CPA ONTARIO

The scale and potential of Ontario's intangible economy

Written by

ECONOMIST IMPACT

Contents

About this report

This document presents findings and insights from an original informational tool and benchmarking index that assesses the scale and potential of Ontario's intangible economy.

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Foreword

In 2021 we issued a white paper, *You Can't Touch This: The Intangible Assets Debate*, calling on the accounting profession to refocus its efforts on supporting the intangible economy. While the profession has been trying to push the needle on the complex question of accounting for intangibles, the intangible horse has bolted. Technology start-ups and scale-ups, and the innovation ecosystem have not waited. Instead they have come up with their own unstandardized and unaudited performance measures. This knowledge gap ladders up into the macroeconomic data used to make decisions about Ontario's future.

Intangible assets are the key source of productivity and growth in today's digital economy. Companies that invest in intangibles grow more and faster than those that don't. This was only amplified during the pandemic. And yet, Ontario's track record of turning high-growth, intangible-powered companies into global competitors remains patchy.

That is why we commissioned Economist Impact to investigate how Ontario can boost its high-growth intangible sector. The resounding answer is that we need a better targeted and coordinated approach to enabling intangible-based businesses to scale.

As you will see in this report, Ontario has the basics for start-ups right. There is capital and infrastructure, a pipeline of skilled talent and plenty of intangible assets being developed. But when start-ups look for growth capital and for entrepreneurs with experience managing exponential growth, they're too often left hanging. Without the ability to manage and fund their own growth, our potential unicorns and their scalable intangible assets are snapped up by foreign buyers.

The good news is that there's a growing recognition among policy makers that more needs to be done to prevent us from becoming little more than an incubator for more advanced economies. Recent initiatives by the provincial government with the formation of Intellectual Property Ontario, as well as the federal government's creation of the new Canada Digital Adoption Program, a C$4bn fund to help small to medium businesses across Canada leverage e-commerce opportunities, are welcomed. And with 2021 marking the worst year on record for cyberattacks, the CIO Strategy Council published a new standard that will help smaller businesses protect their systems from intruders.

But more needs to be done in Ontario and across Canada if we're to compete with the global economy's more dynamic, better capitalized and skilled

markets. And given the broader security risks of losing national ownership of our intangible assets, there's a powerful argument for intangible assets being subject to far stronger national interest considerations before being sold to foreign entities.

The accounting profession has a critical role to play in all of this. Our CPAs are everywhere. Building start-ups, in public practice providing assurance, on executive teams and serving as board directors, chairing audit and finance committees and more. CPAs understand stewardship and controllership, and as the intangible economy continues to accelerate, CPAs can and should play an ever more critical role. We're in the early stages of grasping this opportunity. Helping CPAs develop the necessary controllership and leadership capabilities to better steward intangible assets will help the Ontario economy grow. But these will not be the only steps we take. We must extend our efforts as we rebuild our post-pandemic economic recovery and relentlessly review and advance our professional skillset, including helping to evolve the profession's standards and modernizing disclosures. In doing so, we will help drive long-term sustainable growth for our province and Canada as a whole.

Carol Wilding FCPA, FCA
President and CEO
CPA Ontario

Executive summary

Ontario is Canada's economic powerhouse. Of every C$100 in GDP generated in Canada, almost C$40 are produced in the province. Toronto, the province's capital, is a hub for the financial services, insurance and media industries. Ontario's intangible economy, which consists of capital, assets and investments such as data, software, intellectual property (IP), research and development (R&D), brands, and human and organizational capital, is the biggest in the country.

Accordingly, in our framework measuring the size and performance of the Canadian provinces' intangible economies, Ontario's advantages put it in front, with a score of 75 out of 100 (see figure 1). However, our findings also reveal several areas of weakness in Ontario, where better policies could improve the province's prospects for future, accelerated growth in its intangible economy, here in Canada and globally.

These include a stronger pathway to turn investment into IP. On a proportional basis, Ontario invests relatively heavily in its intangible economy, but it has less success than other provinces and countries in turning this funding into productive assets and retaining ownership of them in the long term. Connected to this is a problem with scaling up. Ontario is mediocre within Canada at cultivating high-growth companies, and Canada as a whole lags well behind the US and China. We also noted the need for big improvements to the province's digital infrastructure as part of its post-covid-19 economic adaptation and the growing problems reported by firms within the intangible sector of finding sufficient workers with suitable skills.

Figure 1
Ontario's intangible economy performance

Category	Score (0-100)
Overall	75
1. Quality of digital infrastructure	89
2. Scale of innovation activity	68
3. IP development	90
4. Availability and scope of financing	69
5. Investment and growth of intangible assets	65
6. Quality of education system	68
7. Skilled labor landscape	69
8. Macroeconomic impacts	80

MATURE (80-100) DEVELOPED (60-80)
EMERGING (40-60) NASCENT (0-40)

Source: Economist Impact

Note: Additional detail about the index's 78 indicators can be found in the appendix. Ontario's performance is benchmarked against the other provinces in Canada and occasionally against other countries.

Our report suggests strategies to strengthen each of these areas. Among our recommendations are greater education around how to commercialize IP for publicly funded institutions and centralized resources for legal and IP expertise; revamped credit-worthiness evaluations designed with intangible or digital businesses in mind; more public investment in digital infrastructure; and a greater focus on intangible-related skills for those in the STEM (science, technology, engineering and mathematics) and creative sectors.

Introduction

The intangible economy is expanding quickly. Across Canadian companies, the share of intangible assets to total market capitalization reached 53% in 2021, up five percentage points in two years.[1] The concentration of intangible assets is even greater among those listed on the Toronto Stock Exchange, at 70%.[2]

These figures may seem impressive, but Canada's intangible economy is not as internationally competitive as it could be—intangible asset concentration in the US reached 76% in 2021, with France at 62% and the UK at 58%. Now, entering a post-covid-19 world in which economic success is more closely tied to intangibles than ever, Ontario cannot afford for its intangible economy to grow at its own pace. Better data and policies are required.

In 2014 an economist working for the Ontario government, Tatiana Muntean, produced the first major study of the province's intangible economy. However, changes to the structure of the economy mean an update is now required. Comprehensive data on intangibles are rare, especially at the province level, and often lag quite a few years, as indicated in this report. Although we acknowledge the challenges of tracking and measuring intangibles, our goal is to fill some of these gaps and provide a current picture of Ontario's intangible economy to spark needed debate.

CPA Ontario emphasized in its 2021 white paper *You Can't Touch This: The Intangible Assets Debate,* "the lack of dialogue between accountants and economists or intangible policy advocates may be the cause of the impasse on intangibles." Amid a lack of dialogue, progress depends on mutual understanding: "Economists need to understand the accounting complexities around intangibles. But accountants also need to better understand the economic context."[3] Our report seeks to illuminate that economic context. We explore the trends and repercussions that we see in Ontario's intangible economy and how those stack up against other economies.

Our analysis builds on the need for a macroeconomic view of overall intangible performance—one that allows for benchmarking across provinces or countries—and also an easy-to-use framework that can provide insight into the different areas of the intangible economy.

In this report, we share our findings about Ontario, discuss the broader context of the province's intangible outlook and explore several major policy issues. Our work catalogs the state of Ontario's intangible development with the latest data available, but it also looks at its surrounding environment, examining how policies can support Ontario's intangible economy in the future.

1 Intangible assets as a share of total listed value, as estimated by Brand Finance Global Intangible Finance Tracker (GIFT™) study, 2021

2 Robert Asselin and Sean Speer. "A New North Star: Canadian Competitiveness in an Intangibles Economy." 2019. https://ca.rbcwealthmanagement.com/documents/1478023/1478039/New+North+Star-EN.pd.pdf/47c3d0cf-95ce-4b1a-9ae0-04f8a2817c7d

3 CPA Ontario Insights. "You Can't Touch This: The Intangible Assets Debate." 2021. https://assets.cpaontario.ca/insights/pdfs/intangible-economy-whitepaper.pdf

Overall findings

Discussions about the intangible economy often focus only on specific pieces of it: many have looked at it from a policy perspective, others have examined the financial metrics for valuing and disclosing intangible assets, and still others have explored businesses' efforts to innovate or access capital.

Our research offers a more comprehensive comparative analysis to answer the question:

"Does Ontario have everything it needs to build a thriving intangible economy and, if not, what else is required?"

Answering this question through a broad lens has become more urgent since the arrival of the covid-19 pandemic, which caused the provincial economy to shrink by more than 5% in real terms in 2020.[4] Although the economy rebounded rigorously in 2021, powering the intangible economy could be an important strategy to raise the province's growth and productivity prospects in the future. This is especially pertinent given the OECD's forecast of annual average growth of 0.7% in real GDP per head in Canada in 2020-30, the slowest among advanced economies.[5]

This outlook is further exacerbated by the country's large and widening "innovation trade" deficit: it is a major exporter of lower margin natural resources and agricultural products, but a net importer of high-margin IP.[6] As Jim Balsillie, chair of the Canadian Council of Innovators, and Dan Ciuriak, economist at the Centre for International Governance Innovation, have noted: "IP and data claim a growing share of global income and wealth, [but] without a strategy to improve our 'poor terms of trade,' Canada faces a shrinking share of that income and wealth."[7] Both Balsillie and Ciuriak are critics of the historical leakage of Canadian-funded intangible assets to foreign firms.

In the following sections, we discuss four components highlighted by our research as being critical to the growth and development of Ontario's intangible economy.

Four areas for development in Ontario's intangible economy:

- Translating intangible investment into productive assets
- Scaling up the commercialization of intangibles
- Adapting to new digital realities in the wake of covid-19
- Boosting intangible economy-specific education and skills training

Some are already well developed (as evidenced by Ontario's strong score in our index), but we also explore aspects where Ontario is falling short of its potential.

4 Ontario Ministry of Finance. "Ontario Economic Update." February 18, 2022. https://www.fin.gov.on.ca/en/economy/ecupdates/update.html

5 David Williams. "OECD predicts Canada will be the worst performing advanced economy over the next decade…and the three decades after that." 2021. https://bcbc.com/insights-and-opinions/oecd-predicts-canada-will-be-the-worst-performing-advanced-economy-over-the-next-decade-and-the-three-decades-after-that

6 Jim Balsillie. "Canada needs a revived Economic Council to thrive in the 21st century". 2022. https://www.theglobeandmail.com/opinion/article-canada-needs-a-revived-economic-council-to-thrive-in-the-21st-century/

7 Ibid

Translating intangible investment into productive assets

Ontario invests heavily in the development of intangibles, but struggles in translating those efforts into a productive, locally owned stock of IP.

Ontario devotes an impressive 31% of its total public and private investment to intangibles (see figure 2)—equivalent to C$60bn in 2020.[8] This proportion is larger than every other province besides Quebec and reflects how important intangibles are to the province's economy. They encompass three broad types of assets:[9,10]

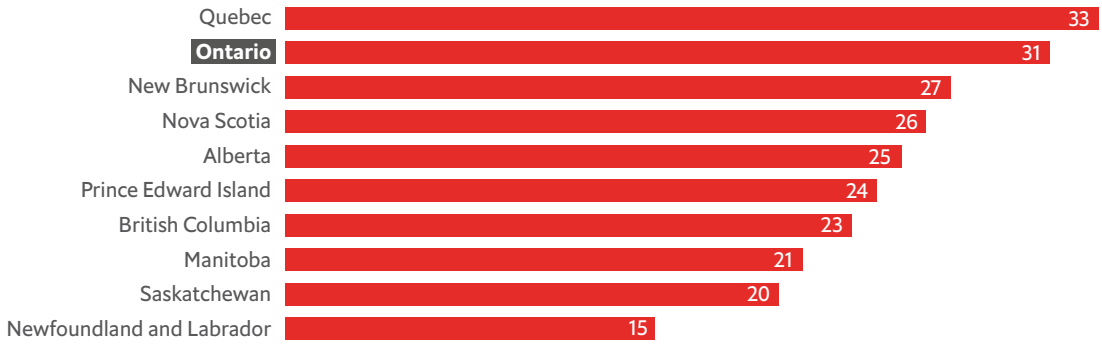
- **Computerized information,** including software, databases, data processing and analysis (for example, 57% of Ontario companies use artificial intelligence [AI] products or services[11])
- **Innovative property,** including creation/discovery work, R&D, IP and patents
- **Economic competencies,** including human capital, market research, brands and organizational capital

Does a high share of investment in intangibles today mean the sector is expanding? To unpack this, we ran some comparisons. Compared with a decade ago, the current share of intangibles within total investment has actually shrunk 4 percentage points from 35% in 2007 to 31% in 2016 (according to the latest available data).[12] Likewise, the gap between Ontario and its neighbor to the south has grown: the US[13] devoted an average of 35% of investment to intangibles between 2000 and 2013[14]

Figure 2

Intangibles account for almost a third of Ontario's total investment

Investment in intangible assets (% of total public and private investment), 2016



Source: Statistics Canada; See category 5 indicators in Appendix A for detailed indicator descriptions and source notes.

8 See indicators 5.1.1, 5.2.1 and 5.3.1 in Appendix A for detailed indicator descriptions and source notes.

9 See Wulong Gu and Ryan Macdonald. "Business Sector Intangible Capital and Sources of Labour Productivity Growth in Canada." 2020. https://www150.statcan.gc.ca/n1/en/pub/11f0019m/11f0019m2020005-eng.pdf?st=nE5enn55

10 These groups reflect an internationally standardized and commonly used categorization for intangible capital, making comparative measurements easier across geographies. See Corrado, C.A., C.R. Hulten, and D.E. Sichel. 2009. "Intangible capital and U.S. economic growth." The Review of Income and Wealth 55 (3): 661–685.

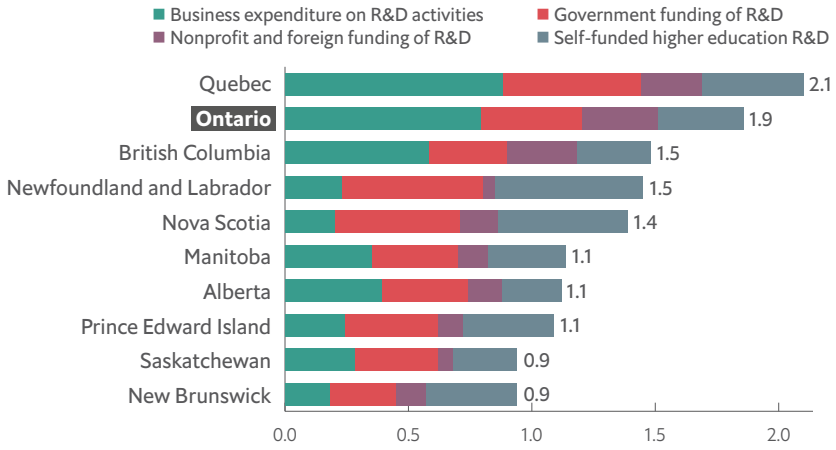
11 Vector Institute. "Ontario AI Snapshot: The state of the province's AI ecosystem in 2020-21." https://vectorinstitute.ai/wp-content/uploads/2021/10/vectoraisnapshot_2020-21_fin.pdf

12 See indicators 5.1.1, 5.2.1 and 5.3.1 in Appendix A for detailed indicator descriptions and source notes.

13 Corresponding US state level data are not available.

14 Carol Corrado, et al. "Intangible investment in the EU and US before and since the Great Recession and its contribution to productivity growth". 2018. https://www.researchgate.net/publication/323448511_Intangible_investment_in_the_EU_and_US_before_and_since_the_Great_Recession_and_its_contribution_to_productivity_growth

Figure 3
Ontario is a high spender on R&D
Expenditure toward R&D, by type, 2020 (%)



Source: Economist Impact estimates, based on Statistics Canada sources;
See indicators 2.3.1, 2.3.4, 2.3.5 and 2.3.6 in Appendix A for detailed indicator descriptions and source notes.

and an estimated 42% in 2019.[15] And looking ahead, our projections suggest only a modest outlook for investment in intangibles in Ontario, with annual growth hovering around 2% from 2011-16.[16] It is clear that there are inefficiencies in the deployment of investment, ranging from misaligned priorities to inadequate financing.

Zooming in on innovative property, defined as assets such as patents and IP developed on the back of investments in R&D, there is cause for concern.

Zooming in on innovative property, defined as assets such as patents and IP developed on the back of investments in R&D, there is cause for concern. Ontario's total stock of innovative property ranks sixth among Canada's provinces, which represents one of its weakest scores among our index's indicators.[17] This is in spite of the fact that Ontario generally scores well for R&D spending, especially among businesses and nonprofits (see figure 3).

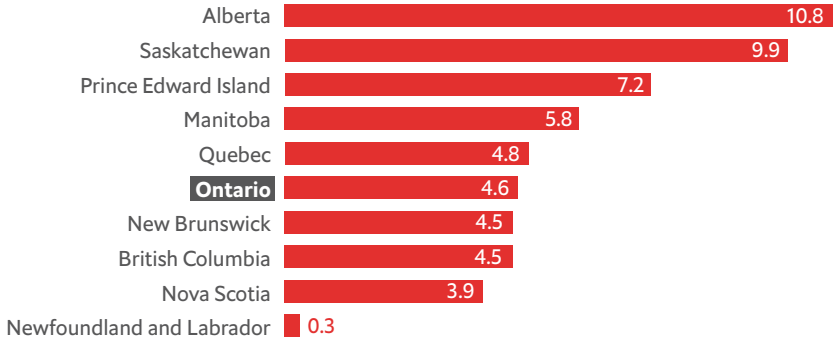
These trends suggest Ontario struggles to translate intangible investments into assets. In particular, the province's weak conversion rate on patent development suggests that its lackluster level of innovative property stock may reflect growing pains around planning, distribution and deployment of investment. For every C$100m spent on R&D in Ontario, the province only generates 4.6 new patents, compared with 11 in Alberta and ten in Saskatchewan (see figure 4). Alberta, by contrast, supports its impressive stock of innovative property through a focus on collaborative research strategies around developing new and sustainable technologies for the oil and energy sector.[18] And although direct cross-country comparisons are difficult (patent requirements are stricter in Canada than in the US), we note that California's rate of patent creation was the equivalent of 19.7 per C$100m in 2019.[19]

Aside from R&D efficiency considerations, another increasingly popular explanation for the patent conversion gap argues that Ontario's subdued levels of university and government funding for R&D results in a host of potential patents and innovations remaining stuck on university shelves or licensed to businesses in a "pre-development" or less leverageable state.[20]

Although these findings highlight potential issues within Ontario, it is important to note that patents

15 McKinsey Global Institute, "The Rise of Intangible Capitalism". 2021. https://www.mckinsey.com/mgi/overview/in-the-news/the-rise-of-intangible-capitalism
16 See indicators 5.1.2, 5.2.2 and 5.3.2 in Appendix A for detailed indicator descriptions and source notes.
17 See indicator 5.2.3 in Appendix A for a detailed indicator description and source notes.
18 Benjamin Dachis and Jacob Kim. "Move over, Waterloo and Ottawa: Calgary is now out-innovating you." 2018. https://www.cbc.ca/news/canada/calgary/move-over-waterloo-and-ottawa-calgary-is-now-out-innovating-you-1.4676458
19 US Patent and Trademark Office; National Science Foundation National Patterns of R&D Resources
20 Expert Panel on Intellectual Property (Government of Ontario). "Report: Intellectual Property in Ontario's Innovation Ecosystem". 2020. https://files.ontario.ca/books/expert-panel-report-intellectual-property-2020-02-20_0.pdf

Figure 4
Ontario struggles to convert research dollars into new patents
Patents per C$100m in R&D spend, 2020



Source: Canadian Intellectual Property Office; Statistics Canada; See indicator 3.1.1 in Appendix A for a detailed indicator description and source notes.

aren't a one-for-one predictor of intangible success, and many businesses in the intangible economy now rely on trade secrets, which are inherently difficult to collect meaningful data on. But, in general, low rates of new patent generation point to potential problems in exploiting intangible assets across the province.

Although patents aren't a one-for-one predictor of intangible success, low rates of new patent generation in Ontario point to potential problems in exploiting intangible assets.

To its credit, the provincial government acknowledges these challenges. In 2019 it convened an expert panel on IP to develop plans to direct strategic investments and capture the homegrown benefits from research and IP commercialization more successfully.[21] Importantly, this includes a focus on retaining the ownership of intangible assets in Canada. The panel's recommendations[22] included a mandatory IP education curriculum for publicly funded institutions, centralized resources for legal and IP expertise, and mandates for research organizations that use public funds in pursuit of commercial benefit.[23] Ontario also recently announced the formation of Intellectual Property Ontario, a new agency to help researchers and companies to maximize the value of their IP in global markets.[24]

Rather than one-off policies, smarter empowerment of the most innovative sectors within the intangible economy is more likely to come through "catalyzing breakthroughs", as stressed by Robert Asselin and Sean Speer of the Public Policy Forum in their series of reports exploring ways to accelerate the intangible economy. As they note, this emphasis on fostering focused intangible development is evident in Canada's proposed plan to create a Canada Advanced Research Projects Agency, akin to DARPA in the US.[25] Although progress depends on implementation, we believe these recommendations represent steps in the right direction to promote a thriving intangible economy.

21 Ibid
22 These recommendations were formalized in Ontario's Intellectual Property Action Plan in 2020.
23 Megan Simpson, Betakit. "Jim Balsillie Led Expert Panel on Intellectual Property Releases Report". 2020. https://betakit.com/jim-balsillie-led-expert-panel-on-intellectual-property-releases-report/
24 Government of Ontario. "Province Launches Intellectual Property Ontario." March 3, 2022. https://news.ontario.ca/en/release/1001687/province-launches-intellectual-property-ontario
25 Robert Asselin and Sean Speer, Public Policy Forum. "New North Star III: The Case for a Canada Advanced Research Projects Agency". 2021. https://ppforum.ca/wp-content/uploads/2021/12/NNS3-CanadaAdvancedResearchProjectsAgency-PPF-Dec2021-EN.pdf

Scaling up the commercialization of intangibles

Commercializing IP and other intangible innovations is crucial for growth, but this step has proven difficult in Ontario.

For businesses in the intangible economy[26] (such as technology companies) to grow quickly, commercializing their intangible assets is fundamental. Initial investments are only the beginning. Our data suggest that Ontario's economy is particularly weak in amplifying commercial value and retaining ownership of it over the long term.

We identified problems around start-up activity—including lower rates of entrepreneurship and new business formation—as well as around scale-up potential (see figure 5) throughout our index. Looking south of the border is illuminating: Ontario has a smaller share of companies that expand to more than 50 employees in under ten years than all 50 US states.[27] This is a broader problem in Canada: although Ontario's business accelerators and incubators are among the best in the country in terms of enabling companies to scale-up, they are much less successful than their US equivalents—leaving Canada behind while other nations are poised to grow. (Toronto's top accelerator, Creative Destruction Lab, received a score of 13.72 on the Narwhal Project's new index for accelerators, compared with StartX's top score of 44.42 in the US.)[28] If Ontario's companies can't scale up as effectively or are acquired by foreign

Figure 5

Fewer than 6% of businesses in Ontario achieved high growth over 2016-19

Share of businesses with annual revenue growth of at least 20% over 2016-19, (%)

Source: Statistics Canada; See indicators 2.2.1 and 2.2.2 in Appendix A for detailed indicator descriptions and source notes.

26 Intangible-focused businesses invest in and rely on assets like data, IP, and brand/organizational capital at a comparatively high level.

27 The share in Ontario is 0.66% and ranges from 0.83% to 2.18% in the US. See Viet Vu and Annalise Hyunh, The Brookfield Institute for Innovation + Entrepreneurship (BII+E). "Scale-up Activity in Ontario". 2019. https://brookfieldinstitute.ca/wp-content/uploads/Scale-up-Activity-in-Ontario_FINAL.pdf

28 Megan Simpson and Charles Mandel. "Narwhal Project Canadian Accelerator Ranking Shows Need for Improvement Compared to US Counterparts". 2021. https://betakit.com/narwhal-project-canadian-accelerator-ranking-shows-need-for-improvement-compared-to-us-counterparts/

Figure 6

A quarter of Ontario businesses that failed to access debt were rejected because of "insufficient collateral"

Share of rejections for debt financing attributed to the business having insufficient collateral, 2017 (%)

Source: Statistics Canada; See indicator 4.1.2 in Appendix A for a detailed indicator description and source notes.

investors before they do,[29] this spells challenges for strengthening employment and building profits in key industries.

Despite this, Ontario does show some bright spots in commercializing intangibles, such as the ongoing scale-up of its AI industry, which added more than 32 new companies and 3,600 new jobs in fiscal year 2019/20 (Apr-Mar).[30] The dramatic growth of Toronto's tech sector also stands out, which added as many new jobs between 2016 and 2020 as Boston, New York and Seattle combined.[31] This is the magnitude of growth that Ontario needs to foster more of. As entrepreneur and economist Charles Plant CPA, CA, notes, "in Canada, even annual growth at 20% will typically see a company bought by the US. Rather, greater than 100% growth at early stages and 60% when scaling is what attracts the financing needed to scale here."[32]

Even for these successful sectors and businesses, though, the process of scaling up relies on more than just patenting and commercializing "technical" IP, as Mr Plant describes it, but also on enhancing synergies across all forms of intangible capital. The most successful businesses achieve scale and rapid growth by capitalizing on upgrades across process-related IP (eg, organizational knowledge about how to scale a business), market-related IP (eg, knowledge about market needs and competitive differentiation in global markets), and other intangible assets such as creative competencies, supply-chain relationships, human expertise, and skilling capacity.[33]

Our research also suggests that another important reason for Ontario's struggles to scale up is the difficulty of accessing consistent, long-term financing. This "curse of collateral" reflects the fact that many intangible-focused businesses[34] and small and medium-sized enterprises (SMEs) lack the physical assets needed to obtain funding to expand their operations. In 2017 a quarter of unsuccessful loan applications from Ontario businesses were rejected because of insufficient collateral (see figure 6). Across Canada, loans to

29 More than half of Canada's venture-backed start-ups that underwent a merger or acquisition in the past two years were sold to foreign buyers. (See: Innovation Economy Council. "Net Benefit: For Canadian Startups, Not All Exits Are Created Equal." 2021. https://innovationeconomycouncil.com/reports/net-benefit/)

30 Vector Institute. "Ontario AI snapshot: The state of the province's AI ecosystem in 2019/20". https://vectorinstitute.ai/wp-content/uploads/2021/01/vectorai_ontarioecosystemsnapshot-final28jan2021.pdf

31 CBRE. "Scoring Tech Talent: How Tech Labor Trends Inform Workforce Decisions & Influence Real Estate in 50 U.S. & Canadian Markets." 2021. https://www.cbre.us/-/media/cbre/countryunitedstates/us-research/major-reports/2021/scoring-tech-talent-media-folder/2021-scoring-tech-talent.pdf

32 Correspondence with Charles Plant, March 2022.

33 Charles Plant, Communitech. "Towards a New Understanding of Intellectual Property." 2021. https://www.communitech.ca/content/downloads/pdfs/Towards-a-New-Understanding-of-Intellectual-Property.pdf

34 Intangible-focused businesses (such as technology companies) invest and rely on assets like data and IP at a comparatively high level and as a result often have fewer physical assets and property to use as collateral for loans.

SMEs made up just 11% of lending in 2018, the lowest among OECD countries. The median value for high-income countries was 53%.[35] These trends make it much harder for start-ups to gain a foothold in the market and challenge incumbents. This systemic issue, rooted in outdated credit-worthiness evaluations, is often cited as one of the leading barriers to enabling disruptive innovation.

Without good access to financing, businesses are encouraged to maintain a reliance on physical assets, delaying the shift toward more productive opportunities.

Beyond the banking sector, similar barriers to accessing financing stretch across the Canadian economy. Total private-equity investment in Ontario, for instance, falls well short in our index compared with that in Quebec and Alberta. And across all provinces, although investment capital is not lacking, private-equity funding for deals involving smaller enterprises remains a notable challenge, as does long-term "patient capital" for companies in the scale-up phase, with the investment potential around intangibles often less well understood.[36,37] Without good access to financing, businesses are encouraged to maintain a reliance on physical assets, delaying the shift toward more productive opportunities. Removing these barriers to scaling up would nudge businesses toward embracing intangibles, helping Ontario unlock the same growth and scalability potential of its most innovative companies.

Although access to venture capital and private equity can help to address funding gaps, these alternative sources are no substitute for a comprehensive financial ecosystem designed to meet the needs of firms in the intangible economy. As British economist Jonathan Haskel[38] argues, in the future we'll need to finance new and different types of industries—not just software or information technology, but things like green innovation or knowledge sectors. "It's not clear [the] venture capital industry is yet well enough equipped to finance that rather different type of investment."[39]

Recognizing this need, the Canadian government has begun to implement some programs that extend IP-backed loans[40] to intangible-oriented businesses that lack traditional collateral; it has also set up a credit guarantee fund designed to help low-collateral SMEs obtain operating funds and loans. However, much work remains to be done in Ontario in making financing accessible to a wider range of start-ups and scale-ups. Looking abroad, additional effective policies can be found in places like South Korea, which has implemented a range of incentives for banks and private investors that invest in small and innovative companies. Accordingly, South Korea has seen its share of lending to SMEs surpass 80% and experienced a dramatic rise in venture and growth capital, all key enablers for intangible success.[41,42]

35 The share of loans to SMEs in 2018 was 17% in the US, 35% in the UK and 60% in New Zealand. (See OECD. "Financing SMEs and Entrepreneurs 2020: An OECD Scoreboard: 1. Recent Trends in SME and Entrepreneurship Finance." https://www.oecd-ilibrary.org/sites/061fe03d-en/1/3/1/index.html?itemId=/content/publication/061fe03d-en&_csp_=5d0be09b32d3f3a6aa507a1c266f5551&itemIGO=oecd&itemContentType=book#section-d1e3050)

36 Business Development Bank of Canada and Canadian Venture Capital & Private Equity Association. "Barriers to Private Equity Investment in Small and Medium-sized Businesses." 2019. https://www.bdc.ca/globalassets/digizuite/16805-roundtables-cvca.pdf

37 TD Economics. "U.S. Leads in Intellectual Property Products Investment, While Canada Lags." 2019. https://economics.td.com/domains/economics.td.com/documents/reports/Ip/CdnIPPinvestment.pdf

38 See *Capitalism without capital: the rise of the intangible economy and Restarting the future: how to fix the intangible economy*

39 McKinsey & Company. "Forward Thinking on the transformative role of intangible assets in companies and economies with Jonathan Haskel and Stian Westlake". 2022. https://www.mckinsey.com/business-functions/marketing-and-sales/our-insights/forward-thinking-on-the-transformative-role-of-intangible-assets

40 IP-backed loans refer to loans that use IP as collateral.

41 OECD. "Financing SMEs and Entrepreneurs 2020: An OECD Scoreboard: 26. Korea." https://www.oecd-ilibrary.org/sites/9fd590e7-en/index.html?itemId=/content/component/9fd590e7-en

42 OECD. "Financing SMEs and Entrepreneurs 2020: An OECD Scoreboard: 1. Recent Trends in SME and Entrepreneurship Finance." https://www.oecd-ilibrary.org/sites/061fe03d-en/1/3/1/index.html?itemId=/content/publication/061fe03d-en&_csp_=5d0be09b32d3f3a6aa507a1c266f5551&itemIGO=oecd&itemContentType=book#section-d1e3050

Adapting to new digital realities in the wake of covid-19

The pandemic accelerated the need for informed decision-making about digital infrastructure and about how to foster a sustainable intangible economy.

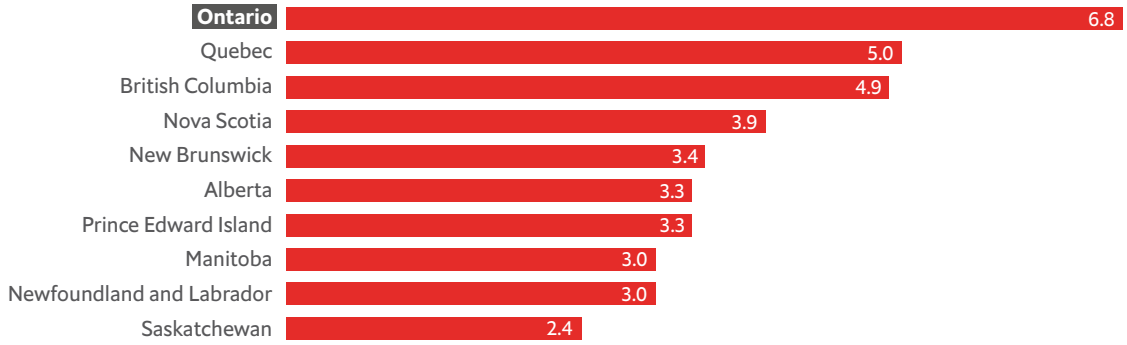
Ontario's intangible economy is powered to a significant degree by its digital economy–the largest (6.8% of GDP in 2019, or C$61bn) and fastest growing (6.1% annually, 2014-19) in Canada.[43] The digital economy includes production of digital goods and services, specifically digitally delivered products, e-commerce, and digital infrastructure such as computer hardware, software, and telecommunications.[44] The strength of Ontario's digital economy relative to its provincial peers is further evident through high rates of public and private investment in information and communications technology products and infrastructure, at 3.2% of GDP. This surpasses Alberta (in second at 2.5%) and the US at 3.1%, but it still trails well behind international leaders such as New Zealand (3.8%) and the Netherlands (4.2%).[45] Although Ontario's digital footprint ought to put the province in a stronger position, the intangible economy's rapid expansion has revealed a variety of new infrastructure needs and risks.

A thriving intangible economy requires the right infrastructure to support it. Although digital infrastructure policies are a strong point for Ontario in our index, clear gaps in preparedness still exist. In 2020 the government identified digital transformation as a strategic priority, publishing its Ontario Onwards action plan.[46] The plan aims to make a range of government services more digitally accessible. In addition, in early March the federal government launched a new C$4bn tech

Figure 7

Ontario's digital economy is the largest in Canada

Contribution of digital economy to provincial GDP, 2019 (%)



If it were its own industry, the digital economy would be larger than the province's entire health care sector.

Source: Economist Impact estimates, based on Statistics Canada sources; See indicator 8.2.1 in Appendix A for a detailed indicator description and source notes.

43 See indicator 8.2.1 and 8.2.2 in Appendix A for a detailed indicator description and source notes.

44 Note: "Estimates [of the digital economy] do not include the uses of digital products in the production process. For example, industries such as health care and agriculture, while users of digital technologies, do not produce digital goods and services." See: Statistics Canada. "Measuring digital economic activities in Canada: Initial estimates." 2019. https://www150.statcan.gc.ca/n1/pub/13-605-x/2019001/article/00002-eng.htm.

45 OECD. "ICT investments in OECD countries and partner economies." 2019. https://read.oecd-ilibrary.org/science-and-technology/ict-investments-in-oecd-countries-and-partner-economies_bcb82cff-en#page7

46 Government of Ontario. "Ontario Onwards: Action Plan". 2020. https://www.ontario.ca/page/ontario-onwards-action-plan

fund to help small businesses adapt to the digital economy.[47] More broadly, better access to digital infrastructure is pivotal in promoting a sustainable economic recovery from the pandemic. Experience has shown that intangible-led recoveries do not automatically result in equal redistribution of wealth and can easily leave behind less productive parts of the economy.[48] For example, 12% of Ontario's population, skewed toward those in rural areas, have limited or no access to high-speed internet, restricting the ability of small business owners in these regions to participate in the intangible economy.[49]

As Ontario's digital economy continues to expand, however, cyberattacks have become a more serious threat for the intangible economy.

Efforts to strengthen the digital and intangible competitiveness of all types of businesses should be a top priority in this new reality. This includes expanded resources and infrastructure to enable e-commerce adoption. Even though e-commerce sales saw 29% annual growth across Canada in 2016-21, they still only account for 6.5% of total domestic retail trade, which lags well short of the US's 12.9%.[50,51,52] Perhaps as a consequence of this untapped potential, 21% of Ontario businesses report that they are likely to invest in e-commerce capabilities in the next year. Among the provinces, only British Columbia saw a higher proportion.[53]

Covid-19's push toward a more digital future has also reinforced the growing importance of intangible assets for business competitiveness and resilience. Local IP and data-first companies in Ontario, such as Snapcommerce (an AI-driven message-based commerce platform) and Maple (a telemedicine start-up) were able to grow their market share during the pandemic, becoming two of the country's fastest-growing technology companies.[54] Similarly, Ottawa-based Shopify—with intangible assets making up an estimated 91% of its enterprise value—doubled its gross merchandise volume, from US$200bn to US$400bn, in just 16 months during the pandemic.[55,56] During the same period other, more labor- or physical capital-intensive companies often struggled to ensure business continuity and manage existential threats.

As Ontario's digital economy continues to expand, however, cyberattacks have become a more serious threat for the intangible economy. In late 2021 a ransomware attack on the government

47 Betakit. "Canadian government launches $4 billion Canada Digital Adoption Program." March 3, 2022. https://betakit.com/canadian-government-launches-4-billion-canada-digital-adoption-program/

48 Rana Foroohar. "Covid recovery will stem from digital business". 2020. https://www.ft.com/content/4a1da405-b452-4e4f-adb8-c44afb9163d0

49 The Manitoulin Expositor. "Ontario Improving Broadband and Cell Service for Rural Communities". 2020. https://www.manitoulin.com/ontario-improving-broadband-and-cell-service-for-rural-communities/

50 Note: In both Canada and the US, e-commerce statistics measure sales, not purchases. This means sales to both domestic and foreign customers are included, but purchases of imports from foreign retailers are not. Although most goods and services (such as food, clothing, electronics, etc) are accounted for, a number of goods are excluded because they are not sold by businesses classified as retail (this includes hotel accommodations, travel services, ticket sales, etc). See Statistics Canada. "Retail E-commerce in Canada." 2016. https://www150.statcan.gc.ca/n1/pub/11-621-m/11-621-m2016101-eng.htm.

51 Statistics Canada. "Table 20-10-0072-01 Retail e-commerce sales (x 1,000)." https://doi.org/10.25318/2010007201-eng

52 U.S. Census Bureau News. "Quarterly retail e-commerce sales: 4th Quarter 2021." 2022. https://www.census.gov/retail/mrts/www/data/pdf/ec_current.pdf

53 Statistics Canada, Canadian Survey on Business Conditions. "Investments in online sales and e-commerce capabilities over the next 12 months, by business characteristics." 2021. https://www150.statcan.gc.ca/t1/tbl1/en/cv.action?pid=3310034501

54 Business Chief. "Deloitte: Top 10 fastest-growing tech companies in Canada". 2021. https://businesschief.com/top10/deloitte-top-10-fastest-growing-tech-companies-canada

55 Intangible assets as a share of total listed value, as estimated by Brand Finance Global Intangible Finance Tracker (GIFT™) study, 2021

56 Muslim Farooque. "Pandemic Reset Can't Stop Shopify's Growth Trajectory." 2021. https://www.yahoo.com/video/pandemic-reset-t-stop-shopify-213043642.html

health system in Newfoundland and Labrador lasted for five days, and as a result thousands of appointments were missed or delayed and the health records of everyone in the province were compromised.[57,58] And it is not just large organizations that are targeted: one in every four Canadian businesses reported suffering a cyberattack in 2021, with more than half of these paying ransom money.[59] This poses a particular threat to smaller businesses, which make up the majority of the Canadian economy and tend to have fewer resources to protect themselves against cyber risks.

Given the speed with which intangibles can turn from assets to liabilities when under attack, well-funded safeguards are paramount to enabling a foundation of trust and resilience across the intangible economy.

As the frequency and consequences of these attacks increase,[60] and as more organizations shift toward a remote- or hybrid-work future, it is clear that ongoing investments to improve cybersecurity will be necessary to protect Ontario's intangible economy. Such infrastructure investments will require co-ordinated and proactive support, as modern cyber-threats evolve rapidly and—like intangibles—can quickly scale in impact.[61] Given the speed with which intangibles can turn from assets to liabilities when under attack, well-funded safeguards are paramount to enabling a foundation of trust and resilience across the intangible economy. Jim Balsillie, Chair of the Canadian Council of Innovators, emphasizes this dual-use nature of intangible assets (ie, they are both economically important and a public good, crucial for ensuring national security). As such, he argues intangibles like data and cybersecurity should be subject to more robust national interest tests when foreign companies and governments try to buy them.[62]

Finally, the pandemic reinforced the importance of encouraging economies to prioritize sustainability and resilience as they recover. Ontario has already established itself as a competitive leader in sustainability through its environmental and clean technology sector, which contributed more than C$23bn to GDP in 2020, with C$7.6bn in exports.[63,64] In particular, the province has cultivated a strong global reputation for water purification capabilities, buoyed by a water sector with some 900 companies.[65] This is the kind of international competitiveness Ontario should focus on as it seeks to rebalance its "IP trade" deficit. It should be noted, however, that the long investment periods associated with developing sustainable technology can deter businesses and investors from taking on such risks. Greater public-private collaboration is one path that can be explored to bridge this funding gap.

57 CBC News. "N.L. health-care cyberattack is worst in Canadian history, says cybersecurity expert." 2021. https://www.cbc.ca/news/canada/newfoundland-labrador/nl-cyber-attack-worst-canada-1.6236210

58 Ian Austen. "As Hackers Take Down Newfoundland's Health Care System, Silence Descends". 2021. https://www.nytimes.com/2021/11/12/world/canada/newfoundland-cyberattack.html

59 The Canadian Press. "A quarter of Canadian companies have been victims of a cyber attack in 2021: survey." 2022. https://montreal.ctvnews.ca/a-quarter-of-canadian-companies-have-been-victims-of-a-cyber-attack-in-2021-survey-1.5770718

60 Kaspersky. "Kaspersky Cybersecurity Bulletin". 2021. https://securelist.com/kaspersky-security-bulletin-2021-statistics/105205/

61 UNCDF Policy Accelerator. "Brief: The role of cybersecurity and data security in the digital economy." 2021. https://policyaccelerator.uncdf.org/policy-tools/brief-cybersecurity-digital-economy#summary

62 Jim Balsillie. "Remarks to Canadian Government Standing Committee on Industry, Science and Technology, June 15, 2020." https://www.ourcommons.ca/Content/Committee/431/INDU/Evidence/EV10797224/INDUEV24-E.PDF

63 Statistics Canada. "Table 36-10-0630-01 Environmental and Clean Technology Products Economic Account, gross domestic product (x 1,000,000)." https://doi.org/10.25318/3610063001-eng

64 Statistics Canada. "Table 36-10-0631-01 Environmental and Clean Technology Products Economic Account, international trade in real (volume) terms (x 1,000,000)." https://doi.org/10.25318/3610063101-eng

65 Perspective. "Ontario's Cleantech Sector is Growing and Innovating at a Rapid Pace". 2020. https://perspective.ca/ontarios-cleantech-sector-growing-innovating-rapid-pace/

Boosting intangible economy-specific education and skills training

To support growth in the intangible economy, Ontario should strengthen its labor supply.

The fourth component in a well-functioning intangible economy is a productive pool of educated, skilled and creative workers. Ontario's job market is flush with intangible-intensive jobs. The province boasts the second-highest concentration of STEM-related jobs in our index (see figure 8). However, these opportunities are only accessible to highly skilled applicants. The difficulty of finding suitable labor is evident in the rising job vacancy rates of Ontario's most intangible sectors, which have risen to 5.2% in the third quarter of 2021, from 3.6% in the first quarter of 2021.[66]

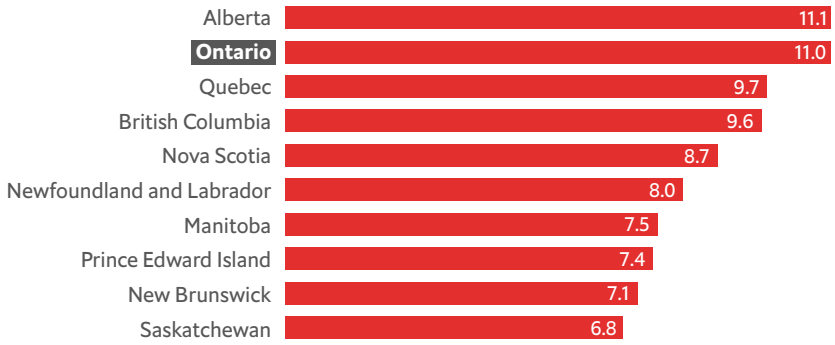
A greater supply of educated workers could help to meet these demands, but Ontario's investments in education are not always yielding the necessary results. Although 66% of Ontario's working-age adults have postsecondary degrees or diplomas,[67] a higher rate than any other province or even any developed country, labor force participation among college graduates is lagging, with one in four not active in the labor force.[68] Moreover, education may not always translate into appropriate skills for facilitating growth in the intangible economy. As many as 55% of entrepreneurs in Ontario report difficulties in hiring employees,[69] a talent gap that can create significant challenges for businesses looking to quickly scale up.

To meet these challenges, Ontario can consider several policies to better prepare its labor force for work in the intangible economy. For instance, participation of college graduates in work-integrated learning programs such as internships, co-op programs, clinical placements, field experience, and community service learning currently stands at 57% in Ontario,[70] which is one of the lowest rates in our index. Greater access to such programs will ensure that graduates gain experience applying intangible-related knowledge and skills to workplace settings. In Ontario, steps are already under way to rethink curriculums and better acquaint students from an early age with STEM pathways in universities and workplaces. In addition, the provincial government recently announced it is expanding investment to a record C$28m for pre-apprenticeship training, which combines classroom instruction with on-the-job learning, and is also finalizing a second round of funding for its C$200m Skills Development Fund,

Figure 8

Ontario and Alberta stand out for their high shares of STEM-related jobs

Share of total employment requiring STEM-related skills, 2017 (%)



Source: Statistics Canada; See indicator 7.1.2 in Appendix A for a detailed indicator description and source notes

66 Statistics Canada. "Table 14-10-0326-01 Job vacancies, payroll employees, job vacancy rate, and average offered hourly wage by industry sector, quarterly, unadjusted for seasonality." https://doi.org/10.25318/1410032601-eng. The six most intangible sectors were selected based on data from the Brand Finance Global Intangible Finance Tracker (GIFT™) study, 2021.

67 indicator 6.2.1 in Appendix A for a detailed indicator description and source notes.

68 See indicator 7.2.1 in Appendix A for a detailed indicator description and source notes.

69 See indicator 7.2.3 in Appendix A for a detailed indicator description and source notes.

70 See indicator 6.2.3 in Appendix A for a detailed indicator description and source notes.

which last year helped 280,000 workers and job seekers make advancements in their careers.[71]

Beyond STEM, Ontario could look to extend intangible skills training and development into the more creative and artistic professions within the intangible economy. Such social clusters have been dubbed the "creative class" by Richard Florida, an urban studies theorist at the University of Toronto, who points out that the creativity and ideas generated in these ecosystems have become one of the most important economic drivers in the 21st century.[72] Creative sectors not only have a powerful economic impact (representing more than 3% of GDP in Ontario in 2019),[73] but they have been pioneers in developing virtual experiences, adopting technological innovation, and driving social and economic change since the covid-19 pandemic began.[74] Ensuring the continued growth of creative assets and capabilities will only benefit Ontario's intangible economy.

Efforts to address rising demand for intangible-related skills should also be complemented by increasing employers' access to foreign labor. Given the province's rapidly aging labor force (21% of the working-age population was older than 55 in 2021, up from 18% in 2011),[75] training may not be enough to ensure an adequate number of workers with the required skills. The Canadian labor market has generally not taken full advantage of the opportunities provided by immigrant skilled labor. Recent research by Statistics Canada has found that only 40% of immigrants with a STEM-related bachelor's degree actually work in STEM fields, compared with 46% of Canadian-born workers (and overall, the share of STEM graduates employed in STEM fields has dropped five percentage points in 10 years). Immigrants in STEM fields also earn 28% less compared with their Canadian-born counterparts.[76,77] With the intensifying competition for intangible-related talent globally, efforts toward making Ontario's labor market more attractive to qualified foreign workers could represent important progress.

Finally, Ontario not only needs to develop skills *for* the intangible economy but also knowledge *about* its intangible economy to help businesses, investors and policymakers more effectively navigate it. As noted in the introduction, current data and metrics about the state of the intangible economy—and about businesses' performance within it—are inadequate. In the absence of more appropriate information, companies and investors often "come up with their own unstandardized and unaudited performance measures", which can make it more difficult to assess true performance or understand intangible-related risks.[78,79] Likewise, the lack of information also leaves policymakers and the public in the dark as they try to chart a course toward a more thriving intangible economy. A concerted effort to strengthen awareness and expertise on these economic, financial and social dimensions remains an urgent priority.

71 Ontario Newsroom. "Ontario Helping More Young People Start Careers in the Skilled Trades." 2022. https://news.ontario.ca/en/release/1001778/ontario-helping-more-young-people-start-careers-in-the-skilled-trades

72 Richard Florida. "The Rise of the Creative Class: And How It's Transforming Work, Leisure, Community and Everyday Life." 2012.

73 Statistics Canada. "Statistics Canada. Table 36-10-0453-01 Culture and sport indicators by domain and sub-domain, by province and territory, industry perspective." 2021. https://doi.org/10.25318/3610045301-eng

74 Economist Impact. "Beyond the spotlight." 2021. https://impact.economist.com/projects/beyondthespotlight/

75 Statistics Canada. "Table 17-10-0005-01 Population estimates on July 1st, by age and sex." https://doi.org/10.25318/1710000501-eng

76 Statistics Canada. "A Canada-U.S. Comparison of the Economic Outcomes of STEM Immigrants". 2020. https://www150.statcan.gc.ca/n1/pub/11f0019m/11f0019m2020016-eng.htm

77 Statistics Canada. "A Gender Analysis of the Occupational Pathways of STEM Graduates in Canada." 2019. https://www150.statcan.gc.ca/n1/pub/11f0019m/11f0019m2019017-eng.htm

78 CPA Ontario Insights. "You Can't Touch This: The Intangible Assets Debate." 2021. https://assets.cpaontario.ca/insights/pdfs/intangible-economy-whitepaper.pdf

79 Information and financial reporting pertaining to intangibles do not fare well in terms of reliability, completeness and accuracy, with 93% of users stating that reporting of intangible assets is inadequate, according to initial findings from a study for the Institute of Chartered Accountants of Scotland. See Stefano Zambon, Giuseppe Marzo, Stefano Bonnini, Laura Girella and Arianna Pittarello (ICAS). "The Production and Consumption of Information on Intangibles: An Analysis of Some Preliminary Results." 2021. https://www.icas.com/thought-leadership/research/theproduction-and-consumption-of-information-on-intangibles-an-analysis-of-some-preliminary-results

Conclusion

Does Ontario have everything it needs to build a thriving intangible economy? Our research shows that the size and potential of Ontario's intangible economy are both strong, with the province leading the nation across many areas. But compared with many global competitors, it punches below its weight in terms of scale and speed. There remain four vital components that should receive more attention as Ontario seeks to cultivate better intangible growth and productivity.

The first is conversion of investment to intangible assets. Although Ontario is a strong investor in intangible development, those efforts have not always led to a productive stock of IP that is owned and retained in the province. The second is commercializing these assets. Gains in productivity and growth will only follow if innovations are successfully brought to scale. The third is informed action to adapt to new digital realities. Without strong access to digital infrastructure, investments in cybersecurity, and a focus on sustainability and competitiveness, Ontario's intangible economy will not be prepared for future risks and opportunities. And, finally, the fourth is investment in intangible economy-specific skills. Fostering a productive pool of skilled and creative workers will ensure Ontario is well poised to meet the rising demands for continued intangible-driven success.

Appendix A: Ontario province profile

The intangible economy consists of capital, investments and assets without a physical embodiment. Intangible assets represent some of the most important economic value generators in modern society, including things such as data, software, intellectual property (IP), research and development (R&D), brands, human capital and organizational capital.

This profile is a data-driven snapshot of the state of Ontario's intangible economy, including assessments of the province's enabling environment for intangible asset development (public policy support, education, skills, innovation activity and financial accessibility) and the size and scope of its intangible economy (the value of intangibles, scale of digital activity and infrastructure, and economic contributions of these factors).

Intangible assets, capital and investment have a widespread impact on economic activity and financial value, contributing significantly to regional and national development. However, information about intangibles is limited. A lack of conventional statistics in this area constrains our thinking and understanding about the scope of intangibles across businesses and the economy. Better measurement of intangibles is therefore key to analyzing and realizing their full potential.

This profile seeks to create a more holistic understanding of intangibles and their value creation. Such information is crucial for informing innovation strategies and policy development, highlighting which areas need improvement and which represent strengths. However, a complete understanding of the intangible economy will require improving data accounting and measurement tools. Without better sources of information, the intangible economy will remain locked in mystery, falling short of its potential long-term value.

Ontario: Key statistics	Value	Rank/10
Intangible investment (% of investment spending, 2016)	31%	2
Annualized intangible investment growth (2011-16)	2.3%	5
Value of intangible capital (% of total capital stock, 2016)	9.5%	4
Total R&D expenditure (% of GDP, 2019)	1.9%	2
Digital economy's contribution (% of GDP, 2019)	6.8%	1
Digital economy's contribution to employment (% of jobs, 2019)	6.1%	1

Overview

Ontario records a strong performance on our index, both in terms of the scale and the potential of its intangible economy, receiving an overall score of 75 out of 100, leading all Canadian provinces.

Ontario excels across the domains of digital infrastructure, digital economic activities and IP development. The province's enabling environment for intangibles is supported by comprehensive provincial and federal policies/ initiatives, sizable investments in functional information and communications technology (ICT) infrastructure, and country-leading contributions of digital activities to provincial GDP (6.8% in 2019) and economic growth (6.1% annual growth, 2014-19).[1]

Leading areas for strengthening Ontario's intangible

1 See indicators 8.2.1 and 8.2.2

economy performance include improving R&D efficiency; increasing investment support for innovative property development; boosting start-up rates, entrepreneurial activity and high-growth scale-ups; and expanding non-collateralized access to financing for businesses. Education and skills development represent another important area for improvement, owing to limited utilization of work-integrated learning programs and constraints around the affordability of higher education institutions.

Enabling environment

Ontario has a robust policy environment enabling the growth of its intangible economy. In terms of digital infrastructure, Canada's Competition Act is the primary policy addressing competition in the digital economy and the collection and use of data. It contains both criminal and civil provisions aimed at preventing anti-competitive practices, encouraging healthy competition within and across provinces. The Government of Ontario has also launched a new digital strategy plan to upgrade digital infrastructure and data services through the Ontario Onwards Action Plan.

To promote innovation activity within the province, the Government of Ontario provides start-up assistance through business grants, subsidies, loan facilities and equity capital. The provincial government also offers tax credits to businesses for R&D and other innovation activities. Strong IP policies, a program for IP-backed loans, and data-focused foreign direct investment (FDI) regulations are also key enablers to the health and success of Ontario's intangible economy. Meanwhile, Ontario's Intellectual Property Action Plan aims to drive long-term economic competitiveness by prioritizing the generation, protection and commercialization of IP.

However, the existence of policy does not directly translate to favorable intangible economy outcomes. Despite current IP policies, Ontario underperforms in some areas of IP development and global competition. Accordingly, a focus on building and maintaining skilled talent and protecting ownership of domestic intangible assets to drive innovation activity is a key topic of discussion among provincial and federal officials. Ontario also faces significant challenges in improving the education system's ability to prepare students for intangible careers and meet skilled labor demand. Developing incentives to preserve local talent will be key, as well as promoting professional and academic resources to further engage the education sector.

Strengths

- **ICT Infrastructure (100/100)**: High performance is driven by Canada's strong ICT infrastructural environment, which ranks as very low risk, providing stability and adequacy in meeting business needs. Ontario boasts high levels of investment in ICT (3.2% of GDP, leading all provinces), which includes software and computer/electronic products.
- **Digital infrastructure policy (96/100)**: Ontario has developed a comprehensive digital strategy plan in the wake of covid-19, including a public consultation process around key issues. Federal policies addressing big data and competition in the digital economy are also in place, managed through Canada's Competition Bureau. In terms of trade in digital services, Ontario benefits from Canada's open economic environment, characterized by low barriers for electronic transactions, payment systems, connectivity and IP/digital policies.
- **Trademark development /IP policy (100/100)**: Ontario leads Canada in trademarks granted per capita and narrowly trails only Quebec and British Columbia in industrial design applications granted per capita. The province also has conducive policies for the protection of IP rights, a published IP action plan, inward FDI screening policies around IP, and support for IP development and commercialization in the province.[2]

2 Despite these positive policies, we note there is active debate about whether Canada's current FDI regulation is sufficient to effectively protect homegrown IP and other intangible assets.

- **Digital contribution to GDP and jobs (93/100)**: Ontario outperforms all other provinces in terms of the contribution of its digital economic activities (6.8% of GDP), annual growth of digital economic activities (6.1%), total economic activity relating to digital infrastructure (5.1% of GDP) and the digital economy's share of jobs (6.1%). Digital activities include digitally delivered products, e-commerce and digital infrastructure (including hardware, software, support services and telecommunications).

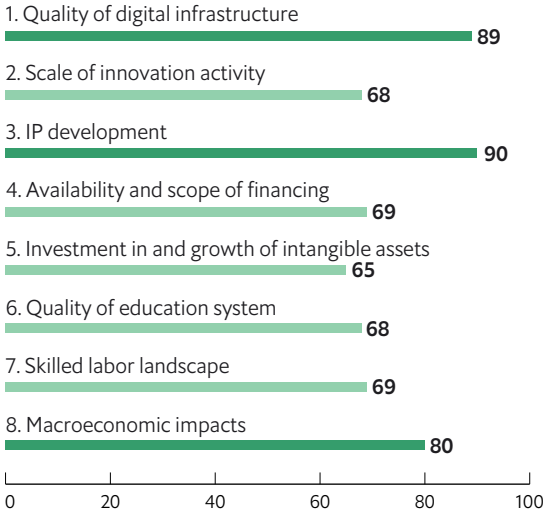
Areas for improvement

- **Entrepreneurial activities and high-growth firms (65/100)**: Ontario recorded relatively lower rates of entrepreneurial activity within existing organizations (5.6% of its population engages in "intrapreneurship" compared with 8.9% across the four Atlantic provinces). Ontario also has a relatively lower share of new business startups (13% of total firms, lagging Prince Edward Island, Alberta and British Columbia) and a lower share of high-growth firms (5.8%, fifth in Canada).
- **Low efficiency in patent creation (41/100)**: Although still above the national average, Ontario's patent performance is an area for improvement. The province has a relatively high rate of patent applications filed but struggles in converting R&D expenditure into patents. Ontario creates 4.6 patents per C$100m in R&D spending, falling significantly behind provinces such as Alberta (10.8 patents per C$100m).
- **Accessibility of financing (52/100)**: While Canada's recent annual growth (2014-2019) in new loans for small and medium-sized enterprises (SMEs) is relatively strong (3.3%), the total share of business loans to SMEs remains low compared with other developed countries. Among businesses in Ontario that have been rejected for debt financing, a quarter of those rejections were because of insufficient collateral—which is unsurprisingly in short supply for intangible-focused businesses. Ontario's financing score is also brought down by limited intangibles investment by private equity firms.
- **Innovative property investment (37/100)**: Of the three main categories of intangibles (computerized information, innovative property and economic competencies), Ontario recorded a relatively weak innovative property performance, for which the province demonstrates low annual investment (8.5% of total investment), slow investment growth over the most recent five years (0% annualized) and low intangible capital stock (4.1% of total capital). Innovative property generally refers to creation and discovery work, is often characterized by R&D and can be monetized and traded through patents, trademarks and industrial designs.
- **Education costs and effectiveness (68/100)**: Despite strengths around educational attainment, quality of educational institutions, and the availability of government credit/ aid for education, Ontario can work to strengthen its education environment, a key growth enabler for the intangible economy. In particular, challenges include high education costs for intangible-related coursework (159% relative to average tuition), a moderate share of STEM (science, technology, engineering and mathematics) graduates (24%, trailing Newfoundland and Labrador's 28%) and low participation rates in work-integrated learning programs (57% of graduates, ninth in Canada).
- **Skilled labor landscape (69/100)**: Ontario has a large concentration of STEM jobs (11% of all jobs) and a high rate of intangible-related job opportunities. However, it lags other provinces in labor force participation among those with at least a bachelor's degree (75.8%, fifth in Canada) and exhibits signs of a relative shortage of skilled labor (55% of entrepreneurs report hiring difficulties). Investments into developing intangible-related skills for workers, specifically skills relevant to STEM areas and the creative/ knowledge economy, can be increased.

Ontario: province scores

MATURE (80-100) DEVELOPED (60-80) EMERGING (40-60) NASCENT (0-40)

Category		Score
	Total: Intangible economy	**75**
	1 Quality of digital infrastructure	**89**
	2 Scale of innovation activity	**68**
	3 IP development	**90**
	4 Availability and scope of financing	**69**
	5 Investment and growth of intangible assets	**65**
	6 Quality of education system	**68**
	7 Skilled labor landscape	**69**
	8 Macroeconomic impacts	**80**



Indicator			Score
	1.1	ICT infrastructure	**100**
	1.2	Cybersecurity	**71**
	1.3	Digital infrastructure policy	**96**
	2.1	Entrepreneurial activity	**68**
	2.2	High-growth firms and scale-up potential	**63**
	2.3	Innovation activity and R&D	**73**
	3.1	Patents	**64**
	3.2	Trademarks	**99**
	3.3	Industrial design applications	**93**
	3.4	Prevalence of formal IP	**92**
	3.5	IP policy	**100**
	4.1	Accessibility of financing	**52**
	4.2	Government programs and incentives	**100**
	4.3	Financial market depth	**56**
	5.1	Computerized information	**77**
	5.2	Innovative property	**37**
	5.3	Economic competencies	**79**
	6.1	Education affordability and enrollment	**65**
	6.2	Education attainment and effectiveness	**71**
	7.1	Intangible-related skills in the labor force	**72**
	7.2	Availability of skilled labor	**66**
	8.1	Productivity and wages	**66**
	8.2	Contribution to GDP	**100**
	8.3	Contribution to employment	**86**
	8.4	Contribution to trade and commerce	**65**

Focus areas for strengthening the performance of Ontario's intangible economy	**Effort** (high/med/low)	**Impact** (high/med/low)	**Timeframe** (short/med/long)
Boost public and private intangibles investment (particularly for innovative property), which has lagged Ontario's total investment growth in recent years. (5.1.2) (5.2.2) (5.3.2)	High	High	Medium term
Increase STEM and intangible-related education opportunities and the affordability of higher-education coursework in intangible fields through tuition aid and scholarship programs. (6.1.1) (6.2.2)	Medium	High	Long term
Expand and enhance financing mechanisms for intangible-intensive businesses, which may not have as much access to collateral for loans. (4.1.2) (4.1.4) (2.1.3)	Medium	High	Medium term
Address skilled labor shortages through intangible skilling programs (particularly in STEM areas) for college graduates, immigrants and less-skilled workers, and encourage businesses to enact HR policies to improve worker retention. (7.2.1) (7.2.2) (7.2.3)	Medium	Medium	Short term
Strengthen IP support, incentives and laws to promote knowledge and use of formal IP for businesses, particularly patent development. This includes providing businesses with legal training and expertise to maximize development and commercialization around patents. (3.1.1) (3.1.2) (3.1.3) (3.4.1)	High	High	Medium term
More efficient  Less efficient			

Ontario scorecard

GUIDANCE: MATURE (80-100) DEVELOPED (60-80) EMERGING (40-60) NASCENT (0-40)

Num	Indicator	Question	Data year	Data point	Units	Normalized score (0-100)	Notes
Total	**Intangible Economy**					**75**	
1	**Quality of digital infrastructure**					89	
1.1	ICT infrastructure					100	
1.1.1	ICT infrastructure quality and adequacy	What is the risk that Canada's information and communications technology (ICT) infrastructure will be inadequate for business needs?	2021	0.0	Score 0-4 (low = best)	100	Normalization: Data min = 0 and max = 4 across countries Source: EIU Operational Risk Model 2021
1.1.2	Level of investment in ICT	What share of Ontario's GDP goes to ICT investment (including software and computer and electronic products)?	2020	3.2	% of GDP (high = best)	100	Normalization: Data min = 1.2 and max = 3.2 across provinces Source: Stock and Consumption of Fixed Non-residential Capital (Statistics Canada); Provincial and Territorial Gross Domestic Product by Income and by Expenditure Accounts (Statistics Canada)
1.2	Cybersecurity					71	
1.2.1	Stringency of data protection policies	How does Canada score on its data privacy and protection laws and regulations?	2021	3.0	Score 0-3 (high = best)	100	Normalization: Data min = 0 and max = 3 across countries Source: DLA Piper's Data Protection Laws of the World Handbook
1.2.2	Cybersecurity preparedness	How does Canada score on cybersecurity preparedness (ability to withstand a cyberattack)?	Dec 2021	0.0	Score 0-4 (low = best)	100	Normalization: Data min = 0 and max = 4 across countries Source: EIU Operational Risk Model 2021
1.2.3	Cybersecurity risk	How does Canada score on cybersecurity risk (likelihood of a major cyberattack occurring)?	Dec 2021	4.0	Score 0-4 (low = best)	0	Normalization: Data min = 0 and max = 4 across countries Source: EIU Operational Risk Model 2021
1.2.4	Cyberattacks	How does Canada score in terms of network attacks and vulnerabilities?	Most recent month (2021)	2.1	% of users experiencing network attacks or vulnerabilities during most recent month (low = best)	83	Normalization: Data min = 0.4 and max = 10.6 across countries Source: Kaspersky Cybersecurity Statistics
1.3	Digital infrastructure policy					96	
1.3.1	Digital competition policy	Has the Canadian Government published a comprehensive, active policy dealing with big data and competition issues in the digital economy?	2018; Active	1	Score 0-1 (high = best)	100	Normalization: Data min = 0 and max = 1 across countries Source: Economist Impact
1.3.2	Digital strategy plan	Does the provincial government have an active digital strategy plan for improving digital infrastructure and data services?	2021; Active	2	Score 0-2 (high = best)	100	Normalization: Data min = 0 and max = 2 across provinces Source: Economist Impact
1.3.3	Digital trade environment	What is Canada's level of digital services trade restrictiveness?	2020	0.1	Score 0-1 (low = best)	88	Normalization: Data min = 0 and max = 1 across countries Source: OECD Digital Services Trade Restrictiveness Index
2	**Scale of innovation activity**					68	
2.1	Entrepreneurial activity					68	
2.1.1	Entrepreneurial activity (early-stage)	What is the rate of total early stage entrepreneurial activity?	2019	18.9	% of adult population (high = best)	63	Normalization: Data min = 14.3 and max = 21.6 across provinces Source: Global Entrepreneurship Monitor: Canada Report; Economist Impact estimates
2.1.2	Entrepreneurial activity (established business)	What is the established business ownership rate?	2019	9.0	% of adult population (high = best)	100	Normalization: Data min = 3.4 and max = 9 across provinces Source: Global Entrepreneurship Monitor: Canada Report; Economist Impact estimates

Num	Indicator	Question	Data year	Data point	Units	Normalized score (0-100)	Notes
2.1.3	Entrepreneurial activity (employee)	What is the rate of employee entrepreneurial activity?	2019	5.6	% of adult population (high = best)	35	Normalization: Data min = 3.8 and max = 8.9 across provinces Source: Global Entrepreneurship Monitor: Canada Report; Economist Impact estimates
2.1.4	Start-up assistance	What is the availability of province-level start-up assistance? A. start-up grants or subsidies, B. start-up/small business loans, and/or C. start-up equity capital	2020	3	Score 0-3 (high = best)	100	Normalization: Data min = 0 and max = 3 across provinces Source: Economist Impact
2.1.5	Start-up rate	What is the business start-up rate?	2019	13.4	Entrants as % share of total firms (high = best)	41	Normalization: Data min = 10.7 and max = 17.3 across provinces Source: Longitudinal Employment Analysis Program (Statistics Canada); Economist Impact estimates
2.2	High-growth firms and scale-up potential					63	
2.2.1	High-growth firms	What proportion of firms are classified as high growth in terms of revenue (greater than 20% average annual growth over a three-year period)?	2019	5.8	% of total firms (high = best)	56	Normalization: Data min = 4.4 and max = 7 across provinces Source: Canadian Enterprise Entrepreneurship Indicator Program (Statistics Canada); Economist Impact estimates
2.2.2	Gazelle firms	What proportion of firms are classified as gazelles (high-growth firms that are younger than five years old)?	2019	1.1	% of total firms (high = best)	53	Normalization: Data min = 0.7 and max = 1.4 across provinces Source: Canadian Enterprise Entrepreneurship Indicator Program (Statistics Canada); Economist Impact estimates
2.2.3	Narwhal firms (precursors to unicorns)	What is the number of narwhal firms (defined according to financial velocity or capital raised per year) in the province?	2021	3.1	Number per $100bn GDP (high = best)	80	Normalization: Data min = 0 and max = 3.9 across provinces Source: The Narwhal Project; Provincial and Territorial Gross Domestic Product by Income and by Expenditure Accounts (Statistics Canada)
2.3	Innovation activity and R&D					73	
2.3.1	Business expenditure on R&D activities	What is total business expenditure on research and experimental development activities as a share of provincial GDP?	2020	0.8	% of GDP (high = best)	87	Normalization: Data min = 0.2 and max = 0.9 across provinces Source: Gross domestic expenditures on research and development (Statistics Canada); Provincial and Territorial Gross Domestic Product by Income and by Expenditure Accounts (Statistics Canada); Economist Impact estimates
2.3.2	Business expenditure on innovation activities	What is average annual business expenditure across all types of innovation activities?	2019	1686	Dollars per firm (high = best)	74	Normalization: Data min = 609 and max = 2060 across provinces Source: Survey of Innovation and Business Strategy (Statistics Canada); Economist Impact estimates
2.3.3	Incentives for R&D/ innovation	Does the provincial government offer R&D and other innovation tax credits to firms?	2020	1	Score 0-1 (high = best)	100	Normalization: Data min = 0 and max = 1 across provinces Source: Economist Impact
2.3.4	Government funding of R&D	What is the total government R&D funding (both federal and provincial) as a share of GDP?	2020	0.4	% of GDP (high = best)	48	Normalization: Data min = 0.3 and max = 0.6 across provinces Source: Gross domestic expenditures on research and development (Statistics Canada); Provincial and Territorial Gross Domestic Product by Income and by Expenditure Accounts (Statistics Canada); Economist Impact estimates
2.3.5	Nonprofit and foreign funding of R&D	What is the total R&D funding from non-profit and foreign sectors as a share of GDP?	2020	0.3	% of GDP (high = best)	100	Normalization: Data min = 0 and max = 0.3 across provinces Source: Gross domestic expenditures on research and development (Statistics Canada); Provincial and Territorial Gross Domestic Product by Income and by Expenditure Accounts (Statistics Canada); Economist Impact estimates
2.3.6	Self-funded higher education R&D	What is the total self-funded expenditure on R&D by higher education institutions as a share of GDP?	2020	0.4	% of GDP (high = best)	30	Normalization: Data min = 0.2 and max = 0.6 across provinces Source: Gross domestic expenditures on research and development (Statistics Canada); Provincial and Territorial Gross Domestic Product by Income and by Expenditure Accounts (Statistics Canada); Economist Impact estimates

Num	Indicator	Question	Data year	Data point	Units	Normalized score (0-100)	Notes
3	**IP development**					90	
3.1	Patents					64	
3.1.1	Rate of patent creation relative to R&D spending	What is the rate of total patents granted per C$100m of R&D spending (both public and private)?	2020	4.6	Number of patents granted per C$100m of R&D spending (high = best)	41	Normalization: Data min = 0.3 and max = 10.8 across provinces Source: Canadian Intellectual Property Office; Gross domestic expenditures on research and development (Statistics Canada)
3.1.2	PCT patents: filed in Canada	What is the rate of PCT (Patent Cooperation Treaty) patent applications filed per capita domestically (includes applications by residents and foreign entities)?	2021	4.7	PCT applications filed per 100,000 people (high = best)	91	Normalization: Data min = 1.2 and max = 5.1 across provinces Source: Canadian Intellectual Property Office; Annual Demographic Estimates: Canada, Provinces and Territories (Statistics Canada)
3.1.3	Total patents: granted in Canada	What is the rate of total patents granted per capita in Canada (includes applications by residents and foreign entities)?	2021	5.2	Patents granted per 100,000 people (high = best)	61	Normalization: Data min = 0.4 and max = 8.3 across provinces Source: Canadian Intellectual Property Office; Annual Demographic Estimates: Canada, Provinces and Territories (Statistics Canada)
3.2	Trademarks					99	
3.2.1	Trademarks: filed in Canada	What is the rate of trademark applications filed per capita domestically (includes applications by residents and foreign entities)?	2021	99.0	Number of filed trademark applications per 100,000 people (high = best)	99	Normalization: Data min = 17.3 and max = 99.9 across provinces Source: Canadian Intellectual Property Office; Annual Demographic Estimates: Canada, Provinces and Territories (Statistics Canada)
3.2.2	Trademarks: granted in Canada	What is the rate of trademark applications granted per capita in Canada (includes applications by residents and foreign entities)?	2021	22.7	Trademarks granted per 100,000 people (high = best)	100	Normalization: Data min = 4.6 and max = 22.7 across provinces Source: Canadian Intellectual Property Office; Annual Demographic Estimates: Canada, Provinces and Territories (Statistics Canada)
3.3	Industrial design applications					93	
3.3.1	Industrial design applications: filed in Canada	What is the rate of industrial design applications filed per capita domestically (includes applications by residents and foreign entities)?	2021	2.4	Industrial design applications filed per 100,000 people (high = best)	96	Normalization: Data min = 0.2 and max = 2.5 across provinces Source: Canadian Intellectual Property Office; Annual Demographic Estimates: Canada, Provinces and Territories (Statistics Canada)
3.3.2	Industrial design applications: granted in Canada	What is the rate of industrial design applications granted per capita in Canada (includes applications by residents and foreign entities)?	2021	1.1	Granted industrial design applications per 100,000 (high = best)	90	Normalization: Data min = 0 and max = 1.2 across provinces Source: Canadian Intellectual Property Office; Annual Demographic Estimates: Canada, Provinces and Territories (Statistics Canada)
3.4	Prevalence of formal IP					92	
3.4.1	Awareness of formal IP	What is the rate of awareness of formal IP (patents, trademarks, industrial design) among firms?	2019	79.7	% of firms (high = best)	84	Normalization: Data min = 71.3 and max = 81.3 across provinces Source: Survey on Financing and Growth of Small and Medium Enterprises (Statistics Canada)
3.4.2	Use of formal IP	What is the rate of use of formal IP (patents, trademarks, industrial design) among firms?	2019	32.9	% of firms (high = best)	100	Normalization: Data min = 13.2 and max = 32.9 across provinces Source: Survey on Financing and Growth of Small and Medium Enterprises (Statistics Canada)
3.5	IP policy					100	
3.5.1	Protection of IP rights	How does the country score on the protection of IP rights?	2021	0.0	Score 0-4 (low = best)	100	Normalization: Data min = 0 and max = 4 across countries Source: EIU Operational Risk Model 2021
3.5.2	IP action plan	Does the province have a published IP action plan, which includes education services/support systems for entrepreneurs and small businesses?	2021	2	Score 0-2 (high = best)	100	Normalization: Data min = 0 and max = 2 across provinces Source: Economist Impact

Num	Indicator	Question	Data year	Data point	Units	Normalized score (0-100)	Notes
3.5.3	FDI policy	Does current screening for inward FDI include a "net benefits test" for intangible-related sectors that: (1) assesses the investment's effect on the broader innovation ecosystem; (2) explicitly considers data and IP in the review process; and (3) ensures Canadian IP and human capital assets are not targeted purely for offshoring purposes?	2021	3	Score 0-3 (high = best)	100	Normalization: Data min = 0 and max = 3 across provinces Source: Economist Impact
3.5.4	Support for IP development and commercialization	Does the province have policies to promote innovation that include credits/assistance for IP-related research and commercialization?	2021	2	Score 0-2 (high = best)	100	Normalization: Data min = 0 and max = 2 across provinces Source: Economist Impact
4	**Availability and scope of financing**					69	
4.1	Accessibility of financing					52	
4.1.1	New loans to SMEs	What is the annual growth rate of new loans to SMEs over the last five years?	2019	3.3	% annual growth over last 5 years (high = best)	61	Normalization: Data min = -14.1 and max = 14.6 across countries Source: OECD "Financing SMEs and Entrepreneurs 2020" report
4.1.2	Insufficient collateral	What is the share of firms whose requests for debt financing have been rejected due to insufficient collateral?	2017	24.2	% of firms rejected for debt financing due to insufficient collateral (low = best)	63	Normalization: Data min = 5 and max = 56.5 across provinces Source: Survey on Financing and Growth of Small and Medium Enterprises (Statistics Canada)
4.1.3	Depth of venture capital	What is the total venture capital investment as a share of GDP?	2019	0.2	% of GDP (high = best)	73	Normalization: Data min = 0 and max = 0.2 across provinces Source: Conference Board; Economist Impact estimates
4.1.4	Private equity finance	What is the value of total private equity finance as a share GDP?	2020	0.2	% of GDP (high = best)	12	Normalization: Data min = 0 and max = 1.5 across provinces Source: CVCA Intelligence, Provincial and Territorial Gross Domestic Product by Income and by Expenditure Accounts (Statistics Canada)
4.2	Government programs and incentives					100	
4.2.1	IP-backed loan programs	Does the government have programs that extend IP-backed loans (loans that use IP as collateral) to intangible-intensive firms?	2020	1	Score 0-1 (high = best)	100	Normalization: Data min = 0 and max = 1 across provinces Source: Economist Impact
4.2.2	Guarantee funds	Does the government have a credit guarantee fund designed to help SMEs obtain funding if they lack traditional collateral?	2020	1	Score 0-1 (high = best)	100	Normalization: Data min = 0 and max = 1 across provinces Source: Economist Impact
4.2.3	Equity tax credits	Do equity tax credits exist in the country's tax regime, including rates, structures and R&D tax incentives?	2020	1	Score 0-1 (high = best)	100	Normalization: Data min = 0 and max = 1 across provinces Source: Economist Impact
4.3	Financial market depth					56	
4.3.1	Depth of financial markets	What is the depth of Canada's financial markets?	2019	1.0	Score 0-1 (high = best)	100	Normalization: Data min = 0 and max = 1 across countries Source: IMF Financial Development Index
4.3.2	Market capitalization to total assets ratio	What is the ratio of market capitalization to total assets on the Toronto Stock Exchange?	2021	27.0	% ratio (high = best)	14	Normalization: Data min = 14 and max = 107 across countries Source: Refinitiv Eikon
4.3.3	Intangible share of total assets	What percentage of the total listed value on the country's stock markets are intangibles?	2021	53.0	% of total listed value (high = best)	53	Normalization: Data min = 0 and max = 100 across countries Source: Brand Finance's Global Intangible Finance Tracker

Num	Indicator	Question	Data year	Data point	Units	Normalized score (0-100)	Notes
5	**Investment and growth of intangible assets**					65	
5.1	Computerized information (e.g., software, databases, data processing and analysis, etc)					77	
5.1.1	Annual investment	What is the annual value of intangible investment in computerized information?	2016	5.2	% of total investment (high = best)	100	Normalization: Data min = 1 and max = 5.2 across provinces Source: Statistics Canada report, "Business Sector Intangible Capital and Sources of Labour Productivity Growth in Canada"
5.1.2	Growth in investment	What is the annualized growth of intangible investment in computerized information over the most recent five years of data (2011-16)?	2011-2016	3.7	% annualized growth (high = best)	31	Normalization: Data min = 1.9 and max = 7.6 across provinces Source: Statistics Canada report, "Business Sector Intangible Capital and Sources of Labour Productivity Growth in Canada"
5.1.3	Value of intangible capital stock	What is the total value of intangible capital stock of computerized information?	2016	1.4	% of total capital stock (high = best)	100	Normalization: Data min = 0.4 and max = 1.4 across provinces Source: Statistics Canada report, "Business Sector Intangible Capital and Sources of Labour Productivity Growth in Canada"
5.2	Innovative property (e.g., creation/discovery work, R&D, IP, patents, etc)					37	
5.2.1	Annual investment	What is the annual value of intangible investment in innovative property?	2016	8.5	% of total investment (high = best)	46	Normalization: Data min = 5.9 and max = 11.6 across provinces Source: Statistics Canada report, "Business Sector Intangible Capital and Sources of Labour Productivity Growth in Canada"
5.2.2	Growth in investment	What is the annualized growth of intangible investment in innovative property over the most recent five years of data (2011-16)?	2011-2016	0.0	% annualized growth (high = best)	36	Normalization: Data min = -5 and max = 8.7 across provinces Source: Statistics Canada report, "Business Sector Intangible Capital and Sources of Labour Productivity Growth in Canada"
5.2.3	Value of intangible capital stock	What is the total value of intangible capital stock of innovative property?	2016	4.1	% of total capital stock (high = best)	30	Normalization: Data min = 2.4 and max = 8.1 across provinces Source: Statistics Canada report, "Business Sector Intangible Capital and Sources of Labour Productivity Growth in Canada"
5.3	Economic competencies (e.g., human capital, market research, brands, organizational capital, etc)					79	
5.3.1	Annual investment	What is the annual value of intangible investment in economic competencies?	2016	17.2	% of total investment (high = best)	98	Normalization: Data min = 4.9 and max = 17.5 across provinces Source: Statistics Canada report, "Business Sector Intangible Capital and Sources of Labour Productivity Growth in Canada"
5.3.2	Growth in investment	What is the annualized growth of intangible investment in economic competencies over the most recent five years of data (2011-16)?	2011-2016	3.2	% annualized growth (high = best)	39	Normalization: Data min = 0.9 and max = 6.7 across provinces Source: Statistics Canada report, "Business Sector Intangible Capital and Sources of Labour Productivity Growth in Canada"
5.3.3	Value of intangible capital stock	What is the total value of intangible capital stock of economic competencies?	2016	4.0	% of total capital stock (high = best)	100	Normalization: Data min = 1.7 and max = 4 across provinces Source: Statistics Canada report, "Business Sector Intangible Capital and Sources of Labour Productivity Growth in Canada"
6	**Quality of education system**					68	
6.1	Education affordability and enrollment					65	
6.1.1	Affordability of higher education	What are the average tuition costs of higher education for coursework pertinent to skills in the intangible economy?	2021/2022	159.1	% relative to overall tuition costs (low = best)	20	Normalization: Data min = 99.2 and max = 173.6 across provinces Source: Tuition and Living Accommodation Costs (Statistics Canada)
6.1.2	Education credits	Does the government or public education institutions provide the following? a. tuition aid (financial aid, grants, bursaries, tax credits) b. merit-based government scholarships	2020	2	Score 0-2 (high = best)	100	Normalization: Data min = 0 and max = 2 across provinces Source: Economist Impact

Num	Indicator	Question	Data year	Data point	Units	Normalized score (0-100)	Notes
6.1.3	Enrollment in higher education	What share of 15-29 year olds are enrolled in higher education institutions for coursework pertinent to skills in the intangible economy?	2019/2020	23.5	% of 15-29 year olds enrolled in higher education institutions for coursework pertinent to skills in the intangible economy (high = best)	75	Normalization: Data min = 15.1 and max = 26.3 across provinces Source: Postsecondary Student Information System (Statistics Canada); Annual Demographic Estimates: Canada, Provinces and Territories (Statistics Canada); Economist Impact estimates
6.2	Education attainment and effectiveness					71	
6.2.1	Educational attainment	What percentage of the population (aged 25-64) has attained at least college or university-level education?	2020	66.0	% of population (high = best)	100	Normalization: Data min = 47 and max = 66 across provinces Source: Labour Force Survey (Statistics Canada)
6.2.2	STEM graduates	What percentage of graduates are in STEM fields?	2019	24.2	% of post-secondary graduates (high = best)	60	Normalization: Data min = 18.3 and max = 28.1 across provinces Source: Postsecondary Student Information System (Statistics Canada); Economist Impact estimates
6.2.3	Work-integrated learning	What percentage of college graduates participated in a work-integrated learning program?	2018 (survey run), 2020 (data release)	57.2	% of college graduates (high = best)	13	Normalization: Data min = 52.3 and max = 89.3 across provinces Source: National Graduates Survey (Statistics Canada)
6.2.4	Quality of higher education institutions	What share of the province's universities are ranked among the world's top 1,000?	2022	43.3	% of all universities (high = best)	100	Normalization: Data min = 0 and max = 43.3 across provinces Source: Times Higher Education's World University Rankings; Universities Canada
6.2.5	Future-oriented skill development	How well does Canada's education system perform in terms of the development of future-oriented skills?	2019	79.1	Score 0-100 (high = best)	79	Normalization: Data min = 0 and max = 100 across countries Source: EIU Worldwide Educating for the Future Index (WEFFI)
7	**Skilled labor landscape**					69	
7.1	Intangible-related skills in the labor force					72	
7.1.1	Prevalence of skills in labor market	How prevalent are occupational skill levels that are of relevance to intangible economic development?	2016	57.9	% of intangible-related occupations (high = best)	46	Normalization: Data min = 54.2 and max = 62.1 across provinces Source: 2016 Census (Statistics Canada)
7.1.2	STEM-skill jobs	What percentage of all jobs require STEM-related skills?	2017	11.0	% of all jobs (high = best)	97	Normalization: Data min = 6.8 and max = 11.1 across provinces Source: 2016 Census (Statistics Canada)
7.2	Availability of skilled labor					66	
7.2.1	Labor force participation among highest educated	What is the labor force participation rate among those with tertiary education?	2020	75.8	% participation rate (high = best)	55	Normalization: Data min = 72.7 and max = 78.3 across provinces Source: Labour Fource Survey (Statistics Canada)
7.2.2	Skilled labor shortage	What is the provincial ratio between human capital with the necessary education/ skills and intangible-related job openings?	2020	21.7	Ratio (skilled labor supply to intangible sector demand) (higher ratio = best)	52	Normalization: Data min = 15.3 and max = 27.8 across provinces Source: Labour Fource Survey (Statistics Canada)
7.2.3	Hiring challenges	What percentage of entrepreneurs report difficulty hiring employees in the past 12 months (results weighted by province and company size)?	2021	55.0	% of entrepreneurs (low = best)	56	Normalization: Data min = 51 and max = 60 across provinces Source: Business Development Bank of Canada
7.2.4	Workplace training	Does government policy use incentives to encourage workplace-sponsored training related to the adoption of advanced technologies?	2020	1	Score 0-1 (high = best)	100	Normalization: Data min = 0 and max = 1 across provinces Source: Economist Impact

Num	Indicator	Question	Data year	Data point	Units	Normalized score (0-100)	Notes
8	**Macroeconomic impacts**					80	
8.1	Productivity and wages					66	
8.1.1	Contribution to productivity	What is the average annual estimated contribution of intangible assets to labor productivity growth, from 1997-2016?	1997-2016	0.3	Percentage point contribution (% pts) to annual labor productivity growth (high = best)	40	Normalization: Data min = 0.1 and max = 0.5 across provinces Source: Statistics Canada study, "Measuring digital economic activities in Canada: Initial estimates"
8.1.2	Average wages in intangible-intensive sectors	What is the average wage in intangible-intensive sectors (defined according to OECD empirical analysis on intangible capital intensity across sectors)?	2020	101.4	% relative to overall province wage rate (high = best)	93	Normalization: Data min = 94.5 and max = 101.9 across provinces Source: Labour Force Survey (Statistics Canada); OECD report, "Productivity Growth and Finance: The Role of Intangible Assets - A Sector Level Analysis"
8.2	Contribution to GDP					100	
8.2.1	Contribution of digital economic activities	What are digital economic activities' contribution to GDP?	2019	6.8	% of GDP (high = best)	100	Normalization: Data min = 2.4 and max = 6.8 across provinces Source: Statistics Canada report, "Measuring digital economic activities in Canada: Initial estimates"; Provincial and Territorial Gross Domestic Product by Income and by Expenditure Accounts (Statistics Canada); Economist Impact estimates
8.2.2	Growth of digital economic activities	What is the average annual growth rate of the digital economy's GDP over the past five years?	2019	6.1	% annual growth (high = best)	100	Normalization: Data min = -0.8 and max = 6.1 across provinces Source: Statistics Canada report, "Measuring digital economic activities in Canada: Initial estimates"; Provincial and Territorial Gross Domestic Product by Income and by Expenditure Accounts (Statistics Canada); Economist Impact estimates
8.2.3	Contribution of digital infrastructure	What share of total economic activity is related to digital infrastructure?	2019	5.1	% of GDP (high = best)	100	Normalization: Data min = 1.9 and max = 5.1 across provinces Source: Statistics Canada report, "Measuring digital economic activities in Canada: Initial estimates"; Provincial and Territorial Gross Domestic Product by Income and by Expenditure Accounts (Statistics Canada); Economist Impact estimates
8.3	Contribution to employment					86	
8.3.1	Contribution to employment	What is the digital economy's contribution to employment?	2019	6.1	% of jobs (high = best)	100	Normalization: Data min = 1.9 and max = 6.1 across provinces Source: Statistics Canada report, "Measuring digital economic activities in Canada: Initial estimates"; Labour Force Survey (Statistics Canada); Economist Impact estimates
8.3.2	Growth of employment contribution	What is the average annual growth rate of employment in the digital economy over the past five years?	2019	4.3	% average annual growth (high = best)	73	Normalization: Data min = -1.1 and max = 6.3 across provinces Source: Statistics Canada report, "Measuring digital economic activities in Canada: Initial estimates"; Labour Force Survey (Statistics Canada); Economist Impact estimates
8.4	Contribution to trade and commerce					65	
8.4.1	ICT share of service exports	What is the value of ICT service exports (relative to all service exports)?	2017	8.3	% of service exports (high = best)	31	Normalization: Data min = 0 and max = 27.2 across countries Source: International Monetary Fund, Balance of Payments Statistics Yearbook and data files
8.4.2	E-commerce transactions	What share of the province's wholesale and retail trade sector is accounted for by e-commerce transactions?	2019	9.5	% of sector GDP (high = best)	100	Normalization: Data min = 2.3 and max = 9.5 across provinces Source: Statistics Canada report, "Measuring digital economic activities in Canada: Initial estimates"; Gross Domestic Product by Industry - Provincial and Territorial (Annual) (Statistics Canada); Economist Impact estimates

Appendix B: Methodology

Data and scoring

All scoring reflects data and information as available at the end of 2021. Across the index, there are 12 qualitative indicators and 66 quantitative indicators. These are grouped into eight categories and 25 subcategories.

All qualitative indicators have been scored on an integer scale. This scale ranges from 0-1 to 0-3, depending on the configurations formulated for each indicator. Scores are assigned by Economist Impact's research managers and team of analysts following a detailed scoring guide. The scoring framework includes binary or dichotomous indicators (1=yes and 0=no) as well as those that award points when certain criteria are met (0=no, +1 if criteria A is met, +1 if criteria B is met). Scores are based on evidence from local laws, regulations, specialized reports, and interviews conducted with local experts and key stakeholders.

All quantitative indicators rely on data from sources such as Statistics Canada, OECD and The Economist Intelligence Unit's proprietary business environment and risk indicators (see full list on next page).

Note: Qualitative scoring was only conducted for Ontario. Quantitative data was collected for all provinces, if available. Data across territories was lacking for some core indicators, and therefore the analysis was restricted to provinces. All comparisons made in this report to country-wide averages or provinces besides Ontario reflect the 66 quantitative indicators only. For this reason, the exact scores and ranks for other provinces are not included. This limitation does not affect the findings as presented; even if all other provinces received full scores across the 12 qualitative indicators, their final scores would not have exceeded Ontario's.

Normalization

Indicator scores are normalized and then aggregated across categories to enable a comparison of broader concepts. Normalization rebases the raw indicator data to a common unit (0-100) so that it can be aggregated upwards: for example, the integer scores for qualitatively scored indicators are transformed to a 0-100 score.

Quantitative indicators are likewise normalized to a 0-100 scale, generally using bookends that correspond to each indicator's minimum and maximum data points:

The formula used is

$x_{norm} = (x - Min(x)) / (Max(x) - Min(x))$,

where Min(x) and Max(x) are respectively the lowest and highest values across the index's geographic sample for any given indicator. The normalized value is then transformed to a 0-100 score to make it directly comparable with other indicators. This in effect means that the geography with the highest raw data value on an indicator will score 100, while the lowest will score 0.

Some quantitative indicators, which feature a built-in scale (for example, scores taken from The Economist Intelligence Unit's sovereign risk ratings), maintain the source scale's original minimum and maximum endpoints, even if no geography receives a score corresponding to either endpoint.

Weighting the index

At the conclusion of the indicator scoring and normalization, Economist Impact applies a series of neutral weightings to calculate the composite or overall index score. Neutral weighting implies equality across indicators within each category and subcategory, and these weights do not represent a final judgment on the relative importance of any component.

Calculations for the overall index result in composite scores of 0-100 for each province, where 100 represents the highest quality and performance, and 0 the lowest.

Data sources used

Brand Finance Global Intangible Finance Tracker (GIFT™) study

Business Development Bank of Canada

Canadian Intellectual Property Office

Conference Board

CVCA Intelligence

DLA Piper's Data Protection Laws of the World Handbook

EIU Operational Risk Model

EIU Worldwide Educating for the Future Index

Global Entrepreneurship Monitor

International Monetary Fund, Balance of Payments Statistics Yearbook and data files

International Monetary Fund, Financial Development Index

Kaspersky Cybersecurity Statistics

OECD

OECD Digital Services Trade Restrictiveness Index

OECD "Financing SMEs and Entrepreneurs 2020" report

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Statistics Canada (refer to Appendix A for the specific source used for each indicator)

The Narwhal Project

Times Higher Education's World University Rankings

Universities Canada

Cover: Shutterstock

About Economist Impact

Economist Impact combines the rigor of a think-tank with the creativity of a media brand to engage an influential global audience. We work with corporations, foundations, NGOs and governments across big themes including sustainability, health and the changing shape of globalization to catalyze change and enable progress. With the power of The Economist Group behind it, Economist Impact crafts bespoke engagements using a potent portfolio of capabilities including:

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- branded content
- media and advertising
- design thinking and data visualization
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