



CANADIAN
MANUFACTURERS
& EXPORTERS

UNLOCKING ATLANTIC CANADA'S GROWTH POTENTIAL:

Removing Barriers to Investment
in Innovation and Advanced
Manufacturing Technologies

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Chief Economist



WHO WE ARE

ABOUT OUR CHIEF ECONOMIST



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Mike Holden leads the organization's economic analysis and forecasting functions, and directs CME's major research projects. He has written on a wide range of issues important to manufacturers, including tax competitiveness, market access, and capital investment. He also directs CME's biannual Management Issues Survey, and was a key architect of CME's Industrie 2030 initiative.

Mike has a BA in honours economics from the University of Alberta and an MA in economics from Queen's University.

ABOUT CANADIAN MANUFACTURERS & EXPORTERS

Since 1871, we have made a difference for Canada's manufacturing and exporting communities. Fighting for their future. Saving them money. Helping manufacturers grow.

The association directly represents more than 2,500 leading companies nationwide. More than 85 per cent of CME's members are small and medium-sized enterprises. As Canada's leading business network, CME, through various initiatives including the establishment of the Canadian Manufacturing Coalition, touches more than 100,000 companies from coast to coast, engaged in manufacturing, global business, and service-related industries.

CME's membership network accounts for an estimated 82 per cent of total manufacturing production and 90 per cent of Canada's exports.

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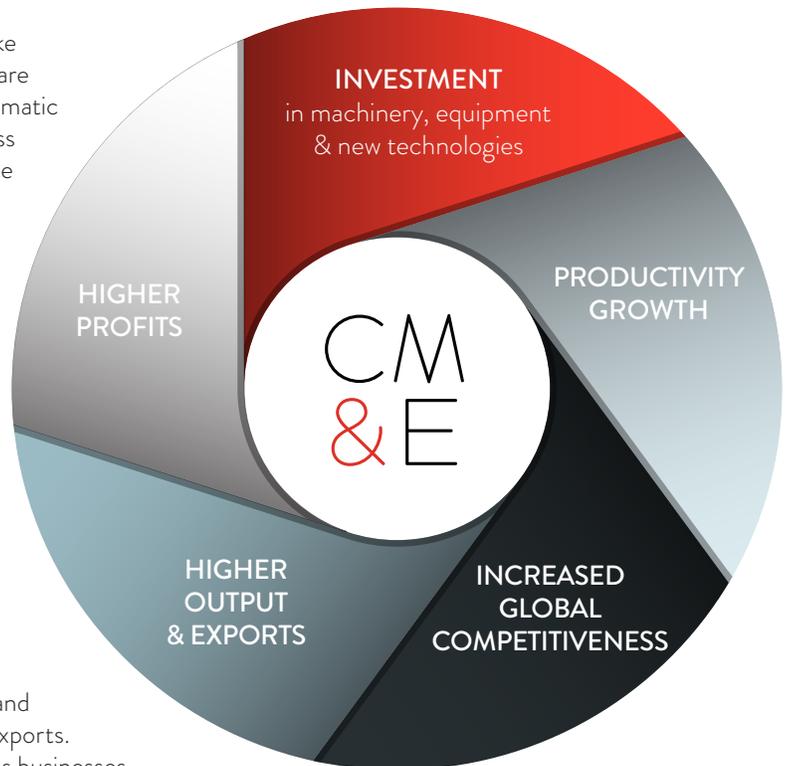
EXECUTIVE SUMMARY

INTRODUCTION

The world of manufacturing is transforming. Technologies like 3-D printing, advanced robotics and the Internet of Things are disrupting established ways of doing business, sparking a dramatic leap forward in innovation, product development and process efficiency. For manufacturers in Atlantic Canada, this can be either a threat or an opportunity. Businesses that embrace advanced manufacturing technologies and analytics will enjoy dramatically lower production costs, quicker product development times, and the flexibility to create innovative new products to meet changing customer demands. Those that do not will find it ever more difficult to meet the quality, cost and operational requirements of their customers.

Strategic investment in innovation and technology adoption is the starting point on a virtuous cycle that ultimately leads to more output, employment and economic growth across Atlantic Canada. Innovation and investment in new technologies improve business productivity. That, in turn, helps businesses become more competitive in domestic and international markets. More competitive businesses attract more production mandates and capture more market share, resulting in higher output and exports. Higher output leads to greater firm profitability, which leaves businesses with more money to invest in innovation and new technologies.

This report outlines a strategy to get Atlantic Canadian manufacturing onto this virtuous cycle. Since businesses drive investment, that strategy focuses specifically on business needs, concerns, opportunities and solutions.



INNOVATION AND TECHNOLOGY ADOPTION IN ATLANTIC CANADA

The Atlantic region lags other provinces in both technology adoption and innovation in manufacturing. According to the results of CME's 2018 Management Issues Survey, only 29 per cent of manufacturers in the region currently use advanced manufacturing technologies, compared to 40 per cent nation-wide. Meanwhile, data from Statistics Canada's Survey of Innovation and Business Strategy show that, while the gap has narrowed in recent years, Atlantic Canadian manufacturers have the lowest reported innovation rates in the country.

At the same time, Canada as a whole ranks poorly in these areas compared to other advanced economies around the world. Most importantly, there is a wide gap in investment growth trends between Canada and the United States. From 2006-2016, US manufacturing investment in new equipment rose by 20.5 per cent while in Canada it fell by 16.9 per cent.

Underinvestment in machinery, equipment and technologies is a major factor behind Canada's lagging productivity growth in manufacturing. Over the last 15 years, labour productivity in Canadian manufacturing has increased by about 20 per cent, compared to nearly 50 per cent in the US and more than 100 per cent in locations like South Korea, Taiwan and Eastern Europe.

And since the Atlantic provinces have lower rates of innovation and technology adoption, productivity levels in the region are behind the national average. The Maritime Provinces have the lowest manufacturing productivity rates in the country. Productivity levels are considerably higher in Newfoundland and Labrador but, even so, remain about 8 per cent below the national average.

WHY ATLANTIC MANUFACTURERS UNDERINVEST

A wide range of overlapping factors contribute to Atlantic Canada's lagging record on innovation and technology adoption in manufacturing. These factors fall within four broad, but interconnected themes.

Labour and skills shortages

Worker shortages erode businesses competitiveness and profitability. A lack of talent stifles innovation, and it limits technology adoption because businesses cannot find workers with the specialized skills needed to assess, operate and maintain that equipment.

High purchase costs and uncertain return on investment

New equipment and technologies are expensive. The way they fit into existing operations is not always obvious, and businesses are effectively taking a leap of faith when they invest in technologies that disrupt established production methods.

Lack of information about new technologies

Businesses are not always aware of what technologies are available, what their benefits and capabilities are, and how they would fit into (or disrupt) existing operations.

Uncompetitive business climate

Rising business costs in the region are eroding profitability. This leaves manufacturers with less money to invest in their operations – in future expansion, in new technologies, or in exploring innovative new products or processes.

KEY FINDINGS

Addressing these issues requires a coordinated policy approach involving both the federal and provincial governments. Businesses must do their part as well through steps like: increasing their tolerance for risk; working together to coordinate worker training and upskilling efforts; and sharing experiences, best practices and success stories in technology adoption.

However, the various levels of government set the environment in which the business community operates. Atlantic Canadian manufacturers offered several ideas for how government policy action could help remove some of the barriers they face when trying to innovate or adopt new technologies. These are summarized in 15 key findings within the broad themes outlined below.

On the issue of labour and skills shortages, businesses suggested that policy action focus on:

- Increasing enrolment in manufacturing-related education programs in Atlantic Canada;
- Developing closer business/post-secondary ties for curriculum development and work-integrated learning programs;
- Expanding the number of skilled immigrants allowed into the region;
- Addressing challenges with providing on-the-job training and upskilling; and
- Providing more resources to expand business management and leadership training.

To address the challenge of high purchase costs and uncertain ROI, Atlantic manufacturers prioritized:

- Expanding existing innovation and technology adoption programs; and
- Supplementing those programs with new ones designed to improve supports for smaller technology adoption initiatives, and outcomes-based private-sector R&D.

Atlantic businesses pointed to three action areas where government policy would help overcome the information gap about new technologies:

- Enhancing existing technology assessment programs in the region;
- Facilitating business participation in technology demonstration tours; and
- Increasing financial supports to attend domestic and international trade shows.

To improve the business climate in the region, Atlantic manufacturers are looking for:

- A lower overall tax burden;
- The removal of unnecessary regulatory differences between the Atlantic provinces;
- More investment in trade-related infrastructure; and
- Coordinated efforts to lower energy prices and other non-tax business costs.

Finally, many Atlantic Canadian businesses find the process of seeking out and applying for federal and provincial government supports to be opaque and burdensome, thus limiting both the uptake and the effectiveness of those programs. They asked that steps be taken to make government programs clearer and easier to find; and to lower the administrative burden of the application and compliance process.

CONCLUSION

Atlantic Canada has an historic opportunity to leverage the Fourth Industrial Revolution to usher in a new era of prosperity for the region. Advanced manufacturing technologies make the most of the region's strengths – its education system, natural resource base, skilled workforce and expertise around industries like marine sciences and food processing – while minimizing its weaknesses – high production costs, a small domestic market and relative lack of proximity to major US markets.

Increased investment in innovation and technology adoption is the first step on the path towards unlocking the region's growth potential.

INTRODUCTION:

MANUFACTURING IN THE DIGITAL AGE

The world of manufacturing is transforming. Technologies like 3-D printing, advanced robotics and the Internet of Things are disrupting established ways of doing business, sparking a dramatic leap forward in innovation, product development and process efficiency. They are opening doors for innovative, risk-taking companies and threatening to leave slow adopters behind.

This is the story of Industry 4.0, or the Fourth Industrial Revolution. Businesses around the world are investing in their own future – maybe even their own survival – through digitization and automation. Countries are developing national strategies to support those businesses; to maximize the potential that these technologies offer; and to ensure the future health and survival of their manufacturing sectors.

For manufacturers in Atlantic Canada, the Fourth Industrial Revolution can be either a threat or an opportunity. Businesses that embrace advanced manufacturing technologies and analytics will enjoy dramatically lower production costs, quicker product development times, and the flexibility to create innovative new products to meet changing customer demands. Those that do not will find it ever more difficult to meet the quality, cost and operational requirements of their customers.

Manufacturing is a major contributor to the Atlantic Canadian economy. The sector directly employed 78,800 people in the region in 2018. It generated more than \$37 billion in output last year, and nearly \$22 billion in total exports.¹ Including direct and spinoff effects, manufacturing accounts for 23 per cent of GDP in the region and 18 per cent of total employment.²

As significant as this impact is, the manufacturing sector in the region has considerable room to grow. Canadian Manufacturers & Exporters (CME) believes that innovation and technology adoption represent the path to unlocking Atlantic Canada's growth potential in manufacturing. They allow the region's businesses to compete with anyone in the world, they boost innovation and productivity, lower production costs, and attract new investment to the region.

The question is, how do we get there? Canada as a whole lags other advanced economies in technology adoption and productivity growth in manufacturing. The Atlantic region, in turn, lags most other provinces.

To be sure, Atlantic Canada has many strengths, including: a large concentration of natural resources and resource-based technologies; world-leading expertise in areas like marine sciences and food processing; numerous post-secondary institutions; a strong supply of labour and skills; and a passionate and influential private sector eager to be engaged.

At the same time, the region also faces several challenges that are limiting its growth potential. First, despite higher unemployment than elsewhere in Canada, businesses struggle to fill both high-skilled and low-skilled positions. Second, production capacity and exports are constrained by insufficient business capital investment and infrastructure support. Third, the business tax structure in the region is uncompetitive relative to other provinces and, now, to the United States as well.

On top of those, there are other, more intractable, challenges. The population in the region is small, ageing and sparsely distributed. Atlantic Canada does not have a major urban centre ranked in Canada's top ten by size. Existing North American trade infrastructure – from US border crossings to rail linkages and port terminals – is concentrated around the Great Lakes. And governments in the region have limited fiscal capacity with which to improve the current policy environment.

These challenges are not insurmountable. CME believes that with a better understanding of the core issues affecting investment, productivity, and exports in Atlantic Canada, we can find the necessary tools to unlock the region's growth potential in manufacturing.

¹ Unless otherwise specified, all data in this report are from Statistics Canada

² CME, *Manufacturing and Exporting in Canada*. Available at www.industrie2030.ca

CME'S APPROACH & REPORT METHODOLOGY

INDUSTRIE 2030

Industrie 2030 was a 2016 initiative developed by Canadian Manufacturers & Exporters to define a long-term advanced manufacturing growth strategy for Canada. It began by asking a simple question: What would it take to double Canada's manufacturing output and exports by the year 2030?

A year-long research and consultation exercise resulted in a roadmap to achieve that goal. Industrie 2030 outlined five growth pillars – overlapping areas where meaningful policy action was needed – and a series of recommendations to make progress in each of those five. These pillars are:

- Building a Strong Labour Pool and Skilled Workforce;
- Accelerating Adoption of Advanced Manufacturing Technologies;
- Fostering Innovation, Commercialization and New Product Development;
- Creating a Competitive Business Environment in Canada;
- Increasing Access to Domestic and Foreign Markets.

At its core, Industrie 2030 is about leveraging the Fourth Industrial Revolution to usher in a new era of growth and prosperity for manufacturing across Canada. While there are important regional differences, many of the broader challenges facing the Atlantic region are the same as they are nationally. For this reason, the methodology, pillars, principles and recommendations from that national strategy form the starting point for this report on unlocking Atlantic Canada's growth potential.

Any strategy to advance innovation and technology adoption in Atlantic Canada must be focused specifically on business needs, concerns, opportunities and solutions. For this reason, our approach to this study was modelled after that used in the Industrie 2030 process – it relied heavily on direct feedback from manufacturers, supported by internal analysis and research.

Industrie 2030 employed a two-stage approach to soliciting business feedback. First, it leveraged CME's bi-annual Management Issues Survey (MIS) to create a knowledge base. The findings from that survey were then supplemented by, and tested against, direct discussions with business leaders in a series of roundtable events held across the country.

The same general approach was used in this study.

MANAGEMENT ISSUES SURVEY

Every two years, CME conducts a large nation-wide survey of manufacturers and business leaders. Respondents are asked a series of detailed questions about their business conditions and outlook; the issues and challenges they face; their view on government policies and programs; and what opportunities they see to improve the business environment in which they operate.

The MIS provides valuable insight into the mindset, aspirations and concerns of manufacturers – both in terms of their day-to-day struggles as well as their longer-term strategic goals. This information guides CME's policy, advocacy and outreach agendas.

CME employed the Atlantic Canadian results from the 2018 *Management Issues Survey* to make a preliminary assessment of what businesses saw as the barriers to innovation and technology adoption in the region, as well as to identify potential solutions to those problems. The survey was in the field nation-wide from July through September 2018. However, the deadline was extended in the Atlantic region to early December to allow more businesses to provide feedback for this study.

All told, CME received 115 responses from Atlantic Canada-based companies. That total accounts for more than 21 per cent of all MIS responses from across the country. While the Atlantic Canadian MIS results are referenced throughout, detailed survey responses are provided in the Appendix to this report.

ROUNDTABLE DISCUSSIONS

The second stage of information-gathering for this project was to test and supplement the results from the MIS with a series of roundtable discussions with business leaders in the region. These roundtables allowed for a more detailed, nuanced and localized discussion of the issues raised in the MIS; and provided the opportunity to explore policy solutions.

Roundtable participants were given an overview of the preliminary MIS results and asked to comment on those findings, elaborate on issues they saw, and offer any information and insight they thought the survey failed to pick up. Discussions were free and open-ended and, to ensure that feedback was honest, made without direct attribution in this report.

CME held seven roundtables across the region in November and December 2018. More than 90 manufacturing leaders and stakeholders participated in these events. We also presented the MIS results at a major conference in St. John's to solicit informal feedback.

OTHER REPORTS

Unlocking Atlantic Canada's Growth Potential is not the first report to examine the issue of how to spur growth in advanced manufacturing in the region. In just the past year alone, there have been two other major efforts in this area: the national Advanced Manufacturing Economic Strategy Table, which released its final report in September; and the Atlantic Growth Strategy – an ongoing cooperative effort between the federal and four provincial governments to stimulate economic growth, development and prosperity in the Atlantic region.

In both cases, these efforts have produced policy recommendations and actions that touch on issues covered in the present report. These recommendations and policy priorities also helped to inform the content and research foundation of *Unlocking Atlantic Canada's Growth Potential*.

THE PROBLEM:

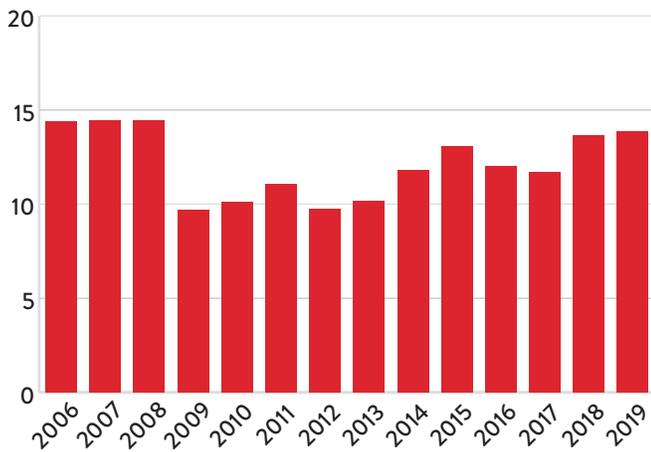
ATLANTIC CANADA LAGS IN MANUFACTURING INNOVATION & TECHNOLOGY ADOPTION

ADVANCED MANUFACTURING TECHNOLOGIES

For Atlantic Canadian manufacturers to prosper, they need to be at the forefront of change, incorporating new digital technologies and advanced manufacturing capabilities into their operations. However, investment in capital and technology adoption in the region lags the national average. And Canadian investment lags most other advanced economies. The result has been slower productivity gains and a gradual erosion of manufacturing competitiveness across Canada, and in the Atlantic region in particular.

Canada's record on capital investment is poor. According to the results of CME's 2018 Management Issues Survey, only 40 per cent of businesses report that they presently use advanced manufacturing technologies. Moreover, investments in these, and other, types of machinery and equipment are heading in the wrong direction. According to Statistics Canada, manufacturers intend to spend \$13.9 billion on machinery and equipment in 2019. That total is effectively unchanged since 2015 and is four per cent less than they invested in 2007 – even without accounting for the effects of inflation.

FLAT M&E EXPENDITURES IN CANADIAN MANUFACTURING
(\$billions)

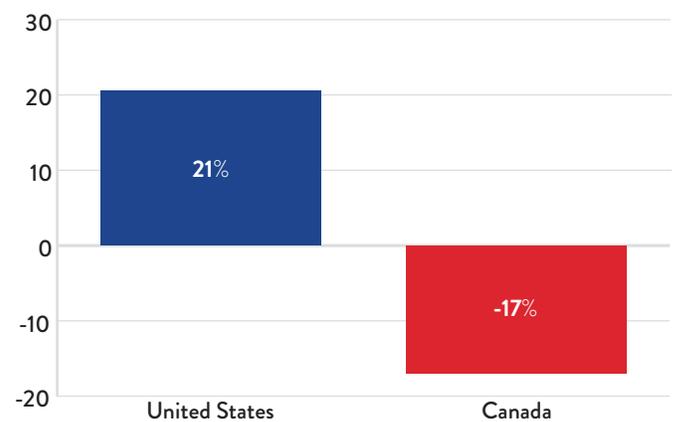


Source: Statistics Canada

Note: 2019 data reflect investment intentions

Meanwhile, most other OECD countries have seen manufacturing investment increase significantly in recent years. Most importantly, there is a wide gap in investment trends between Canada and the United States. In the decade leading up to 2016 – the most recent year for which US data are available – US manufacturing investment in new equipment rose by 20.5 per cent. Over that same ten-year period, Canadian manufacturing investment fell by 16.9 per cent.

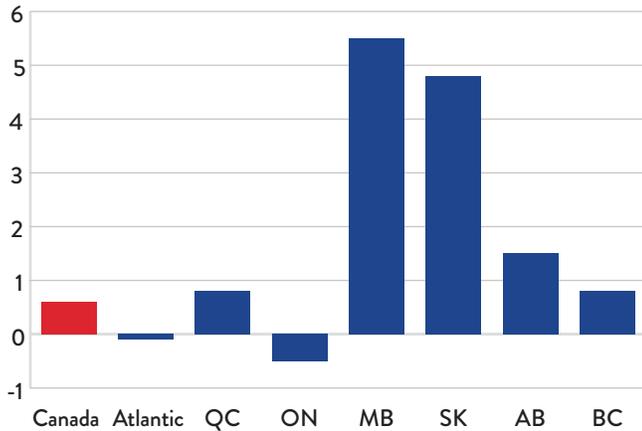
MANUFACTURING INVESTMENT IN MACHINERY AND EQUIPMENT
(% growth, 2007-2016)



Source: US Census Bureau, Statistics Canada

CAPITAL EXPENDITURES IN MANUFACTURING

(average annual growth, 2006-2018, in %)

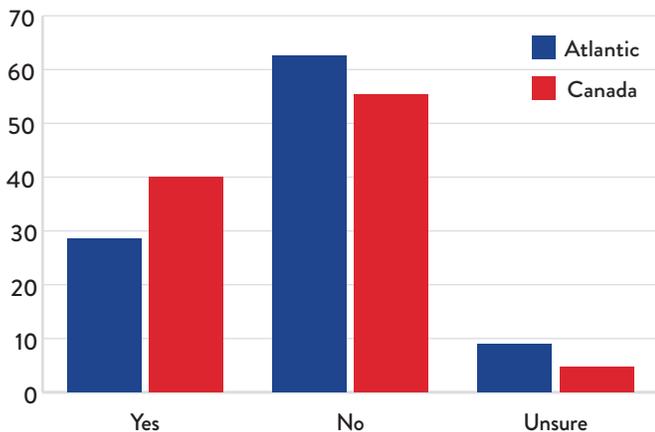


Source: Statistics Canada

Data on manufacturing machinery and equipment investment for the Atlantic provinces are not publicly available. However, overall manufacturing capital expenditures in the region (facility construction as well as machinery and equipment) have fallen by an estimated 22 per cent from 2008-2018, compared to 7.2 per cent for Canada as a whole. Data from CME's 2018 Management Issues Survey also suggest that technology adoption in the region lags other parts of Canada. While 40 per cent of businesses nation-wide reported that they currently use advanced manufacturing technologies, that was true of only 28.6 per cent of Atlantic Canadian survey respondents.

DOES YOUR COMPANY PRESENTLY USE ADVANCED MANUFACTURING TECHNOLOGIES?

(% of respondents)



Source: 2018 Management Issues Survey

INNOVATION

Innovation is about turning an idea into a product or service, or improving the effectiveness of business operations. Successful innovation is leveraging those improvements into commercial and social benefits.

Consumers are growing ever more demanding as rapid advances in technology reshape their expectations. To meet these expectations, manufacturers must be continuously innovating – investing in research and development that leads to new product commercialization or processes to improve output and productivity. Demonstrated ability to commercialize new products is essential to attracting production mandates which, in turn, generates investment, jobs and economic growth.

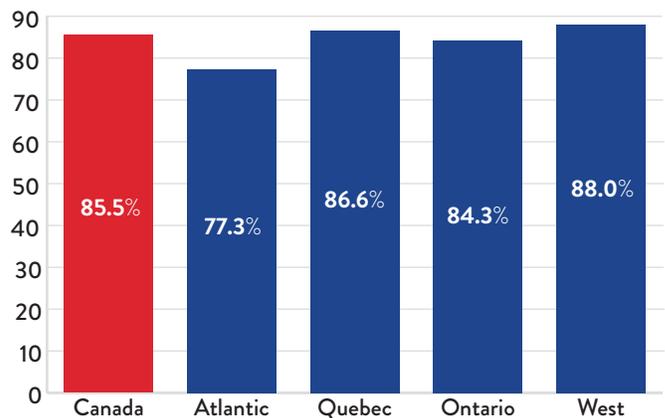
Innovation and technology adoption are closely related. Many innovative activities require, or are enabled by, new equipment. Simply put, new equipment and technologies allow businesses to do things they were unable to do before. Other types of innovation are driven by adapting to technological change and maintaining global competitiveness.

Canada's record on manufacturing innovation is improving. The most recent Statistics Canada Survey of Innovation and Business Strategy notes that 86 per cent of manufacturers across the country reported making at least one new innovation over the 2015-2017 period. That represents a significant increase over the 66 per cent of business that reported new innovations from 2012-2014.

While its record improved the most over that period, Atlantic Canada still lags other parts of the country when it comes to manufacturing innovation. From 2015-2017, 77 per cent of Atlantic manufacturers reported introducing a new innovation – the lowest rate in Canada. By comparison, 87 per cent of Quebec manufacturers reported making new innovations and 88 per cent of manufacturers in western Canada.

ATLANTIC CANADA LAGS IN MANUFACTURING INNOVATION

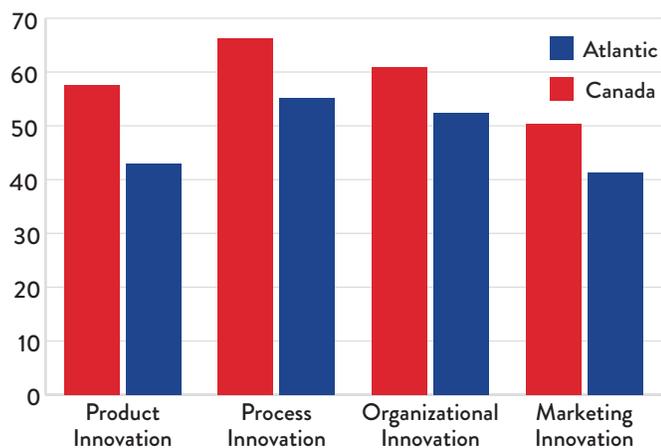
(% of firms reporting at least one innovation, 2015-2017)



Source: Statistics Canada

Moreover, the innovation gap is widest in the areas arguably most important to future manufacturing success. Broadly speaking, there are four types of innovation in business: innovation in products; processes; operations; or marketing. Of those, product and process innovation have the most direct bearing on business competitiveness and growth. Across Canada, 58 per cent of manufacturers reported making a product innovation from 2015-2017, compared to 43 per cent in the Atlantic region. Similarly, two thirds of Canadian manufacturers made at least one process innovation over that period; in Atlantic Canada, 55 per cent – 11 per cent lower than the Canadian average.

MANUFACTURING INNOVATIONS BY TYPE
 (% of firms reporting at least one innovation, 2015-2017)



Source: Statistics Canada

Somewhat perplexingly, even as Atlantic Canadian manufacturers report making fewer innovations, they also report fewer obstacles to innovation. Across Canada, 59 per cent of businesses reported encountering at least one innovation obstacle, compared to 52 per cent in the Atlantic region. It is unclear whether this is because businesses in the region have a lower appetite for risk, see less of a need to innovate, or is the result of some other factor.

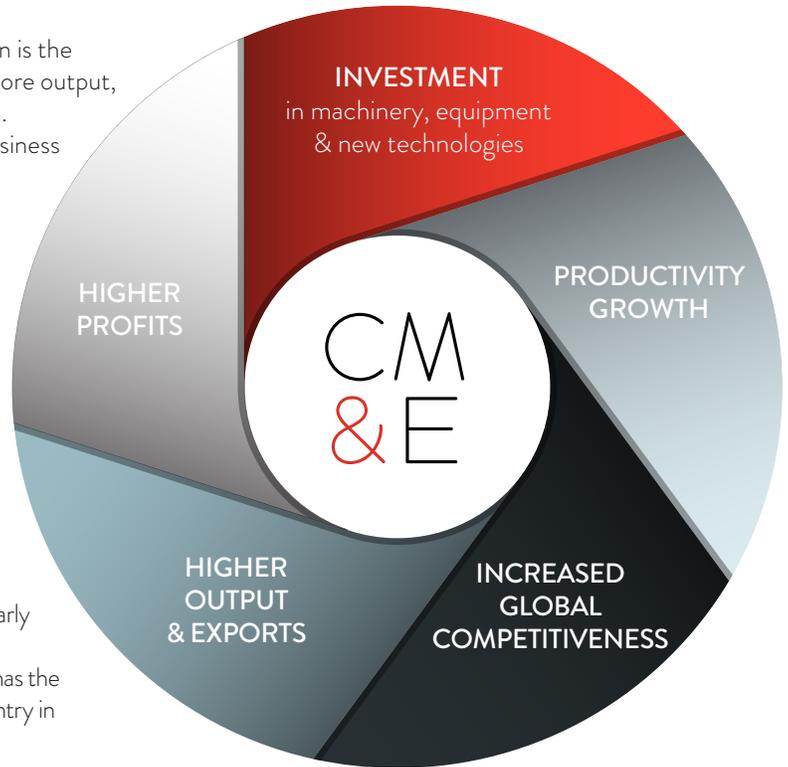
IMPACT OF UNDERINVESTMENT:

LOW PRODUCTIVITY & REDUCED COMPETITIVENESS

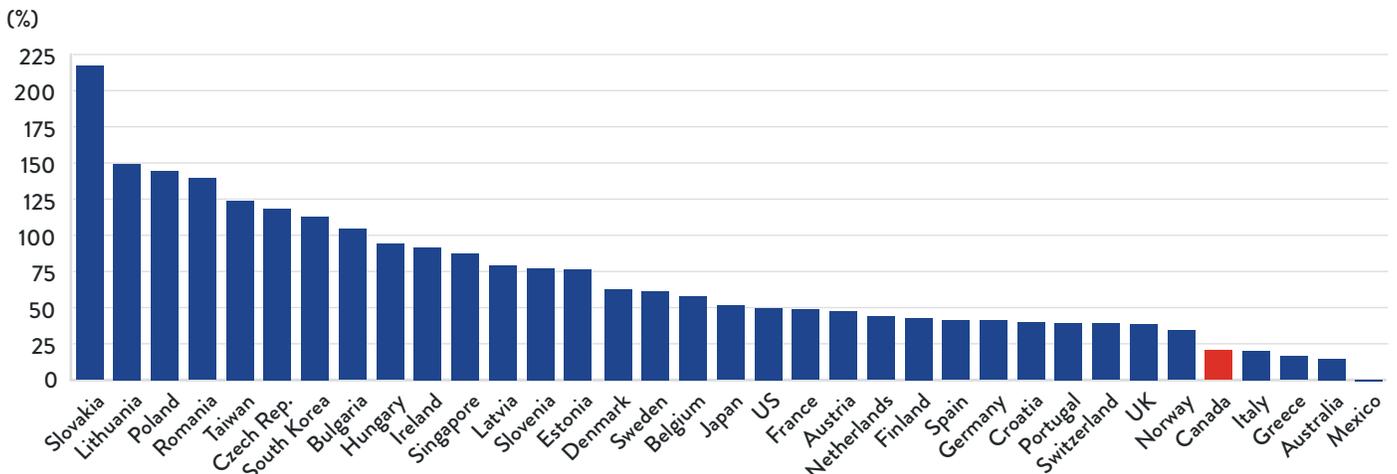
Strategic investment in innovation and technology adoption is the starting point on a virtuous cycle that ultimately leads to more output, employment and economic growth across Atlantic Canada. Innovation and investment in new technologies improve business productivity. That, in turn, helps businesses become more competitive in domestic and international markets. More competitive businesses attract more production mandates and capture more market share, resulting in higher output and exports. Higher output leads to greater firm profitability, which leaves businesses with more money to invest in innovation and new technologies.

However, chronic under-investment in capital and lagging innovation are undercutting manufacturing competitiveness in the Atlantic region and across Canada. This is most evident when comparing manufacturing productivity growth in Canada with our global competitors. Over the last 15 years, labour productivity in Canadian manufacturing has increased by about 20 per cent. Meanwhile, productivity in the US has grown by nearly 50 per cent, and it has more than doubled in locations like South Korea, Taiwan and Eastern Europe. In fact, since 2002 Canada has the poorest record in manufacturing productivity growth of any country in the G-7, save Italy.

Because of our closely-integrated economies and the ease with which investment can flow across the border, the most concerning productivity gap is between Canada and the United States. Over the last 30 years, manufacturing productivity in the United States has risen by 172 per cent, compared to just 87 per cent in Canada, with most of that gap emerging over a 10-year period in the early 2000s. The silver lining for Canada is that US manufacturing productivity has been stagnant since about 2010 while it continues to grow slowly in Canada. However, there remains a wide difference in manufacturing productivity levels between the two countries. Historically, while US businesses have leveraged capital investment to drive competitiveness and output growth, Canadian businesses have often relied on a low exchange rate.



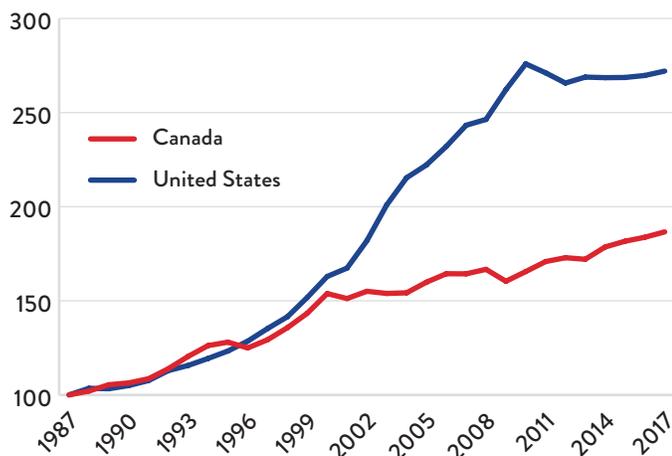
MANUFACTURING PRODUCTIVITY GROWTH - 2002-2017 (%)



Source: Conference Board

LABOUR PRODUCTIVITY IN MANUFACTURING

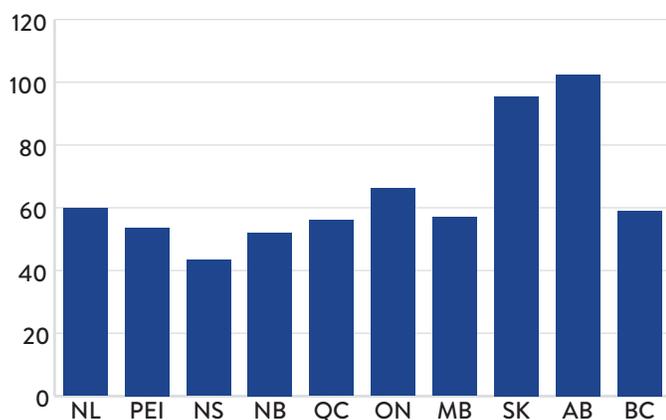
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Source: Statistics Canada, US Census Bureau

MANUFACTURING PRODUCTIVITY BY PROVINCE - 2017

(2012 dollars/hour)



Source: Statistics Canada

While Canada lags other countries in manufacturing productivity, the Atlantic region lags the rest of the country. According to data from Statistics Canada, the Maritime Provinces have the lowest manufacturing productivity rates in the country. Productivity levels are considerably higher in Newfoundland and Labrador but, even so, remain about 8 per cent below the national average.

This productivity gap deters manufacturing growth and investment in Atlantic Canada. Businesses invest in locations where the potential return on investment (ROI) is highest. While ROI is affected by many factors – including taxes, land and labour costs, access to markets and infrastructure – at the end of the day, nothing matters more than productivity. A productive manufacturing sector can afford higher taxes and higher wages and still be a magnet for investment.

CONTRIBUTING FACTORS:

WHY ATLANTIC CANADA UNDERINVESTS

A wide range of overlapping factors contribute to Atlantic Canada's lagging record on innovation and technology adoption in manufacturing. Many of these factors are not unique to the region – they are evident across the country and contribute to Canada's overall innovation and investment gap with other advanced manufacturing economies around the world. In some cases, however, these issues are more pronounced in Atlantic Canada, or have distinctive regional components.

Throughout our industry consultations in Atlantic Canada, it became clear that the barriers to innovation and technology adoption in the region fell under four broad, but interconnected themes. Addressing these challenges simultaneously and holistically is the key to moving forward on improving manufacturing competitiveness in the Atlantic provinces. Each of these four themes is discussed below.

LABOUR AND SKILLS SHORTAGES

Labour and skills shortages represent the single largest barrier to innovation and technology adoption in Atlantic Canada. The issue appeared consistently throughout our survey results and dominated the roundtable discussions in every province.

What did the MIS results say?

40% of Atlantic respondents said that skilled labour shortages were the most pressing issue they face today

48% say they face immediate labour/skills shortages and **62%** expect shortages within the next 5 years

21% of businesses said the lack of skilled workers was one of their biggest barriers to technology adoption

28% said that the availability of skilled personnel was one of their most significant innovation challenges

How Does This Limit Innovation and Technology Adoption?

The link between labour and skills shortages on the one hand, and innovation and technology adoption on the other, is not as obvious as some of the other issues that are discussed further below. In fact, technology adoption is often presented as a solution to labour supply issues; technology and automation usually reduce the amount of labour needed for manufacturers to produce each unit of output.

However, evidence from our roundtable discussions suggest that this only tells part of the story. Automation may indeed reduce the need for certain kinds of unskilled labour, but it also creates demand for higher-skilled workers needed to operate and maintain that equipment. Fewer of those skilled workers may be needed, but they are still in short supply. In other words, automation in many cases merely substitutes one type of labour shortage with another.

At a more basic level, labour shortages also limit innovation and technology adoption by preventing businesses from operating at optimal levels. Over the course of our roundtable discussions, many Atlantic Canadian manufacturers expressed frustration that labour supply issues – from recruitment and retention, to finding high-quality workers, to chronic absenteeism – were limiting their ability to produce goods as efficiently and effectively as possible. This impacts production, competitiveness and, ultimately, profitability. That, in turn, leaves businesses with less money available to invest in new machinery, equipment and technologies.

There are many other ways in which access to labour and skilled workers affects innovation and technology adoption. For one, innovation does not happen without an engaged workforce with bright ideas and the skills to turn those ideas into results. For another, businesses require skilled workers to be able to operate and maintain new machinery, equipment and technologies.

Indeed, skilled labour shortages impact every step of the process of technology investment. As we heard in our roundtable discussions, technology adoption has many components and potential pitfalls: determining what to buy; how to integrate new equipment into existing operations; how to change those operations to accommodate the new technology; how to adapt the equipment; and how to maintain and repair it when it breaks down. Each of these steps require workers with specialized and specific skills.

In other words, technology and skills are fundamentally interconnected. Without access to a skilled, innovative workforce, the economic case for investing in technology adoption evaporates.

Contributing Factors in Atlantic Canada

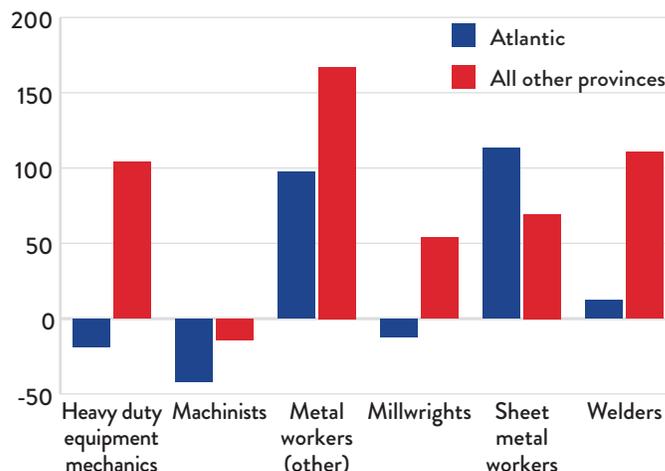
Several factors are contributing to labour and skills shortages in Atlantic Canada. Some are demographic or social in nature. Others relate to shortcomings in the education system, while others still touch on challenges businesses face with on-the-job training and career advancement.

Perhaps the most important contributor is that not enough students are graduating from post-secondary programs in manufacturing-related fields. This issue has two components. First, Canada has a nation-wide cultural bias that values university education over the skilled trades. As a result, too few Canadian students pursue vocational training, despite the relative ease with which they could find high-paying work in those fields.

This issue is magnified in Atlantic Canada, where vocational enrolment growth lags the rest of the country. For example, the number of students registered in machinist apprenticeship programs outside the Atlantic region fell by 14 per cent from 2000 to 2016. In Atlantic Canada, meanwhile, the decline was 42 per cent over that same period. There are also wide differences in enrolment growth in most other apprenticeship programs that have direct linkages to manufacturing.

GROWTH IN APPRENTICESHIP PROGRAM REGISTRATIONS

(2000-2016, in %)

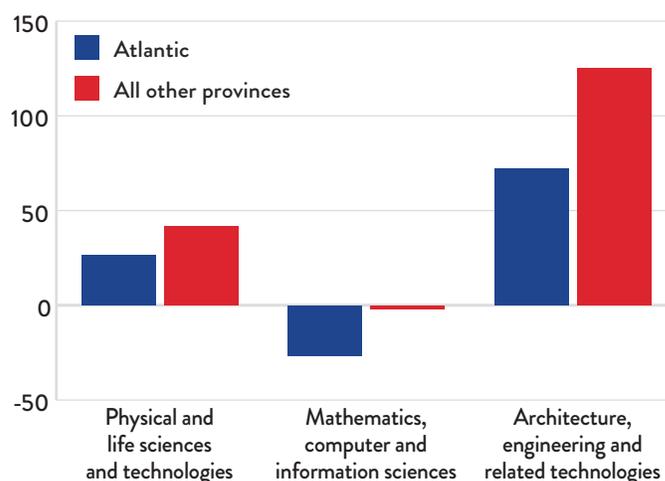


Source: Statistics Canada

The second component to this issue is that Atlantic Canada also lags the rest of the country when it comes to enrolment in STEM-related fields (science, technology, engineering and mathematics). The gap is especially pronounced in mathematics, computer and information sciences, where the number of Atlantic graduates has fallen by more than 25 per cent, while it has remained steady elsewhere in the country.

GROWTH IN POST-SECONDARY GRADUATES FROM STEM-RELATED FIELDS

(% change, 2000-2016)

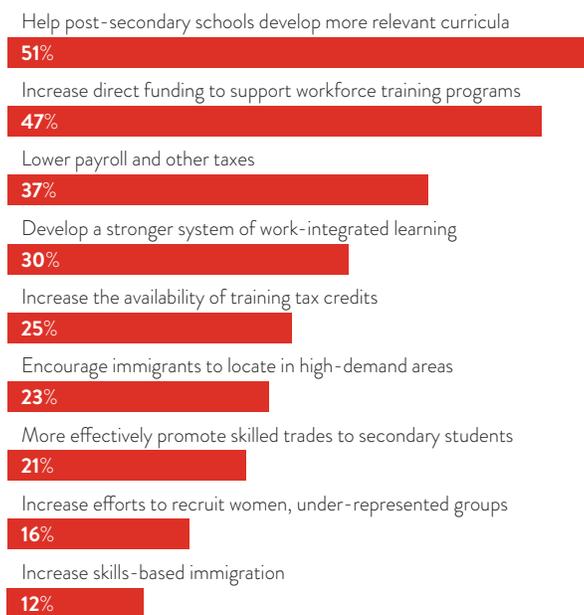


Source: Statistics Canada

A related issue is that Atlantic businesses do not always find that post-secondary graduates are equipped with the right skills when they enter the workforce – whether that be cognitive reasoning, adaptability, cross-functional capabilities or even specific technical skills. According to our MIS results, more than half of survey respondents said that the most valuable action governments could take in addressing labour/skills shortages is to help post-secondary institutions develop more relevant programs.

WHAT ROLE SHOULD GOVERNMENTS PLAY IN HELPING MANUFACTURERS ADDRESS LABOUR AND SKILLS SHORTAGES?

(% of respondents)



Source: 2018 Management Issues Survey

Note: Respondents were asked to select their top three choices.

Aside from the quality and quantity of post-secondary graduates and programs, Atlantic Canadian manufacturers identified several other issues that affect their ability to attract the workers they need. While not all these issues suggest an obvious policy solution, they do represent legitimate obstacles for businesses operating in the region.

In particular, many businesses reported significant retention challenges – whether for skilled or unskilled positions. Small businesses noted that it was difficult to retain skilled employees because the opportunities for internal career advancement in a small operation were necessarily limited. Others believed that young workers were less responsive to traditional salary/benefit perks, placing a premium on flexibility and lifestyle benefits instead. Manufacturers have a hard time adapting to this trend because they rely on shift work and specific production runs that preclude significant worker flexibility. Several businesses noted that absenteeism and a deteriorating work ethic were also growing issues. Many roundtable participants felt that the only way around obstacles like these was through better hiring practices. They admitted that they needed to do a better job of identifying potential employees who not only had the right skills but would also be a good fit for the culture of the organization.

Manufacturers operating outside the region’s major urban centres also noted that it was growing increasingly difficult to persuade workers to relocate to rural areas. Although there were considerable cost-of-living benefits, workers (especially young ones) were often unwilling to leave bigger cities with more recreational and cultural amenities.

These issues are all magnified by another, more chronic, demographic challenge in the region: inter-provincial out-migration of young working-age Atlantic Canadians. While net out-migration has slowed since the early 2000s, it remains the case that there is a persistent net outflow of young working-age men and women, partially offset by a net inflow of older Canadians. This trend exacerbates existing challenges, especially in post-secondary enrolment and worker retention.

LACK OF INFORMATION ABOUT NEW TECHNOLOGIES

The second issue raised by Atlantic Canadian businesses is a general lack of awareness of the new technologies that are available. The technology information gap exists at every stage of the investment and implementation process – from simply not having enough information about what’s on the market, to a lack of clarity on the benefits and capabilities of new technologies, to uncertainty about how new technologies would fit into (or disrupt) existing processes.

How Does This Limit Innovation and Technology Adoption?

A lack of information about the potential benefits offered by new technologies is a fundamental barrier to investment and a major issue in Atlantic Canada. When asked about their main barriers to technology adoption, nearly 30 per cent of survey respondents in the region said that their business had no need for such technologies. While there are possibly rare cases where there are indeed no technologies that would help a business become more innovative or productive, it is far more likely that this response betrays a lack of information about what’s out there and how it could benefit them.

What did the MIS results say?

30% of Atlantic respondents said that one the main barriers to technology adoption is uncertainty about how those technologies fit into existing operations

30% of respondents believe that their business has no need for such technologies

29% stated that a lack of machinery and equipment was a major factor limiting their capacity for innovation

WHAT ARE THE MAIN OBSTACLES PREVENTING YOUR COMPANY FROM INVESTING MORE IN ADVANCED TECHNOLOGIES?

Purchase costs are too high/economic return is uncertain

46%

Our business has no immediate need for such technologies

30%

Unclear how new technologies would fit into existing operations

30%

The rising cost of doing business leaves no funds to invest

23%

We lack the skilled workers needed to use new technologies

21%

We lack sufficient financial and/or tax incentives

18%

We lack information about the technologies that are available

16%

Too disruptive to ongoing operations

14%

We have difficulty getting financing

5%

There are limited opportunities to test new technologies

5%

New technologies have too short a shelf life

2%

Source: 2018 Management Issues Survey

Note: Respondents were asked to select their top three choices.

The technology information gap has three broad components. The first is a simple lack of awareness about the machinery, equipment, software or other technologies that are available. Businesses can hardly be expected to make informed investment decisions if they are unaware of the options that are available.

The second component is that businesses do not always have a complete understanding of what any given new technology can do, or how it could be relevant to their specific operations. This uncertainty can stem from a lack of available demonstration and testing opportunities.

These two components also touch on the challenge of information paralysis. There are many new tools, technologies and solutions available that could benefit Atlantic Canadian manufacturers. However, it takes time to learn about the various options; each new technology is slightly different or solves a different problem; and with limited financial resources, manufacturers are left trying to prioritize investment decisions without having all the information they want or need.

The third component to the information gap relates to the inevitable disruption that comes from incorporating new technologies into existing processes. Simply put, things seldom work out exactly as planned. Technologies need to be adapted or tailored to specific needs. They may not perform exactly as advertised. There are challenges integrating new equipment into existing spaces and making the inevitable workforce adjustments – training or otherwise – that are needed. These all add to the uncertainty of making major investment decisions.

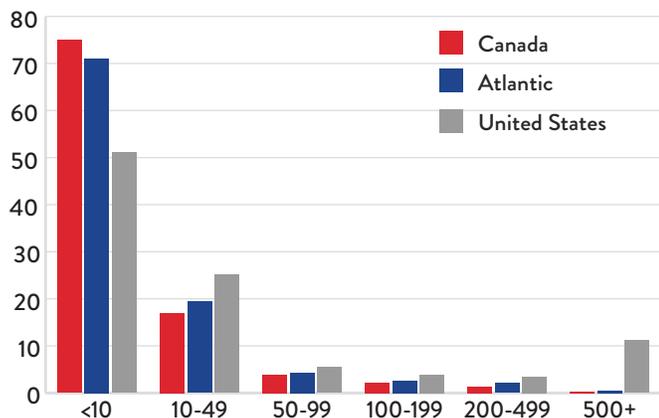
Contributing Factors in Atlantic Canada

There are several factors contributing to the information gap about new technologies, but most stem from a single issue: the industrial structure of manufacturing in Atlantic Canada. The region’s manufacturing sector skews small. A full 91 per cent of all manufacturing businesses in Atlantic Canada have fewer than 10 employees or no permanent workforce. Only 0.46 per cent of manufacturing operations in the region have more than 500 employees.

To be clear, these figures are not significantly different from what is found across the country. In fact, if anything, the number of large companies operating in the Atlantic region is disproportionately high compared to other parts of Canada.

MANUFACTURING ESTABLISHMENTS BY SIZE

(% of total)



Sources: Statistics Canada, US Census Bureau

Note: Canadian data are for 2018, US data for 2016

The overarching issues is that, whether in the Atlantic provinces or elsewhere, manufacturing operations in Canada tend to be smaller than they are in other countries. The difference with the United States is especially stark. In the US, only 51 per cent of manufacturing establishments have fewer than 10 employees, while a full 11 per cent have more than 500.

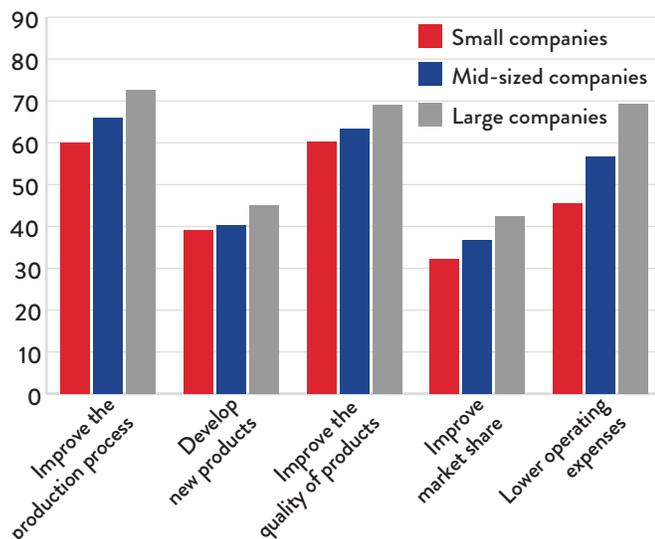
This size issue is a major constraint on technology adoption – and specifically on the information-gathering side. Throughout our roundtable discussions, businesses noted that they lack the internal resources needed to perform technology assessments, research new equipment, attend trade shows, apply for government support programs, or undertake any of a number of other tasks that would help them learn about new technologies.

The reason for this is simple. A company of only 10 people cannot afford to remove 10 per cent of its productive capacity by devoting one employee to researching potential new technologies and designing a plan to seamlessly integrate that product into existing operations.

Indeed, evidence suggests that companies that have more resources at their disposal generally have more success at identifying new technologies and integrating them into their operations. According to data from Statistics Canada’s Survey of Advanced Technology, large companies were consistently more likely to report that their investments in advanced technologies either met or exceeded their initial objectives.

REPORTED SUCCESS IN NEW MANUFACTURING TECHNOLOGIES INVESTMENT

(%)



Source: Statistics Canada

A related issue is that many companies report that they are simply too busy with day-to-day operations to devote much time to strategic thinking and research about new technology adoption. Roundtable participants noted that advanced manufacturing technology assessment programs like those offered by the Atlantic Canada Opportunities Agency (ACOA) are especially valuable because ACOA provides a service that the company may not have the capacity to undertake on its own.

A final contributing factor is the chronic labour and skills shortages facing manufacturers in the region. The impact of shortages on production and equipment operation/maintenance were discussed above. However, skilled workers are also important in the information-gathering stage. Their expertise is critical in identifying and testing equipment, as well as ensuring that any new technology is seamlessly integrated into existing operations.

BUSINESS CLIMATE

Businesses that are optimistic about their future; that operate in a competitive cost environment; that are profitable; and that see opportunities to expand market share are more likely to innovate and make strategic investments in new equipment and technologies. Improving the business climate in Atlantic Canada is thus critical to addressing the technology and innovation gap in the region.

What did the MIS results say?

32% of Atlantic respondents said that the federal and provincial governments were not supporting investment in, and growth of, their company

37% said that federal government policies have grown less supportive over the past three years

28% stated that one of their biggest challenges today is government policies driving business costs higher

29% said that the rising cost of doing business is limiting their ability to invest in new technologies

How Does This Limit Innovation and Technology Adoption?

Previous CME research has shown that there is a close relationship between after-tax profits and capital spending in Canada.³ The reason for this is simple: when businesses make a profit, they can either distribute the proceeds to shareholders as dividends; or they can retain them within the corporation to reinvest. The more profitable a business becomes, the more funds it has available to invest in its operations – in future expansion, in new technologies, or in exploring innovative new products or processes.

³ CME, Restoring Canada's Advantage: A Need for Tax Reform

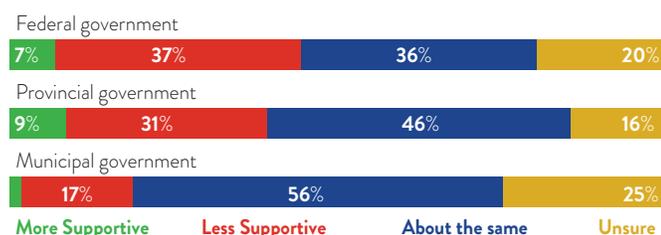
The problem is that a wide range of tax, regulatory and policy changes are increasing the cost of doing business across Canada. This trend is eroding profits and limiting the resources available to Atlantic Canadian manufacturers with which to innovate and invest in new technologies.

Indeed, a significant share of manufacturers in Atlantic Canada feel that the various levels of government are not supporting their efforts to invest and grow. According to our MIS results, 32 per cent of businesses believe that the federal government and provincial governments in the region are not supporting them. That share rises to 63 per cent for municipal governments.

Moreover, manufacturers believe the policy environment is deteriorating. Only seven per cent of businesses in the region believe that federal government policies have become more supportive over the last three years, while 37 per cent believe that policies have become less supportive. The responses were slightly better at the provincial level, where 8.5 per cent of respondents thought the policy environment was improving compared to 31 per cent who thought it was deteriorating.

The eroding business climate is having a direct effect on technology investment in Atlantic Canada. According to the MIS results, 23 per cent of respondents stated that the rising cost of doing business was one of the main factors limiting their ability to invest in new technologies. The issue was reinforced during our roundtable discussions. Manufacturers from across Atlantic expressed concern about the rising tax burden, onerous regulatory requirements, and government policy decisions that were driving up the cost of doing business in the region.

HAVE GOVERNMENT TAX AND REGULATORY POLICIES BECOME MORE SUPPORTIVE OR LESS SUPPORTIVE OVER THE PAST THREE YEARS?



Source: 2018 Management Issues Survey

Contributing Factors in Atlantic Canada

A wide range of factors is contributing to the high and rising cost of doing business in Atlantic Canada. To begin with, the corporate tax structure in the region is high. Provincial general corporate tax rates in the region range from 14 to 16 per cent, compared to a range of 10-12 per cent elsewhere in the country. According to our MIS results, 43 per cent of businesses believe that lowering the combined federal/provincial corporate tax rate is the most beneficial tax measure governments could take to help manufacturers in the region. The only option with a higher score (45 per cent) was to introduce (or re-introduce, in the case of Newfoundland and Labrador) a manufacturing and processing tax credit.

PROVINCIAL CORPORATE TAX RATES ON M&P INCOME (%)

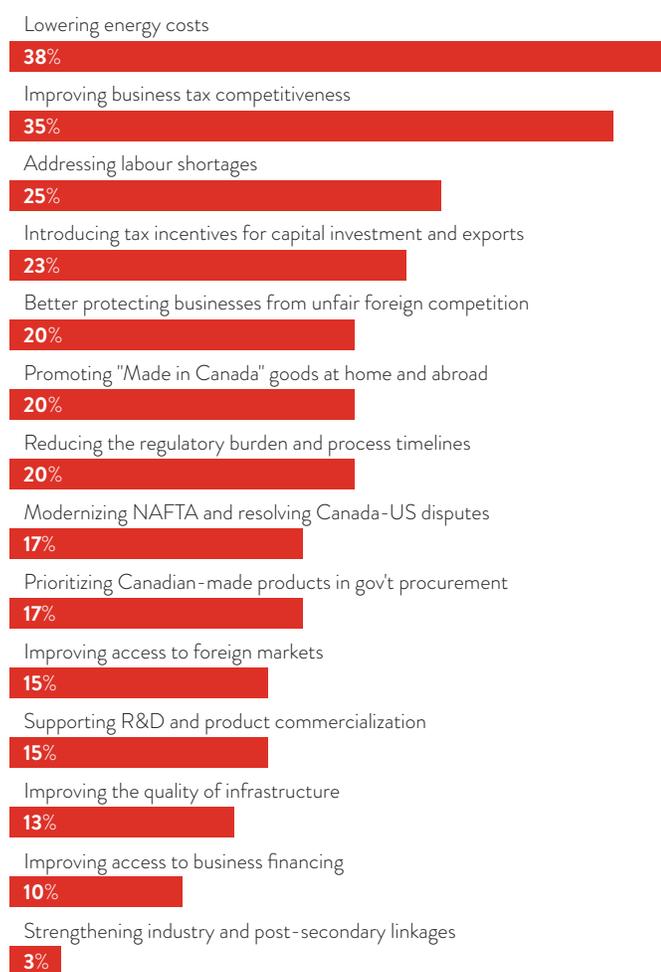


Source: KPMG

In addition, manufacturers pointed to a range of tax and policy changes that are raising business costs in Atlantic Canada. Topping the list was energy costs. When asked in the MIS about what government actions would be most effective in supporting businesses in the region, lowering energy costs was by far the highest-scoring option, at 38 per cent. Indeed, the issue of energy pricing was raised repeatedly over the course of CME's roundtable discussions in the region. It was an especially common subject in Nova Scotia, where it was noted that the promised cost savings from converting from bunker fuel to natural gas were not realized; and in Newfoundland and Labrador, where massive cost overruns on the Muskrat Falls hydroelectric project are driving up electricity prices for end users in the province.

On top of energy prices, manufacturers pointed to a host of other, smaller tax and policy changes that are raising business costs in the region. Some of these were local or provincial, while others were federal changes that apply across the country. Among the issues raised in our roundtable discussions was the introduction of new federal/provincial carbon pricing plans, as well as the new Clean Fuels Standard policy and higher Canada Pension Plan payments. At the provincial/local level, some of the issues raised included provincial transportation regulations, differences between provincial carbon pricing systems and the federal backstop, higher property taxes and higher workers' compensation costs.

WHICH GOVERNMENT ACTIONS WOULD MOST HELP SUPPORT AND EXPAND YOUR BUSINESS?



Source: 2018 Management Issues Survey

Note: Respondents were asked to select their top three choices.

To be sure, there have been some positive developments on the tax side when it comes to incentivizing investment in new technologies. In late November 2018, the federal government announced that it would match US tax provisions that allowed businesses to immediately write off all qualifying capital expenditures in the year in which they were made. This improvement to the Accelerated Capital Cost Allowance (ACCA) is a significant step forward for the manufacturing community in Atlantic Canada and across the country.

However, it was noted in our New Brunswick roundtable events that initiatives like this, though welcome, will have limited impact because they occur in the context of a generally deteriorating business cost environment. In a sense, the enhanced ACCA is like taking a step forward on a moving sidewalk that's headed in the opposite direction. Manufacturers see programs like the ACCA as valuable not because it might spark new investment, but because it helps to partially offset the impact of other policies that are undermine their competitiveness. In that sense, the impact of programs like an enhanced ACCA may be limited because they do not improve the business climate as much as prevent it from getting worse.

HIGH PURCHASE COSTS AND UNCERTAIN ROI

When it comes to direct barriers to innovation or investing in new technologies, the most important issue identified by Atlantic Canadians manufacturers was purchase costs and uncertain economic return. Policies that help drive down the effective cost of new technologies or otherwise improve the expected ROI will play a pivotal role in increasing technology investment in the region. This, in turn, will have a stimulating effect on manufacturing innovation; new equipment and technologies open the door to developing new or improved products and production methods.

How Does This Limit Innovation and Technology Adoption?

The link between purchase costs/uncertain return on investment and technology adoption is clear. New equipment and technologies are expensive. The way they fit into existing operations is not always obvious, and businesses are effectively taking a leap of faith when they make the decision to invest in technologies that disrupt established production methods.

The issue of cost and uncertainty is also closely related to the two previous issues identified above – the lack of information about new technologies and the rising cost of doing business in Atlantic Canada. In the first case, a lack of information and testing opportunities adds to the uncertain return on new technology investment. It is challenging to say the least to assess the potential ROI on a piece of new equipment if companies do not have a good understanding of the available options, how the equipment works, how it could be integrated into existing operations, or whether it will deliver as promised.

Similarly, the overarching business cost structure impacts on the affordability of new investment. It was noted earlier that 23 per cent of MIS respondents stated that one of their main barriers to technology adoption was that the rising cost of doing business leaves them with no funds with which to invest. Higher profits mean that companies have more up-front cash available. It also has the potential to reduce financing requirements, which lowers the effective cost of investment.

What did the MIS results say?

At **46%** of respondents, high costs and an uncertain ROI was identified as the top barrier to new technology investment in Atlantic Canada

23% of respondents said that increasing tax incentives for new capital investment should be a top government priority

29% said that a lack of necessary machinery, equipment and technology was one of their main barriers to new product development

Similarly, **26%** stated that a lack of internal funding/resources was a major barrier to product innovation

Contributing Factors in Atlantic Canada

One of the main issues facing Atlantic Canadian manufacturers that are interested in investing in new technologies is the sticker price of those products. The problem here is that many of the new technologies that are available must be imported from other countries. In these cases, already-high purchase costs can be magnified by movements in the exchange rate. As the value of the Canadian dollar has fallen since 2008, the average cost of imported machinery and equipment has soared. In the last 10 years, the average purchase cost of domestic machinery and equipment has risen by 14 per cent. Meanwhile, the cost of imported machinery has grown by 42 per cent.

MACHINERY AND EQUIPMENT PRICES FOR MANUFACTURERS

(Index: Q1 2000=100)



Source: Statistics Canada

Another barrier to technology adoption is that output levels in Atlantic manufacturing facilities are not always high enough to warrant the investment. Roundtable participants pointed out that businesses require an expected two-year payback to even consider making an investment in new technology. However, if companies are not running at optimal capacity, it is nearly impossible to achieve that expected ROI. We heard that many companies in the region only operate one or two shifts a day. Limited production runs deter investment in new technology because the equipment will not be used intensively enough to justify the purchase.

The issue of uncertain ROI also ties into the labour and skills shortages described earlier. One of the reasons Atlantic manufacturers can be hesitant to purchase expensive new technologies is because they cannot always find the people needed to operate that equipment at optimal levels, or for as many shifts as needed to achieve a two-year ROI. The high cost of recruiting, training and retaining workers adds to the uncertain ROI and purchase cost of the technology itself.

Several roundtable participants also suggested another ROI-related barrier: the business culture in the region is too risk-averse. In their view, Atlantic Canadian businesses tend not to be first-movers when it comes to technology adoption. They are more likely to wait for others to make that first investment and then act later themselves when more information about the benefits is available.

This is not the first time that CME has heard this observation from the manufacturing community; we hear similar stories around the country – almost always as a comparative statement between Canadian manufacturers and those in the US. US businesses have a larger cultural appetite for risk and are far more likely to be first-movers in technology adoption than their Canadian counterparts. There is a direct link between the higher tolerance for risk in the US and the fact that manufacturing productivity rates in that country are higher.

MAIN FINDINGS & ACTION AREAS

Through survey responses and direct roundtable consultations, Atlantic Canadian manufacturers offered several ideas for how government policy action in each of the above four areas could help boost manufacturing innovation and technology adoption in the region. As a complete package, these findings represent a strategic direction towards unlocking Atlantic Canada's growth potential in manufacturing.

ADDRESSING LABOUR & SKILLS SHORTAGES

There is no easy solution to the problem of labour and skills shortages in manufacturing. However, it represents perhaps the biggest obstacle, not only to innovation and technology adoption in Atlantic Canada, but also to long-term business competitiveness in the region. The message from our roundtable discussions was that solving – or at least mitigating – this problem should be one of government's highest priorities.

Increasing Enrolment in Manufacturing-Related Education Programs in Atlantic Canada

Businesses in the region believe that more effort is needed to encourage students at an early age to pursue careers in manufacturing-related fields. Three specific and interconnected ideas were put forward to advance this goal.

First, businesses saw value in the development of more vocation-based education streams at the secondary-school level. This could include programs that give students high school credit for vocational work experience; or developing a path to high school graduation through emphasis on studies in skilled trades and related fields.

Second, businesses believe that students at a young age would benefit from more and better information about career opportunities in manufacturing. This includes information about potential wages, the ease of finding work in areas where labour shortages are chronic, and the education path needed to pursue those career options.

Third, manufacturers see value to developing more “open doors” programs across the region. Allowing secondary students the chance to tour a modern manufacturing facility would help erase lingering misperceptions about the nature of manufacturing work, and could excite and inspire students to choose an education path that leads to a meaningful career in the sector.

Lastly, all the above steps need to emphasize participation by women, Indigenous Peoples, and other under-represented groups. Women, especially, are heavily under-represented in STEM and manufacturing-related education programs. Addressing that issue has the potential to dramatically increase the size of the manufacturing labour pool.

Finding 1: Increasing enrolment in manufacturing-related post-secondary programs would help address labour and skills shortages in the region. Some of the ways to advance this goal include:

- Developing more vocation-focused education streams at the secondary level;
- Providing more information to secondary students about career options in manufacturing;
- Creating more opportunities for students to participate in “open doors” programs that allow them to visit local manufacturing facilities; and
- Focusing the above efforts on recruiting more women to manufacturing-related fields.

Developing Closer Connections Between Businesses and Post-Secondary Institutions

MIS results show that businesses believe the single most important thing governments can do to address labour and skills shortages is to work with post-secondary institutions to develop education and training programs that more closely meet business' needs.

Doing this right means involving the local business community. Manufacturers know best the skills that are needed in their operations and those that are lacking in their recent hires. Closer ties between industry and the academic community are thus critical to ensuring that new graduates have relevant and up-to-date skills – an issue that is especially important given the rapid pace of technological change in manufacturing. Enhancing these linkages also supports the broader innovation agenda by increasing opportunities for collaboration on research and development activities.

In our roundtable consultations, Atlantic Canadian manufacturers pointed to two specific steps that would help in this process. First, while we heard that existing ties between regional post-secondary institutions are relatively strong, businesses also believe those ties could be strengthened even further.

One option to advance that goal could be the creation of a series of local workforce planning consortia across Atlantic Canada. These consortia would bring together major employers, their supply chains, and local education institutions from the secondary school level all the way through to major post-secondary institutions. They would meet on a regular basis to discuss current and future workforce needs, and to drive curriculum planning and career counselling to meet those needs.

Second, businesses pointed to the fact that Canada has a relatively underdeveloped network of work-integrated learning (WIL) programs. While the most recent federal budget has provided more support for WIL, it remains to be seen whether that step will be sufficient to address the issue. Moreover, it is critical that such programs involve active participation – and a leadership role – for future employers.

Finding 2: Atlantic Canadian manufacturers would like to see greater cooperation between government, post-secondary institutions and the business community on issues related to workforce training, curriculum development and work-integrated learning.

Addressing Immediate Skills Shortages Through Immigration

Increasing the number of students enrolled in manufacturing-related education programs is an important long-term solution, but it does little to help businesses with immediate labour and skills shortages. Atlantic Canadian businesses told us that they cannot afford to wait several years for the education system to provide the workers they need.

The solution to this problem lies in the immigration system. Atlantic manufacturers strongly support efforts to increase the number of immigrants coming into the region to fill existing job vacancies. They were especially supportive of the Atlantic Immigration Pilot (AIP) launched in March 2017 as part of the Atlantic Growth Strategy.

Atlantic Canadian manufacturers would like to see the AIP expanded and made permanent. They also pointed to two areas where it could potentially be improved: by increasing the target number of skilled immigrants allowed into the region under the program; and by shortening the application, processing and approval timelines.

Finding 3: Atlantic Canadian businesses strongly support the Atlantic Immigration Pilot (AIP). They expressed a desire for the federal government to:

- Make the program permanent;
- Increase the target number of skilled immigrants allowed under the program even beyond current plans to do so; and
- Take additional steps to accelerate the application, approval and processing timeline.

Increasing Supports for On-the-job Training and Skills Development

On-the-job training and upskilling are critical to ensuring that manufacturing employees are able to use advanced manufacturing technologies to their fullest potential. MIS results clearly show that businesses would like to see governments provide more direct funding to support such workforce training.

This support is important for two reasons – also highlighted in our survey results. The main barriers that Atlantic businesses face in providing workforce training are: the high cost of training programs; and the risk of losing workers after they had been trained.

These speak to concerns about the ROI on upskilling a company's existing workforce. All manufacturers support the development of a more skilled and productive workforce. However, in an environment of scarce talent, a tragedy of the commons problem emerges: individual companies underinvest in workforce training because they risk not capturing the benefit of that investment. The result – even greater skills shortages – is counter to the overall common good. The result is a vicious cycle of under-training that manufacturers themselves need to address.

Moreover, existing labour and skills shortages already make it difficult for Atlantic Canadian manufacturers to operate at optimal efficiency. Removing workers from the shop floor for training only magnifies the immediate problem.

This challenge is especially acute for small manufacturers where each individual worker makes up a larger proportion of the overall workforce.

The Government of Canada supports workforce training through the Canada Job Grant. In addition, it announced the creation of the Canada Training Benefit in the 2019 federal budget to encourage Canadians to invest in their own skills. While Atlantic businesses strongly support initiatives like these, the barriers described above limit their ability to take full advantage of these programs.

Finding 4: Atlantic Canadian businesses strongly support the Canada Job Grant and other federal initiatives aimed at skills upgrading. However, they continue to face challenges when it comes to their share of program financing, the risk of losing workers after they have been trained, and balancing the need to invest in skills development against the fact that ongoing labour shortages make it difficult to invest in training without adversely affecting productive capacity in the short term.

Developing Management Capacity in the Region

A final issue that deserves attention is the lack of management capacity in Atlantic Canadian businesses. According to the MIS results, labour shortages in production management/supervision occupations are far more acute within the region than they are elsewhere in the country. Shortages in executive positions are also more pronounced in Atlantic Canada. We heard in our roundtable consultations that these shortages are a part of the reason why Canada (and the Atlantic region directly) has a culture of entrepreneurship but not of risk-taking – the kind of risk-taking that leads to investment in new advanced manufacturing technologies.

Finding 5: Atlantic Canadian manufacturers see a lack of management capacity as an obstacle to growth and strategic investment. They would like to see more resources be made available to support management and executive training in the region.

ASSISTANCE WITH THE HIGH COSTS & UNCERTAIN ROI OF INNOVATION AND TECHNOLOGY INVESTMENT

As noted in the previous section, MIS results show that high purchase costs and uncertain economic return are the most important direct barriers to private-sector investment in innovation and new equipment and technologies. Moreover, a lack of necessary machinery and equipment was identified as the biggest barrier to new product development.

The federal and provincial governments offer a wide range of support programs intended to mitigate those risks. ACOA plays a pivotal role in this area through initiatives like the Atlantic Innovation Fund and the Regional Economic Growth Through Innovation (REGI) program, which has a stream explicitly designed to accelerate growth in high-potential firms in the region. These regionally-delivered programs complement broader federal initiatives such as the Strategic Innovation Fund, the Accelerated Growth Service, the Innovation Supercluster – with the Ocean cluster located in Atlantic Canada – and the Industrial Research Assistance Program.

A range of programs exist at the provincial level as well, largely focused on the innovation side. These include Nova Scotia's Innovation Rebate Program, the Small Business Investment Grant in PEI; and the Startup Investment Fund offered by the New Brunswick Innovation Foundation.

Expanding Existing Supports for Innovation and Technology Adoption

Atlantic Canadian manufacturers believe that steps can also be taken to expand or enhance existing support programs to help lower the cost of investment and increase the potential ROI associated with technology adoption.

Perhaps the most important tool available to Atlantic Canadian manufacturers is the Atlantic Investment Tax Credit (AITC). The business community within and outside the region believes this program to have immense value; CME has recommended several times to the Government of Canada that the AITC be expanded to the rest of the country. Enhancing this credit would be a critical step in boosting the ROI associated with technology adoption.

Finding 6: The Atlantic business community benefits tremendously from the Atlantic Investment Tax Credit and would like to see it expanded to allow them to claim a greater share of the cost of investment in new machinery, equipment and technologies.

Filling Gaps in Existing Government Support Programs

During our roundtable discussions, participants identified two areas where they believe gaps exist in current federal government support programs for innovation and technology adoption in the region. First, several manufacturers felt that there was a need for better support for small-scale technology adoption – especially for small- and medium-sized enterprises. This could take the form of amending the Business Development Program; or replacing it with a new initiative.

The former SMART program delivered through FedDev Ontario stands as a potential model in this regard. The SMART program had two basic components: it provided support to conduct technology assessments by qualified professionals; and it offered financial support for advanced technology adaptation and adoption – up to 35 per cent of costs to a maximum of \$100,000.

The technology assessment component of the SMART program is already being delivered in Atlantic Canada directly through ACOA as well as CME's Manufacturing Productivity Program (see below). However, the technology adoption/adaptation component of SMART – which accounted for most of program resources – could be adapted to Atlantic Canada to fill the gap for SMEs.

Finding 7: A program modelled after the SMART program delivered through FedDev Ontario could be an important tool in financing advanced technology adaptation and adoption in Atlantic Canada. This could be done at the regional or provincial levels.

Second, it was also noted during our roundtable consultations that improvements were needed on the innovation and commercialization side as well. One manufacturer pointed out that the emphasis of Canada's R&D supports was heavily skewed to the research side and not enough support is available on the development side. New research and intellectual property (IP) is of limited value if it sits on a shelf and does not result in process improvements or successful commercialization of new products.

One way to accomplish this goal would be to introduce a "patent box" program in Atlantic Canada. A "patent box" is a tax incentive that provides relief from corporate tax on income generated from certain types of qualifying IP, particularly patents. Relief can be given either as a reduced tax rate or a deduction for a portion of the patent box income. Patent box incentives are currently available in Quebec and Saskatchewan.

Finding 8: Atlantic Canadian businesses would like to see government R&D supports focus more heavily on the development side: turning IP into new commercial products; as well as innovative process improvements. One option to do this would be to introduce a "patent box" program similar to those in place in Quebec and Saskatchewan.

ADDRESSING THE INFORMATION GAP ABOUT NEW TECHNOLOGIES

Businesses in Atlantic Canada are more likely to invest in new technologies if they have a clear idea of the benefits those technologies offer. Technology demonstration tours, trade shows, and opportunities to test new equipment are all good ways to de-mystify technologies and give manufacturers a better understanding of their potential value, and how they could fit into – or transform – existing operations.

Enhancing Existing Technology Assessment Programs

The issue of technology awareness was highlighted repeatedly over the course of our roundtable discussions. Several participants stated that they simply did not have the time or resources to fully explore the investment options available to them.

Because of that obstacle, many participants pointed to the value of technology assessment programs such as those offered by ACOA and CME. These programs fill in an important gap for SMEs that lack the time, resources and expertise needed to evaluate potential technology investments. For example, ACOA's Advanced Manufacturing Technology Assessments involve site visits by qualified professionals that examine a company's performance and recommend how advanced manufacturing technologies could be implemented. For its part, CME offers a series of diagnostic tools under the umbrella of its Manufacturing Productivity Program in Nova Scotia and in Newfoundland and Labrador. These include technology assessment and adoption, as well as Green and LEAN diagnostics.

Finding 9: Roundtable participants in every province pointed to the value of technology assessment programs in helping them identify areas for improvement and investment opportunities. They stressed that expanding such assessment programs through trusted service providers would boost investment in the region.

Facilitating Business Participation in Technology Demonstration Tours

Another important way to improve awareness of new technologies is to allow businesses to see those technologies in action. It was noted earlier that a perception exists that many Canadian businesses are not risk-takers; they prefer to take a wait-and-see approach when it comes to technology adoption. This perception may or may not be accurate, but in either case, few things are as motivating as seeing what success looks like. If Atlantic Canadian businesses can see examples of successful technology adoption in their own backyard, it will drive their own desire to invest.

One way to accomplish this goal is to promote direct, first-hand exposure by facilitating site visits for technology demonstration tours. In that vein, CME operates a program in BC called Innovation Insights – an event series that, through tours and practical demonstrations, showcases innovative technologies and manufacturing processes on-site in a leading manufacturing facility in the province. Introducing a similar program in Atlantic Canada would provide tremendous benefit to manufacturers in the region.

Finding 10: Technology demonstration tours and site visits are a valuable way for Atlantic Canadian businesses to see the potential benefit of investing in new machinery, equipment and technologies. Increasing the availability of such programs would increase familiarity with those technologies and lead to greater investment.

Increasing Financial Supports for Attending Domestic and International Trade Shows

Finally, while there is high value to showcasing regional success stories, Atlantic Canadian manufacturers told us that they would also benefit from exposure to leading-edge manufacturing technologies from outside the region – whether that be elsewhere in Canada or around the world. As a positive step in that direction, CME and ACOA are partnering on a pilot initiative to lead a delegation of 16 Atlantic Canadian businesses to attend the 2019 Hannover Messe Automation Show in Germany. That trade show focuses on the latest innovations and trends in robotics, automation, environmental engineering and nanotechnology in the food and beverage industries.

This pilot was well-received by the business community. Similar initiatives under a formalized program would help familiarize a wide range of Atlantic manufacturers with new technologies and innovative solutions to their business challenges.

Finding 11: Atlantic Canadian businesses would benefit from exposure to leading-edge manufacturing technologies such as those displayed at cutting-edge trade shows and exhibitions across Canada and around the world. Government supports that offset some of the travel costs to attend these shows would increase participation by Atlantic businesses and highlight to them the potential benefits of investing in new technologies.

IMPROVING THE BUSINESS CLIMATE IN ATLANTIC CANADA

At the end of the day, businesses will innovate and invest in new technologies only if two conditions are in place: they see opportunities for growth; and they have money to invest. This latter condition speaks to the issue of business profitability. As noted earlier, there is a close relationship between business profitability and capital investment. Profitable businesses tend to invest more in new capital, paving the way for future business growth.

There are two main ways in which governments can help boost profitability in manufacturing: by lowering the effective tax burden that businesses face; and by enacting policies that reduce the non-tax cost of doing business in the region.

Lowering the Immediate Tax Burden on Atlantic Canadian Manufacturers

The simplest and easiest way for governments to raise after-tax income for Atlantic Canadian manufacturers is to reduce the amount of tax they pay. However, this solution is complicated not only by the wide range of taxes levied on businesses, but also the fact that five different governments are involved – not including those at the local level, which can also have a significant impact on the business tax burden in the region.

MIS results clearly show that taxation is an issue for Atlantic Canadian manufacturers. When asked what government actions would be most helpful in supporting and expanding their business, the second highest response was “improving business tax competitiveness.” Only “lowering energy costs” scored higher (that issue is discussed further below).

Moreover, businesses in the region were clear about the kinds of tax changes they would like to see. According to our MIS results, 45 per cent of respondents believe that implementing a Manufacturing and Processing tax credit would be the most beneficial tax change, while 43 per cent called for lower headline corporate tax rates.

Finding 12: Businesses in Atlantic Canada would like to see a reduction in the overall tax burden they face. MIS results show that such efforts would help support investment and business expansion in the region.

Lowering the Non-Tax Cost of Doing Business in the Region

Lowering business taxes is just one of the steps that governments can take to improve business profitability (and investment attractiveness) in the region. According to our MIS results, the single most important action that governments could take would be to lower energy costs for businesses. During our roundtable consultations, no subject aside from labour and skills shortages generated as much heated discussion as energy prices.

This issue is complicated by the fact that addressing energy prices requires provincial action, and by the fact that the specific problem varies from province to province. In Newfoundland and Labrador, the issue is about electricity pricing and financing cost overruns in major hydro projects; in Nova Scotia, it is about natural gas supply and pricing.

Current and anticipated government policy actions will only magnify this issue. The federal Clean Fuel Standard and carbon pricing policies may have a positive effect on lowering GHG emissions, but they will also undoubtedly further increase energy costs in Atlantic Canada. Many roundtable participants flagged these issues as part of their concern about the region’s long-term business competitiveness.

Finding 13: Atlantic Canadian businesses are very concerned about rising energy costs and the impact that is having on their ability to invest, grow and attract production mandates. Next to addressing labour and skills shortages, they see lowering energy costs as the most important thing governments could do to improve business competitiveness in the region.

While energy pricing was by far the most important cost challenge mentioned by Atlantic Canadian manufacturers, they raised a host of other issues as well. Many of them touched on transportation-related challenges. For one, businesses pointed to provincial differences in transportation regulations that add unnecessary costs and delays to shipping goods within and outside the region. Some talked about rail capacity constraints, costs and the need to improve intermodal linkages. In addition, roundtable participants in New Brunswick pointed to proposed changes in the province’s *Assessment Act* that would allow for heavy machinery and equipment to be included in the calculation of assessed property values.

Finding 14: Atlantic Canadian businesses would like governments in the region to increase their investment in business- and trade-related transportation infrastructure. They would also like to see greater progress on regulatory harmonization and other policy matters that are unnecessarily raising the cost of doing business in Atlantic Canada.

INCREASING AWARENESS & ACCESSIBILITY OF GOVERNMENT SUPPORT PROGRAMS

One of the most important findings to come out of the Atlantic Canadian MIS results and our roundtable consultations was that many businesses in the region are not taking the fullest advantage of the government supports that are available to them.

This problem has two components. First, many businesses are simply unaware of the services that are out there. Roundtable participants noted that, between the federal and provincial governments, there are dozens of programs available to help them with a wide range of needs. These are scattered across numerous departments and agencies, are usually designed with specific and narrow eligibility criteria, and are designed to achieve tightly-focused outcomes.

These features create an accessibility barrier for Atlantic Canadian businesses. As one roundtable participant stated, private-sector business leaders are heavily focused on their company's operations – they are not in the business of applying for government assistance and seldom think about those supports as an option. In addition, businesses are also typically not adept at speaking or interpreting the language of government. As such, many find government programs and websites opaque or unintuitive. And when they do think about government supports, they are usually looking for – and are unable to find – an obvious point of contact to whom they can direct their enquiries.

The second issue is that, even when businesses are aware of the government supports that are available, many said that the administrative burden of the application and approval process is too onerous and the outcome too uncertain to be worth the time and effort needed to apply. In our roundtable discussions, it was noted that when SMEs are looking to hire a new staff member, they want that person to be an engineer, technician, skilled tradesperson, or to work in some other productive role. They do not want to hire a new employee for the purpose of applying for government grants.

This issue also came up in our survey results. Respondents who had, in the past, accessed government supports designed to encourage investment in new machinery, equipment and technologies were asked to rank their experience (on a scale of one to five) with those programs. Only 17 per cent agreed with the statement that the “administrative burden was low.” Less than 25 per cent were confident their efforts would qualify them for support, and only 30 per cent said that the application process was easy to navigate.

What businesses told us they want is for government to help bridge these gaps. While the federal government offers passive concierge services on its website, it was suggested that a more active approach was needed. Businesses see tremendous potential value in the idea of government officials reaching out to them, taking the time to learn about their operations, challenges and goals, and then providing them with a tailored shortlist of government support options for which they would undoubtedly qualify. It was suggested that the individuals who already work with businesses on technology assessments in the region would be well-positioned to play such a role.

Finding 15: In the short term, Atlantic Canadian businesses would like to see governments provide an active consultancy service that would identify relevant support programs and assist them with the application process. In the long-term, they would like to see those support programs be made simpler, broader, and easier to understand. They would also benefit from faster approval timelines and greater advance certainty that their application will be ultimately successful.

CONCLUSION

Atlantic Canada has an historic opportunity to leverage the Fourth Industrial Revolution to usher in a new era of prosperity for the region. Advanced manufacturing technologies make the most of the region's strengths – its education system, natural resource base, skilled workforce and expertise around industries like marine sciences and food processing – while minimizing its weaknesses – high production costs, a small domestic market and relative lack of proximity to major US markets.

Those technologies also play a critical role in fostering innovation, commercialization and new product development in the region. New technologies unlock new capabilities, more efficient production methods, and allow businesses to compete in new markets.

Investment in innovation and technology adoption leads to the most important result of all: improved business productivity. That, in turn, increases competitiveness and allows businesses to capture more domestic and foreign market share. When output and exports grow, profitability rises, businesses expand and have more resources with which to invest in innovation and new technologies.

Getting onto this virtuous cycle is the key to unlocking Atlantic Canada's growth potential in manufacturing. Through our Management Issues Survey results and extensive regional consultations, Atlantic Canadian manufacturers have clearly identified the main issues and challenges preventing this from happening. These are:

- Chronic labour and skills shortages;
- A lack of information about new technologies;
- An uncompetitive business climate; and
- High purchase costs and an uncertain ROI on new technology investment.

Addressing these issues through the findings presented in this report is the first step towards a more competitive manufacturing sector and a more prosperous economy in Atlantic Canada.

This report is supported in part by the Atlantic Canada Opportunities Agency (ACOA) under the Atlantic Policy Research Initiative, which provides a vehicle for the analysis of key socio-economic policy issues in Atlantic Canada. The views expressed in this study do not necessarily reflect the views of ACOA or of the Government of Canada. The author is responsible for the accuracy, reliability and currency of the information.

APPENDIX

2018 MANAGEMENT ISSUES SURVEY: ATLANTIC CANADIAN RESULTS

RESPONDENT PROFILE :

REGIONAL DISTRIBUTION

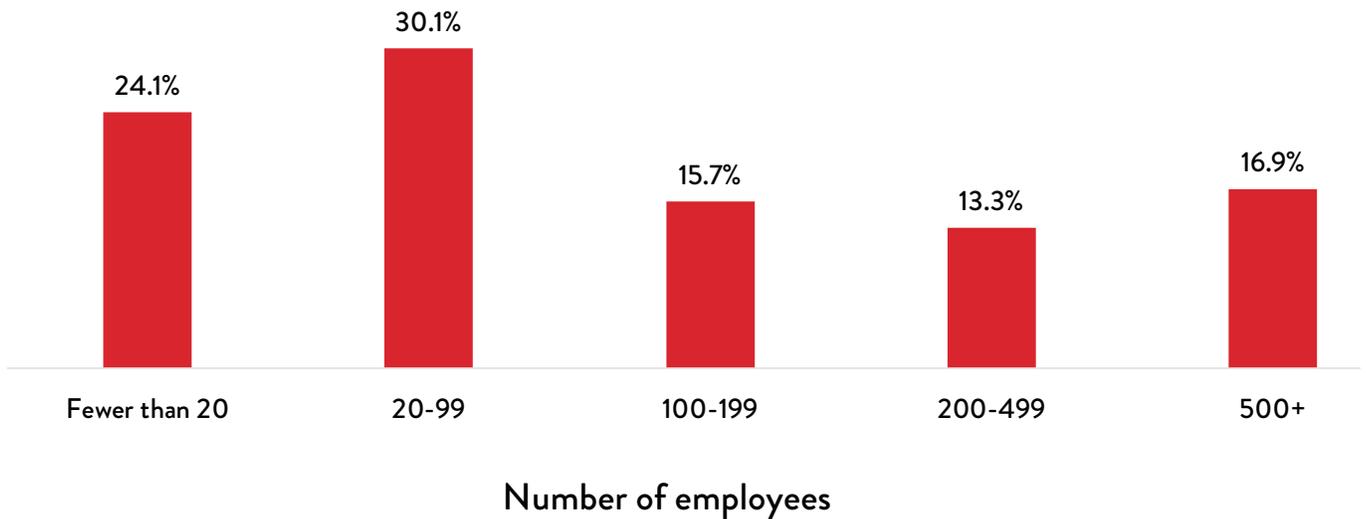


	PRIMARY LOCATIONS	LOCATIONS WITH OTHER ATLANTIC HQ	TOTAL LOCATIONS
NB	11	20	57
NS	37	11	81
PEI	0	12	28
NL	67	16	107
Total	115	59	273

About 38% of primary respondents have offices elsewhere in the region.

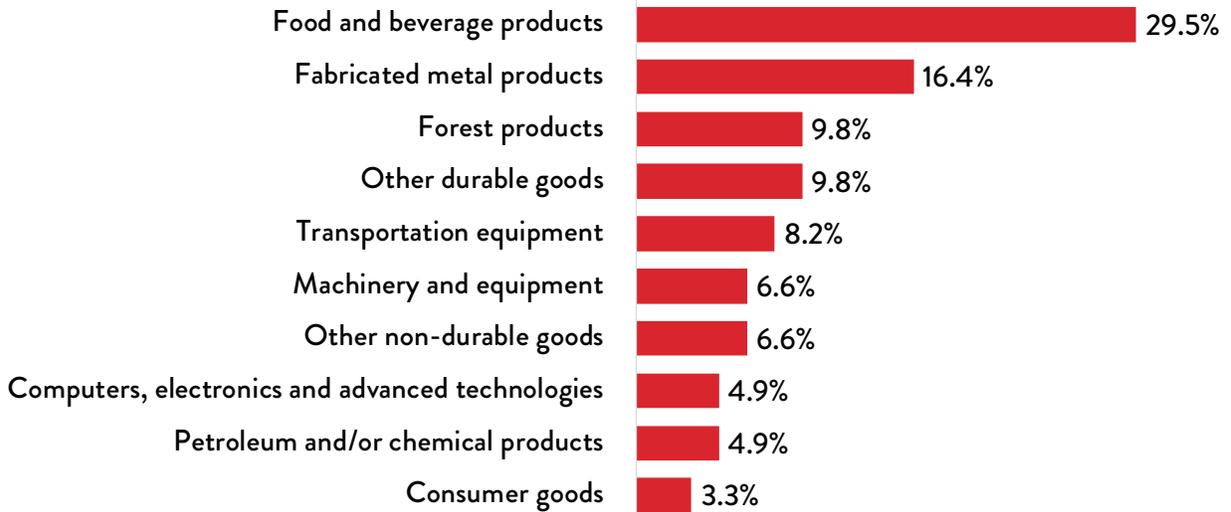
RESPONDENT PROFILE:

BUSINESS SIZE



RESPONDENT PROFILE:

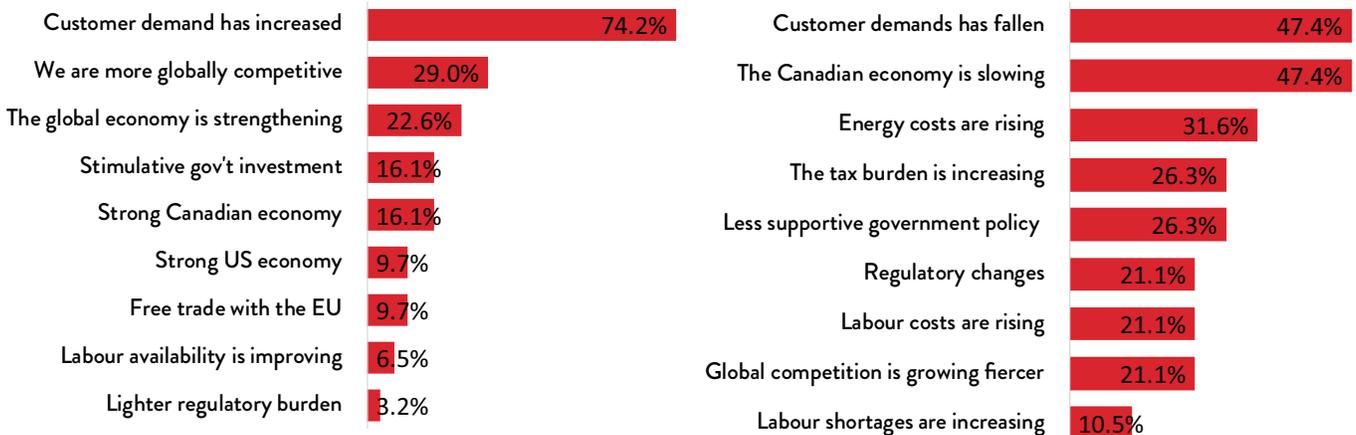
INDUSTRIES REPRESENTED



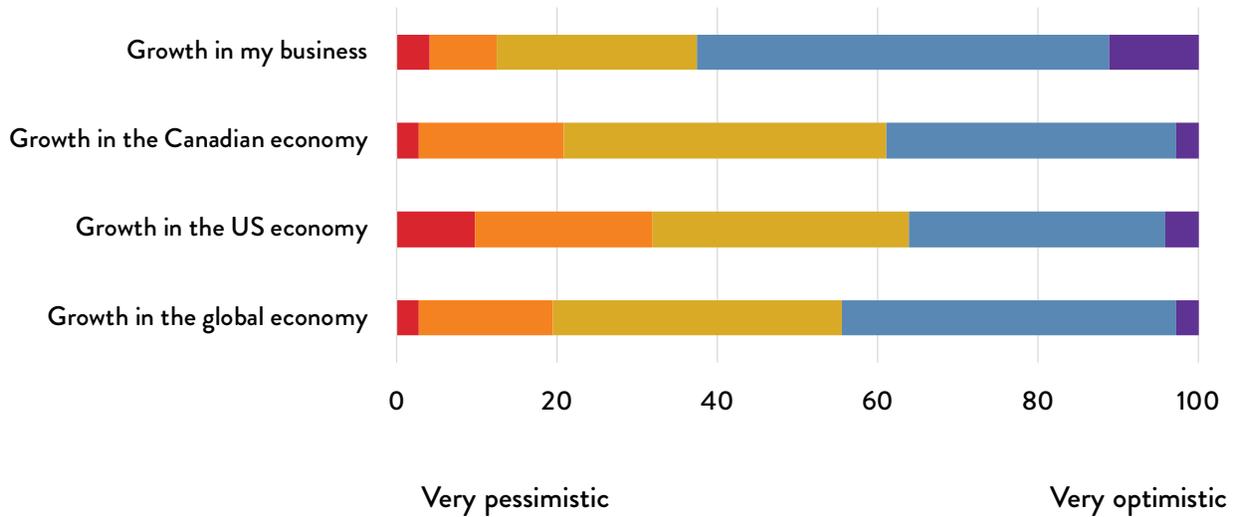
HAVE BUSINESS CONDITIONS IMPROVED OR DETERIORATED IN THE PAST 3 YEARS?

Improved: 39.5%

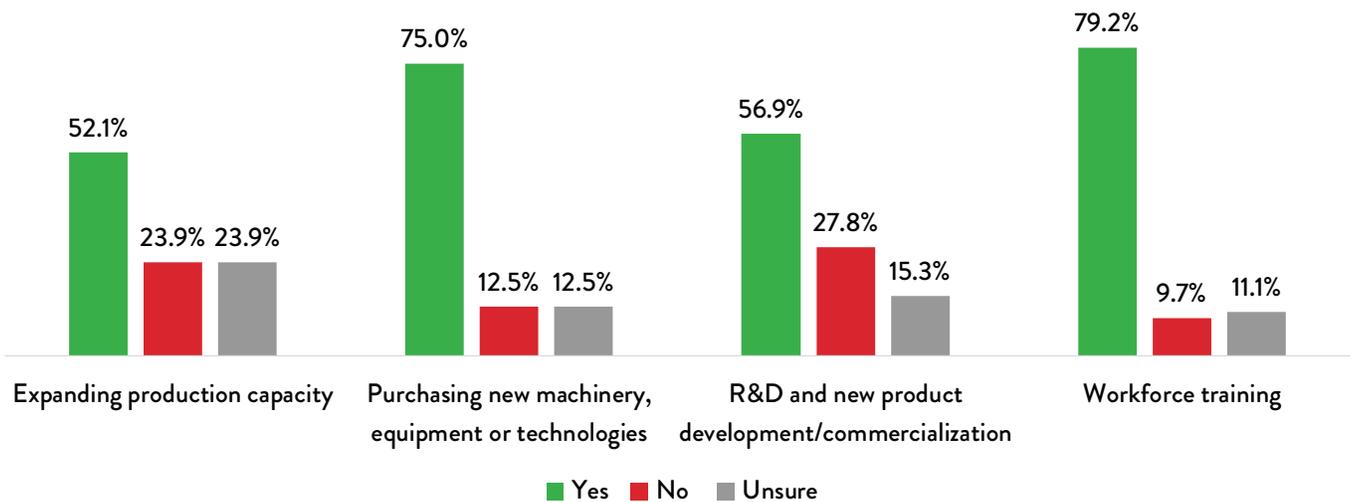
Deteriorated: 26.8%



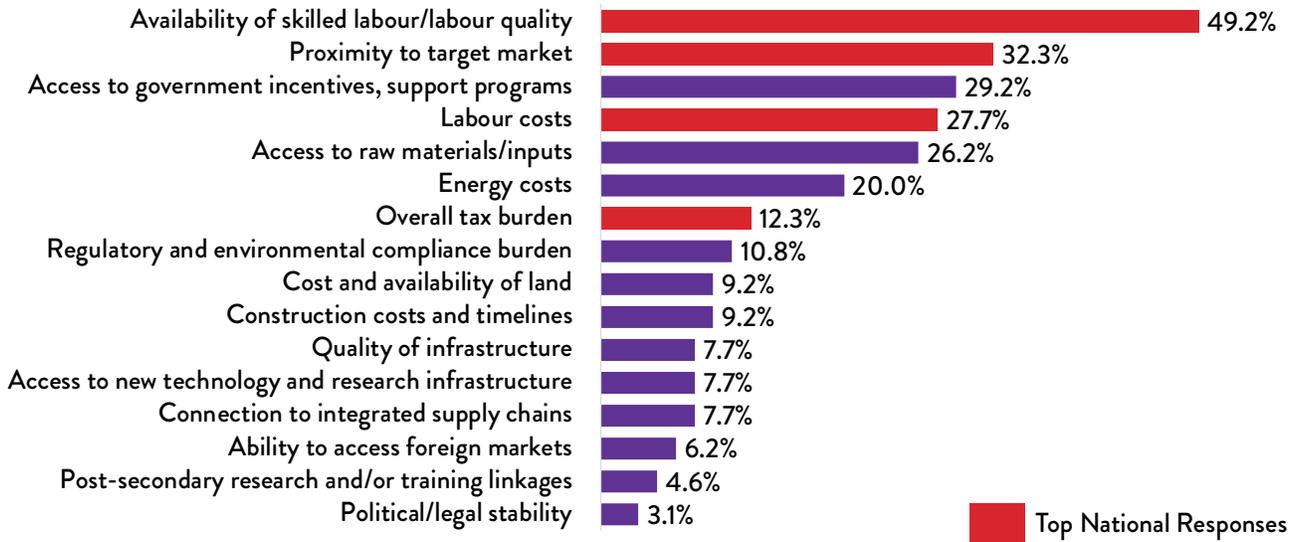
WHAT IS YOUR OUTLOOK OVER THE NEXT THREE YEARS?



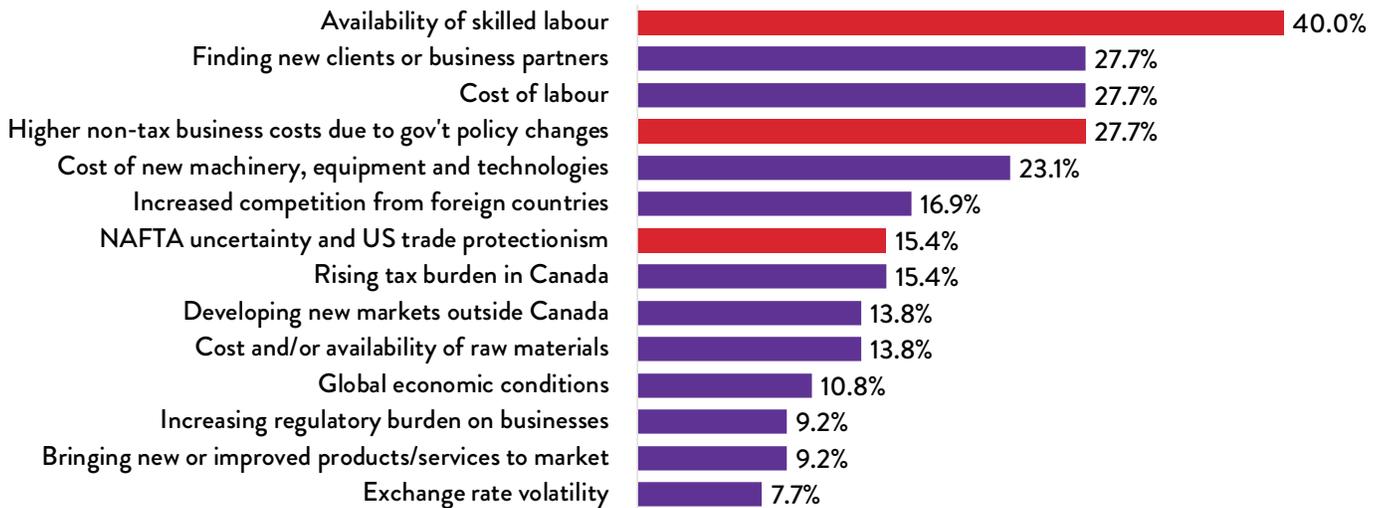
PLANS FOR MAJOR NEW INVESTMENTS OVER THE NEXT THREE YEARS?



WHAT ARE THE MOST IMPORTANT FACTORS IN DECIDING WHERE TO BUILD A NEW PLANT/FACILITY?



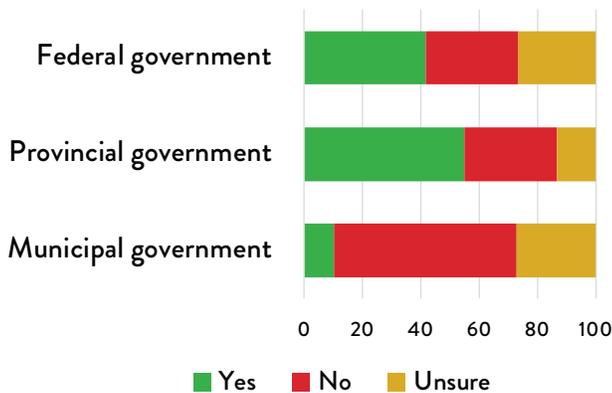
WHAT ARE THE MOST PRESSING CHALLENGES FACING YOUR COMPANY TODAY?



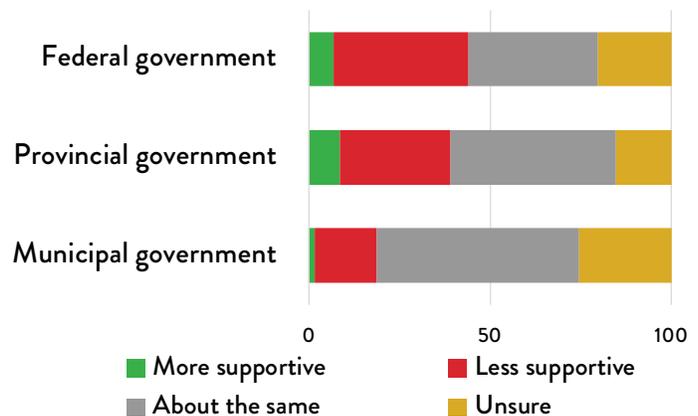
WHAT ARE YOUR COMPANY'S BIGGEST STRENGTHS?



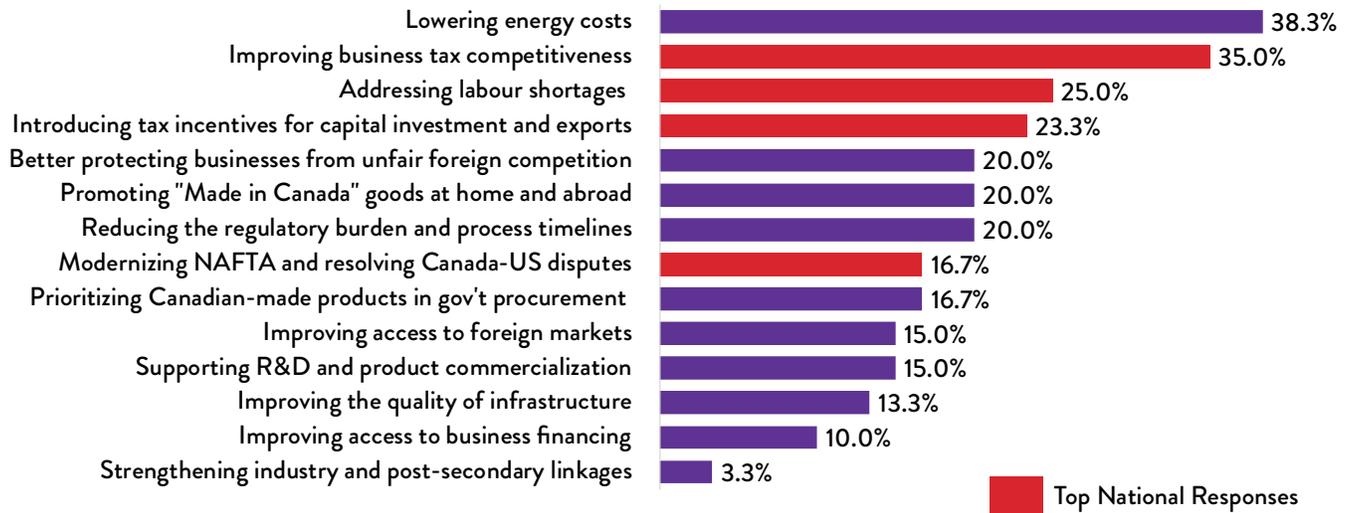
ARE GOVERNMENTS SUPPORTING YOUR INVESTMENT AND GROWTH?



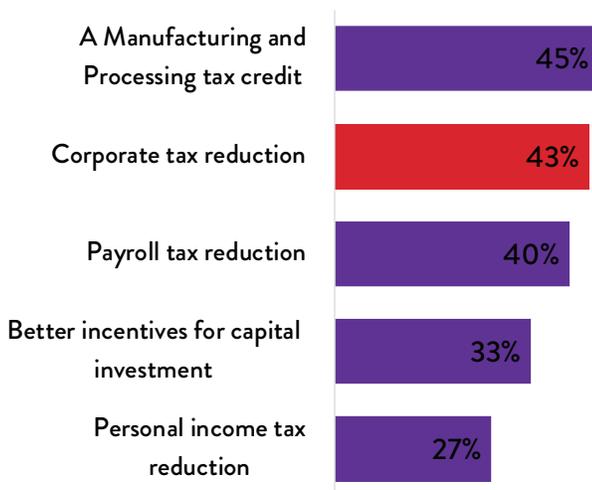
HOW HAVE GOVERNMENT POLICIES CHANGED OVER THE LAST 3 YEARS?



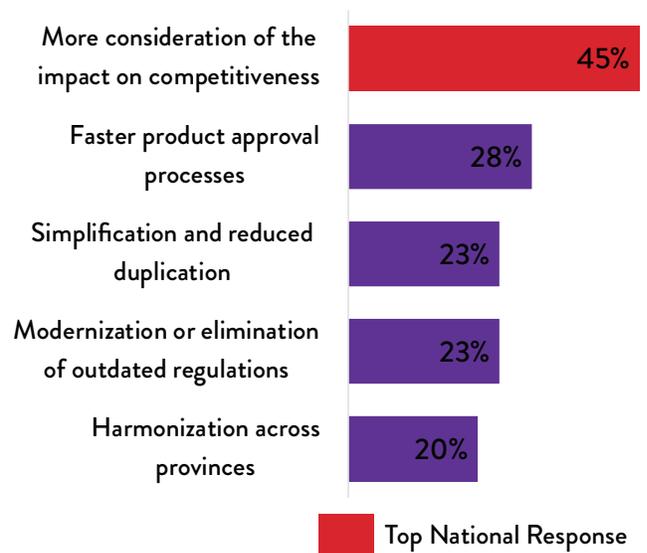
GOVERNMENT ACTIONS TO HELP YOU SUPPORT AND EXPAND YOUR BUSINESS



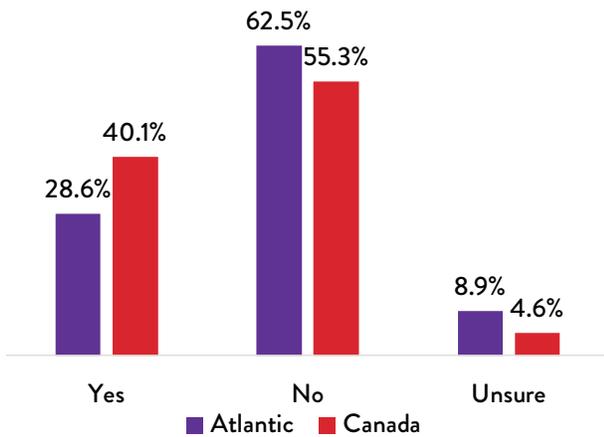
MOST BENEFICIAL TAX MEASURES



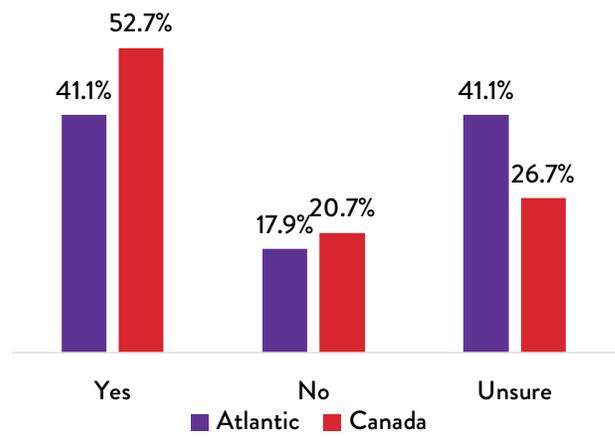
MOST BENEFICIAL REGULATORY MEASURES



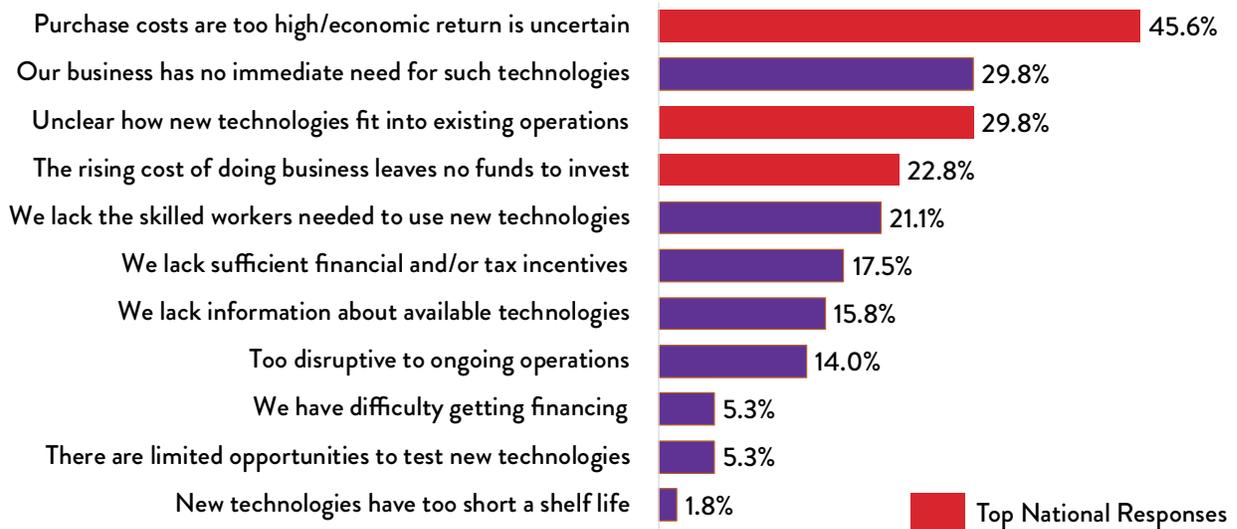
DOES YOUR COMPANY PRESENTLY USE ADVANCED MFG TECHNOLOGIES?



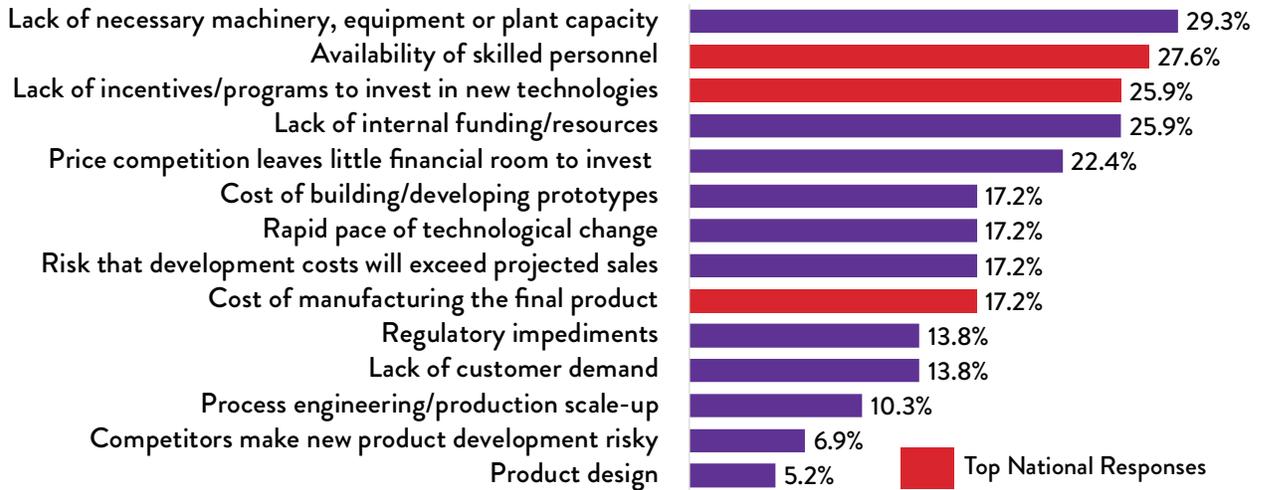
DOES YOUR COMPANY PLAN ON INVESTING IN THEM IN THE NEXT THREE YEARS?



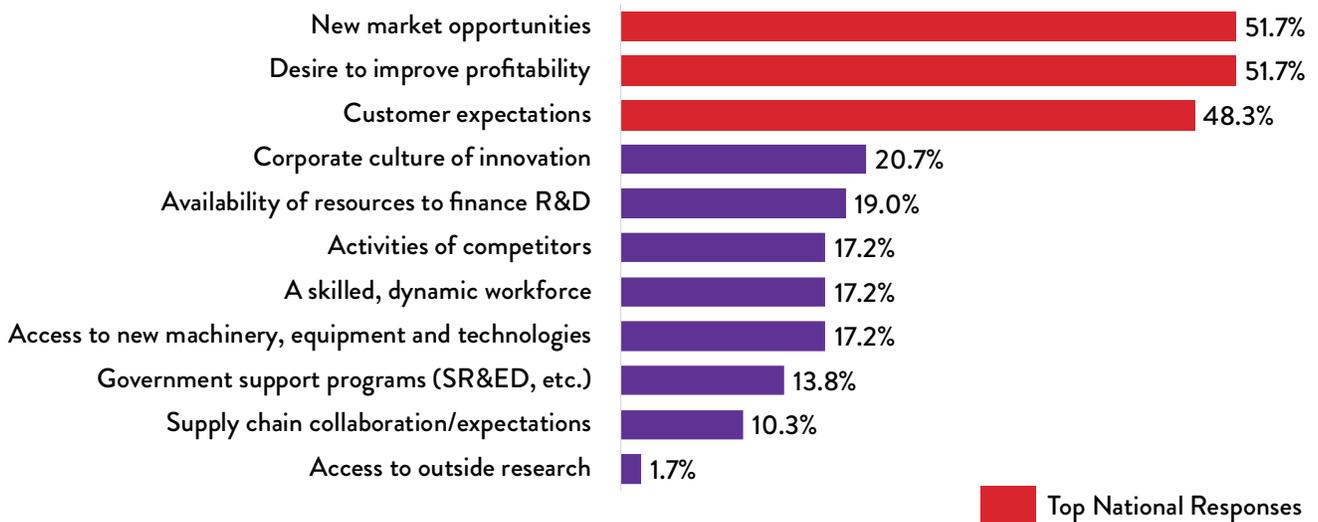
MAIN OBSTACLES PREVENTING INVESTMENT IN ADVANCED MANUFACTURING TECHNOLOGIES



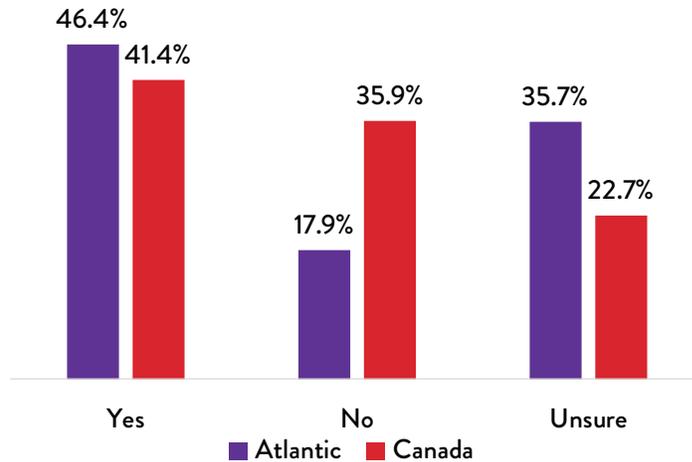
MOST SIGNIFICANT CHALLENGES WHEN BRINGING NEW PRODUCTS OR SERVICES TO MARKET



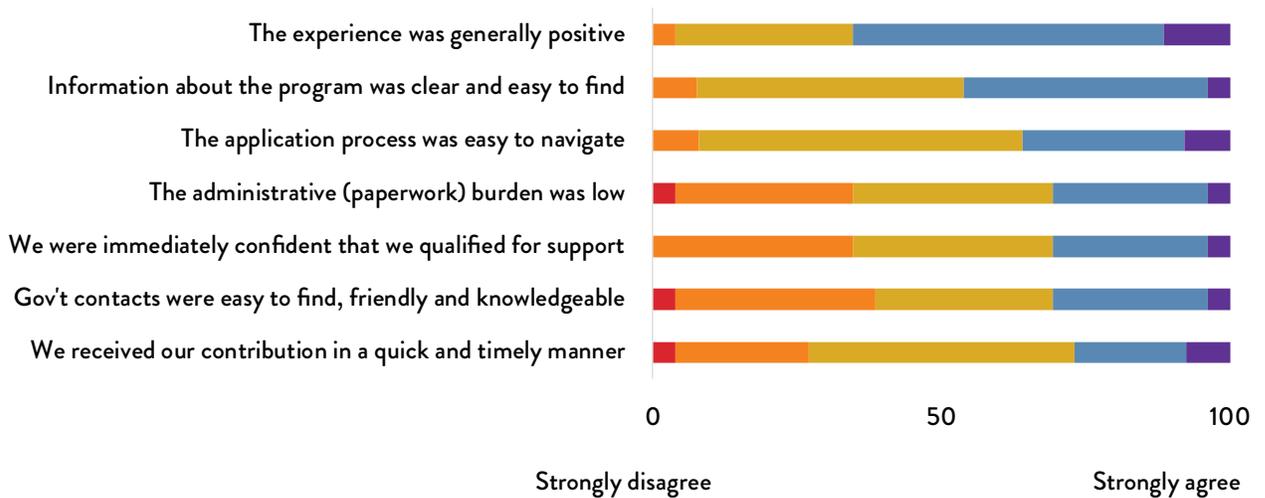
MOST IMPORTANT FACTORS DRIVING INNOVATION IN YOUR COMPANY



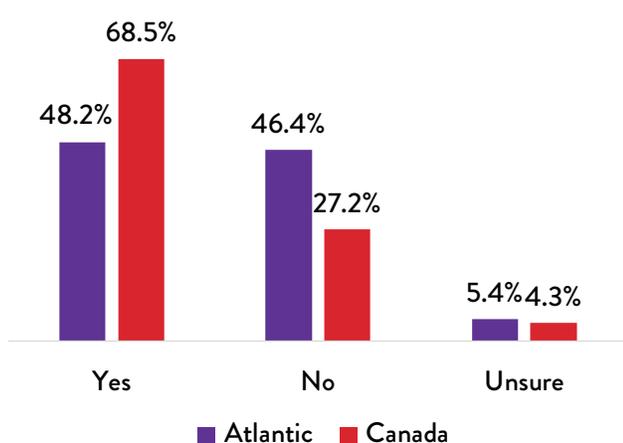
HAVE YOU APPLIED FOR GOVERNMENT INVESTMENT SUPPORT PROGRAMS?



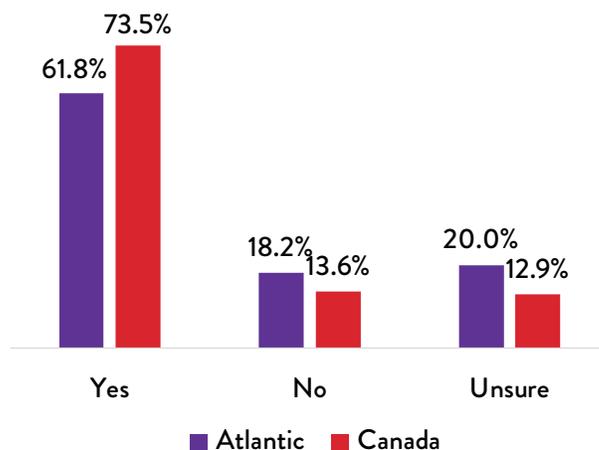
WHAT WAS YOUR EXPERIENCE WITH THOSE SUPPORT PROGRAMS?



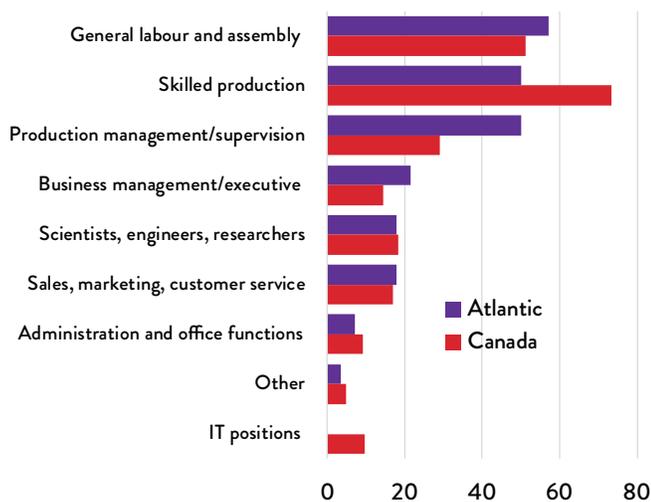
DOES YOUR COMPANY FACE IMMEDIATE LABOUR/SKILLS SHORTAGES?



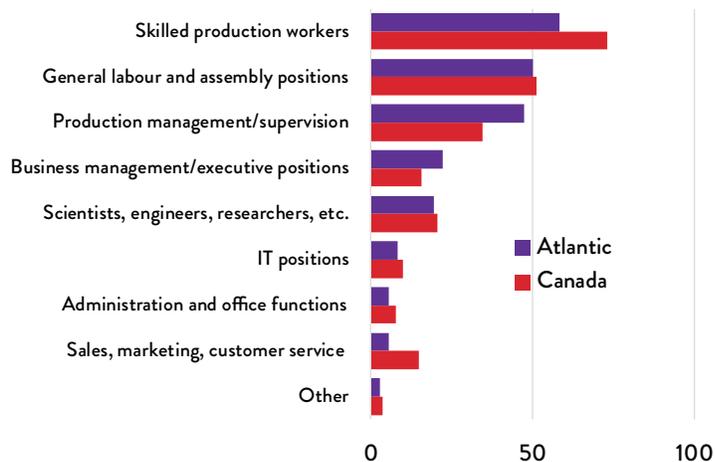
DO YOU EXPECT SHORTAGES IN THE NEXT FIVE YEARS?



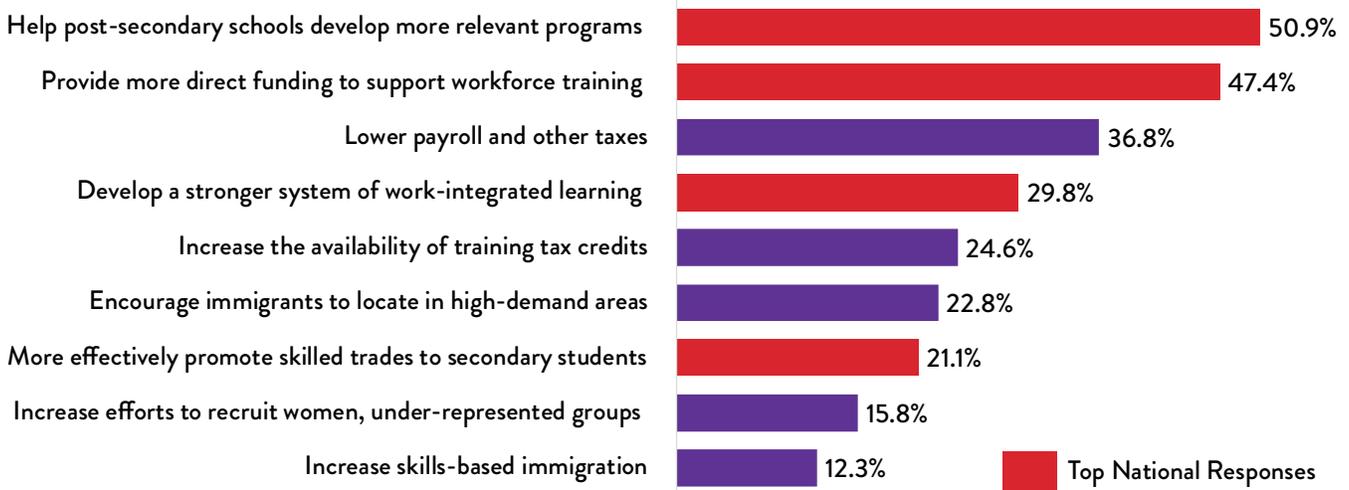
CURRENT SHORTAGES BY OCCUPATION



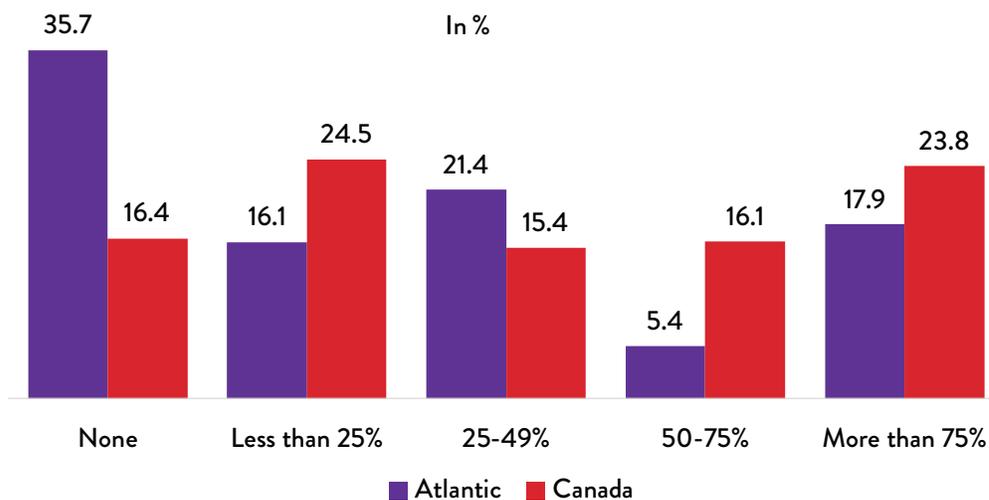
ANTICIPATED SHORTAGES WITHIN FIVE YEARS



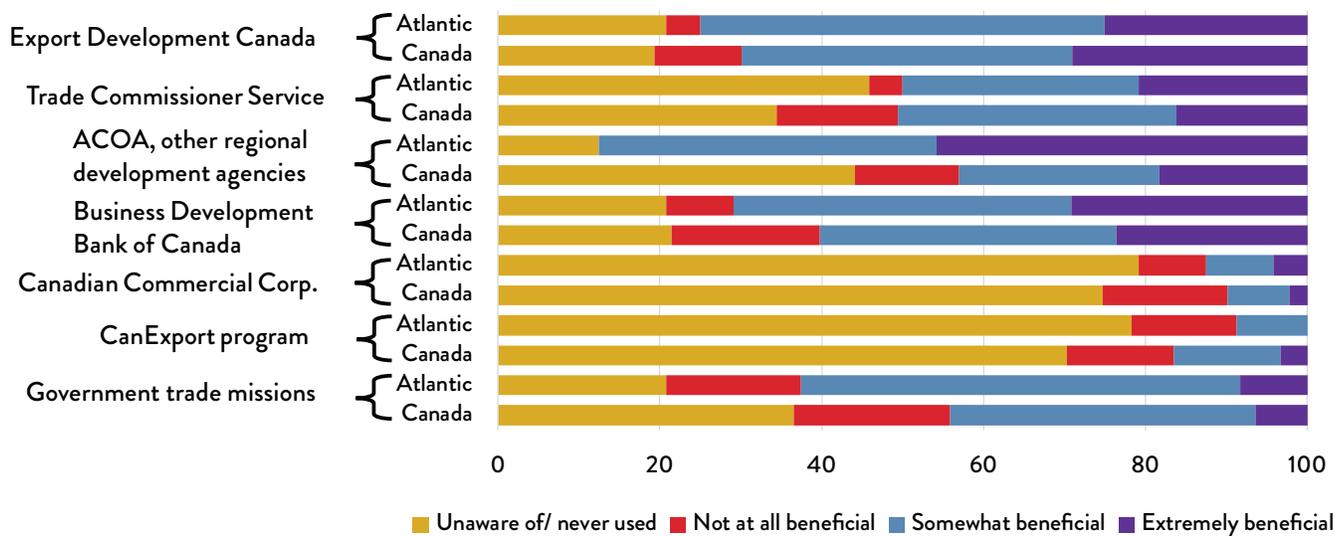
GOVERNMENT ROLE IN HELPING MANUFACTURERS ADDRESS LABOUR/SKILLS SHORTAGES?



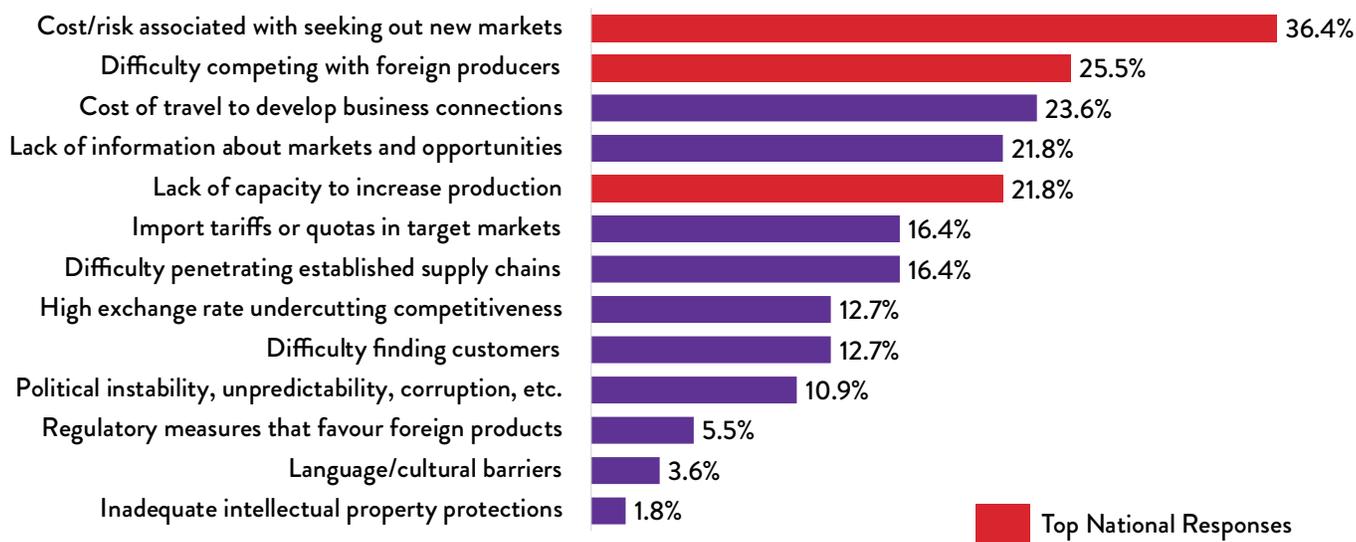
APPROXIMATELY WHAT SHARE OF YOUR TOTAL PRODUCTION IS EXPORTED?



WHAT WAS YOUR EXPERIENCE WITH GOVERNMENT TRADE ASSISTANCE PROGRAMS/SERVICES?



BIGGEST OBSTACLES PREVENTING YOU FROM EXPANDING YOUR EXPORTS?



WHICH PUBLIC SECTOR ACTIONS WOULD HAVE THE GREATEST IMPACT ON YOUR EXPORT GROWTH?

