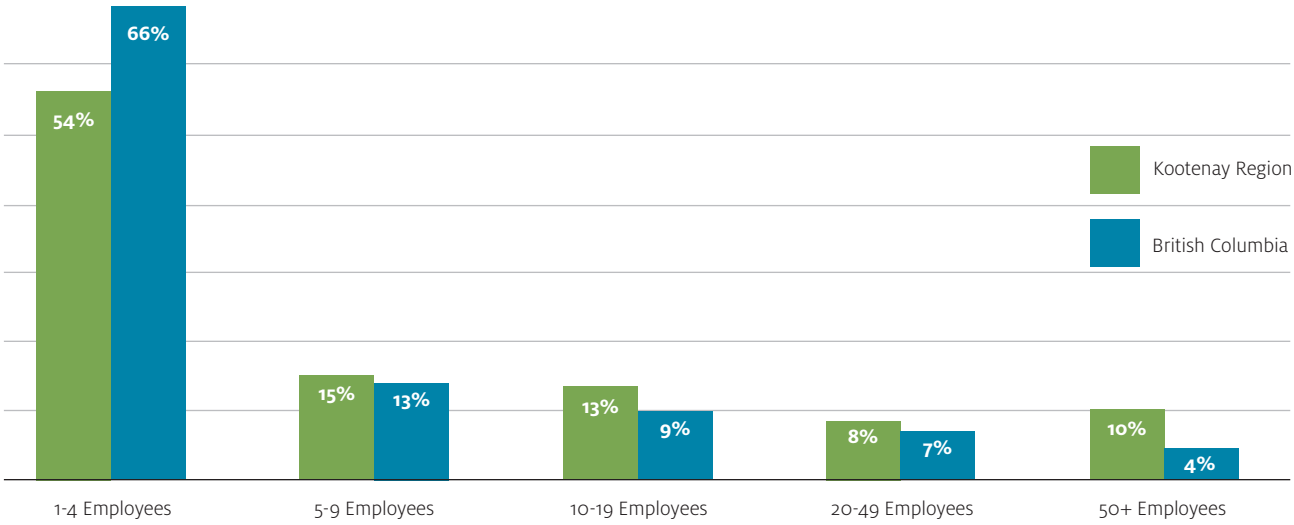
Among the firms surveyed, 38% had been in business for less than five years, of which 10% launched their company within the last year. An uptake of newly established firms during the pandemic displays a positive trend of start-ups in the region.

Business Size

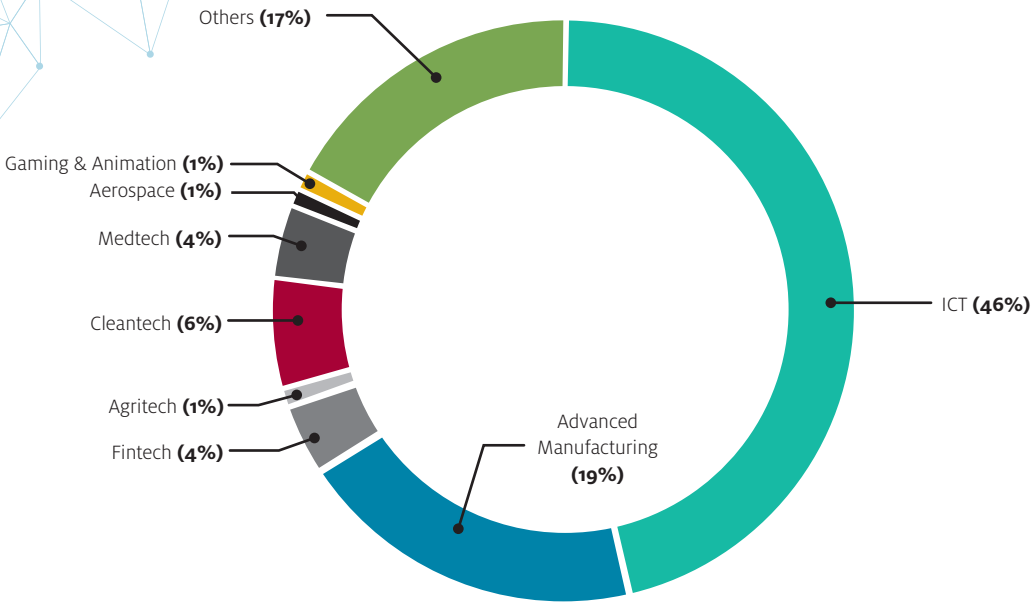
The size of technology companies that responded to the survey aligns in distribution with provincial data.[4] Half of all the companies in the region operate with less than four employees, with 29% reporting no employees.

Remarkably, the proportion of businesses with 50+ employees in the survey (10%) exceeds the provincial rate of 4%. Larger firms in the region are predominantly from advanced manufacturing.

The Kootenay technology sector recorded a 5.9% increase in small business counts between 2014 and 2019, compared to the average 4% growth across all industries in the region.[5]



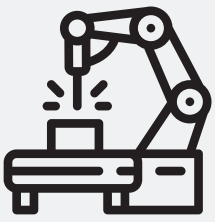
Survey results show that most of the local technology businesses have less than 50 employees. This raises the question of why are the majority of tech businesses operating at a small scale? The BC Technology Report Card (2020) notes a persistent scale-up gap in BC's tech sector. It articulates that companies remain small, sell too early, and don't grow into the medium and large-sized companies that anchor a technology ecosystem. They also indicate a need for more sustained, multi-year public investments that encourage companies to scale up.[2]



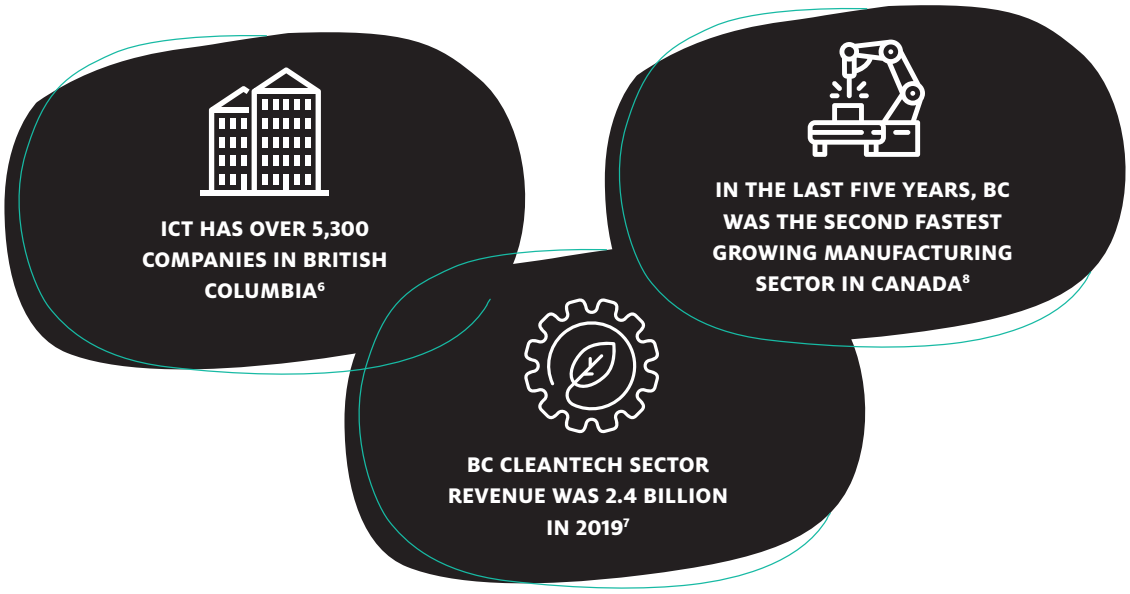
Kootenay Technology Sector by Categories

It is challenging to define the tech sector since technology, and technology-driven advancements permeate all industries. Differences in business climate highlight regional-specific categories. This study adopted tech sector categorization discussed in the *Okanagan Tech Sector* report[3], including Information & Communication (ICT), Advanced Manufacturing, Environment & Technology (CleanTech), Medicine & Technology (MedTech), Finance & Technology (FinTech), Agriculture & Technology (AgriTech), Aerospace, and Gaming & Animation.

Of the total respondents to this survey, 46% of Kootenay technology businesses fall under ICT, making this category dominant within the region. Advanced Manufacturing is the second-largest group at 19%, followed by CleanTech (6%). Consulting, engineering, and architectural services are accounted for in the Other category.



ICT is the dominant tech category in the Kootenays, echoing a similar trend reported for the Okanagan. Advanced Manufacturing accounts for a somewhat larger proportion in the Kootenay (19%) than in the Okanagan (14%).



Kootenay Technology Categories

INFORMATION AND COMMUNICATION + TECHNOLOGY = ICT

ICT might be what many of us think the technology sector is. It includes hardware, software, computing, information technology, SaaS (software as a service), data, Internet of Things (IoT), electronics, and telecommunications.

MANUFACTURING + TECHNOLOGY = ADVANCED MANUFACTURING

Advanced Manufacturing combines industrial technology and advanced materials, including pulp and paper mills, wood product manufacturing, and mining. These groups play a crucial role in the Kootenay technology sector.

ENVIRONMENT AND CLEAN TECH = CLEANTECH

CleanTech is instrumental in the face of climate change. CleanTech encompasses any technology used in environmental protection, renewable energy, and sustainability.

AGRICULTURE + TECHNOLOGY = AGRITECH

Agriculture has been an essential part of our identity in BC. AgriTech uses technology to improve farming and growing processes by monitoring and analyzing weather, pests, soil, and air temperature. It also integrates robotics and artificial intelligence.

FINANCE + TECHNOLOGY = FINTECH

The marriage of finance and technology is known as FinTech. This sector involves banking, investing, financial education, blockchain, and cryptocurrency.

AVIATION + AERONAUTICS= AEROSPACE

Aerospace encompasses aviation and aeronautics and combines research, design, manufacturing, operations, and aircraft and spacecraft maintenance.

GAMING AND ANIMATION

The Gaming and Animation category includes film, virtual reality, augmented reality, artificial intelligence, gaming, and animation.

MEDICINE + TECHNOLOGY = MEDTECH

MedTech is any technology developed for use in the medical field covering life sciences, pharmaceuticals, medical devices, and information systems.

OTHER

This category includes consulting, engineering and architectural design.

BUSINESS FINANCE

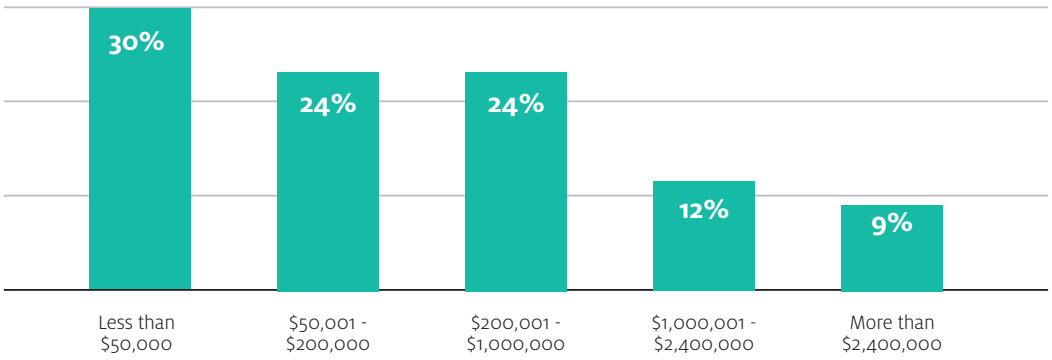
BC's high-tech sector revenue has been increasing for ten consecutive years, outpacing the national average growth. In dollar terms, BC's high-tech sector ranked third in Canada in 2018, behind Ontario and Quebec.[2]

The Kootenay region is home to 2% of all high-tech businesses in BC, and to measure the Kootenay tech sector's contribution to provincial success, revenue, expenses, and investments are observed.

Kootenay technology sector businesses' average annual revenue is $515,057

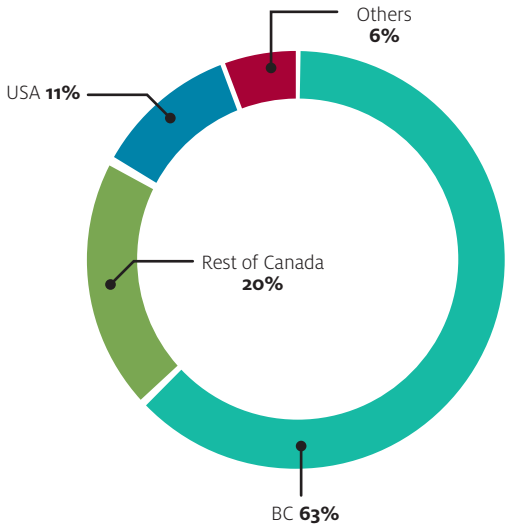
Revenue

The 2020 Kootenay Technology Survey asked companies to share their average annual revenue. Only 9% of companies stated income above $2.4 million. Over half of the business reported revenue below $200,000, with 30% disclosing yearly revenue of less than $50,000. The average annual revenue derived from the survey is $515,057 per technology company in the region after outlier removal.



Sales & Exports

The Kootenay tech sector's dominant sales market is within BC (63%) and Canada (20%). Only 17% of all sales revenue is generated from foreign markets, such as the USA, China, Australia, or Europe, with the United States being the most prominent market for exports.



Expenditure & Investment

Half of the survey participants stated annual expenses below $50,000 per year. Average expenses are estimated at $249,715 per company after outlier removal, suggesting an efficiency rate of 48.5%.[i]

Companies that invest in research and development (R&D) reported an average yearly investment of $7,141 after outlier removal. One-quarter of Kootenay tech firms said they do not invest in research and development. Low R&D investment suggests that local tech businesses lack the financial resources or incentives to invest in R&D. More government support, financing programs, and procurement chains[ii] could help local firms go from concept to execution.[2]

Equity Investment

Over half of the participating companies reported no equity investment in the past three years. The most common source of equity investment comes from founding shareholders and owners (20%), followed by family and friends (7%) and venture capitalists (7%). Moreover, 63% of surveyed technology companies indicated they did not receive financial government support, suggesting that many tech businesses in the Kootenays are self-financed.

[i] The efficiency rate is derived from the average expenses in proportion to the average revenue ($249,715 / $515.057).

[ii] The majority of survey participants indicated they do not engage in government procurement (77%).

BUSINESS CLIMATE

The rural context of Kootenay region poses unique challenges for technology businesses, yet companies in this sector are optimistic about future economic growth. The business environment of the region plays a significant role in that optimism.

Through this survey, technology firms provided advantages and barriers to operating their businesses in the Kootenays. The table below offers a list of advantages and challenges, from the most frequently mentioned to the least.

Advantages

>> RURAL ADVANTAGES

low living costs, beautiful nature, and lifestyle

>> INNOVATIVE AND SUPPORTIVE COMMUNITY

>> ECONOMIC FACTORS

diversity of the economy, friendly attitude towards small businesses, and tourist hub

>> WORKFORCE STABILITY AND QUALITY

>> GOOD TECHNOLOGY INFRASTRUCTURE

broadband

>> OTHER COMMENTS

land availability, Selkirk Technology Access Centre, housing development, growing population and unique amenities.

Challenges

>> IN-ADEQUATE TRANSPORTATION

airplane, buses, goods shipping, and difficult access in wintertime

>> ECONOMIC FACTORS

small population and local suppliers' shortage

>> LACK OF HOUSING

>> LACK OF SKILLED WORKFORCE & A TIGHT LABOUR MARKET

>> POOR TECHNOLOGY INFRASTRUCTURE

broadband

>> OTHER COMMENTS

the lack of professional services, inadequate infrastructure, resistance to change from residents and living costs.

Quality of technological infrastructure (broadband) in the Kootenays was mentioned both as an advantage and challenge, pointing to an unequal distribution of adequate infrastructure in local communities.

Companies are overall satisfied with workforce stability and quality. However, finding skilled staff was reported as one of the biggest challenges in the region, demonstrating a notable gap between professional labour supply and demand within this sector. Moreover, lack of support for hiring students and insufficient resources for wage subsidies add further hurdles for tech businesses.

Similar results were reported in the Okanagan[3], where local technology businesses indicated the most frequent barrier to growth was the lack of qualified talent.

Kootenay tech companies rated the overall business climate as 'good'. They were satisfied with local government support, economic development initiatives, local Chambers of Commerce, and Community Futures.[i]

[i] What is Community Futures? – Community Futures "operates 267 non-profit offices across Canada that provide small business services to people living in rural communities. Each office delivers small business loans, tools, training and events for people wanting to start, expand, franchise or sell a business". https://communityfuturescanada.ca/

Workforce

BC ranks third in high-tech employment in Canada, with numbers rising for seven consecutive years. In 2018, the high-tech sector employed 5.4% of BC's workforce, at a 6.2% increase from the previous year.[4] Following this trend, the demand for tech workers in rural areas has also risen. This section provides a factual overview of the Kootenay's tech workforce based on feedback collected in the regional survey.

EMPLOYMENT

The survey asked businesses to report the number of people they employ. More than half of the companies surveyed operate with less than five employees, reflected in an average of 3.3 full-time employees per company after outlier removal. The 62 firms that responded to this survey question employ a total of 1,377 full-time workers.

Between 2013 and 2018, the BC tech sector added over 25,000 jobs.

The local tech sector's total number of full-time employees can be estimated by adding the number of employees reported in the survey and the number of employees for all local tech companies that did not participate in the survey. Assuming an average of 3.3 employees, firms that did not participate in the survey employ a calculated 2,049 additional workers,[i] summing up to an estimated total of 3,426 full-time workers employed in the local tech sector. In addition to full-time employees, part-time and casual workers account for 13% (512 employees) of the total local workforce. Tech workers in non-tech companies were not considered in this report.

3,426

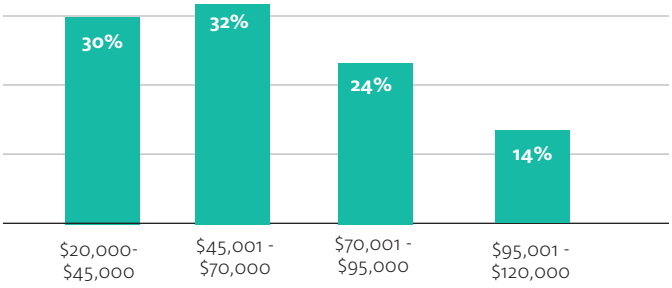
FULL-TIME WORKERS EMPLOYED IN KOOTENAY'S TECHNOLOGY SECTOR.

Survey results show that most workers employed in the Kootenays technology sector are 35 years and older, while workers aged 25 and under account for only 3% of the workforce.

WAGES

BC's technology sector pays higher wages than other industries in the province. The average weekly income of a technology worker in BC was $1,740 in 2018 ($90,480 annually) compared to the average weekly wages of $970 ($50,440 annually) across all industries.[4]

In the Kootenays, the average wages of a full-time technology worker in 2020 were estimated at $1,208 weekly and $62,832 annually. According to the survey, only 14% of local tech workers earn wages above $95,000 per year. While most workers earn between $45,000 to $70,000 annually, 30% of the technology companies report salaries for a full-time employee below $45,000 per year.



Tech sector wages reported for the Kootenays are below provincial wages within the tech sector but are above the industrial average. And while BC's technology sector continues to grow, wages have not shown a comparable trend[2] and continue to be outperformed by wages in the U.S tech sector.

Average Annual Salaries

$62,832
Kootenay Technology

$90,480
BC Technology

$50,440
BC Across All Industries

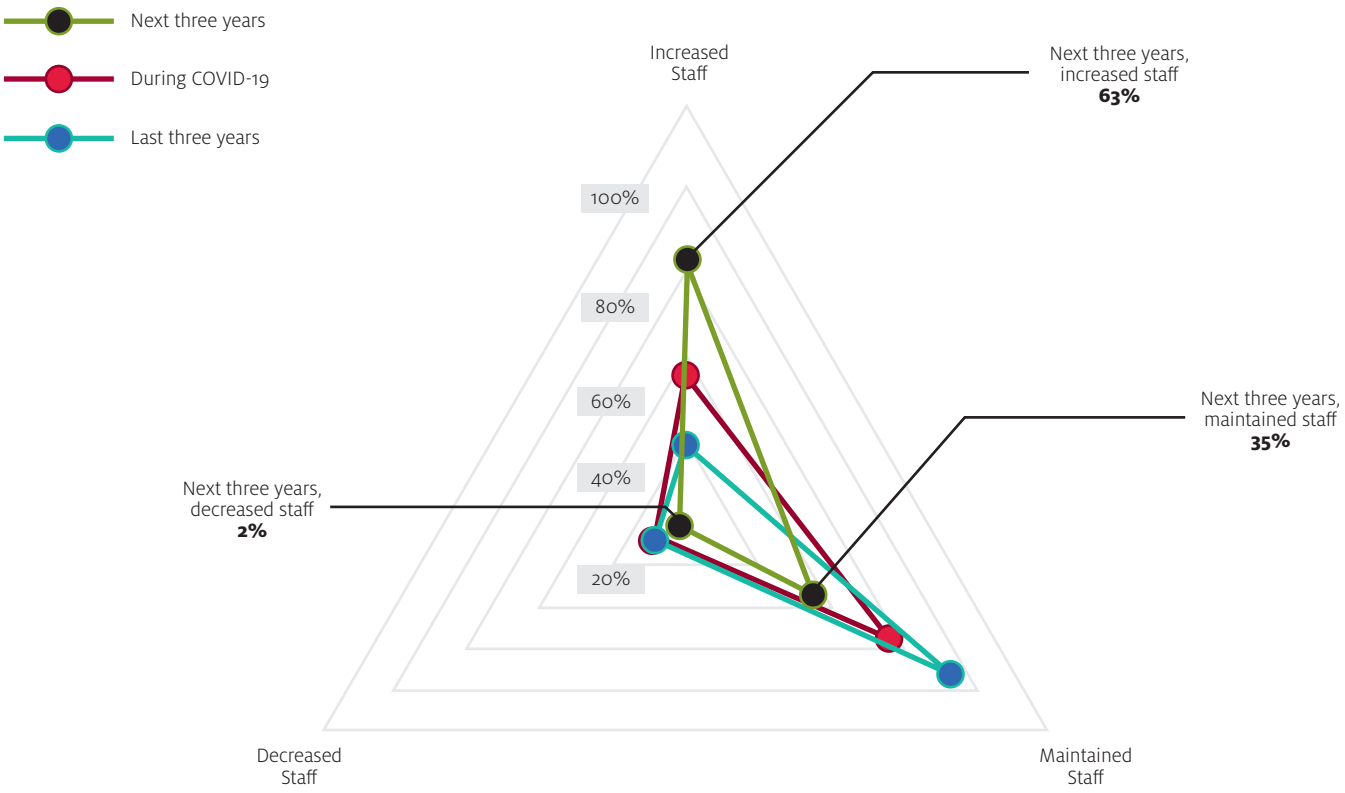
$148,252
United States Technology

[i] Of the 683 technology businesses in the region, 62 answered the survey question; those that did not participate in the survey employ an estimated 2,049 additional employees (683-62)*3.3.

WORKFORCE RETENTION & EXPANSION

In the survey, companies were asked to describe employment trends from the past three years, during the COVID-19 pandemic, and projections over the next three years.

In the past three years, 35% of the surveyed companies increased the number of workers, and 56% sustained staff. During the pandemic, 19% still reported growing employee numbers, while 75% of businesses maintained staff. Although the end of the pandemic is still unclear, 63% of surveyed tech companies project an increase in staff numbers over the coming three years.



Technology companies prefer to hire locally, but 60% encounter challenges finding skilled staff.
Survey results suggest that successful employee retention and attraction in the Kootenay region depend on enhancements around housing, transportation, local health care, funding, advertising and marketing, and collaboration with other companies and local colleges.

Economic Impact

The technology sector is one of the fastest-growing industries in our day and age, yet the Canadian technology sector has room to catch up compared to the United States. In 2018, Canada's tech sector's GDP was $145 billion and responsible for 7% of the national GDP, compared to three trillion and 11% in the U.S, respectively.[4]

BC's tech sector generated 6.5% of the total provincial GDP and experienced the highest five-year compound annual growth rate of 4.6% among all BC industries in 2018.[2]

BC ranked in the top three fastest-growing technology sectors within Canada. Even with this noticeable growth, the absolute value of the BC tech sector's revenue of $34.7 billion in 2018 was only half of Quebec's and one-third of Ontario's tech sector revenue.[2]

The assessment of the Kootenay tech sector's economic impact will help understand the performance of the local tech industry and place it in context to BC's economy.

THE PRINCIPLES OF ECONOMIC IMPACT ANALYSIS

Economic impact analysis estimates the quantitative benefits an industry, project, or event brings to the economy. The total economic impact of an industry is the summary of the direct, indirect and induced impact.

For the Kootenay technology sector, the direct impact is the direct effect tech businesses and their operations present on the BC economy. The indirect impact is the second-layer imprint that companies have on their suppliers, and the induced effect defines household spending from employees.

The Canadian Input-Output Model (I/O Model) is an effective tool to calculate an industry's economic impact. The general method to calculate each economic impact is multiplying the sector's total revenue with the respective multiplier provided by the I/O Model.[17] For instance, we can obtain the Kootenay tech sector's direct GDP impact by multiplying its total revenue with the GDP direct multiplier. The greater the multiplier, the more significant the impact.

Commonly discussed economic impact measures are industry output and GDP; The output describes the total gross value of goods or services produced by a given industry, measured by the price paid, which is the producer's revenue. GDP is the total unduplicated value of the goods and services produced in a country or region's economic territory during a given period.[i]

Deriving the direct and indirect output impact and direct and indirect GDP impact of the Kootenay tech sector, the provincial I/O Model multipliers provided by Statistics Canada (2017)[9] were applied. According to BC Stats, the tech sector can be defined by 38 NAICS[ii] industries. For an industry-based impact assessment, the impact multipliers were derived as average from those industries' multipliers, assuming equal weight for each industry.

When calculating the Kootenay tech sector's total economic impact, the induced impact was not considered; adopting the idea that domestic economic leakage and double-count effects on other industries[iv] would overestimate the sector's economic impact in the region. Other factors influencing the accuracy of the impact assessment could derive from the I/O Model. The I/O Model assumes linear relations, immediate changes, no capacity constraints, personal income spending, and relationships between industries.[10]

[i] GDP is always smaller than Output since it eliminates intermediate goods and services, but it is more critical to government stakeholders.

[ii] NAICS -North American Industry Classification System.

[iii] Profile of the British Columbia Technology Sector (2019 Edition) defined the technology sector by 38 six-digit NAICS codes, while only 21 respective four-digit codes were used to calculate average multipliers.

[iv] Domestic economy's leakages: Parts of the household income spent on imported goods. Double-counts effects: The money spent on vegetables by an employee from the technology sector, which is called the induced impact, is the revenue, or the direct impact, of the agriculture sector. When considering the economy as a whole, that amount of money is counted twice.

THE KOOTENAY TECHNOLOGY SECTOR'S ECONOMIC IMPACT

This economic impact analysis presents the Kootenay tech sector's output and GDP impact on BC' economy. When deriving the local tech sector impact, the I/O Model multipliers were applied to the sector's total revenue. The sector's total revenue was adopted from the Kootenay Technology Sector survey (2020).

Surveyed companies reported a total of $69,951,719 in combined revenue from 32 responses and $515,057 in average revenue.[i] With an estimated count of 683 tech businesses in the region, the revenue for the remaining 651 firms is calculated by applying the average revenue, yielding an additional $335,302,107 in revenue.[ii] Combining both the survey revenue and the remaining companies' revenue results in an estimated $405,253,826 in total revenue for the Kootenay technology sector.

Kootenay Technology Sector Output Impact

The Canadian economic I/O Model defines the direct output equivalent to the sector's total revenue (described by an output multiplier of 1.00). Therefore, the direct output impact of the Kootenay tech sector on the BC economy is $405,253,826.

The local sector's indirect impact was calculated by multiplying the sector's total revenues with the average indirect output multiplier. The average indirect output multiplier yields 0.296.[iii] From the total revenue of the technology sector, the indirect impact was estimated at $120,104,437.[iv] The indirect impact was generated by industries that supply or provide services to the Kootenay technology firms.

The total economic impact, known as the output impact, combines the direct and indirect impact of the sector. The total output impact of the Kootenay technology sector yields $525,358,263:

Total Economic Impact:	
Direct Impact:	**$405,253,826 x 1 = $405,253,826**
Indirect Impact:	**$405,253,826 x 0.296 = $120,104,437**
Total Impact:	**$525,358,263**

[i] Outliers were removed when deriving the average.

[ii] This method applies the average revenue to companies of all sizes and stages and could overestimate a companies' actual revenue, especially for companies with no employees.

[iii] The detailed multiplier table can be found in the Appendix.

[iv] Output indirect impact = Total revenue x Output indirect multiplier = $405,253,826 x 0.296 = $120,104,437

Kootenay Technology Sector GDP Impact

GDP is a crucial economic indicator, representing the total dollar value of final goods and services produced by a sector, intermediate costs excluded.

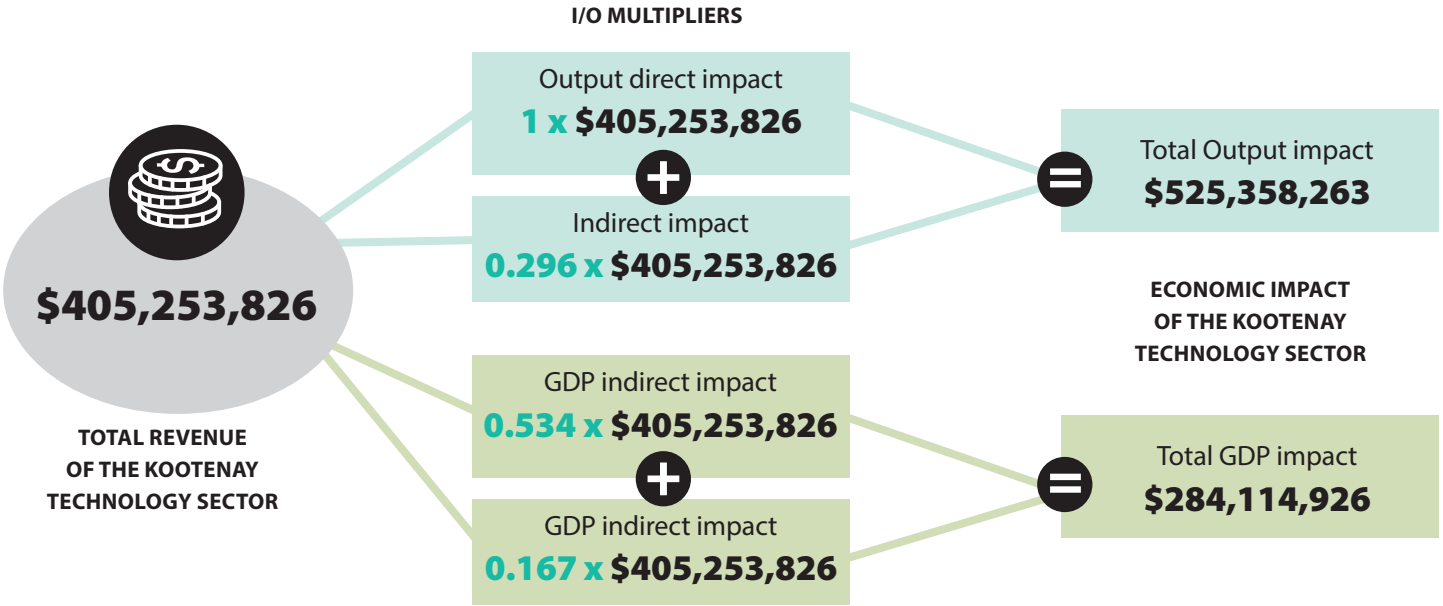
Following the I/O Model methodology, the Kootenay technology sector's GDP was calculated by multiplying its total revenue with the respective multipliers. In this case, the average GDP direct multiplier is 0.534, and the indirect multiplier is 0.167, yielding a total GDP impact of $284,114,926 for the Kootenay technology sector.

Total GDP Impact:	
GDP Direct Impact:	**$405,253,826 x 0.534 = $216,298,897**
GDP Indirect Impact:	**$405,253,826 x 0.167 = $67,816,028**
Total GDP Impact:	**$284,114,926**

Insights on Economic Impact

At half a billion dollars in output impact or $300 million in GDP impact, the Kootenay technology sector is a relatively small contribution to the provincial economy, reflecting the region's small proportion (2%) of technology businesses and low reported average revenue.

The technology sector is one of the fastest-growing industries worldwide, and its contribution is expected to grow more prominent in the future. Even though the Kootenay tech sector is accounting for only a small portion of the economy, there is potential for future expansion.

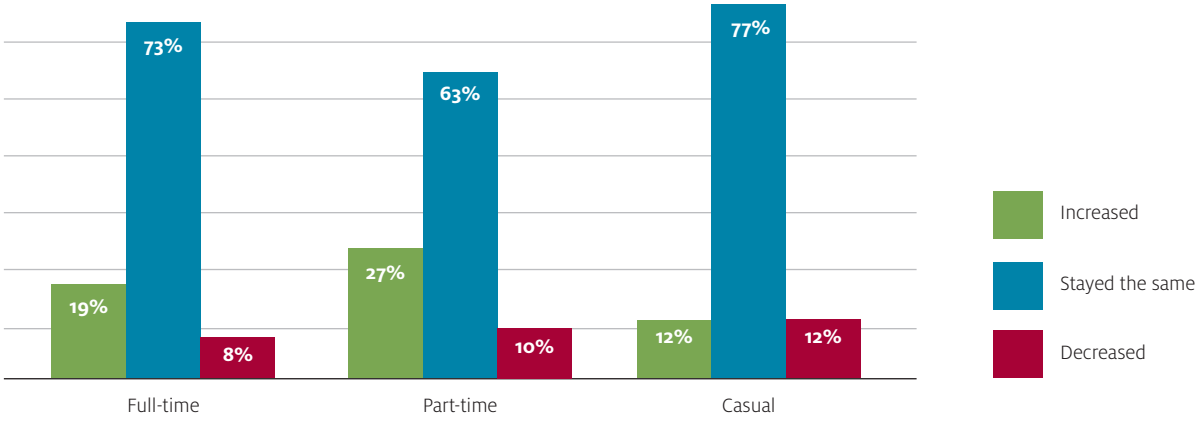


COVID-19 Impact

COVID-19 has changed how we live, work and use technology. This past year has put the tech sector in a position to become a leader in economic growth and recovery as the global demand for digital transformation continues to soar.

Compared to other regions in BC, employees in the Kootenays were the least likely to have lost their jobs, with less than one employee laid off per business on average across all industries.[5]

Of all survey participants, 10% launched their business just before or during the pandemic. With the global technology sector showing consistent growth, most local tech businesses (63%) project growth over the next three years, demonstrating an encouraging trend when looking to the future past the pandemic.



According to the 2020 Kootenay Technology survey, most companies maintained or increased staff across all employment categories (full-time, part-time, and casual) during the COVID-19 pandemic. One out of five local businesses increased numbers of full-time employees, and 73% were able to provide job security during the pandemic. On the other hand, COVID-19 was listed as one of the challenges in employee retention by businesses due to lack of work or inadequate job applicants.

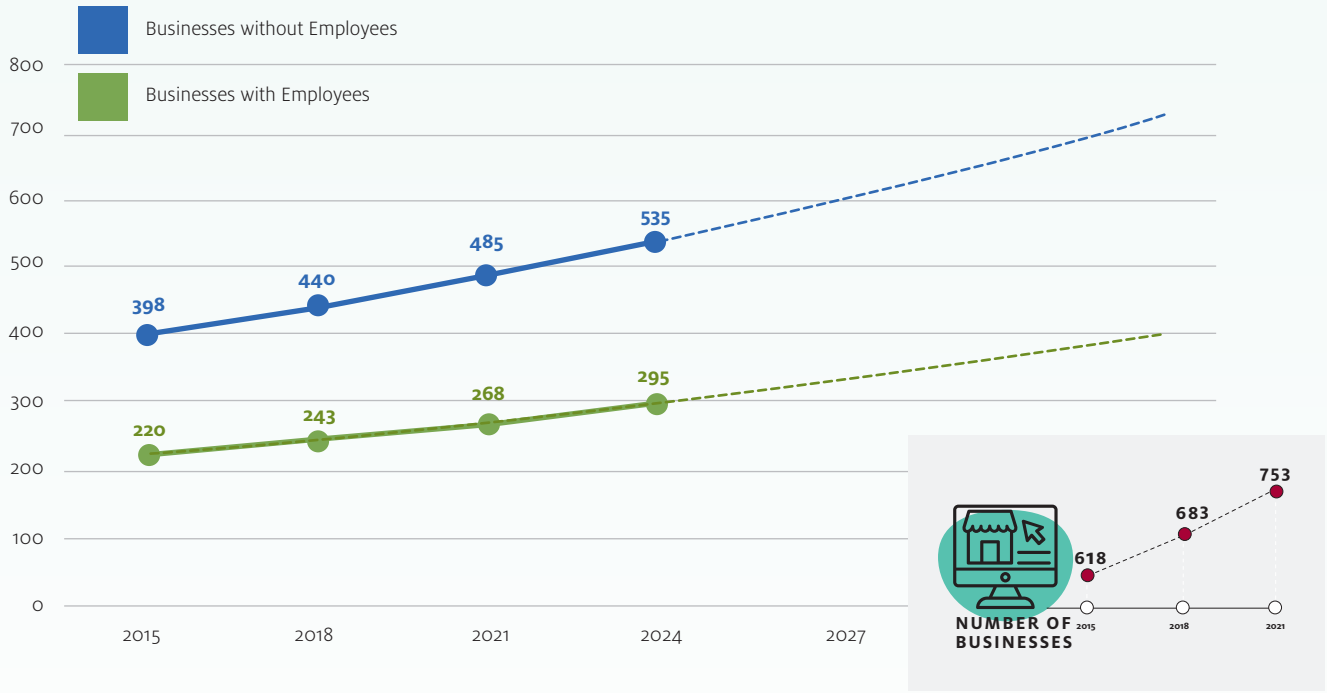
Virtual training programs were already on the rise before the pandemic and were frequently embraced by technology workers.[11] In the Kootenays, online and webinar training was reported as favoured for education and training purposes.

Projected Outlook

The Kootenays Technology Survey captured a snapshot of the local tech sector's current performance. The projected outlook can provide policymakers and other key stakeholders with an understanding of the sector's expansion opportunities and challenges. Discussions of potential growth and possible industry trends for the local tech sector are based on survey results and provincial data.

1) THE NUMBER OF KOOTENAY TECHNOLOGY COMPANIES LIKELY CONTINUES TO GROW.

For all calculations in this report, the number of high-tech businesses in the Kootenay region was adopted from the BC Technology Sector Profile (2020),[4] counting 243 local tech businesses with employees and 440 without employees in 2018. Assuming that the local tech sector continues to grow at the three-year average rate of 3.37% annually, the Kootenays could be home to 268[i] high-tech companies and potentially 485 tech operations without employees by 2021.

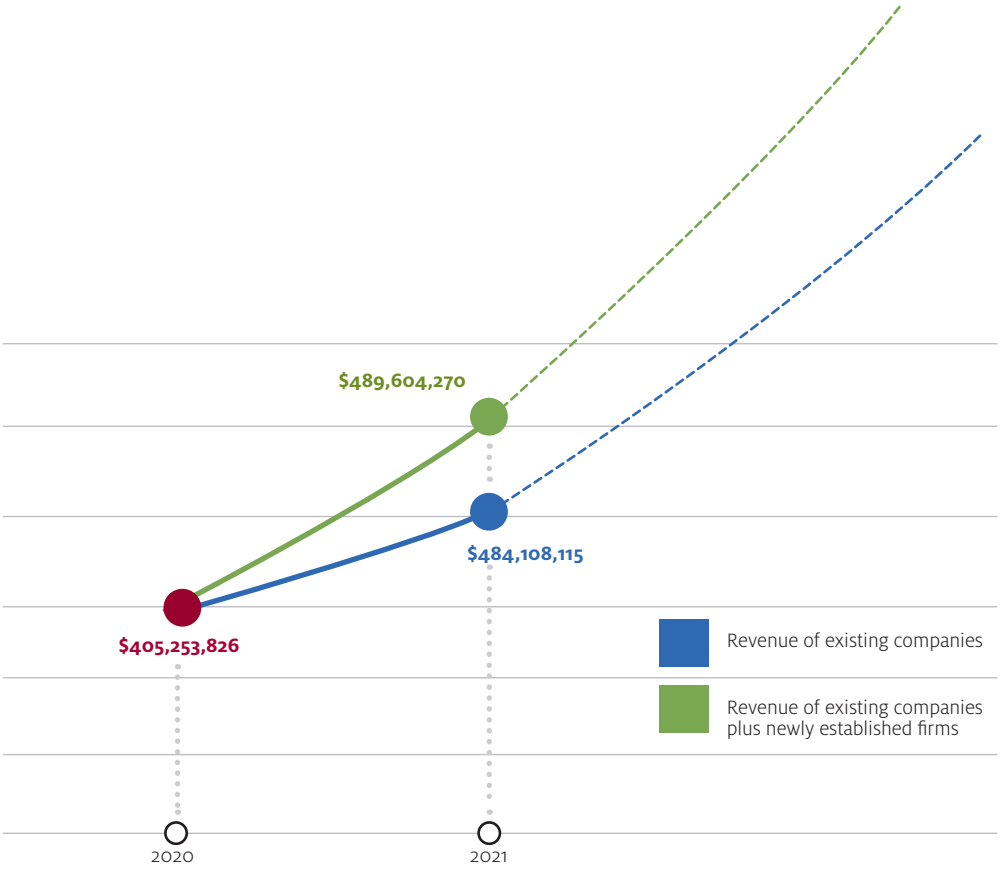


[i] 243(1+0.0337)^3 = 268.4

2) THE KOOTENAYS TECHNOLOGY SECTOR EXPECTS GROWING REVENUE

The Kootenays technology sector generated approximately $4 million in revenue last year. The majority of survey respondents (94%) projected an average revenue increase of 21% for the upcoming year, resulting in possible revenue of $484,108,115 for 2021 from all existing local companies.[i] Assuming that future projections for business counts are realized and 70 new firms are added to the local tech business pool by 2021, the regional tech sector could report an estimated $489,604,270 in total revenue.[ii] The additional $5 million in revenue from newly founded companies adopts the average revenue of $78,517 for companies 1 to 4 years of age, derived from the survey.

If the region can support a consistent growth in business numbers and productivity, the regional tech revenue has the potential for exponential growth over the coming years.



[i] 2021 projected revenue for 683 existing companies = 94% x $405,253,826 x 21% + $405,253,826 = $484,108,115. The average projected growth rate of 21% is applied to the 94% of companies that predicted growth for the next year. The loss of revenue from the 6% of businesses that expected a decrease over the coming year was not considered.

[ii] Total 2021 Kootenay technology sector's projected revenue = 683 existing firms + 70 new firms = $484,108,115 + 70 x $78,517 = $489,604,270. For this prediction, companies' average revenue at the beginning state (1-4 years) of $78,517 reported in the survey was applied to the 70 new companies.

3) TECHNOLOGY COMPANIES PLAN TO EXPAND AND HIRE MORE EMPLOYEES

Business expansion refers to the stage where companies seek additional options to generate more profits. Survey results suggest that about 60% of local tech companies intend to expand within the next three years, 12% report expansion plans past the three-year mark, while a quarter of local businesses do not plan to expand in the foreseeable future. Moreover, companies in the Kootenays that predict to expand plan to invest an average of $302,750; of which, approximately 50% is allocated to research & development.

Local tech firms are optimistic, projecting increased revenue and planning for expansion. Following these trends, employment within the local tech sector is also expected to increase. Most surveyed businesses predict to hire additional staff in the next three years, including full-time, part-time, and casual workers.

4) TALENT SHORTAGE CONTINUES TO BE A CHALLENGE FOR THE KOOTENAY TECHNOLOGY SECTOR

Talent availability is one of the most crucial factors to drive growth and innovation in the tech sector. In recent years, BC's technology talent pool has increased, yet demand for skilled labour in the industry still exceeds talent supply.[12] As stated in the 2016 TechTalentBC Report, the BC tech sector was anticipated to suffer an aggregate shortage of 30,500 skilled workers by 2021.[13] This projected talent shortage might be even more pronounced in rural areas, such as in the Kootenay region.

In the Kootenay Tech Survey, 60% of participating companies reported finding skilled staff to be their biggest recruitment challenge, and 17% stated that they are facing difficulties in hiring due to competitive markets. Relatively low average salaries of rural tech workers and limited career transfer options could contribute to a skilled worker shortage in the areas.

Survey results also show that 32% of current employees within the regional sector are 50 years and older, expectedly leaving the workforce within the next 15 years. Strategic planning could strengthen the region's future talent pool by attracting and educating young workers for the sector's long-term growth.

Keeping existing staff up to date on current and evolving trends will require continuous training in technology-related skills. Local businesses anticipate the need for relevant training in machine learning, cloud computing, software development, digital fabrication, Industry 4.0, AI, blockchain and 5G.

5) MANUFACTURING, CLEANTECH AND CANNABIS ARE PROMISING CANDIDATES FOR THE FUTURE GROWTH OF THE KOOTENAY TECHNOLOGY SECTOR

Advanced Manufacturing claims 19% of the Kootenays tech sector - exceeding the provincial average. Traditionally rich in mining and natural resources, the local industry has adopted innovative advanced materials. Clusters of existing advanced manufacturing companies could significantly boost future growth potential.

CleanTech is currently accounting for 6% of all local tech businesses. An increase in carbon tax and cap-and-trade regulations will likely force companies to adopt renewable and green energy technologies to reduce manufacturing costs and remain competitive.[14] In the West Kootenays, several municipalities have committed to 100% renewable energy by 2050.[15] The transition to clean energy is expected to motivate the adoption of green technology locally and create more jobs within the sector.

In 2019, there were an estimated 2,500 small-scale cannabis producers in the Kootenays. Companies that drive innovation in the cannabis sector might not be captured by the survey due to the operations' unresolved legal status. However, the local marijuana industry is expected to grow noticeably with the support of Community Future's Cannabis Business Transition Initiative funded by the province.[16] Cannabis businesses could create more jobs, expand their scales, and apply more innovative farming technology. The Kootenays AgriTech sector will likely welcome more legal marijuana firms in the near future, increasing its contribution to the economy.

Closing Remarks

The assessment of the Kootenay technology sector is the first of its kind in the region. This report provides valuable information to policy-makers and local stakeholders and has created a foundation for future research. Recurring adoption of this assessment is recommended to capture the sector's growth patterns in upcoming years.

The COVID-19 pandemic may have added some challenges; yet it also accelerated the demand for digital transformation, creating considerable opportunities for the regional tech sector.

Industry-specific programs and public investments are needed to drive a regional strategic plan that creates an attractive business environment for tech entrepreneurs and established tech businesses. The local technology sector could benefit from programs opening up international export markets, helping upscale and mature existing companies, and creating a framework that taps into synergetic effects across the local tech ecosystem.

The Kootenay technology sector is a thriving and resilient industry, and despite its unique rural challenges, it has immense potential to support economic recovery, sustainable development and drive regional economic growth.

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Appendix: The Input-Output Multipliers

Source: Statistics Canada. Input-output multipliers, provincial and territorial, detail level

Type: Provincial Direct and Indirect multipliers.

Industry: described by 21 NAICS industry.[i]

Geography: British Columbia.

Geography coverage: Provincial.

Year: 2017

Link: https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3610059501

Profile of the British Columbia Technology Sector: 2019 Edition		BC Stats				
Code	Description		Direct Multipliers		Indirect Multipliers	
		Code	Output	GDP	Output	GDP
325189	All other basic inorganic chemical manufacturing	3251	1	0.425	0.550	0.326
325410	Pharmaceutical and medicine manufacturing	3254	1	0.301	0.457	0.247
333310	Commercial and service industry machinery manufacturing	3333	1	0.331	0.468	0.252
334110	Computer and peripheral equipment manufacturing	3341	1	0.425	0.212	0.123
334210	Telephone apparatus manufacturing	3342	1	0.454	0.246	0.144
334220	Radio & television broadcasting and wireless communications equipment manufacturing	3342	1	0.454	0.246	0.144
334290	Other communications equipment manufacturing	3342	1	0.454	0.246	0.144
334310	Audio and video equipment manufacturing	334A	1	0.557	0.150	0.087
334410	Semiconductor and other electronic component manufacturing	3344	1	0.400	0.274	0.154
334511	Navigational and guidance instruments manufacturing	334A	1	0.557	0.150	0.087
334512	Measuring, medical and controlling devices manufacturing	334A	1	0.557	0.150	0.087
334610	Manufacturing and reproducing magnetic and optical media	334A	1	0.557	0.150	0.087
335315	Switchgear and switchboard, and relay and industrial control apparatus manufacturing	3353	1	0.416	0.197	0.110
335920	Communication and energy wire and cable manufacturing	3359	1	0.399	0.273	0.155
335990	All other electrical equipment and component manufacturing	3359	1	0.399	0.273	0.155
336410	Aerospace product and parts manufacturing	3364	1	0.432	0.189	0.103
339110	Medical equipment and supplies manufacturing	3391	1	0.515	0.308	0.171
511211	Software publishers (except video game publishers)	5112	1	0.642	0.285	0.169
511212	Video game publishers	5112	1	0.642	0.285	0.169
512110	Motion picture and video production	5121A0	1	0.289	0.552	0.248
512190	Post-production and other motion picture and video industries	5121A0	1	0.289	0.552	0.248
515210	Pay and specialty television	5152	1	0.498	0.308	0.152
517310	Wired and wireless telecommunications carriers (except satellite)	517	1	0.600	0.264	0.157
517410	Satellite telecommunications	517	1	0.600	0.264	0.157
517911	Telecommunications resellers	517	1	0.600	0.264	0.157
517919	All other telecommunications	517	1	0.600	0.264	0.157
518210	Data processing, hosting, and related services	518	1	0.617	0.309	0.184
519130	Internet broadcasting and web search portals	519	1	0.480	0.502	0.293
541330	Engineering services	5413	1	0.660	0.310	0.180
541360	Geophysical surveying and mapping services	5413	1	0.660	0.310	0.180
541370	Surveying and mapping (except geophysical) services	5413	1	0.660	0.310	0.180
541380	Testing laboratories	5413	1	0.660	0.310	0.180
541514	Computer systems design & related services (except video game design and development)	5415	1	0.631	0.294	0.177
541515	Video game design and development services	5415	1	0.631	0.294	0.177
541620	Environmental consulting services	5416	1	0.676	0.315	0.187
541690	Other scientific and technical consulting services	5416	1	0.676	0.315	0.187
541710	Research and development in the physical, engineering and life sciences	5417	1	0.769	0.208	0.122
541720	Research and development in the social sciences and humanities	5417	1	0.769	0.208	0.122
	Average:		**1**	**0.534**	**0.296**	**0.167**

[i] *Profile of the British Columbia Technology Sector (2019 Edition) defined the technology sector by 38 six-digit NAICS codes, while only 21 respective four-digit codes were found to calculate average multipliers.*

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