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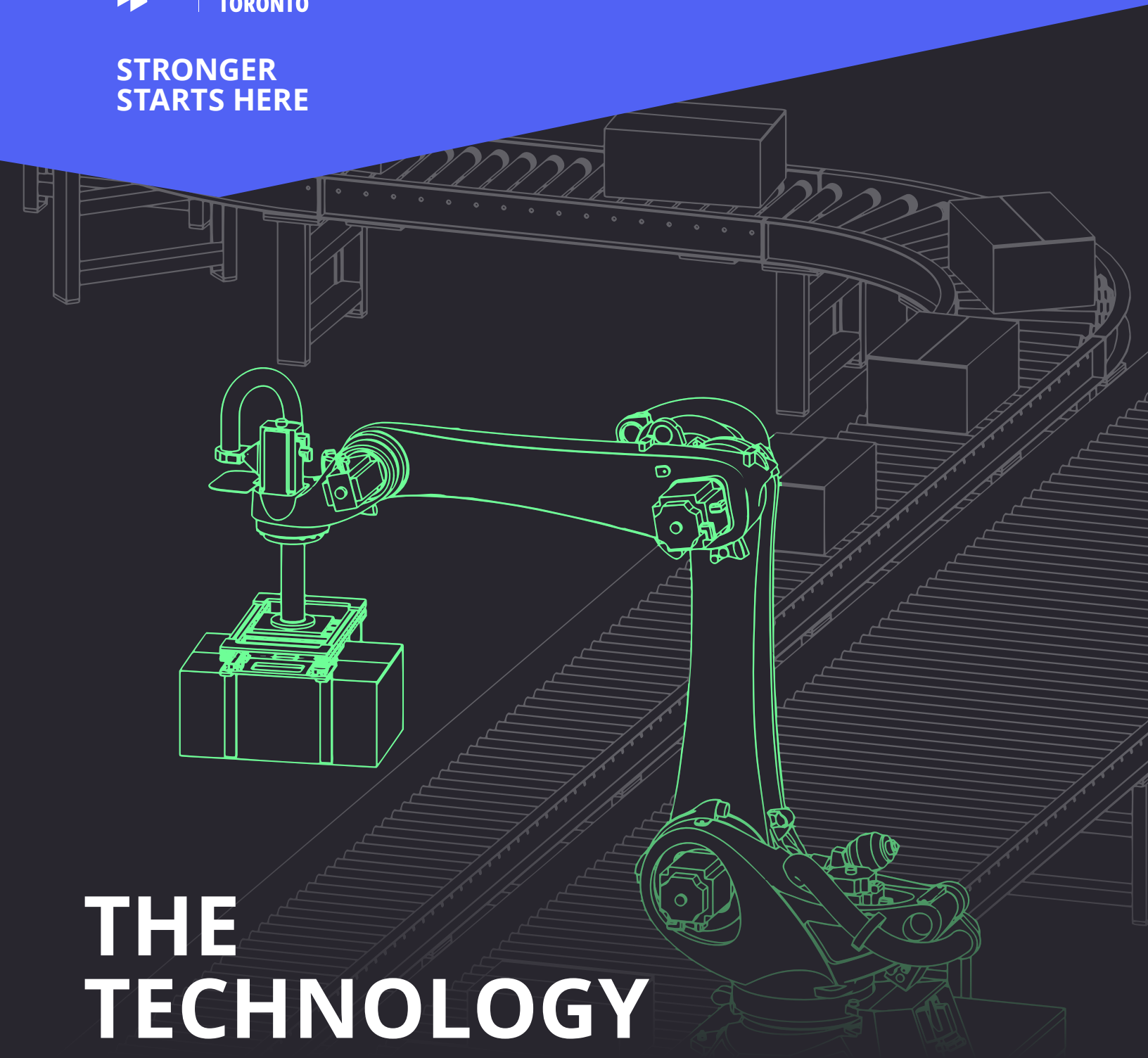
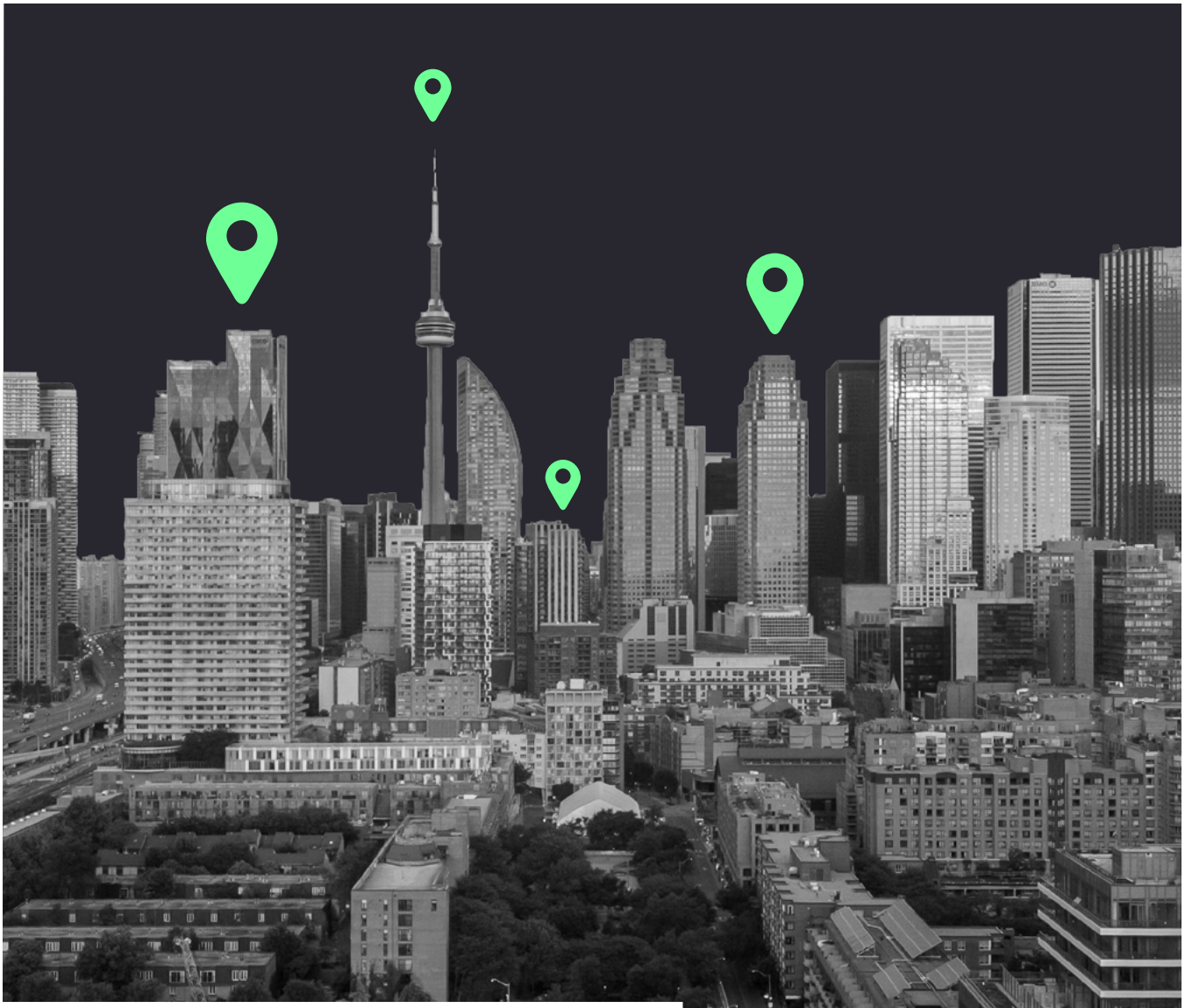


THE TECHNOLOGY IMPERATIVE

Rebuilding Ontario's Manufacturing Advantage

MARCH 2026



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About this report

Technologies have reshaped the global manufacturing sector, but Ontario manufacturers are not adopting them at the same level as their global competitors. New research from this report found that only 15% of Ontario's manufacturers say their technology adoption is "advanced." This is putting their business growth and our economic competitiveness at risk.

The Business Council of Toronto, convened by the Toronto Region Board of Trade, established the Advanced Manufacturing Council to provide business-led leadership to address this challenge. Composed of senior executives from across the region, the Council is focused on closing Ontario's productivity gap, accelerating tech adoption, and positioning Toronto as a global hub for advanced manufacturing. This report, prepared by FT Longitude, is a direct outcome of that mandate, reflecting the perspectives of industry leaders across the sector.

The findings are intended to inform decision-making by business and government, and to reinforce the leadership role of the Toronto Region. The report provides a current state assessment of tech adoption across the region, identifies where the region already leads, and where significant challenges remain. It concludes by identifying the actions needed to unlock investment, scale innovation, and execute a successful industrial policy.

The Toronto Region Board of Trade thanks NGen for its partnership in the development of this report, with special thanks to Stewart Cramer, Chief Program Officer, NGen, for his ongoing support, and the BCT Advanced Manufacturing Council members for their invaluable insights, inputs, and resources.

AGS Automotive Systems · AtkinsRéalis · bdc · MAGNA COSMA INTERNATIONAL · MAPLE LEAF · MDA SPACE · NGen · SIEMENS · TMMC Toyota Motor Manufacturing Canada Inc.

THIS REPORT WAS PRODUCED BY: FT LONGITUDE

ABOUT THE BUSINESS COUNCIL OF TORONTO

The Toronto Region Board of Trade brought together a council of the region's top business leaders to deliver practical impactful solutions and advocacy that make Canada's economic engine more prosperous and a better place to live, work, invest, and do business. The Business Council of Toronto is structured around an Executive Table and three partnership councils: Advanced Manufacturing, Climate & Energy Transition, and the GTA West Economic Gateway, with a foundational Financial Services Competitiveness Coalition.

ABOUT THE RESEARCH

Between April and May 2025, we surveyed 200 senior employees from Ontario manufacturing firms who are responsible for technology adoption in their organization.

Participants were split between Canadian domestic companies (103) and international or multinational companies with operations in Canada (97). Companies surveyed ranged from micro-sized firms (1–4 employees) to large-sized firms (500 or more employees).

Representation within the manufacturing sector spanned four key subsectors, including: Automotive (80), Aerospace (40), Agrifood (40), and Chemicals (40).

We also conducted in-depth interviews with 12 industry leaders across each of the four subsectors:

Greta Cutulenco
CEO and Founder, Acerta

Ashur Hanna
Director of Operations, Fresh Start Foods Canada

Ammar Jafar
CTO, LabsCubed

John Laughlin
CTO, Next Generation Manufacturing Canada

Joe Loparco
Co-President, AGS Automotive Systems

Robert Mastrotto
VP, Projects, Next Generation Manufacturing Canada

Jonathan Pastrikos
Assistant Vice President, BDC Advisory Services, BDC

Jovan Phull
CTO & Co-Founder, Kon Aerosystems

David Pitts
President, Angstrom Engineering

Irfan Sattar
CEO, Helios Laboratories

Frank Voss
former President at Toyota Motor Manufacturing Canada

Mary Ann Wenzler
Vice President, Greater Toronto Area West, BDC

Executive Summary

As advanced technologies redefine manufacturing globally, Ontario manufacturers risk losing ground due to slower adoption. What is holding Ontario back? This report reveals that the barriers include cultural resistance, lack of leadership buy-in, and a shortage of technology-literate talent. About 60% of manufacturers do not know where to begin with training, and two in five fear they have not adopted enough technology to stay competitive. There are also external factors, such as uncertainty over trade with the U.S., that are forcing firms to rethink their technology investment strategies.

Ontario is Canada's top manufacturing region. But the value created by its manufacturing sector, as measured by GDP, dropped by 17% between 2002 and 2024, and its productivity is just 70% of U.S. levels.[1] Between 2002 and 2022, the province's manufacturing exports increased at a slower rate than every other province apart from Prince Edward Island.[2]

There are bright spots, however. The research found that a sizable segment of manufacturers that adopted advanced technologies in Ontario experienced higher investment returns, stronger talent retention, and greater ambitions for market expansion. The report provides recommendations to Ontario manufacturers on how to transform into sector leaders and for policymakers on how to foster more domestic champions.

What Ontario Manufacturers are Telling Us

Our survey of 200 senior employees from Ontario manufacturing firms reveals the barriers manufacturers face, and provides lessons for policy makers and business leaders on how to foster more domestic champions.

Ontario has a technology deficit

The vast majority (86%) of manufacturers in Ontario say that technology could completely transform their businesses. Only a few, however, have turned that potential into reality:

60% describe their level of technology adoption as **moderate**

25% say they are only in the **early** stage of adoption

These low levels of technology adoption are blunting businesses' competitive edge. Two in five manufacturing organizations are concerned that they have not adopted enough technologies to be competitive, and only 11% say they have high confidence in their technological adoption levels.

To seize these opportunities, Ontario's manufacturers will need to invest decisively and strategically. Although most have already invested in cloud and the Industrial Internet of Things (IIoT) (84% and 60% respectively), only 37% have invested in AI. Even fewer (32%) have invested in advanced robotics.

Manufacturers cannot rely on single technologies for success, they will need to integrate a range of tools. This could be particularly challenging for smaller organizations. Only 17% of micro firms surveyed have invested in advanced robotics, compared with 57% of mid-sized firms and 47% of large organizations.

The Barriers to Greater Technology Adoption

Asked about the greatest barriers to technology adoption, Ontario's manufacturers most often pointed to a lack of positive **culture**, followed by **senior leadership**'s lack of understanding of the benefits.

When they explain why culture is such a challenge, many organizations say there is a widespread lack of comfort around new technologies. Firms also seem to be unsure about the value of technology for their business, and this could be another reason for cultural hesitation.

After culture and leadership, the manufacturers in our survey identify a **lack of technical skills** as a barrier to technology adoption. Almost half (47%) say they struggle to attract tech-literate talent. And the top challenge they face in attracting or retaining workers with technical knowledge is competition from other industries.

But the difficulty is not just in finding new talent with the right skills; it is also in equipping existing staff with the training they need to keep pace with evolving technologies. Many firms appear to find this daunting: 60% say they do not know where to begin with technology training.

As a result, many organizations are turning to external programs and partnerships for support:

81% say they use local support programs to help them with technology adoption

70% say they make use of local support programs to help them with technology skills development

Most (69%) also benefit from government funding and incentives, but this does not mean they are satisfied: 83% say it would benefit their organization to have access to more government funding and incentives, and this rises to 93% for micro companies. Respondents also say that accessing financial support is a challenge because government application processes are too complex.

Eight in ten manufacturers say it would benefit them to build more effective partnerships with other organizations.

HIGH PERFORMERS PROVIDE A BLUEPRINT FOR SUCCESS
A small group of the manufacturers in the survey—just 15%—demonstrate high levels of technological adoption and prowess, and these businesses are experiencing greater investment returns. We call these firms Technology Adoption Leaders, and they have valuable lessons for the rest of the sector.

What Needs to Change: Lessons from the Technology Adoption Leaders

Our research identifies a small group—just 15% of the organizations we surveyed—that have successfully adopted leading-edge technologies. These Technology Adoption Leaders describe their level of technology adoption as "advanced" and are confident that they have adopted enough technologies to be competitive.

The Technology Adoption Leaders' forward-thinking strategies are paying off. Compared with the other manufacturers in the research, they are:

- More likely to say that increasing their market share and their product lines are priorities for the next year
- More likely to already be benefiting from using a wider range of new and advanced technologies, including AI, digital twins, advanced robotics, and additive manufacturing
- Much less likely to be struggling to attract tech-literate talent, or to create rewarding career paths for them

The leaders are **more proactive** than other manufacturers: 63% say they are increasing their technology investment plans in response to U.S.-Canada trade uncertainty. They also make greater use of **external support:**

77% say they use local support programs to help them with technology skills development, compared with **69%** of the other manufacturers in the research

83% build effective partnerships with other organizations, compared with **76%**

77% benefit from government funding and incentives, compared with **68%**

While their approach to formal training is like the rest of the manufacturers, they are much more likely to say they actively **encourage knowledge-sharing** within their organization: 60%, compared with 38% of the other firms.

Recommendations

Recommendations for Manufacturing Organizations

BUILD PARTNERSHIPS TO STAY INFORMED AND INSPIRED
Building partnerships can empower organizations with shared knowledge and ideas in a rapidly changing technology landscape. Engaging the supply chain and ensuring suppliers are technically advanced, boosts efficiency for everyone.

USE PEER BENCHMARKING TO GAIN CLARITY AND UNLOCK GLOBAL INSIGHTS
Comparing practices with peers, and benchmarking internationally, reveals blind spots and identifies new opportunities for innovation.

EMBED A CULTURE OF LEARNING AND INNOVATION
Develop a culture of continuous upskilling from the top down, encouraging a 'fail fast' mentality and reinforcing learning through peer sessions and rewards for knowledge sharing.

CREATE SPACE FOR KNOWLEDGE SHARING
Creating dedicated labs or demonstration hubs accelerates knowledge sharing and helps employees upskill by seeing tools in action.

TAKE A HOLISTIC APPROACH TO TRAINING TO ENSURE NO ONE GETS LEFT BEHIND
Developing technically savvy talent is essential, but workers must be trained in the most in-demand, future-focused skills. Apprenticeships can help build a strong pipeline of young technology talent, but businesses also need to upskill existing workers. Collaboration with colleges and vendors is also a great way for smaller companies to upskill staff.

SET AMBITIOUS STRATEGIC GOALS AND IDENTIFY ASSOCIATED BUSINESS IMPROVEMENT TARGETS
Firms should use peer benchmarking to develop strategic goals that strengthen their competitive position which can then be further broken down into two to four business improvement goals such as developing new high-value products, reducing costs, or improving processes.

MEASURE ROI TO GET A CLEARER PICTURE OF THE VALUE OF YOUR TECHNOLOGY, AND MAKE SMARTER INVESTMENT DECISIONS
Examining how ROI is measured arms businesses with the data to make informed decisions. Understanding the ROI of technology is essential both for deciding which technologies to invest in, and for building an internal case for technology adoption.

Recommendations for Policy Makers

CREATE SHARED TECHNOLOGY HUBS TO DE-RISK INNOVATION FOR MANUFACTURING BUSINESSES
Providing space to experiment is a crucial way for policymakers to encourage organizations to collaborate, test new technologies, and promote knowledge sharing in a risk-free way.

ENABLE BENCHMARKING AT SCALE
By building tools that let organizations easily compare themselves to peers, governments simplify the process and give leaders a starting point.

SIMPLIFY AND CENTRALIZE SUPPORT PROGRAMS TO IMPROVE ACCESS FOR ALL BUSINESSES
Existing provincial and national innovation programs are making a difference, but more must be done. Programs must be easy to access and centralized – Ontario has an opportunity to consolidate its resources and create pathways for organizations to navigate.

OFFER FUNDING IN WAYS WHICH PROMOTE COLLABORATION
Funding which requires two or more companies to collaborate benefits the organizations at once, but also encourages long-term partnerships.

USE TRAINING TO EQUIP LEADERS WITH THE SKILLS THEY NEED TO LEAD THEIR ORGANIZATIONS INTO A TECH-ENABLED FUTURE
Existing training programs leave a gap in executive-level technology training. CEOs and leaders need the skills to identify opportunities for technology implementation, and overcome entrenched ideas and resistance during the adoption process.

SET PRODUCTIVITY TARGETS AND/OR MISSION-ORIENTED GOALS
Governments can mobilize businesses through productivity targets or mission-oriented goals that drive productivity-enhancing investments.

DEVELOP AN AMBITIOUS INDUSTRIAL POLICY PROGRAM
In a changing global landscape, countries are taking a more active role in shaping their domestic economies. To compete over the long-term, Canada should commit significant public funds towards a modern industrial policy agenda.

Introduction

Technology has changed the manufacturing sector profoundly. From streamlining production to minimizing downtime and enhancing product quality, emerging technology and digital solutions now have the biggest influence on the industry's productivity and performance. This is the era of Industry 4.0.

Industry 4.0 integrates technologies such as artificial intelligence (AI), edge computing, and robotics into factories where systems make decisions autonomously. Manufacturers that can implement these technologies benefit from real-time decision-making and more agile, flexible, and productive operations. Falling behind means missing out on downtime reductions, increases in throughput and labor productivity, and better forecasting accuracy.[3]

In Canada, manufacturers are struggling to keep up. Canada is making progress in advancing its manufacturing sector, but is trailing behind Industry 4.0 leaders including China, Germany, Japan, and the U.S.[4]

Productivity and innovation are a particular problem. Research by the Centre for Canadian Innovation and Competitiveness finds that Canada's research and development (R&D) spend, which is an indicator of innovation levels, is stagnant compared with global peers. Between 2002 and 2020, Canada's labor productivity growth rate was less than half that of the U.S.[5]

From 2013 to 2023, Canadian firms invested an annual average of just 8% of GDP in machinery, equipment, and intellectual property. In contrast, U.S. firms invested 11% of GDP over the same period, driving a wedge in productive capital investment between the two economies.[6]

The province must take full advantage of emerging technology opportunities and ensure companies of all sizes and across all subsectors can benefit.

Ontario's Manufacturing Sector is in Danger of Falling Behind

Ontario is traditionally recognized as Canada's top manufacturing centre, but the value its manufacturing sector created, as measured by GDP, dropped 17% between 2002 and 2024, and productivity lags at 70% of U.S. levels.[7] Between 2002 and 2022, the province's manufacturing exports increased at a slower rate than all other provinces, apart from Prince Edward Island.[8] Our research finds that just 15% of Ontario manufacturing organizations see their company's technology adoption level as 'advanced'.

However, Ontario does have some bright spots of high performance. A group of the manufacturers in our survey demonstrate high levels of technological adoption and prowess, and they are taking a strategic approach to technology adoption. We call these firms the Technology Adoption Leaders, and they are:

- Finding it easier than other Ontario manufacturers to retain innovative, tech-literate talent
- Using a wider range of new and emerging technologies
- More likely to be planning to increase their market share over the next year

In this study, we delve into the challenges faced by businesses across the province and assess the state of technology adoption.

A small group of advanced manufacturers will not be enough to enhance Ontario's position in the global manufacturing sector. The province must take full advantage of emerging technology opportunities and ensure companies of all sizes and across all subsectors can benefit.

"This is about competitiveness," says Frank Voss, former President at Toyota Motor Manufacturing Canada. "This is a global challenge. We need to find ways to accelerate."

WHAT THE RESEARCH SHOWS

15% of Ontario's manufacturing organizations see their company's technology adoption level as "advanced."

40% are concerned that they have not adopted enough technologies to be competitive.

80% say their goals for the next year are being influenced by U.S. policy, and 60% say they are changing their technology investment plans because of uncertainty about U.S.-Canada trade.

60% want their employees to be more tech-literate but do not know where to start.

73% of the firms that both describe their level of technology adoption as "advanced" and are confident that their business has adopted enough technologies to be competitive, say that increasing market share is a business priority in the next year. This compares with 56% of the rest of the firms surveyed.

Ontario Has a Technology Deficit

Manufacturers in Ontario know that technology adoption is critical to the success of their sector: 86% say it has the potential to completely transform their business.

This transformative potential is set to grow. "We're starting to see exponential growth as globalization is really driving change—for example with competition with China on EVs [electric vehicles]," says Joe Loparco, co-president at AGS Automotive Systems, an automotive supplier based in Ontario. "If we thought technology adoption was a challenge before, it'll become a life-altering challenge now."

But while manufacturers might understand the potential of advanced technologies, only a few have turned that potential into reality. The majority (60%) describe their level of technology adoption as "moderate," while a quarter say they are only in the "early" stage of adoption.

Technology adoption is not progressing at the same rate in all businesses. Micro businesses (businesses with 1–4 employees) are far more likely to say they are at the early stage; 70% put themselves in this category, and only 7% claim advanced levels of technology adoption, suggesting they are struggling to upgrade with fewer resources.

Low levels of technology adoption are blunting businesses' competitive edge. Two in five manufacturing organizations are concerned that they have not adopted enough technologies to be competitive, with only 11% reporting high confidence in their technological adoption levels.

Only 15% of manufacturing organizations are advanced in technology adoption

25% **EARLY-STAGE**
Limited digitalization and advances technologies in place

60% **MODERATE**
Some automation and digitalization in use in product operations

15% **ADVANCED**
Extensive application of digitalized processes and advanced manufacturing technologies across the enterprise

Question: How would you describe the level of tech adoption at your business?

Some Firms are Building Resilience in an Uncertain Environment

Eighty percent of manufacturing organizations say their goals for the next year are being influenced by U.S. policy. "It's put a strain on our sales, because both Canadian and U.S. customers are being more cautious and pulling back their budgets," says Ammar Jafar, CTO at LabsCubed, a Kitchener-based start-up that builds automated tensile testers for rubber and plastic. "We've had a few deals fall through in the last stages of the sales process."

Some businesses are responding to uncertainty by restricting their technology-related investments: 15% say they are delaying their investment decisions because of the uncertainty, while 3% are actively scaling back their investments.

However, more are responding by increasing investment: 21% say they are increasing technology investment to expand their product lines. And 23% say they are increasing technology investment to reduce or diversify their export strategy.

"We're looking at different markets. Just two weeks ago, I went to the U.A.E. for a trade show," says Jafar. "We're looking at Europe more, and we already have a handful of customers in Mexico, but now we're looking at it as a more serious market for us to expand into."

The choice of how to respond in this moment could be critical to the future of the sector. "When I hear announcements like 'delay' or 'pause,' I worry because the ramifications of that is a missed opportunity," says Toyota's Frank Voss. "We're not learning, we're not growing, we're not developing. So, we're not getting ready for that next step."

According to the CTO of an Ontario-based aviation manufacturer, "uncertainty about U.S.-Canada trade might push manufacturers into taking the initiative on technology investment."

They added that "with Canada and the U.S. and all the politics going on, I think Canada is realizing that we should no longer be dependent on the U.S. We need to be independent. And we need to catch up on these technologies."

Three in five manufacturing businesses are changing their technology investment plans because of U.S.-Canada trade uncertainty

Question: How is the ongoing uncertainty around U.S.-Canada trade affecting your technology investment plans?

INDUSTRY 4.0: THE TECHNOLOGIES

We asked manufacturing organizations about their level of adoption of the following technologies:

AI and machine learning

AI and machine learning allow systems to analyze vast datasets, identify patterns, and make decisions or predictions with minimal human intervention.

Cloud

Cloud computing provides on-demand access to computing resources, data storage, and software applications.

Industrial Internet of Things (IIoT)

IIoT connects industrial machines and devices to a network, enabling real-time data collection and analytics that enhance operational efficiency, equipment monitoring, and process optimization.

Digital twins

A digital twin is a virtual replica of a physical asset or process that uses real-time data to simulate, monitor, and optimize performance.

Advanced robotics and cobots

Advanced robotics and collaborative robots (cobots) are programmable machines that automate complex tasks and can work alongside humans.

Virtual reality (VR) and augmented reality (AR)

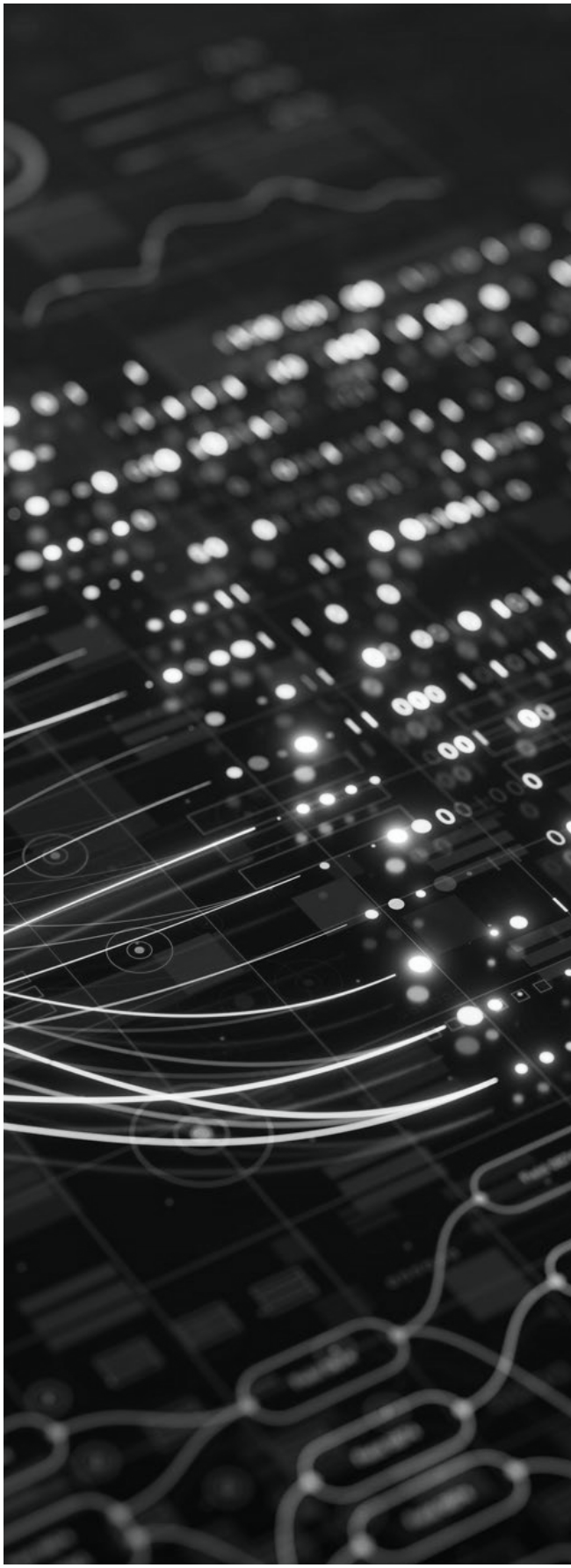
VR and AR technologies immerse users in digital environments or overlay digital information on the physical world, and can be used for training, maintenance, and remote support.

Edge computing

Edge computing processes data locally on or near the source of generation (e.g., machines or sensors), reducing latency and enabling faster decision-making.

Additive manufacturing

Additive manufacturing, commonly known as 3D printing, builds objects layer by layer from digital models, allowing for rapid prototyping, customized production, and less material waste.



Which Technologies are Ontario's Businesses Investing in?

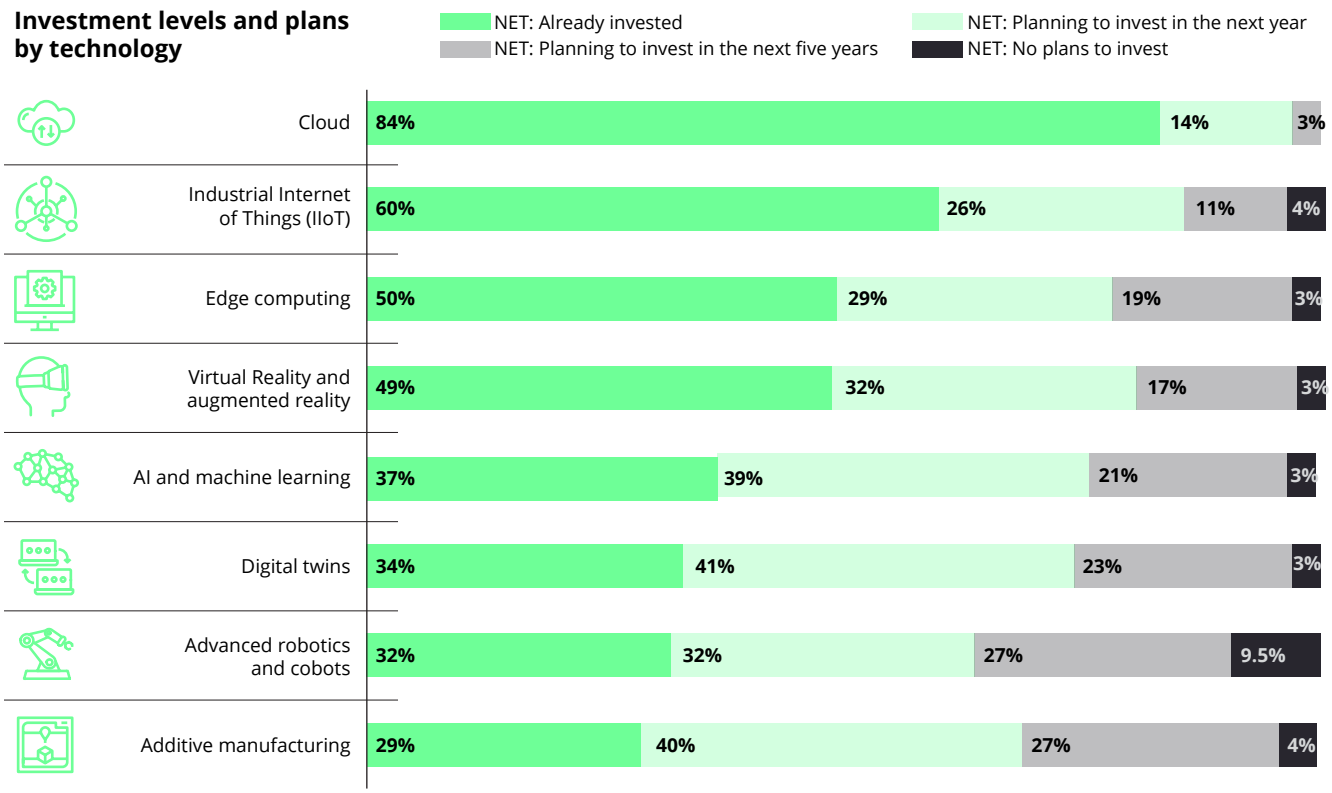
Emerging technologies are coming together to create a new kind of factory where IIoT sensors collect real-time data and edge computing processes it locally to detect faults or trigger alarms. Edge computing also provides faster local processing for AI, which can flag predictive maintenance issues or optimize processes—all without the need for data to be sent to the cloud.

Digital twins and VR allow for more advanced simulation and testing capabilities, with VR creating immersive environments that manufacturing companies can use to train staff or visualize new factory layouts and product designs.

Eight in ten Ontario manufacturers have already invested in cloud and 60% have invested in IIoT, with a further 26% saying they plan to invest in IIoT in the next year. About half have already invested in edge computing and VR/AR, while just 37% have already invested in AI, and about a third have already invested in digital twins. Manufacturers do seem to be forging ahead over the next year: 41% say they plan to invest in digital twins over this period, and 39% say the same about AI.

About a third of businesses have already invested in advanced robotics, and another third plan to make investments over the next year. Recent research from the Information Technology and Innovation Foundation (ITIF) and the International Federation of Robotics shows that Canada uses significantly fewer industrial robots per manufacturing worker than comparative countries. The country's low level of robot installation compared with China and Korea is particularly striking because Canadian manufacturing wages are higher, which means the return on investment (ROI) of investing in robots would be higher.[9]

Cloud is top of the technology adoption list



Question: For each of the below technologies, please tell us whether your organization has already invested in them, plan to invest in them within the next year, or plan to invest within the next five years

Only 17% of micro firms surveyed have invested in advanced robotics, compared with 57% of mid-sized firms and 47% of large organizations.

Instead of focusing on a single technology, however, manufacturers need to integrate a range of technologies. "What we're seeing now is that technology is becoming more integrated," says Jonathan Pastrikos, Assistant Vice President of BDC (Business Development Bank of Canada) Advisory Services. "It's not just one type of technology, it's a combination of technologies that need to be deployed to be effective, and to help the company reach its goals."

Irfan Sattar, CEO of specialist pharmacy supplier Helios Laboratories, agrees: "When you have separate components working independently of each other and one of them goes down, the whole system will suffer," he says.

A Big Issue for Small Firms

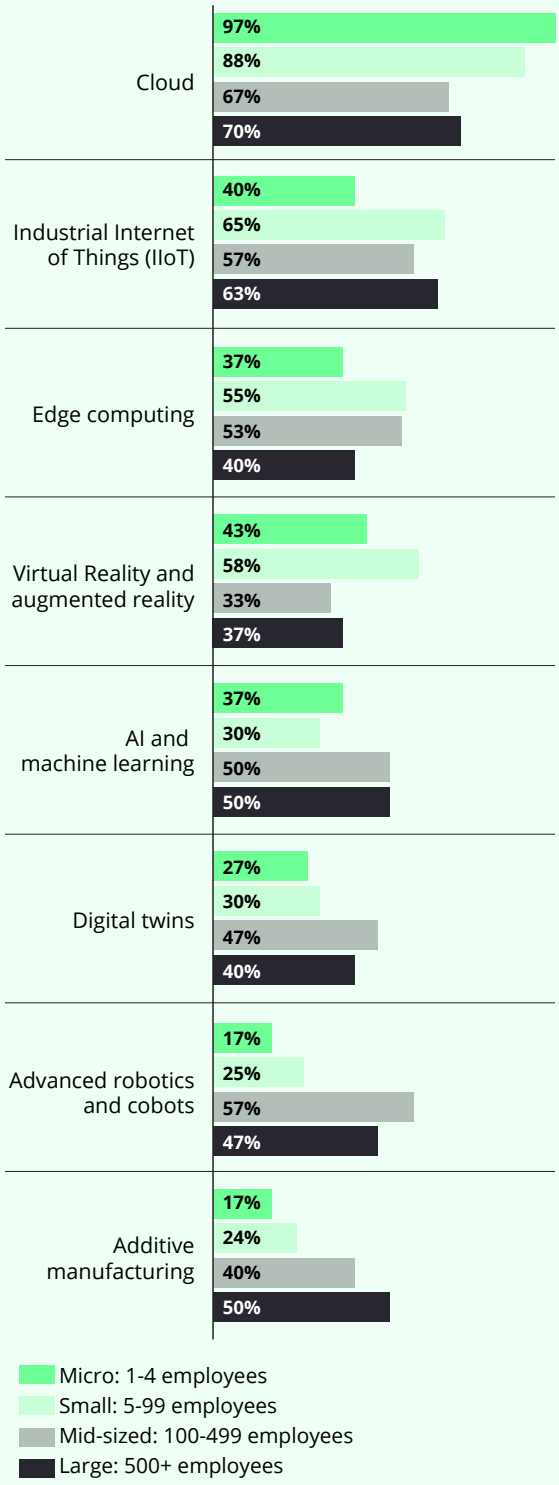
David Pitts, President at Angstrom Engineering, says that any business that does not integrate these technologies risks being left behind: "I think anybody who's not looking to become more efficient using these tools is going to suffer."

This could be a problem for smaller organizations. Only 17% of micro firms surveyed have invested in advanced robotics, compared with 57% of mid-sized firms and 47% of large organizations. According to Pastrikos, mid-sized and large companies are now investing more in robotics and advanced physical technologies because "the efficiencies are much more evident, so the ROI is quickly calculable."

One country that has tried to improve rates of technology adoption in its smaller firms is Germany. The Mittelstand-Digital Initiative offers knowledge-sharing workshops, demonstration centers and information and networking events based at regional hubs. These sessions are specifically designed to increase rates of digital transformation among smaller and mid-sized businesses.[10]

Larger companies are more likely to be investing in emerging technologies

Technology adoption by firm size



Question: For each of the below technologies, please tell us whether your organization has already invested in them, plan to invest in them within the next year, or plan to invest within the next five years

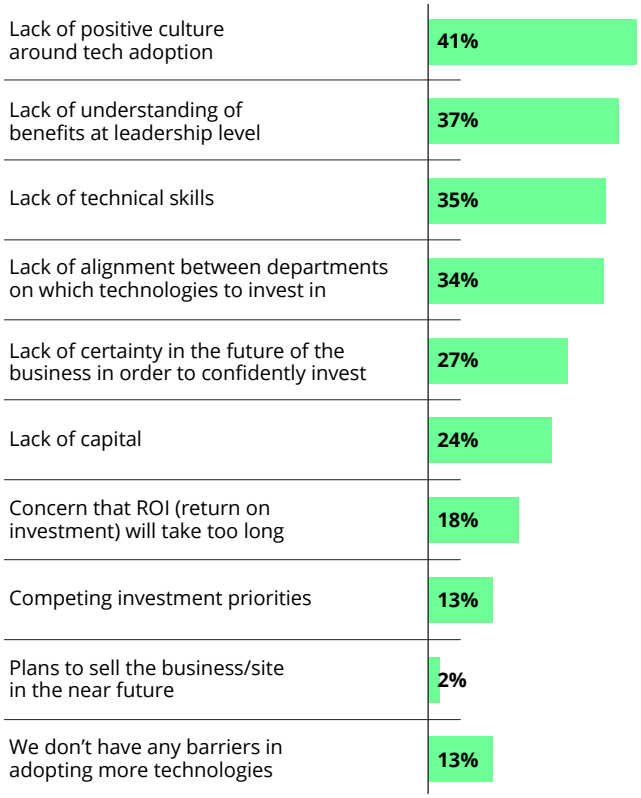
The Barriers to Greater Technology Adoption

When we asked manufacturing organizations in Ontario about their greatest barriers to increased technology adoption, one factor stood out: culture.

They identified a lack of positive culture as their organizations' top barrier to greater technology adoption, followed by senior leadership's lack of understanding of the benefits. Together, these factors suggest that leadership plays a pivotal role in technology adoption, because of a lack of either understanding or encouragement.

"Canadians tend to be more conservative, more stuck in their ways," says one CTO. "Technology adoption tends to be really slow from that side. A lot of people actually advised us to start out in the U.S. and then come back to Canada later."

Lack of positive culture and leadership understanding of the benefits are the top barriers to greater technology adoption



Question: What are the top three barriers to your business adopting more technologies?

"Automotive has been highly automated by most industry standards and in doing that it has these defined processes. And the more defined they are, the more constrained it is. There's almost a paradox where the more advanced you are, the harder it is for you to change."

Manufacturing Suffers from Resistance to Change

Asked for additional details on why culture is such a challenge, many organizations said there is a widespread lack of comfort with new technologies. "Fear of unknown technology," said one respondent. Another said: "Honestly, it's tough because a lot of our team just aren't really comfortable with new tech. It makes trying out new things feel like a huge learning curve for everyone, and it slows us down quite a bit."

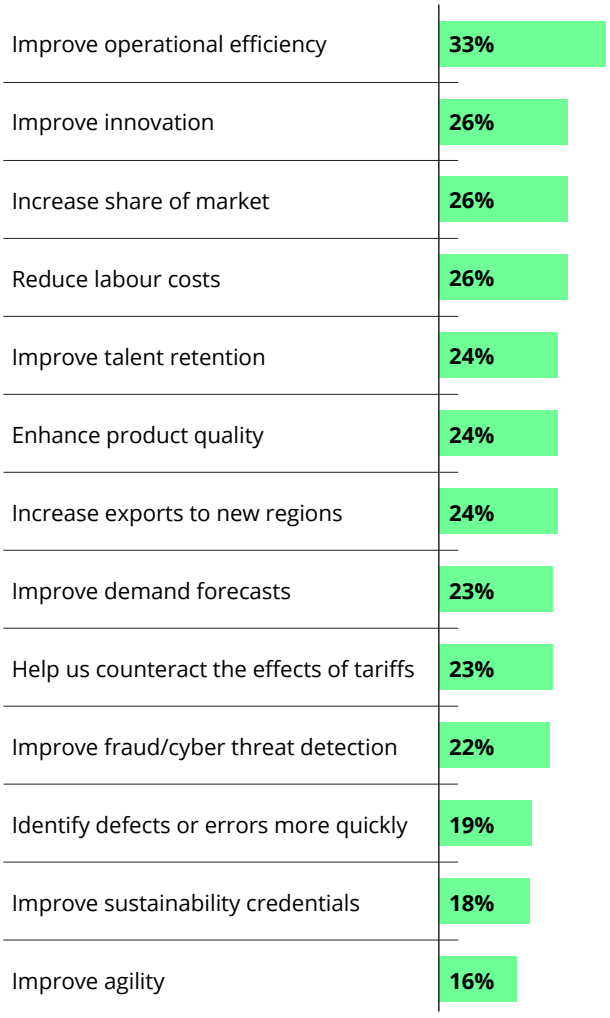
AGS Automotive's Joe Loparco explains that the automotive sector is fixated on adhering to set processes, compared with others where it is easier and more common to try new approaches. "Culture is definitely a big factor," says Loparco. "Automotive has been highly automated by most industry standards and in doing that it has these defined processes. And the more defined they are, the more constrained it is. There's almost a paradox where the more advanced you are, the harder it is for you to change."

There is a cautious conservatism, according to LabsCubed's Jafar: "Especially in the rubber industry, a lot of people are set in their ways [about] how things are done. Change is hard, and so trying to convince people to implement these new technologies takes a while, and a lot of persistence. Canada, in general, is conservative."

The survey findings also suggest that firms are unsure about the value of technology for their business. Asked to select their top three benefits from a list, their choices were relatively evenly distributed across the options. This might reflect the wide variety of the types of benefits offered by technology, but it could also mean that they are not clear about which benefits are the most significant.

No clear consensus about the benefits of technology adoption

Top benefits of technology adoption



Question: What are the top benefits that you think your business could stand to gain from adopting more technologies?

Mary Ann Wenzler, Vice President, Greater Toronto Area West at BDC, says many manufacturing organizations have not been prioritizing technology adoption and do not know where to begin. "The global uncertainty, particularly with the U.S., is undoubtedly inhibiting investment," says Wenzler. "But in this market, companies have been incentivized on their realty investment versus investment in the business side. And the pace of technology change has now got away from entrepreneurs, so now they're interested but they don't know where to start."

Helios Laboratories' Sattar says delays around technology adoption extend to regulators, which can create more confusion for manufacturers. "There is a disconnect between reality and regulation," he explains. "The world is changing fast but regulators aren't keeping up, which can make it challenging to innovate in a way that is compliant with local policies. New regulations should be created for emerging technologies and AI tools, to help companies evolve with time."

Inertia is slowing down skills acquisition

Manufacturers in our survey say the third greatest barrier to more technology adoption is a lack of technical skills. The difficulty is not just in finding new talent with the correct skills. Toyota's Frank Voss says trying to upskill workers in new technologies can be challenging when they are already very experienced. "New workers that are coming through the programs are coming with quite a solid foundation in the new technology," says Voss. "Getting the existing people skilled up and giving them the tools and learning to be able to work with that new technology—that is a challenge." Manufacturing firms are daunted by this challenge: 60% say they do not know where to begin with technology training.

Forty-two percent of manufacturers say they struggle to align the skills of employees with their technologies. According to Voss, automotive workers need a much broader skill set today than in the past: "They've got to be able to do systems integration and understand shop floor automation

because the equipment they're managing now has multiple dimensions. And if you do have a fault, you need to make sure that you can recover the process. That may mean working with data or working with electronics in addition to the traditional hardware side."

However, resistance to change within manufacturing organizations can get in the way of acquiring these skills, according to Greta Cutulenco, CEO and Founder of Kitchener-based Acerta, which builds data analytics tools for automotive manufacturers. "When you bring in a lot of these digital technologies to the shop floor, I find the first reaction is often 'I've been doing this for decades in my way, why do I need this new technology?", says Cutulenco. "One of the things when we work with manufacturers, a lot of the time, is to really focus on how we change the culture of the organization and help it go from a more traditional approach to a more data-driven approach."

Nearly two-thirds of manufacturers do not know where to begin with technology training

Almost half (47%) of manufacturers say they struggle to attract tech-literate talent. And manufacturers say the top challenge of attracting or retaining workers with technical knowledge is competition from other industries.

AGS Automotive's Joe Loparco says that many younger skilled workers are seeking "that start-up dazzle": "When you get people that are highly skilled in a new technology area, they're in demand and they don't want to join a manufacturing company and then that's all they do. They prefer to work for a service provider, whether it's a consultancy or an integration firm, that works for many companies as this will allow them to get a breadth of experience across diverse applications."

60% The pressure of day-to-day tasks stops employees from being **more creative with technology**

60% We want to train our employees to be more tech-literate but **don't know where to begin**

47% **We struggle to create rewarding career paths** for AI/tech-savvy talent

47% **We struggle to attract** tech-literate talent

42% **We struggle to align the skills** of our employees with our existing technologies

40% **We struggle to keep** our most innovative employees

Question: To what extent do you agree with the following statements about your workforce? Chart shows proportion of respondents who agree with each statement.

83% say it would benefit their organization to have access to more government funding and incentives, and this rises to 93% for micro companies.

Access to external support can be complex

Asked about government support options and partnership opportunities, the majority of manufacturers (81%) say they use local support programs to help them with technology adoption. Seventy percent say they make use of local support programs to help them with technology skills development, and 69% benefit from government funding and incentives.

Most manufacturing organizations have been able to access local support programs, but this does not mean they are satisfied: 83% say it would benefit their organization to have access to more government funding and incentives, and this rises to 93% for micro companies.

BDC's Mary Ann Wenzler says she often finds that her clients have missed out on funding that should have been a perfect fit for their business or project: "We hear a lot that complex application requirements put them off, or annoying fine print, like having to apply and be approved before you even start a program. Many companies just say it's too tricky to navigate, so they don't apply."

A lot of programs are reimbursement only, so companies must be able to get projects underway themselves and claim back costs later. This is supported by research by Canadian Manufacturers & Exporters, which found that less than half of manufacturing and exporting organizations agreed that government funding application processes are easy to navigate.[11]

"It takes a lot of work," says Loparco. "The process is usually bespoke, so you've got to apply, you may need to bring in consultants. There's uncertainty on whether you're going to get it or not." These barriers can be particularly prohibitive for small companies that have fewer resources to put into applications or the size of program required to attract funding. "The problem is you need scale," says Loparco. "And for some of the smaller companies especially, it's just too much. It's also the resource, time, and skill level necessary to actually implement many big projects."

Partnerships are essential but underused

Eight in ten manufacturers say it would benefit them to build more effective partnerships with other organizations. According to BDC's Jonathan Pastrikos, public-private partnership opportunities do exist but are not promoted enough to be effective: "Often, technology companies offer incentives for entrepreneurs which go completely unnoticed. I think there should be a greater light put on the opportunities in the private sector to offer support and subsidies."

Partnerships can drastically speed up problem-solving. "Collaboration forces people to look beyond their walls to really consider where the best solutions are," says Robert Mastrotto, VP, Projects at Next Generation Manufacturing Canada (NGen), an industry-led non-profit that brings together advanced manufacturing and technology companies to encourage digital transformation in Canadian manufacturing. "Why reinvent the wheel when there are organizations with the solutions out there that are more than willing to engage?"

John Laughlin, CTO at NGen, adds that for partnerships between technology companies and manufacturing organizations to succeed, manufacturing companies need to be open about their challenges. "We have a large portfolio of projects building new AI capabilities at the moment, because manufacturers recognize that they do not have the AI knowledge and tools embedded within their organizations," says Laughlin. "But it's all down to collaboration, because you've got to really open up on what the challenges are in order to provide the right data to train the model to get the results."

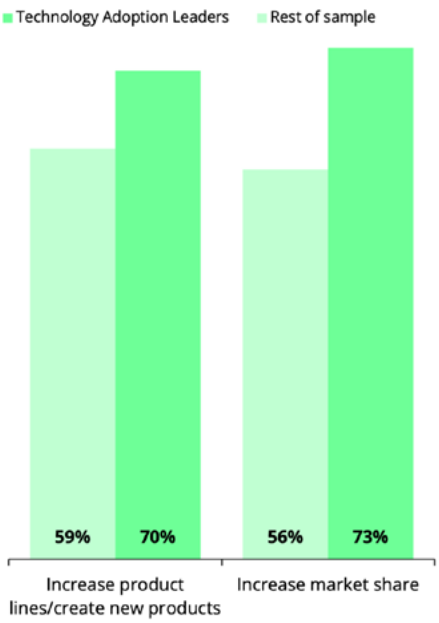
What Needs to Change: Lessons from the Technology Adoption Leaders

Our research identifies a small group—just 15% of the organizations we surveyed—that have successfully adopted leading-edge technologies. They describe their level of technology adoption as "advanced" and are confident that they have adopted enough technologies to be competitive. We call them the Technology Adoption Leaders.

The Leaders' forward-thinking strategies are paying off. They are:

- More likely to say that increasing their market share and their product lines are priorities for the next year.
- More likely to already be benefiting from using a wider range of new and advanced technologies, including AI, digital twins, advanced robotics, and additive manufacturing.
- Much less likely to be struggling to attract tech-literate talent, or to create rewarding career paths for them.

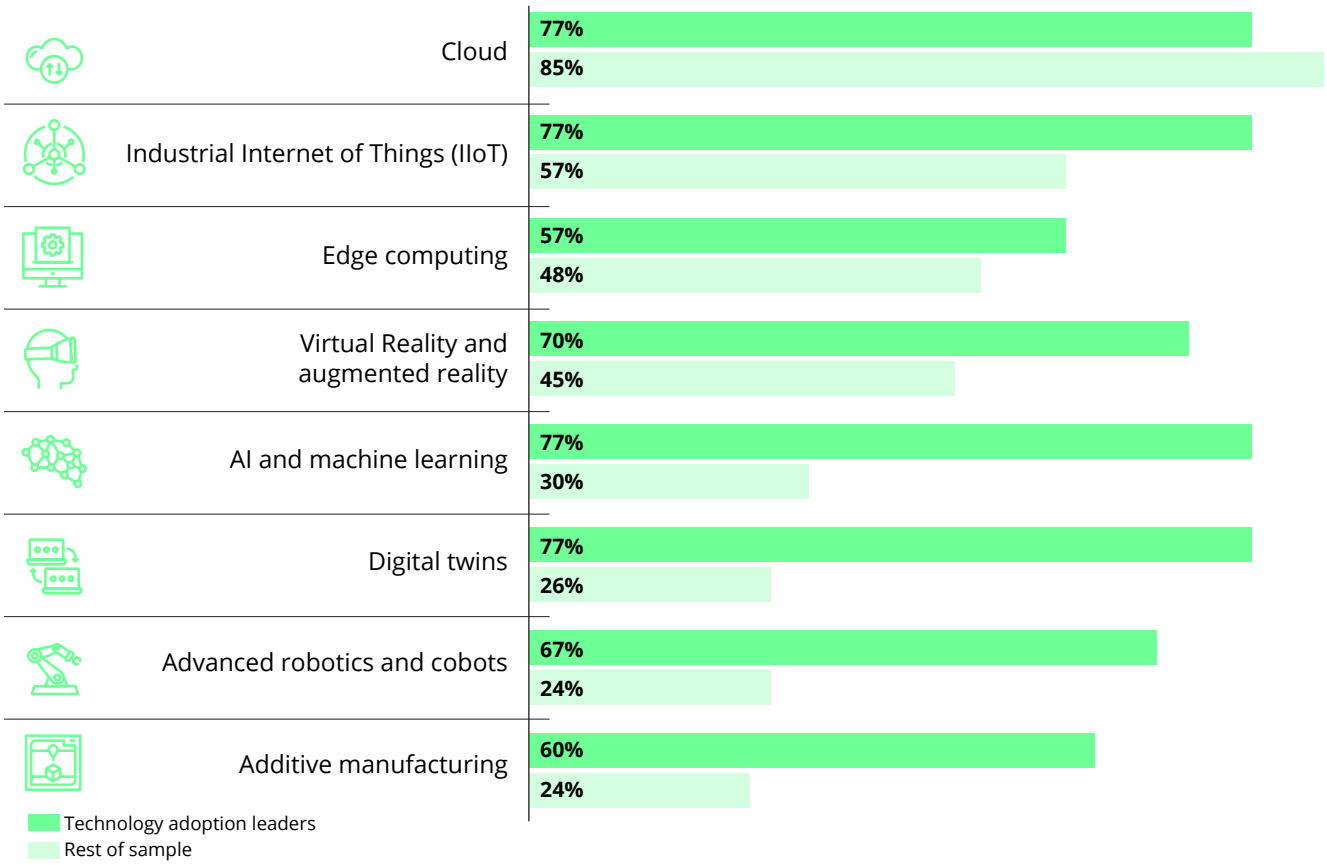
Growth is more likely to be a priority for Technology Adoption Leaders than other firms



Question: To what extent are each of the below a priority for your business in the next year?

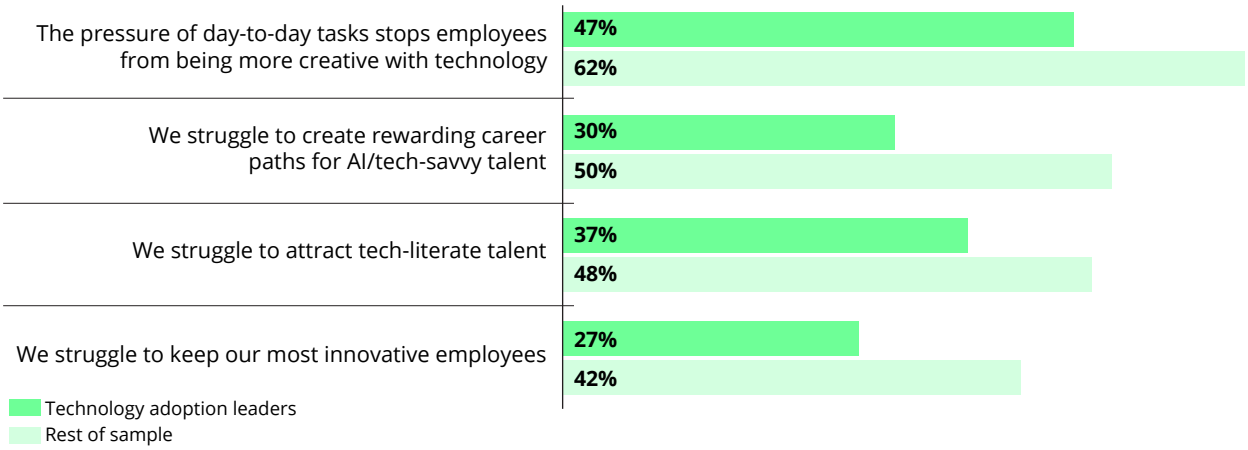
Technology Adoption Leaders are more likely to be using advanced technologies

Technology adoption by firm size



Question: For each of the below technologies, please tell us whether your organization has already invested in them, plans to invest in them within the next year, or plans to invest within the next five years - Chart shows proportion who have already invested in each technology

Technology Adoption Leaders are much less likely to struggle to attract and retain tech-literate talent



Question: To what extent do you agree with the following statements about your workforce? Chart shows proportion of respondents who agree with each statement

What are the Technology Adoption Leaders Doing Differently?

They are proactive

The Technology Adoption leaders are more likely to say they are responding proactively to US-Canada trade uncertainty, with 63% saying they are increasing their technology investment plans in response.

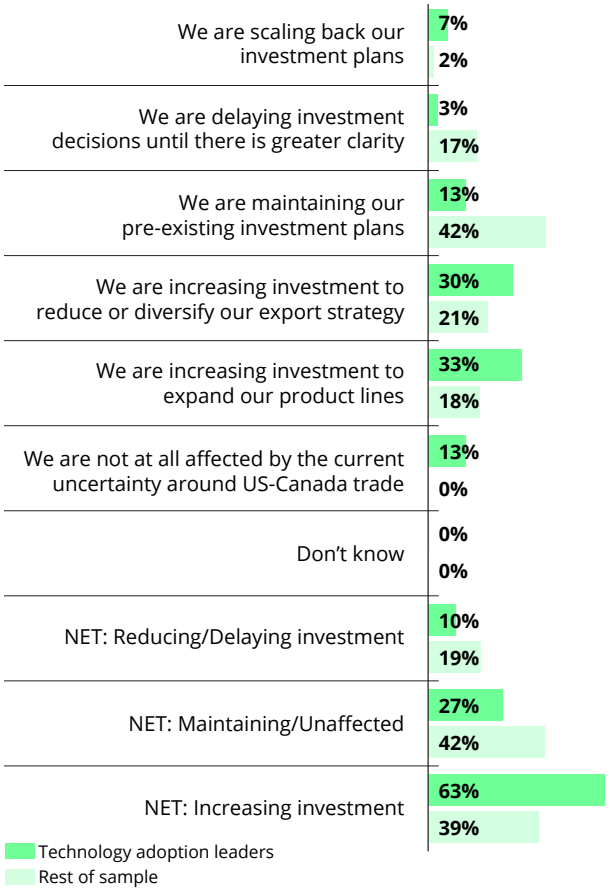
They make the most of external support and partnerships

The Technology Adoption Leaders are more likely to be using local support programs to help them with technology skills development: 77% say they are doing this, compared with 69% of the rest of the sample. They are also more likely to build effective partnerships with other organizations (83%, compared with 76% of the other firms) and to benefit from government funding and incentives (77% versus 68%).

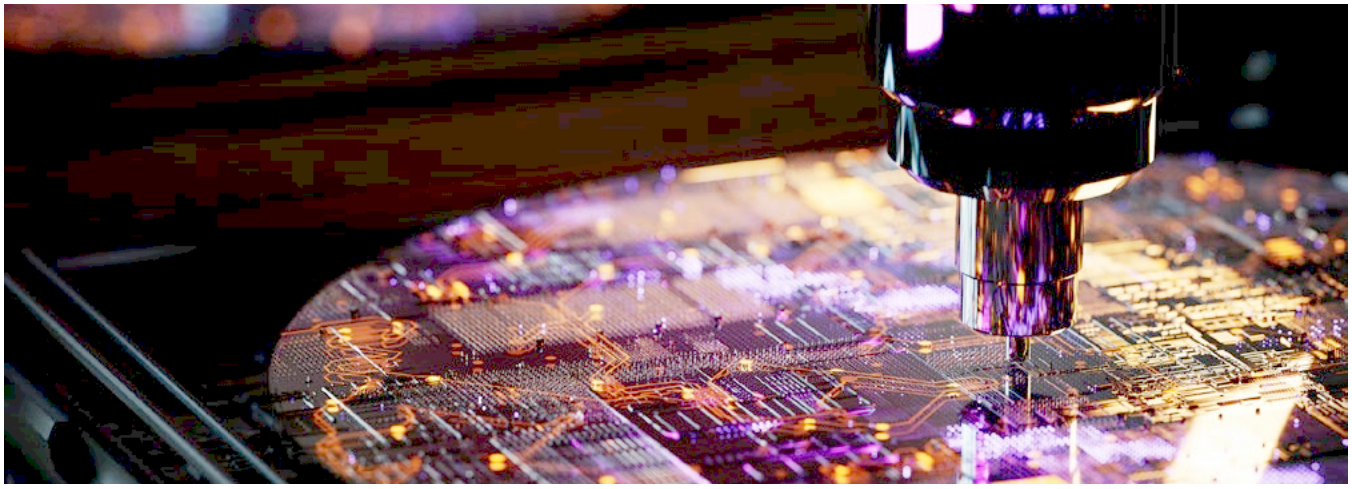
Finally, although their approach to formal training is similar to the rest of the sample, they are much more likely to say they actively encourage knowledge-sharing within their organization: 60% compared with 38% of the other firms.

What can other organizations in Ontario do to catch up to Technology Adoption Leaders? And how can policymakers help them?

Leaders are much more likely to be increasing their technology investment in response to US-Canada trade uncertainty



Question: How is the ongoing uncertainty around US-Canada trade affecting your technology investment plans?



Manufacturers: How to Replicate the Success of the Technology Adoption Leaders

1. Forge effective partnerships

As technology continues to rapidly evolve, building partnerships with other organizations can be critical to keep gaining essential knowledge – as the Technology Adoption Leaders seem to understand.

These do not necessarily need to be formal, large-scale projects. Even informal collaboration is valuable. LabsCubed's Jafar recently attended an event in Kitchener to share technology ideas amongst Canadian automation and robotics companies, as a direct response to the political situation between the US and Canada. "The idea was to ask how we make use of all these new technologies to help companies here navigate tariffs and uncertainty, and help each other grow."

Collaborative laboratories are also becoming increasingly popular across industries as a way to share tools and expertise.[12]

Voss says Toyota is in the process of setting up 'accelerator labs' where technology demonstrations take place for employees as well as partners and suppliers in the Toronto region, including real production lines. "People can see the technology and understand that it's not so scary. It's not so complicated or difficult. You just need to invest enough time to understand. Those give the opportunity to bring people together and show them what's possible."

2. Ensure technical strength across your supply chain

Voss adds that working with suppliers that also keep pushing for higher levels of technology adoption is an important part of Toyota's strategy. To encourage this, Toyota includes companies in their supply chain in their knowledge-sharing.

Taking this approach to the supply chain ensures that companies benefit from the most innovative solutions and highest possible efficiency, as well as the opportunity to share ideas.

AGS Automotive Systems' Loparco agrees: "We try to spend most of our time bringing in new partners that are already technologically advanced. They're already culturally there, and we can learn from them. If you bring in more advanced suppliers, then you benefit from that innovative thinking."

3. Design effective training

Although the Technology Adoption Leaders don't report particularly different training approaches to the rest of the sample, industry experts agree that getting training right is critical to successful technology adoption.

Toyota's Voss says asking employees for honest feedback on their knowledge gaps is the only way to ensure training is targeting the right areas. "We have an annual skills evaluation process for all our

technical people, and it's a self-driven feedback process. They're able to say, 'I'm strong here, I need help here.' And based on that, we'll determine what the training for that group is or that individual is in the coming year."

Ashur Hanna, director of operations at Fresh Start Foods Canada Ltd, based in Toronto, adds that it's critical to involve employees throughout the process of introducing a new technology. "For example, before I even order a new machine, I tell the team who's going to use it and I ask them what they think. I explain all the benefits and why it's better than what we have already."

He adds that working with the right partners can be a big part of helping employees become comfortable with new processes, so they can support implementation. "We like to take a supervisor right to the supplier and let them show them the new machine themselves, then they can come back and explain to their teams how it works."

4. Embed a culture of learning

While training is important, it's most effective when delivered within a wider culture that promotes constant learning—as suggested by the Technology Adoption Leaders being much more likely to actively encourage knowledge sharing. But what does this look like in practice?

BDC's Pastrikos says encouraging tech-savvy employees to become internal 'champions' of certain tools or of digitization overall is the best way to ensure people at every level get inspired and supported. "That's what it really takes, is someone to help make sure all of this is proliferating throughout your company."

He adds that BDC offers specific services to help businesses embed technology adoption and innovation into their top-level strategies, so that an open and positive culture to new processes and ideas filters down from leadership.

AGS Automotive Systems' Loparco says using a cross-functional approach to new innovations helps ensure they are organized and effective. "That way, we bring in project management skills to help the people that are really good at research and development. And I personally get very involved in a lot of new initiatives to protect them from being cut. Because a lot of the time we fail, but then I say that's good because we've learned something that doesn't work... so let's keep on trying."

LabsCubed's Jafar agrees that this 'fail fast' mentality is key to encouraging innovation and adds that as a leader he actively pushes employees to make time for learning. "We have an allowance per month for every employee to use as they wish for their own growth and training, whether it's a book or a course. And if there's any new technologies they want to try, I certainly encourage them and tell them to go for it—whether there's going to be results for us sooner or later."

"When incentives are provided at the tail end of a project, that's always a challenge for entrepreneurs from a cash flow perspective. Allowing benefit from that money earlier and faster in the process would be very impactful."

Jonathan Pastrikos, Assistant Vice President, BDC Advisory Services, BDC

Policymakers: How to Create More Technology Adoption Leaders

1. Improve funding and incentives

While the examples above all show there are plenty of actions which manufacturing firms can and should take themselves, there is also a need for more external support.

An essential first step is simplifying access to funding, especially for small to medium-sized companies, who will struggle to allocate resources to long applications, says BDC's Wenzler. "We need to make funding programs more equitable and user-friendly. In the US, we're seeing some constituencies change their approach and almost electing companies first, which they then specifically target with their funding programs." This approach, she explains, reduces the load on companies to find suitable funding options for them.

Pastrikos agrees that programs need to be structured differently and says funding should be offered earlier: "When incentives are provided at the tail end of a project, that's always a challenge for entrepreneurs from a cash flow perspective. Allowing benefit from that money earlier and faster in the process would be very impactful."

Acerta's Cutulenco agrees that the administrative burden can be off-putting, but says the right incentives can forge new partnerships and encourage companies to be more innovative in the long-term. One way to boost participation, she argues, is to encourage collaboration.

She points to three projects which Acerta has carried out with funding from NGen. In each project, Acerta has partnered with a Canadian manufacturer for a year and embedded its AI-driven analytics platform into their production processes. "The funding offsets both our costs and the manufacturers' costs, and it's a fantastic incentive for a Canadian manufacturer to then take a bit more risk and invest into some innovation. Through the projects we have found manufacturers who are interested in testing out technology where historically, they would maybe have just thrown more people at a project—but technology can get them there faster and more cheaply."

2. Cut barriers to support

One way to support organizations without adding any administrative burden is through automatic policy instruments, such as tax relief. "I'm much more of an advocate of facilitating technology adoption just by making it a generic program that just says, if you do these things, it's a given," says AGS Automotive's Loparco. "You don't have to apply, it's automatic. For example, every time you install a robot, you get a tax credit of some sort as opposed to some big program that has to demonstrate 50 robots."

Canada's Scientific Research & Experimental Development (SR&ED) tax credit is by far Canada's largest innovation support program. The program allocates more than $4 billion annually towards stimulating business R&D.[13] However, the program is in need of immediate reform, plagued by a complex and cumbersome application process, lack of focus on commercialization activities, and low expenditure limits, among other challenges.

"So many of our programs focus on basic skills training, which is desperately needed. But I think that a program for CEOs and winning over their minds, making them comfortable with technology and training them on the constraints that they're going to encounter would be very valuable."

Joe Loparco, Co-President, AGS Automotive Systems

3. Broaden training support to target leadership

Government support for training is also essential, but this must cover a varied set of skills and target workers in all stages of their careers in order to provide value to manufacturing organizations. Government programming and support often concentrate on giving engineers or other workers technical training – but the research suggests there is a missing piece around leadership training.

"So many of our programs focus on basic skills training, which is desperately needed. But I think that a program for CEOs and winning over their minds, making them comfortable with technology and training them on the constraints that they're going to encounter would be very valuable," says Loparco. "We've not targeted our CEOs or executive ranks. And I think I'd like to see Ontario and the Canadian government do that."

In recognition of this need, NGen recently launched its Technology Leadership Program, with the aim of providing leadership teams with the tools to self-assess the business and find areas that can be matured to be globally competitive, as well as correct areas that may hamper success. In the process, the program aims to help leaders rebuild entire business strategies in line with the needs of their customers.

"We recognized that the reason that most technology adoption projects were unsuccessful had much less to do with technology, than with people and leadership," says Stewart Cramer, chief program officer at NGen. "We created the Technology Leadership Program to help leadership teams to understand and find alignment around the key priorities of their businesses, as well as the leadership practices required to drive successful transformation."

4. Create opportunities for collaboration

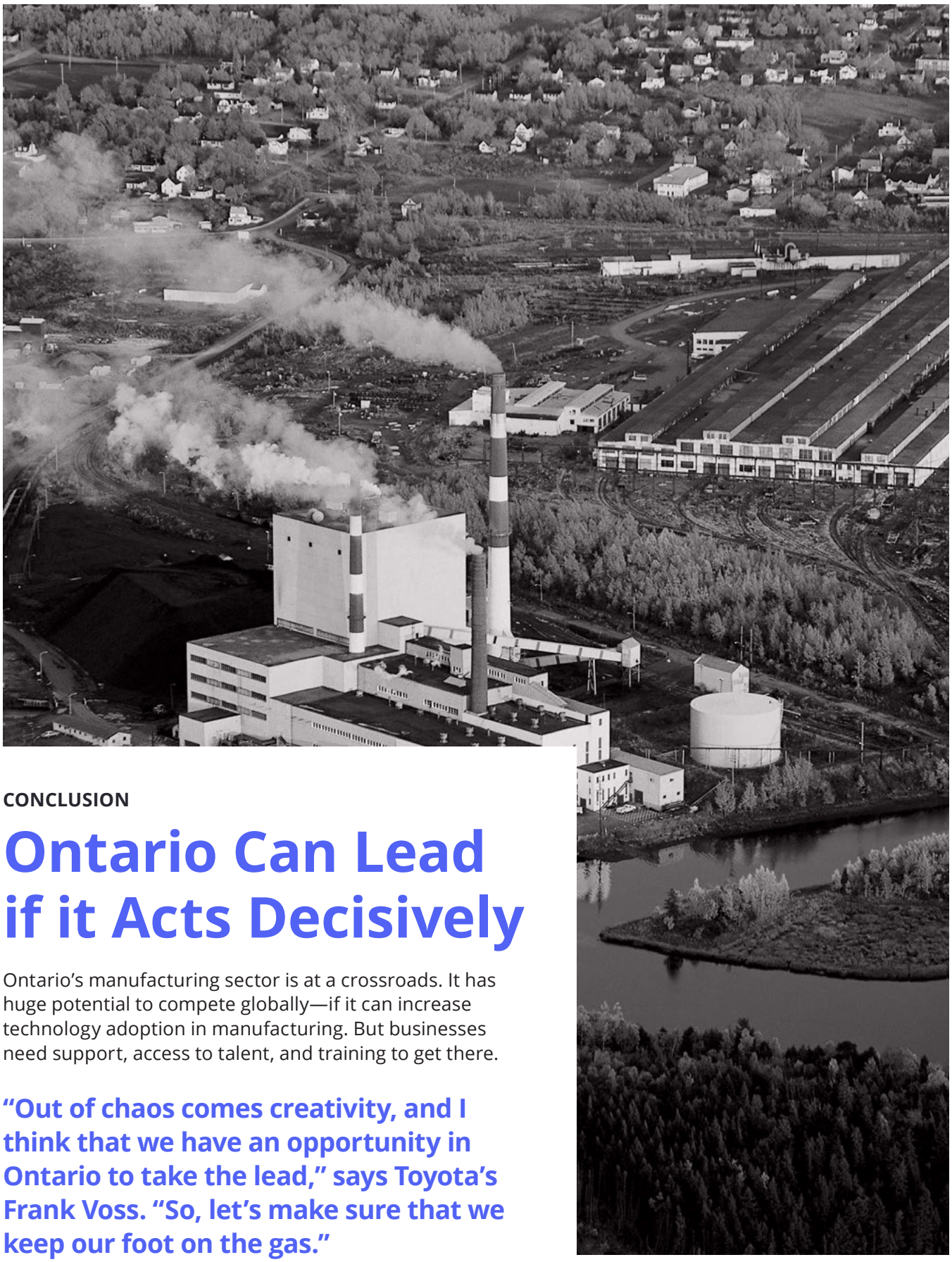
As well as providing monetary incentives to businesses, governments can also fund the collaborative spaces which organizations can use to share resources and ideas, like the shared laboratories mentioned above. This means companies take on less risk themselves as well as having the chance to work together.

The Singaporean government has already taken this step. Its Model Factory project, created by the Ministry of Trade and Industry, allows companies to experiment with new technology in a collaborative environment. With a large main facility as well as a series of micro-factories, the project focuses on value chain resilience, circular manufacturing and digital twins.[14]

5. Give firms the tools to assess their progress

Benchmarking tools offer valuable opportunities for firms to assess their operations and see how they measure up against their peers. Assessing how far along they are on their digital transformation journey can be difficult to establish from the inside, and it's easy for blind spots to persist.

Again, a good example of this can be found in Singapore. The Singapore Smart Industry Readiness Index, developed by the country's Economic Development Board, breaks down Industry 4.0 into three building blocks, and gives organizations the tools to assess how they perform across all three.[15]



CONCLUSION

Ontario Can Lead if it Acts Decisively

Ontario's manufacturing sector is at a crossroads. It has huge potential to compete globally—if it can increase technology adoption in manufacturing. But businesses need support, access to talent, and training to get there.

"Out of chaos comes creativity, and I think that we have an opportunity in Ontario to take the lead," says Toyota's Frank Voss. "So, let's make sure that we keep our foot on the gas."

Recommendations for Manufacturing Organizations

BUILD PARTNERSHIPS TO STAY INFORMED AND INSPIRED
Building partnerships can empower organizations with shared knowledge and ideas in a rapidly changing technology landscape. Engaging the supply chain and ensuring suppliers are technically advanced boosts efficiency for everyone.

USE PEER BENCHMARKING TO GAIN CLARITY – AND UNLOCK GLOBAL INSIGHTS
Comparing practices with peers, and benchmarking internationally, reveals blind spots and identifies new opportunities for innovation.

EMBED A CULTURE OF LEARNING AND INNOVATION
Develop a culture of continuous upskilling from the top down, encouraging a 'fail fast' mentality and reinforcing learning through peer sessions and rewards for knowledge sharing.

CREATE SPACE FOR KNOWLEDGE SHARING
Creating dedicated labs or demonstration hubs accelerates knowledge sharing, and helps employees upskill by seeing tools in action.

TAKE A HOLISTIC APPROACH TO TRAINING TO ENSURE NO ONE GETS LEFT BEHIND
Developing technically savvy talent is essential, but workers must be trained in the most in-demand, future-focused skills. Apprenticeships can help build a strong pipeline of young technology talent, but businesses also need to upskill existing workers. Collaboration with colleges and vendors is also a great way for smaller companies to upskill staff.

SET AMBITIOUS STRATEGIC GOALS AND IDENTIFY ASSOCIATED BUSINESS IMPROVEMENT TARGETS
Firms should use peer benchmarking to develop strategic goals that strengthen their competitive position, which can then be further broken down into two to four business improvement goals such as developing new high-value products, reducing costs, or improving processes.

MEASURE ROI TO GET A CLEARER PICTURE OF THE VALUE OF YOUR TECHNOLOGY, AND MAKE SMARTER INVESTMENT DECISIONS
Examining how ROI is measured arms businesses with the data to make informed decisions. Understanding the ROI of technology is essential both for deciding which technologies to invest in, and for building an internal case for technology adoption.

Recommendations for Policymakers

CREATE SHARED TECHNOLOGY HUBS TO DE-RISK INNOVATION FOR MANUFACTURING BUSINESSES
Providing space to experiment is a crucial way for policymakers to encourage organizations to collaborate, test new technologies, and promote knowledge sharing in a risk-free way.

ENABLE BENCHMARKING AT SCALE
By building tools that let organizations easily compare themselves to peers, governments simplify the process and give leaders a starting point.

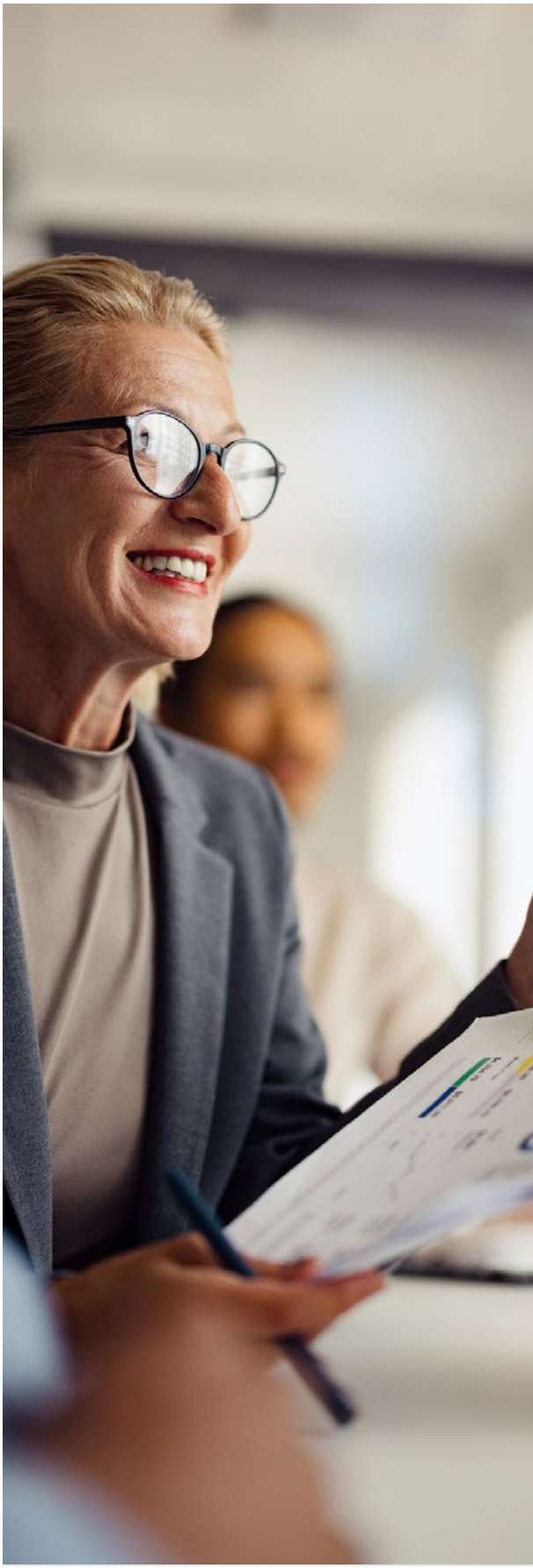
SIMPLIFY AND CENTRALIZE SUPPORT PROGRAMS TO IMPROVE ACCESS FOR ALL BUSINESSES
Existing provincial and national innovation programs are making a difference, but more must be done. Programs must be easy to access and centralized – Ontario has an opportunity to consolidate its resources and create pathways for organizations to navigate.

OFFER FUNDING IN WAYS WHICH PROMOTE COLLABORATION
Funding which requires two or more companies to collaborate benefits the organizations at once, but also encourages long-term partnerships.

USE TRAINING TO EQUIP LEADERS WITH THE SKILLS THEY NEED TO LEAD THEIR ORGANIZATIONS INTO A TECH-ENABLED FUTURE
Existing training programs leave a gap in executive level technology training. CEOs and leaders need the skills to identify opportunities for technology implementation, and overcome entrenched ideas and resistance during the adoption process.

SET PRODUCTIVITY TARGETS AND/OR MISSION-ORIENTED GOALS
Governments can mobilize businesses through productivity targets or mission-oriented goals that drive productivity-enhancing investments.

DEVELOP AN AMBITIOUS INDUSTRIAL POLICY PROGRAM
In a changing global landscape, countries are taking a more active role in shaping their domestic economies. To compete over the long-term, Canada should commit significant public funds towards a modern industrial policy agenda.



APPENDIX

Manufacturing Case Study

Modernizing Maple Leaf Foods Heritage Plant

Highly automated, process-defined manufacturing environments face a distinct productivity challenge. Operational leaders can identify improvement opportunities, such as enhancing quality and reducing waste, but mature facilities are often constrained by tightly coupled legacy systems. Even minor modifications can reverberate across the operation. Systems once considered advanced have, under shifting market demands, become barriers to modernization.

The modernization challenge is not solved by simply adopting new software. It requires integrating data across equipment, systems, and operators in a way that delivers measurable performance improvements without disrupting daily production. At Maple Leaf Foods' Heritage Plant in Hamilton, Ontario, where approximately 800 million hot dogs are produced annually, inefficiencies persisted despite robust production monitoring. Variations in log size disrupted slicing efficiency and reduced yield. Overcooking to ensure safety led to moisture loss and lower output. Inconsistent slicing settings contributed to product waste and equipment wear.[16]

Rather than pursue a greenfield build or replace core systems, Maple Leaf chose to modernize its existing operations. In 2019, the company launched an initiative to optimize operations by positioning its Manufacturing Execution System (AVEVA MES) at the center of its digital transformation.[17]

Working with Cygnus Consulting, its integration partner, and Braincube, its analytics provider, Maple Leaf layered advanced process analytics onto live production data. This approach enabled real-time monitoring, root-cause analysis, and tighter process control across production lines.

This effort reflects several key recommendations for manufacturers. Maple Leaf established external partnerships to integrate advanced analytics into existing systems rather than replacing core infrastructure. It also tied improvements directly

to production KPIs, creating a clear business case for continued investment. Equally important, the company equipped plant teams with the tools and training needed to interpret live data, embedding a culture of continuous learning on the shop floor.

The results were impressive. ROI was achieved within three months through immediate cost savings from reduced waste and process optimization. Yield improved by 12% across multiple lines, and "golden batches", ideal production outcomes, were consistently achieved through continuous adaptation to live operating conditions.[18] Reductions in product "giveaway" further strengthened quality control and material efficiency.

For Canadian manufacturers, this case study illustrates that meaningful productivity gains do not always require new builds or rebuilds. By integrating advanced analytics into existing operations, manufacturers can reduce waste, strengthen quality control, and unlock incremental improvements that scale over time. The Heritage Plant demonstrates how disciplined, data-driven modernization can improve competitiveness while reinforcing safety, compliance, and operational resilience.

By integrating advanced analytics into existing operations, manufacturers can reduce waste, strengthen quality control, and unlock incremental improvements that scale over time.

Policy Maker Case Study

How Singapore De-Risks Manufacturing Modernization

Manufacturers across advanced economies face a common modernization challenge: while many recognize the need to adopt new technologies and processes, progress is often slowed by execution risk, fragmented support systems, and uncertainty about where to start. This is particularly true for small and mid-sized manufacturers, where leadership capacity, capital, and in-house expertise can be limited. Singapore offers a useful policy example of how these barriers can be addressed.

The government allocated S$25 billion ($26.8 billion CAD) for its Research, Innovation and Enterprise (RIE) 2025 plan (2021-2025)[19] and set an overall goal to grow manufacturing by 50% from 2020 to 2030 under its Industry Transformation Maps.[20] Through a set of practical measures, the government has helped to de-risk innovation, enable benchmarking, and build collaboration into delivery models - approaches that align closely with the report's recommendations for policymakers.

These initiatives operate within a broader national transformation model that has sustained Singapore's position as one of the world's most advanced manufacturing economies. In 2025, Singapore ranked the 5th most innovative nation globally in the Global Innovation Index[21]. It ranked 2nd worldwide in industrial robot density—having doubled robot density over seven years—underscoring the scale of automation embedded across its industrial base.[22] Manufacturing accounts for approximately 19.7% of Singapore's GDP[23], nearly double that of the United States or Canada, and well above the OECD average. In 2025, manufacturing was a primary driver of economic expansion, growing 8.7% for the year, while 85% of the $14.2 billion in fixed-asset investment commitments were directed toward manufacturing-related projects. These indicators reflect the scale and intensity of Singapore's long-term industrial strategy.

Singapore's approach, led by the Ministry of Trade and Industry (MTI)[24], sets industrial direction and oversees the statutory boards that deliver programs. Two key players are A*STAR (Agency for Science, Technology and Research)[25], which translates applied research into industrial solutions, and The Economic Development Board (EDB)[26], which supports industrial capability-building. Together, these institutions create a pathway for firms to access support—reducing the "search costs" and fragmentation that often make it difficult for companies to scale.

In this centralized governance model, the underlying mechanisms are transferable: shared test environments, collaboration-linked funding, and a common benchmarking tool can all be implemented through joint federal–provincial delivery, regional hubs, and aligned program design.

A central feature of Singapore's approach is the creation of shared technology hubs to de-risk innovation. A*STAR's Singapore Institute of Manufacturing Technology (SIMTech) runs the Model Factory@SIMTech[27], a physical "learning factory" where companies can see technologies in action, test integration challenges, and work with partners before deploying changes in live production.[28] This tackles a common barrier to adoption: manufacturers are more willing to invest when they can validate solutions in a realistic environment without putting day-to-day operations at risk.

Singapore complements its technology hubs with funding and governance models that promote collaboration. The Advanced Remanufacturing and Technology Centre (ARTC)[29]—an A*STAR-led, Nanyang Technological University (NTU)-partnered, membership-based public–private consortium—acts as a shared execution platform. Member companies bring real operational challenges, co-develop solutions with applied teams, and then scale what works in their own facilities. This consortium model reduces duplication, spreads risk, and strengthens long-term partnerships across large firms, SMEs, startups, and public agencies.

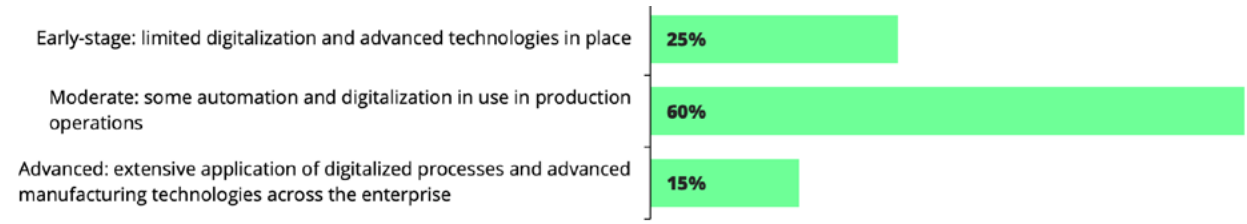
To help firms navigate modernization in a structured way, the EDB introduced the Smart Industry Readiness Index (SIRI)[30], a benchmarking framework that can be applied at scale. SIRI helps manufacturers understand their current maturity, and identify priorities across processes, technology, and organizational readiness. Recognizing its broader value, the World Economic Forum adopted the SIRI framework as an international reference model, and Singapore subsequently commercialized and scaled the methodology through the International Centre for Industrial Transformation (INCIT)[31]. Today, SIRI assessments are used by companies and governments globally, demonstrating how Singapore's domestic industrial policy tools have evolved into globally recognized standards for manufacturing transformation.[32]

Singapore's industrial strategy led by MTI aligns innovation capacity, skills, and investment priorities over the long term—showing how ambitious industrial policy can be translated into practical action through capable delivery institutions. The system reduces execution risk, strengthens partnerships, and supports informed decision-making. As Canada looks to accelerate manufacturing modernization—particularly in sectors tied to defence and supply chain resilience—Singapore's approach provides a clear example of how policy can move from encouraging adoption in principle to enabling adoption in practice.

In this centralized governance model, the underlying mechanisms are transferable: shared test environments, collaboration-linked funding, and a common benchmarking tool can all be implemented through joint federal–provincial delivery, regional hubs, and aligned program design. The key lesson is not to replicate Singapore's structure, but to create a similarly coherent pathway that reduces fragmentation and helps firms move from pilot projects to scaled execution.

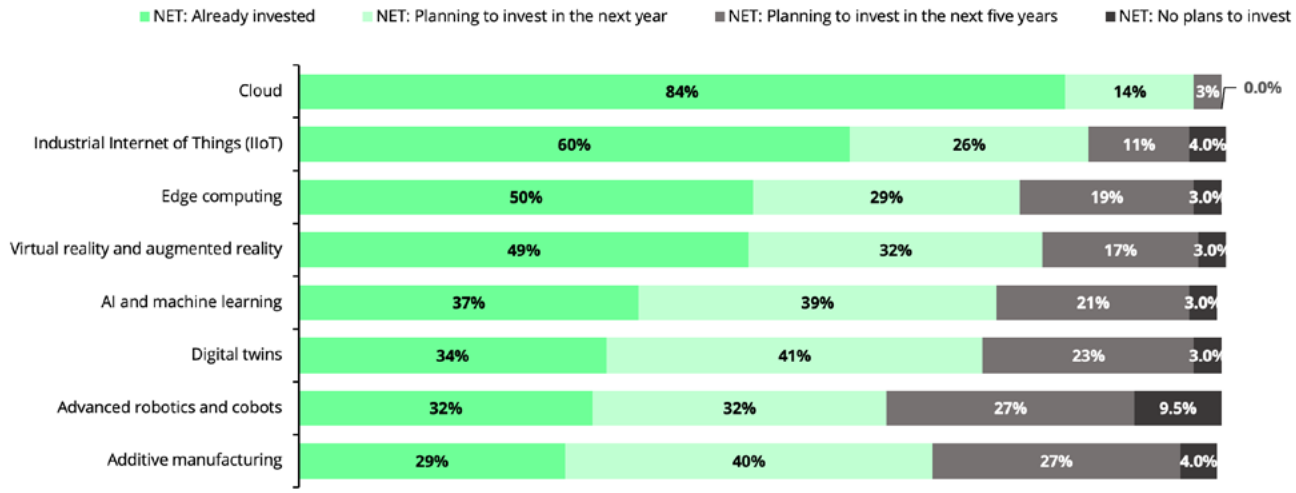
Full Insights from the Research

Only 15% of leaders see their company's tech adoption level as advanced



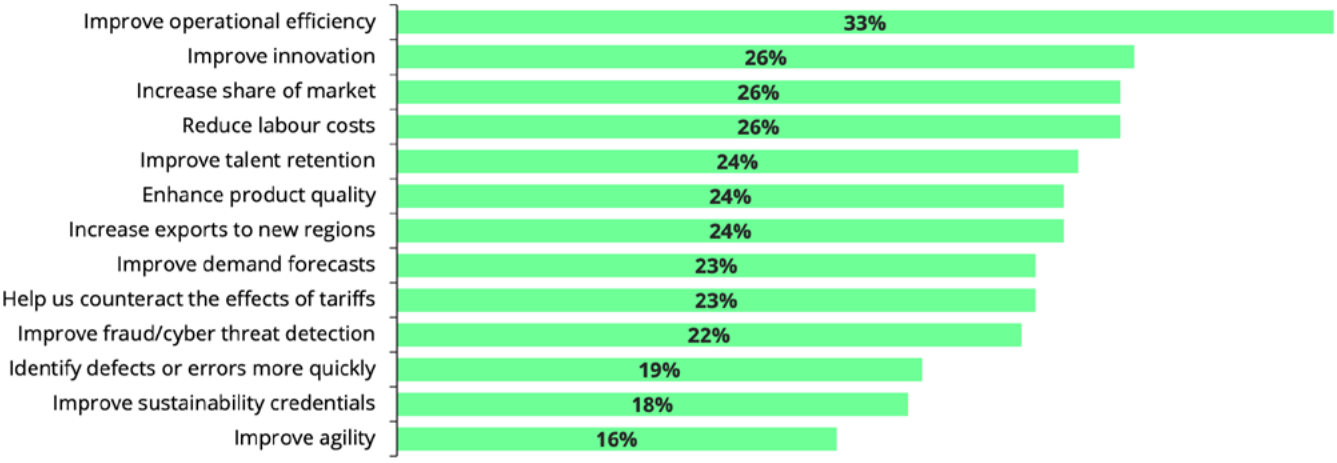
Question: How would you describe the level of tech adoption at your business?

Two in five leaders are concerned that they have not adapted enough technologies to be competitive



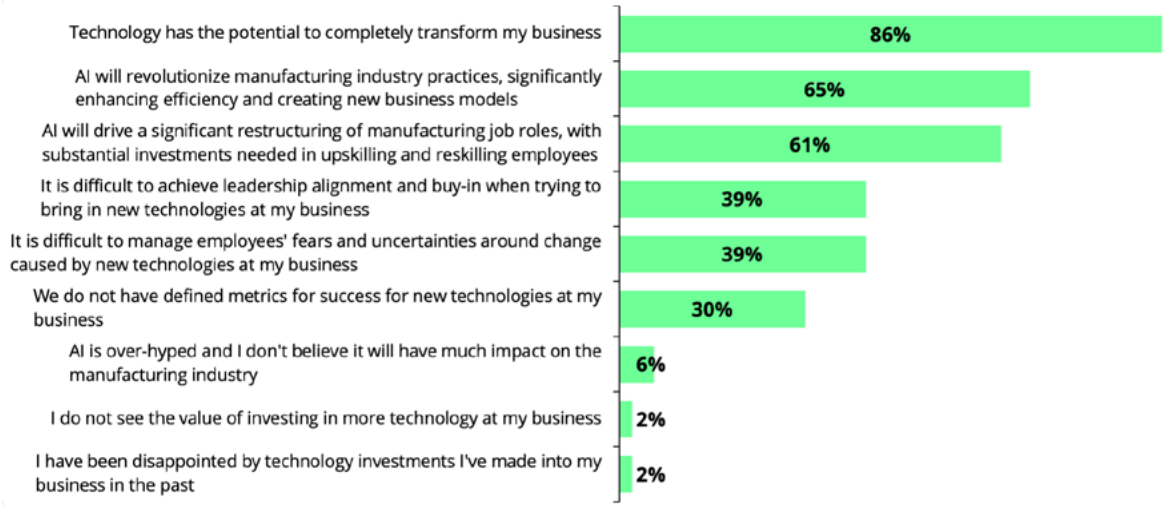
Question: For each of the below technologies, please tell us whether your organization has already invested in them, plans to invest in them within the next year, or plans to invest within the next five years

Operational efficiency is the top benefit businesses could gain from adopting more tech. Almost a quarter say more tech could help them counteract the effects of tariffs



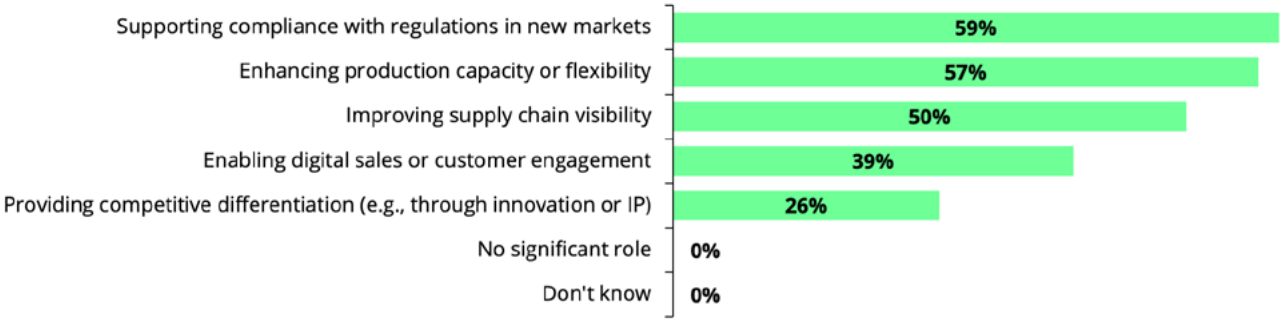
Question: What are the top benefits that you think your business could stand to gain from adopting more technologies?

86% of leaders say technology has the potential to completely transform their business. But two in five say it is difficult to manage employees' fears and uncertainties around new tech



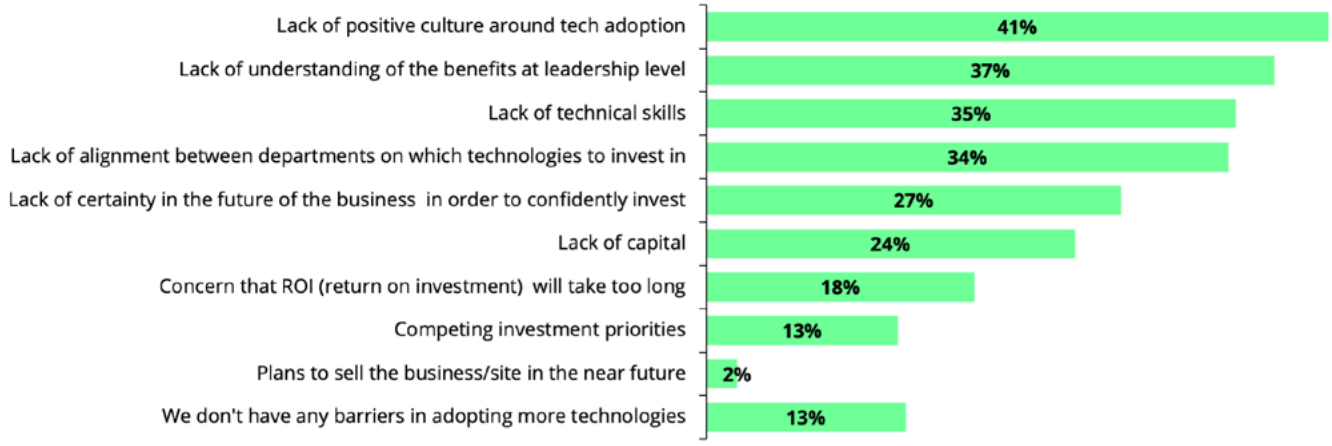
Question: To what extent do you agree with the following statements about technology's impact on your business and the wider manufacturing industry?

The top way which businesses see technology helping them to compete in new markets is by supporting them with regulations



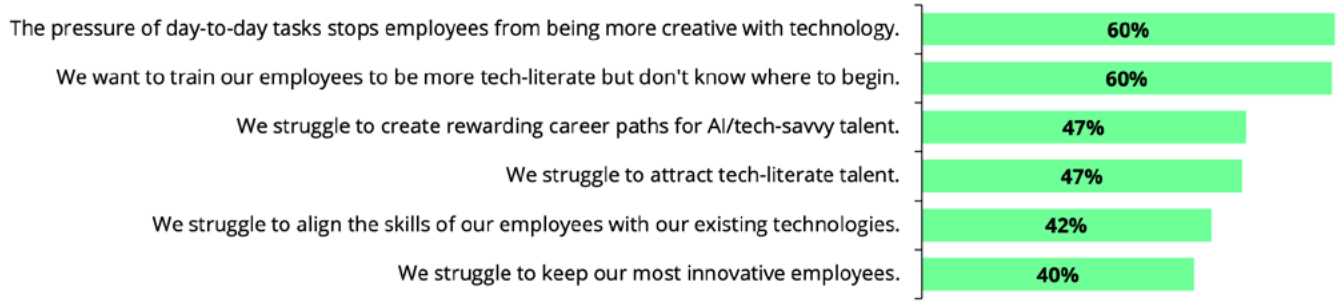
Question: What role do you see for technology in enabling your business to compete in or access new markets?

A lack of positive culture is the top barrier to greater tech adoption, followed by a lack of leadership understanding of the benefits



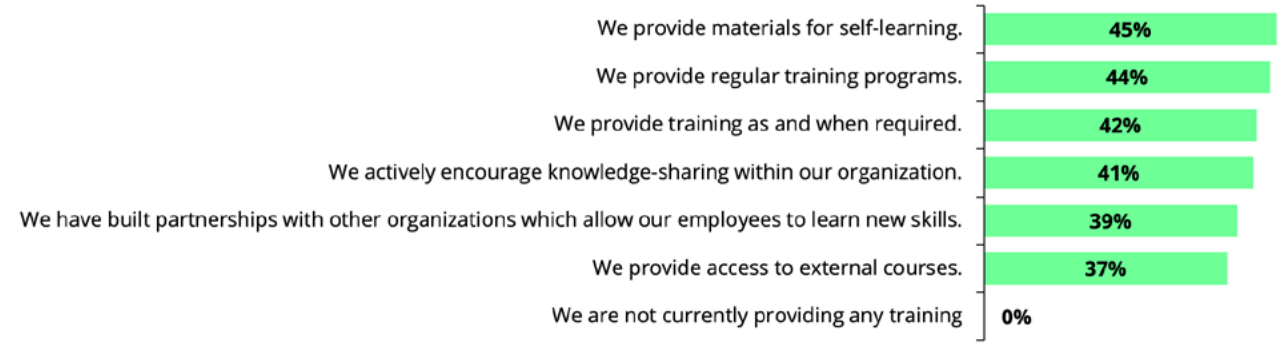
Question: What are the top three barriers to your business adopting more technologies? - Ranked 1-3

60% of leaders say the pressure of everyday tasks stops employees from being more creative with technology



Question: To what extent do you agree with the following statements about your workforce? - Agree

Less than half of businesses provide regular technological training programs, and only around a third provide access to external courses

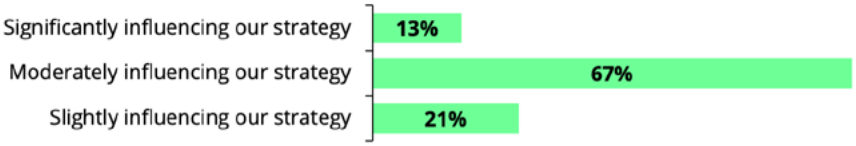


Question: What actions are you taking to ensure employees have the skills to keep up with technological advancements?

Leaders are much more likely to be increasing their technology investment in response to US-Canada trade uncertainty

Question: How is the ongoing uncertainty around US-Canada trade affecting your technology investment plans?

80% of businesses say their goals for the next year are being influenced by U.S. policy



Question: To what extent are your goals for the next year being influenced by U.S. policy?

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