MANUFACTURERS' OUTLOOK 2018

CHALLENGES and OPPORTUNITIES

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Executive Summary

Canadian manufacturers have a positive view of their prospects in 2018 although they are concerned by how Trump administration policies and other factors might affect their businesses.

PLANT's Manufacturers' Outlook 2018 survey conducted from July 11 to Sept. 5 shows 44% of senior company executives are optimistic about the coming year, although most (50%) qualify their optimism with caution. Looking at the next three years, the percentage of those who are optimistic declines (38%) as caution increases (57%), along with their view of Canada's growth (22% and 66%). The global view inspires even less confidence (19%) with 65% favouring caution.

Manufacturers are also either very or somewhat concerned about what's going on in the US. American protectionism is worrying 92% of executives, followed by rising global protectionism (90%), US President Donald Trump's impact on nation-to-nation relationships (88%) and the NAFTA renegotiation (88%).

The survey, conducted by RK Insights for **PLANT** Magazine in partnership with sponsors Grant Thornton LLP, SYSPRO Canada and Machines Italia with the Italian Trade Commission, is based on 495 replies from senior manufacturing executives (margin of error of +/- 3.6%, 19 times out of 20).

Most of the companies (64%) fall into the small business category (under 100 employees); 34% are medium-sized (under 500); and 12% are large (500 or more).

More than half of the senior executives are expecting orders and sales to increase (averaging 12% and 13%); but costs will also increase by 6%. Pricing will stay the same for 48% but 43% expect increases of 5%. Thirty-nine per cent see profits rising 8%.

Controlling costs tops the list of challenges for 66% of respondents, followed by pressures on prices (53%) and improving productivity (49%), which moved up from sixth spot in the 2017 survey results.

Optimism is evident by their top choices for investment over the next three years: 79% will spend on machinery, equipment and technology, and 68% will invest in training. Average investment will be more than $1.4 million.

Most of companies harvest the bulk of their sales in Canada and the US, followed by Europe. Only 16% will drive growth by entering new markets, while 22% will focus on North America. What's holding them back from increasing their revenues outside North America? Thirty-seven per cent say intense competition, followed by difficulty identifying opportunities (26%).

A growing risk of cyber attacks aimed at industrial targets is only a medium concern for most executives (45%). Less than half are very prepared for a variety of attacks, 25% are most unprepared for targeted external attacks and 21% are prepped for breaches through a third party vendor.

Companies continue to lag in the adoption of advanced measures and technologies that would improve productivity. Only 36% make use of automatic data access, analysis and review to measure and monitor productivity; 46% do it manually; 18% don't measure; and 59% do not plan on a digital production transformation involving Industry 4.0 and the IIoT over the next 12 months.

The top three most used advanced technologies are CAD/CAE/CAM (60%), custom manufacturing (57%) and automation (42%).

In line with last year's survey results, respondents demonstrated limited engagement with the IIoT, which connects and optimizes machines via the internet. Only 9% are applying IIoT capabilities, 33% are not familiar with these capabilities and 29% pronounced them not applicable.

More than half of the executives (54%) see innovation as very important to their business strategies with the most focus on products (66%), processes (65%) and technologies (51%). The average innovation spend for 2018 will be 4.9% of revenue and 55% plan to increase their investment over the next five years while 41% will invest at the current level. Thirty-four per cent intend to take advantage of the SR&ED tax credit, but 43% will not do so and 59% said it had no impact on their investment in innovation.

With increasing focus on regulations targeting the reduction of carbon emissions, 75% indicated they were very or at least somewhat engaged. But government moves to put a price on carbon have not raised the priority level of responses to climate change for 52% of companies and 44% do not include carbon reduction as a part of a formal business strategy.

Following the survey, there has been a deluge of provocative Trump tweets, US trade actions aimed at Canadian interests and some doubt cast over the successful negotiation of a new NAFTA deal. These developments suggest manufacturers should take nothing for granted. Prepare for the possibility of an end to NAFTA agreement and what that will mean to Canada-US trade, while taking steps to enter new global markets.

Joe Terrett, Editor, **PLANT**

Message from Grant Thornton

We are once again very proud to work with **PLANT** Magazine to provide you with the 2018 Manufacturers' Outlook survey report. Many manufacturers from across the country provided their opinions and insights in this year's survey and, by doing so, painted an in-depth picture of both the opportunities and challenges that lie ahead in the Canadian manufacturing sector.

Overall, companies continue to express a generally optimistic view of the industry and its prospects, indicating manufacturing in Canada is alive and well. We couldn't agree more. Working with many manufacturers from coast to coast, it's evident the industry continues to be a critical engine of innovation and driver of employment in communities across the country.

Respondents to the 2018 survey continue to make significant investments in new machinery, equipment and technology, training and R&D while also focusing their growth strategy on expanding sales and distribution channels, both domestically and internationally. This indicates that many manufacturers not only recognize the strong prospects available in this evolving economic environment, but they're taking some strides toward seizing these opportunities as well.

That said, manufacturers continue to face many challenges – particularly in respect to US expansion efforts. With NAFTA hanging in the balance, Canadian manufacturers may have to look beyond our neighbour to the south and leverage the strong manufacturing reputation Canada has earned around the world to thrive in the global marketplace.

Cybersecurity is also a growing risk that is on the minds of many manufacturers. As cyber attacks continue to grow – both in number and complexity – it's clear that no business is too small to be a target. To successfully move into the future and effectively compete, technology and cybersecurity investments must evolve in tandem.

At Grant Thornton, we have the privilege of serving manufacturers across the country and around the world. We've seen them face change head-on and transform challenges into opportunities. After reviewing the results of this year's Manufacturers' Outlook survey, and speaking with manufacturers face-to-face, it appears this trend will continue. And we look forward to supporting manufacturers as they boldly navigate through 2018 and beyond.

Jim Menzies
National Leader – Manufacturing Industry
Grant Thornton LLP

Message from SYSPRO Canada

SYSPRO Canada is proud to once again co-sponsor with Grant Thornton LLP, **PLANT** Magazine's Manufacturers' Outlook 2018 report, which surveyed almost 500 Canadian manufacturing executives about their business practices for the year, including outcomes and impacts, opinions and insights into the future of their industry.

Manufacturers are facing new obstacles and challenges to success. Yet despite globalization, increased competition and the growing uncertainty of trade flows, 44% of Canadian manufacturers are optimistic about their business prospects for 2018, while 50% are cautious about the future. Looking ahead at the next three years, optimism is still strong, but a little less so at 38%.

Paradoxically, manufacturing leaders are much less optimistic about Canada's economic growth (22%) and even less so about global potential (19%), although 43% see globalization as impacting their businesses in a positive manner.

Following the election of President Donald Trump, manufacturers have expressed some concern about the current state of US policies and trade agreements. More than half of those surveyed (54%) are very concerned about US protectionism, as are 45% who cited both the Trump Administration's impact on nation-to-nation relationships and the NAFTA renegotiation. Perhaps that's why 42% of respondents plan to invest more heavily in Canada as part of their future strategy for growth.

Growth is certainly top of mind based on their investment plans. Spending on machinery, equipment and technology is the first priority for 79% of executives with an average expenditure of more than $1.4 million. Other top priorities include training for 68% and R&D for 50%. Innovation is also key to their plans. Efforts are focused on products for 66%, processes for 65% and technology for 51% with spending averaging 4.9% of revenue.

SYSPRO Canada is dedicated to helping Canadian companies grow and prosper, and is excited to participate in the opportunities that lie ahead for manufacturers. As a global organization that serves leading manufacturing and distribution organizations around the world, SYSPRO feels strongly that Canadian manufacturers have limitless opportunity to establish themselves as global market leaders and anticipates their success in the coming year.

James Weir
Vice-President of Sales, SYSPRO Canada

Manufacturers' Outlook **2018**

CHALLENGE
Opportuni

IMAGE: GETTY

Manufacturers face uncertainties and turbulence with confidence

By Joe Terrett, Editor

It has been quite a year for manufacturers looking for some stability following last year's US election. On Nov. 8, 2016, the good people of the United States decided to shake things up and they elected Donald Trump president.

This opened the door to America First protectionism and an adversarial view of global trade punctuated by Trump's withdrawal from the Trans-Pacific Partnership; a possible end to the North American Free Trade Agreement (NAFTA); the threat of a border tax on exports to the US (now off the table); tax cutting policies that would divert investment from Canada to the US; and the rolling back of climate change and energy policies as the Trudeau government imposes them (thus creating another competitive disadvantage for the home team).

Yet with all the executive orders, dicey NAFTA negotiations and a tsunami of erratic tweets, much of the prophesied upset in the first year of the Trump regime has not materialized, although some conditions for manufacturers are still best described as uncertain.

And there are other significant factors at work. Advanced technologies plus other disruptive innovations are changing how manufacturers operate and serve their markets. Companies are urged to be in tune with Industry 4.0 and the smart factory, but how do they harness these technologies to take their companies into the future?

Despite all this uncertainty and change, the 495 owners and senior executives of mostly small companies (less than 100 employees) who responded to the **PLANT** Manufacturers' Outlook 2018 survey look at the year ahead with confidence, although they have some concerns.

How confident are they? Many senior executives (44%) are optimistic about their prospects, but 50% are more cautious about their outlook. And optimism declines as caution increases the farther out they look. Their view of prospects over the next three years shows 38% are optimistic (57% cautious) yet their view of the Canadian economy over the same period is much less confident at 22% (66% cautious). How they see the world economy is even less optimistic at 19% compared to 65% taking the cautious view. Globalization is seen as less of a threat. Most (43%) see it affecting their businesses positively, 21% negatively and the rest say it has no impact.

They have reason to be positive yet cautious about 2018. The Bank of Canada forecasts modest GDP growth of 2% while other economists aim somewhere north of that, with a US outlook of 2.1% and global outlook of 2.9%, although executives are concerned about protectionism and other policies south of the border.

Introducing the business leaders

But first, let's take a look at the entrepreneurs who participated in this year's survey.

RK Insights conducted the survey for **PLANT**, in partnership with sponsors Grant Thornton LLP, an accounting, tax and advisory firm; SYSPRO Canada, a provider of ERP software and services; and Machines Italia and the Italian Trade Commission. The margin of error is +/- 3.6%, 19 times out of 20.

Most of the companies (89%) are SMEs, of which 33% have 24 or fewer employees, and

2018 Manufacturers' Outlook Roundtable Panel

PANEL PHOTOS: STEPHEN UHRANEY

Front (seated): Jocelyn Bamford and Dina Ignjatovic. Table (L-R): Andrew Mitchell, James Johnson, Sunil Chand and Al Diggins. Back (L-R): Andy McFarlane, Brad Miller, Simon Drexler, James Weir, Doris Valade, Jim Menzies, David McPhail. Missing, Peter Howard.

39% are forecasting 2018 revenues of up to $5 million. Most (68%) are privately owned, and 15% of those firms are family owned or partnerships (4%). Just 25% are subsidiaries of a multinational company. Of the companies spread across Canada, more than half (56%) come from Ontario's manufacturing heartland, 24% from the West, 17% from Quebec and a little less than 5% from Atlantic Canada.

How do they see business growth in the year ahead? More than half (57%) forecast orders increasing by an average 12%, and 62% predict sales will be 13% higher. Forty-three per cent expect prices to increase 5% and 62% predict costs will increase 6% while 39% see profits rising 8%.

The survey drew 14 panellists representing manufacturers, industry analysts and providers of services to **PLANT**'s offices in Toronto on Oct. 17 as part of the 2018 Outlook roundtable, where they shared views on the results and the challenges manufacturers face in the marketplace.

Dina Ignjatovic, an economist with TD Bank who covers manufacturing, the auto industry, commodities and regional outlooks, kicked things off by confirming strong growth in manufacturing following a couple years

Jocelyn Bamford
Vice-President
Automatic Coating Ltd., Toronto
Manufactures coatings for industrial and consumer products.

Sunil Chand
Leader, National Cybersecurity Practice
Grant Thornton LLP, Southern Ontario
Accounting, tax and advisory firm. Manufacturers' Outlook sponsor.

Al Diggins
President, General Manager
Excellence in Manufacturing Consortium, Owen Sound, Ont.
Not-for-profit organization that helps manufacturers compete globally.

Simon Drexler
Director of Product
OTTO Motors, Kitchener, Ont.
Designs, manufactures and operates self-driving vehicles for industry.

Peter Howard
Vice-President, Sustainability
Pond Technologies, Markham, Ont.
Makes algae-based super foods utilizing carbon capture technology.

Dina Ignjatovic
Economist
TD Economics, Toronto
Provides analysis of economic performance with an emphasis on Canada, US states, Europe and Asia.

James Johnson
Senior Trade Analyst – Industrial and Capital Goods/Machines Italia Canada Project Manager
Machines Italia, Italian Trade Commission, Toronto
Sixteen Italian machinery manufacturing associations representing more than 10,000 companies. Manufacturers' Outlook sponsor.

Andy McFarlane
Operations Manager
Jervis B. Webb Co. of Canada, Hamilton
Manufactures materials handling equipment.

David McPhail
President, CEO
MEMEX Inc., Burlington, Ont.
Provides factory floor data communications and efficiency systems.

Jim Menzies
National Manufacturing & Distribution Leader
Grant Thornton LLP, Southern Ontario
Accounting, tax and advisory firm. Manufacturers' Outlook sponsor.

Brad Miller
CFO
AGNORA, Collingwood, Ont.
Fabricates architectural glass for the North American market.

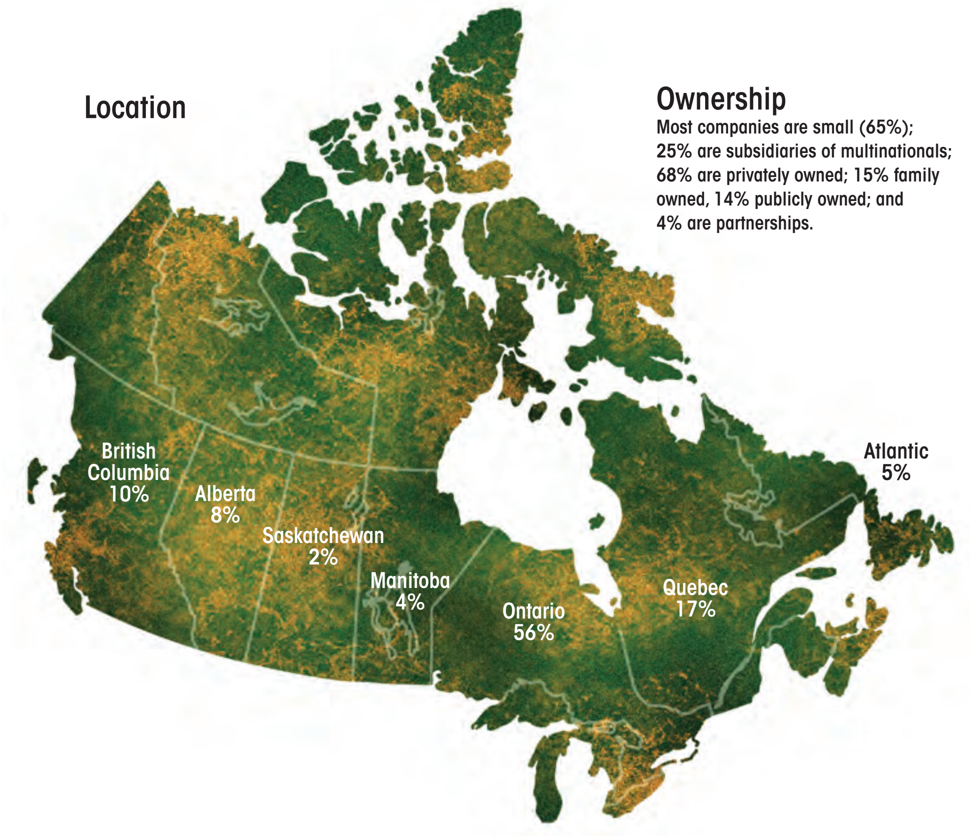
Andrew Mitchell
President, CEO
Select Food Products Ltd., Toronto
Manufactures a variety of sauces and condiments.

Doris Valade
President
Malabar Super Spice Co., Burlington, Ont.
Makes spices, seasonings and ingredients for Canadian meat and food processors.

James Weir
Vice-President, Sales
SYSPRO Canada, Mississauga, Ont.
ERP software and services. Manufacturers' Outlook sponsor.

Demographics

Location



Ownership

Most companies are small (65%); 25% are subsidiaries of multinationals; 68% are privately owned; 15% family owned, 14% publicly owned; and 4% are partnerships.

Revenue

	2016	2017	Forecast 2018
Up to $5 M	44%	41%	39%
$5 to $9 M	11%	9%	8%
$10 to $24 M	16%	17%	17%
$25 to $49 M	9%	11%	11%
$50 to $99 M	8%	9%	10%
$100 to $249 M	5%	5%	7%
$250 to $499 M	3%	3%	2%
$500 to $749 M	1%	1%	1%
$750 to $999 M	1%	<1%	<1%
$1 Billion or more	3%	4%	5%

Number of employees

1 – 24	33%
25 – 49	14%
50 – 99	17%
100 – 199	12%
200 – 499	12%
500 – 999	4%
1,000 or more	8%

Sectors served

Industry	Per cent
Fabricated metal products	24%
Plastics and rubber products	19%
Machinery	16%
Miscellaneous manufacturing	15%
Food and beverage	13%
Electrical equipment, appliances and components	10%
Printing and related support activities	9%
Wood products	9%
Primary metal	9%
Aerospace products, parts, components, systems	8%
Automotive products, parts, components, systems	8%
Computer and electronic products	7%
Petroleum and coal products	6%
Chemicals	6%
Paper manufacturing	5%
Other transportation, related equipment	5%
Furniture and related products	4%
Textiles	3%
Ship and boat building	3%
Other	3%
Durable goods industries	2%
Clothing	2%
Non-metallic mineral products	2%
Railroad rolling stock	2%

TOP: FOTOLIA

of softness.

"Machinery manufacturing has been the clear out-performer, although food, plastics and rubber, and computer and electronics manufacturing have also turned out a solid performance," she said.

Looking ahead, macro conditions support further growth from economic activity in both Canada and the US. And business investment in both countries is expected to grow at a solid pace, helping to underpin demand for machinery and equipment.

The Canadian dollar is expected to hover around US80 cents, which should bode well for US demand. Following growth of around 3% this year, manufacturing is expected to expand at a more moderate clip of 1.5% to 2% in 2018-19.

"On the flip side, auto manufacturing will likely be a weak spot, as production is scaled back alongside falling demand for some vehicles that are produced here, and a slowdown in overall US sales," she said.

Even so, she noted Canadian auto sales have been well above expectations and continue to grow thanks in large part to low interest rates, favourable financing and extended loan terms that are making purchasing so affordable. "As well, there is a lot of disruption in the industry and all the new technology that you see coming out in cars these days has kept consumers coming back to showrooms and looking at new cars. Back in 2010-11, Bluetooth wasn't standard in a car. Now every new car has it," Ignjatovic said.

Trends in Canada and the US have been a little bit different with the American market peaking and sales coming down after six years of growth after the financial crisis.

"But overall, I think the outlook on the sales side is good. This obviously translates into the production side," she said.

However, auto production in Canada faces a number of challenges. Much of the new OEM investment has migrated to Mexico and southern US states where governments are providing a lot of incentives for automakers to open up, expand or retool plants.

"Canada hasn't really been competitive on that front until the last couple of years," Ignjatovic said. With a Canadian dollar that lingered at almost parity with the US currency looking like the new normal, automakers questioned whether or not they should invest in Canada. But then oil prices plunged, hence the US80 cent loonie. She warned a low dollar might not last if oil prices rise again, though.

Yet there are still opportunities within Canada's auto sector thanks to the new technologies that are coming along.

"We have a skilled labour force, we have strong engineers here," said Ignjatovic. "If you look at it from that perspective, there is a lot of opportunity to grow because that is the way the industry is going."

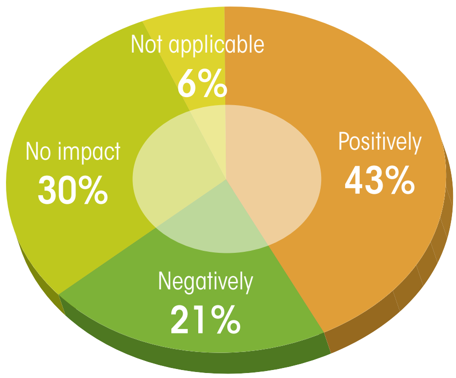
How important is automotive to the Canadian economy? Very. It's Canada's largest manufacturing sector, accounting for about 10% of manufacturing GDP and 15% of merchandise

Business outlook

Business confidence

	Optimistic	Cautiously Optimistic	Not Optimistic
Business prospects for 2018	44%	50%	6%
Business prospects over the next three years	38%	57%	5%
Canada's economic growth next three years	22%	66%	12%
Global economic growth next three years	19%	65%	16%

Globalization's effect on business



Business growth 2018

	Increase	Decrease	Same	% Change
Orders	57%	8%	36%	12%
Sales ($)	62%	8%	30%	13%
Your pricing	43%	10%	48%	5%
Profits	39%	21%	40%	8%
Costs	62%	8%	30%	6%

Issues of concern

	Very concerned	Somewhat concerned	Not concerned
Trump's impact nation-to-nation relationships	45%	44%	12%
Rising global protectionism	35%	55%	10%
US protectionist policies	54%	38%	8%
Renegotiation of NAFTA	45%	43%	12%
Border Adjustment Tax	44%	45%	11%
US corporate tax of 20%	27%	37%	36%
Softwood lumber dispute	32%	37%	31%
US exiting Paris Accord	29%	34%	37%
Anti-globalization impacting trade flows	25%	58%	18%
Trudeau government's climate change measures	36%	36%	28%
Free trade agreement with China	30%	48%	23%

Entering new markets over the next three years

United States	29%
Canada	26%
Western Europe	13%
Mexico	12%
Other Central/South America	12%
Central/Eastern Europe	9%
China	9%
Brazil	7%
Other	7%
Australia/New Zealand	6%
Japan	4%
India	4%
Korea	3%

Revenue by country

Canada	62%
United States	36%
Other	14%
Mexico	13%
Western Europe	11%
China	11%
Central/Eastern Europe	10%
Japan	7%
Other Central/South America	6%
India	5%
Australia/New Zealand	5%
Brazil	4%
Korea	4%

We have a skilled labour force, we have strong engineers here. If you look at it from that perspective, there is a lot of opportunity…

— Dina Ignjatovic

Skills gaps

- 42% General labour
- 39% Production/production support
- 27% Sales/marketing/customer support
- 27% Engineering
- 22% Management
- 15% R&D
- 11% IT/cybersecurity
- 7% Digital/social media
- 4% Skilled labour/skilled trades
- 3% Other
- 10% Not applicable

exports. And it, like other segments of Canadian manufacturing, is caught up in the protectionist trade turbulence created by the Trump administration.

Automotive's supply chain is intricately woven throughout North America and characterized by multiple border crossings running on just-in-time schedules. As of this writing, the NAFTA renegotiation was not going well, with the US looking for 5% North American content in each vehicle, 50% of it from the US, and an automatic termination after five years unless the partners agree to extend it. These demands are unacceptable to Canada, Mexico and the automotive industry.

The Trump factor

Of course, much of the NAFTA antics transpired after the Outlook survey was pulled from the field in early September. At that time, respondents were already either very or somewhat concerned about what's going on in the US. Protectionism worried 92% of executives, followed by rising global protectionism (90%), Trump's impact on nation-to-nation relationships (89%) and the NAFTA renegotiation (88%).

Their concerns, particularly as they pertain to trade, are warranted. Companies continue to derive most of their revenue from North America: 62% comes from Canada, 36% from the US and 13% from Mexico, while Europe accounts for 21%, China 11%, Japan 7%, and less from all other markets. Looking ahead three years, North America is still the preferred region for market expansion (29% to the US and 26% to new markets in Canada), followed by Europe (22%), Brazil and other Central and South America (19%), Mexico (12%) and China (9%).

What's holding them back from expanding their exports beyond North America? Thirty-seven per cent identified competition, difficulty identifying opportunities (28%), transportation and logistics issues (26%), finding international partners (22%), trade barriers and protectionism (20%) and

Business outlook

Challenges over three years

Controlling/reducing costs	**66%**
Pressures on pricing	**53%**
Improving productivity	**49%**
Value of the Canadian dollar	**48%**
Skills gaps, management/employees	**44%**
Increasing sales/orders	**43%**
Gaining market share	**41%**
Entering new markets	**38%**
Investing in new machinery, equipment, technology	**38%**
Developing new products	**36%**
Economic conditions	**30%**
Production capacity	**26%**
Government red tape, associated costs	**24%**
Environmental regulations/costs	**22%**
Disruption in your industry sector	**17%**
Access to credit/financing	**11%**

I think regardless of what happens to NAFTA, there are other levers that the US can pull to make it much more difficult to get stuff across the border, such as more frequent inspections...

— Andrew Mitchell

currency fluctuations (20%).

Any change to NAFTA or its end will impact manufacturers, some more than others. For panellist Andrew Mitchell, president and CEO of Select Food Products Ltd. in Toronto, the impact would be limited. The company makes sauces and condiments, some of them destined for the US. "I think regardless of what happens to NAFTA, there are other levers that the US can pull to make it much more difficult to get stuff across the border, such as more frequent inspections. That would really hamper our ability to do business with retailers in the US."

A disruption to the treaty would be more serious for Andy McFarlane, operations manager for Jervis B. Webb Co. of Canada. The Hamilton company makes materials handling equipment, some of it for the automotive industry.

"We typically ship 75% of our product into Michigan so it's definitely going to hurt us, if that's the way it goes. The

Revenue constraints

Competition	37%
Difficulty identifying opportunities	28%
Transportation/logistics issues	26%
Finding international partners	22%
Trade barriers: protectionism/tariffs	20%
Currency fluctuations	20%
Lack of internal resources/expertise	19%
Managing risk	18%
Government policies	18%
Lack of market demand	15%
Global sourcing/supplier issues	10%
Growing opposition to global trade	8%
Other	5%
Not applicable/no constraints	20%

Shifting operations/investment to the US (64 replies)

High costs in Canada	67%
Closer to customers	50%
Tax reform, including lower corporate taxes	47%
Avoid issues re: tighter border	42%
Concern about a border adjustment tax	34%
Protectionist policies/measures	34%
US tax/cash incentives	28%
More relaxed environmental/ climate regulations	19%
Other (specify)	4%

NAFTA investments

42%	Invest in Canada
18%	Hold off on investment in Canadian operations
10%	Make any new investments in US rather than Canada
6%	Move current Canadian operations to the US
4%	Make any new investments in Mexico rather than Canada
35%	Not applicable

automotive business has been growing. How do we keep competitive in that market?"

For David McPhail, president and CEO of MEMEX, a provider of data-driven smart manufacturing technology based in Burlington, Ont., the uncertainty created by Trump policy plans has held up orders and tossed growth projections out of the window.

"I think what Trump did for our business this year was to play around at 3 a.m. with tweets about changing the capital cost allowance. What does that do for a profitable manufacturer in the US? Because 90% of our technology is exported, what happens is they sit on their chequebooks. They say, 'Well, if they're going to change the US tax code, I'll write off the entire capital cost of a project in the fiscal year that I incur the expense, so I'm just going wait.'"

Brad Miller is CFO of AGNORA, a fabricator of innovative architectural glass in Collingwood, Ont. that exports to the US. He said uncertainty and the complications that may arise at the border even before anything is decided about NAFTA are prompting the company to think about how to adapt. "When we talk about potential expansion, do we need to go into the US now before something official happens?"

Simon Drexler, director of product for OTTO Motors in Kitchener, Ont., a manufacturer of self-driving vehicles for materials handling, says the situation likely isn't as dire as depicted in the media. "The worst-case scenario is that [Trump] says, 'Okay, we're going to walk away,' and it has to go to [Congress]. It's very unlikely [Congress] would blow up NAFTA because a majority of the states rely on Canadian goods to do business."

"The uncertainty is something that we need to try to filter," said Jim Menzies, national manufacturing leader for

Grant Thornton LLP, an accounting, tax and advisory firm and Outlook sponsor. He noted the President's tendency to make public statements that don't necessarily come to pass. "It's also important to realize that trade is a two-way arrangement. If you just look to the automotive industry, there's typically at least $70-billion in goods that go back and forth between Michigan and Southern Ontario in any given year. Those are big numbers that I think the US administration is very aware of."

What does Canada look like without NAFTA? Ignjatovic said the fallback would be the Canada/US Free Trade Agreement.

A bilateral deal is also possible although she said Canada would still push – for supply chain reasons – to have Mexico included in any agreement. Another option is more trade with the UK, which is in the process of extracting itself from the EU.

"There will be disruption, and I don't think anyone's for that," she said. "Automotive is one industry that stands to suffer. And I think that even the automakers in the US are not for this. There's a lot of industries Trump says he's trying to help that actually are on the ground saying, 'No, this isn't going to work.'"

Menzies believes an end to NAFTA will force manufacturers to enter other markets. "Venturing outside of the US is something that many believe Canadian manufacturers have not taken full advantage of. I think that will force our hand a little bit."

Does a TPP-11 offer any value? Ignjatovic said it could be used as the basis for a re-negotiated NAFTA because it addressed more non-tariff barrier issues than the current North American deal. "We don't know what's happening behind closed doors but that could be something that they're looking at."

The NAFTA turmoil is a wake-up call for all manufacturers that the reliability of the US market can change, said Doris Valade, president of Malabar Super Spice Co. in Burlington,

Venturing outside of the US is something that many believe Canadian manufacturers have not taken full advantage of. I think that will force our had a little bit...

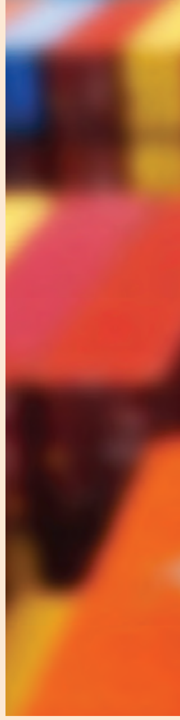
— Jim Menzies

Trade

Export for growth

Look beyond North America

By Kim Laudrum



If you want to catch fish, you have to go where the most fish are.

It's an old adage that Canadian manufacturers should pay attention to if they want to position their companies for growth, says Mitchell Osak, managing director of strategic advisory services with Grant Thornton LLP.

Given increasing threats of trade protectionism in the US and anti-globalization headwinds, it's time to get serious about exporting beyond traditional markets. Why? "General growth levels in Canada have slowed," Osak says.

Canada's galloping 4.5% rise in GDP levels in the third quarter this year put it in the lead among G7 countries. But growth has since slowed to an expected 3% for the year. Respectable these days, yes, but hardly what most entrepreneurs would expect for their own companies.

On the other hand, emerging markets in India and China are experiencing more than double Canada's growth. India's GDP growth is on track to reach 7.2% while China should see 6.7% this year, according to the International Monetary Fund. And the pace is expected to continue.

Britain post-Brexit also holds potential for Canadian manufacturing exporters.

"Opportunities abound for Canadian manufacturing," Osak says. "Positioning for growth is a good reason to put in place an emerging-market exports strategy."

Risk avoidance is another good reason to diversify beyond traditional markets, Osak says. Seventy-five per cent of Canada's exports are destined for the US. That's a lot of eggs in one basket.

Trade relations at the moment with our neighbour to the south are unpredictable. As an example, look at the introduction of a 219.63% penalty announced by the US Commerce Department's International Trade Administration against Bombardier, Canada's aerospace leader, and the firm's C-series of jets. ITA levelled an additional 79.82% tariff

Look beyond traditional markets for growth. IMAGE: FOTOLIA

against Bombardier jetliner purchases made by Delta Air Lines, bringing the total order penalty to 300%. These are whacky days.

To combat tariffs, protectionist policies such as Buy American, uncertainties stirred up by NAFTA renegotiations and other barriers to trade in the US, diversification makes sense.

Identify opportunities to export your product. Do your due diligence. "Measure twice, cut once," Osak says. "Be prudent, smart and analytical to find the opportunity that's best for your company and your product."

What steps can manufacturers take to develop business with other countries?

Get detailed knowledge of the target market, including its customers, local and foreign competitors, and trade and local regulatory requirements.

Look at best practices from other companies' experiences, with both similar and different products, including what worked and what did not work.

Tap local contacts that can provide intimate knowledge of the market and culture, as well as connections with potential clients, channel partners and important government agencies, for approvals.

To exploit opportunities consider establishing a foreign office or partnering in a joint venture to get around tariffs and barriers. It appears Bombardier has done this now with Airbus to build some of the C Series jetliners at a plant in Alabama.

Also take advantage of existing technologies to market some products directly. Osak cites Alibaba as an example. It has a massive e-commerce platform that you can use to sell into Asia or source foreign-language suppliers, such as graphic designers or software code writers. And now Japan has an Amazon site.

"You are getting a rich source of analytics when you use e-commerce platforms like these," Osak says. "We're a big believer in leveraging existing technologies to help with every aspect of the business, from marketing to manufacturing, developing new products, and gaining access to data about your customer."

Many countries now have a sophisticated technology infrastructure, which makes it easier for Canadian firms to gain a foothold in emerging markets, Osak says. "Your ability to sell to Kenya or Nigeria through e-commerce is just as good as it is here in Canada."

Technology plays a huge role in helping businesses expand their markets worldwide. With globalization there is a move to crypto currencies such as bitcoin. "In a bitcoin-powered world payments and commerce becomes seamless," Osak explains. "Blockchain is another technology that helps overcome accounts receivable headaches."

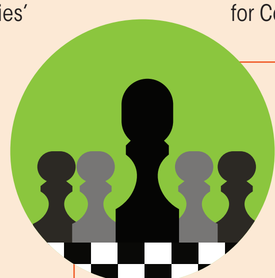
Osak doesn't understand why 37% of respondents to the Outlook 2018 survey said they might not be able to win in foreign markets based on price or delivery. He suggests they look to new technologies to help make them more competitive.

"The Industrial Internet of Things (IIoT) and Industry 4.0 are focused primarily on improving operations first and foremost," Osak pointed out.

These would help manufacturers become more competitive by improving their prices, distribution, delivery and ultimately their exports.

"Digital supply chain analytics allows manufacturers to automatically shift production at the plant. This can help with inventory management, scheduling production, reduce time delays from suppliers to OEMs, and it enhances risk management," Osak says.

What if there's no NAFTA? Osak is not worried. "We traded a lot with the US before NAFTA. There's no doubt the type of trade might change in the short run, but not in the long run." He cites well-established trade routes, services,



How to combat trade barriers

1. Understand what barriers exist and how they might affect the business. Policies can be as disruptive as tariffs.

2. Make sure the juice is worth the squeeze. Analyze what could be gained by making a strategic investment. Grant Thornton is paying close attention to that while Britain negotiates Brexit.

3. Are your products and services as competitive as they can be? Higher costs could destroy you if you can't pass them along to your customer.

4. Be proactive in changing your go-to-market export strategy. You might have to do value-added manufacturing or something in local markets to get around market tariffs.

There are lots of opportunities for companies that are not already in Europe, and particularly the 22% that are planning to expand into the market...

— James Johnson

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infrastructure and a long history of north-south commerce.

Meanwhile, NAFTA negotiations could force manufacturers to double-down on technology and become more competitive.

"Diversifying markets outside of the US and Mexico is a good thing in and of itself," Osak says, even if NAFTA remains intact.

Where can manufacturers get help to access export markets?

- Global professional consulting services firms whose operations, offices and experts span dozens of countries;
- Canadian trade commissions in some countries and government agencies such as Export Development Canada; and
- leveraging friends and families who hail from or live in those regions.

Canadian manufacturers make quality products needed by customers around the world. Gaining access to those markets might take some ingenuity, but it's worth it. The world is your oyster.

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Ont. Her company makes spices, seasonings and ingredients for Canadian meat and food processors. "Because we import a lot of our single ingredients and spices, we've added 10% to 14% to our bottom line as a result of CETA (Canada-European Union Comprehensive Economic and Trade Agreement) and the removal of tariffs. That agreement has been a huge benefit for us. We must not overlook what we can do as a country worldwide."

The EU is the second largest economy and Canada's second largest trading partner after the US, as well as the second largest importing market for goods. With CETA, 98% of EU tariff lines became duty-free, and an additional 1% will be eliminated over a seven-year phase-out period.

James Johnson, senior trade analyst for the Italian Trade Commission (an Outlook sponsor) and the Canada project manager for Machines Italia, noted European tariffs were as high as 20% to 25%, and higher for some products. "There are lots of opportunities for companies that are not already in Europe, and particularly the 22% that are planning to expand into the market."

Growth strategies

Indeed, survey responses point to some vigour among companies that intend to invest in their businesses. Strategically, machinery, equipment and technology top the list for 52%, followed by innovation (49%) and introducing new products (45%).

In line with Ignjatovic's observations, investment priorities are machinery, equipment and technology for 79%, training (68%), R&D (50%) and productivity projects (45%). Those investing in machinery, equipment and technology over the next three years are split (27% each) on spending up to $99,000 and $100,000 to $499,000. Average spending is more than $1.4 million.

There will be no spending on expanding, upgrading or building new facilities for 35% of respondents, but 24% will invest up to $100,000 and 21% plan to spend $100,000 to $499,000. Twenty-two per cent have recently completed expansions but 22% will not be doing so because of the cost of replacing older equipment.

Most companies (72%) intend to finance growth with internally generated cash flow, followed by bank financing (35%) and government programs (17%).

When linking strategy deployment to the budgeting process, 34% say key strategic projects and major capital items are included in the budget; 33% say budget development is integrated with the strategy planning process; 23% note changes to the plan trigger revisions to the organization and department budgets as required; and 10% say department and key strategic projects are included in department budgets.

Senior executives were also asked to describe how they develop strategy and planning. Forty-seven per cent said their plans are developed and refined through the year as needed; 27% develop plans within the organization; and 18% have formal process of strategic planning tools and third-party data assessments. Only 8% develop plans to implement strategies using a formal process of planning tools, third-party data and assessments.

Top challenges

Controlling and reducing costs over the next three years continue to be the chief challenges identified by 66% of manufacturers, followed by pressures on pricing (53%), improving productivity (49%), value of the loonie (48%), filling skills gaps (44%) and increasing sales (43%).

The greatest skills gaps are in general labour (42%), production and production support (39%), sales/marketing/customer support, and engineering (both 27%).

Most companies (42%) plan to invest in Canada, but 18% are holding off and 10% intend to make new investments in the US rather than Canada. Of those turning to the US, 67% cite high costs in Canada and 50% want to be closer to customers.

Some of those high costs flow from government policy, which prompted Jocelyn Bamford to form the Coalition of Concerned Manufacturers.

"That was as a result of seeing some provincial and now federal policies that aren't supportive of the business and manufacturing environments. Our purpose is to make sure governments understand that nothing happens without business," she said.

Bamford is vice-president of Automatic Coating Ltd., a manufacturer of coatings for industrial and consumer products that she runs with husband Brad, who is president.

She cited the high cost of electricity in Ontario and now the province's new workplace legislation (Bill 148, the Fair Workplaces, Better Jobs Act 2017), plus the cascading effect raising the minimum wage to $15 per hour (by 2019) will have on payrolls as prompting some manufacturers to consider packing up and moving.

Add to that federal government plans to dramatically change they way it taxes small business owners by restricting them from sharing income with family members, hiking taxes on some investments, and making it more difficult for

There are so many people in our coalition right now that are saying, 'I'm not going to grow here'…

— Jocelyn Bamford

Environment

Have recent moves by federal and provincial governments raised the priority level of your company's response to climate change

23% Yes **52%** No **25%** Not Applicable

Are carbon reduction measures part of a formal business strategy?

15% Yes **20%** Working on it **20%** Applying informally **44%** No

Priorities for managing environmental impact

80%	Reduce waste, scrap
59%	Increase energy efficiency in facilities and production
38%	Water use
29%	Engaging employees in the development of sustainability measures
27%	Measure and reduce emissions
27%	Respond to regulatory restraints on operations
21%	Include green efforts and community engagement in the business plan
15%	Manage impact of products through the value chain
7%	Mitigate operational risk related to climate change
1%	Other
8%	Not applicable

entrepreneurial families to transfer their businesses to sons and daughters. (The Trudeau government has since clarified and retreated from some of these proposed changes).

"There are so many people in our coalition right now who are saying, 'I'm not going to grow here. I'm going to open a distribution plant in the US. Or I'm going to build a secondary plant in the US,' just because of energy pricing."

The Wynne government's workplace reform moves in Ontario are forcing companies like Select Food Products to drive productivity gains by investing in automation.

"Perversely, more people will be out of work and they'll be the low-skilled people who are basically going to be unemployable," said Mitchell. "But the other thing that will happen is companies that are unable to compete will either go out of business or be bought by stronger companies and integrated."

Bamford predicts an unintended consequence of escalating costs in Ontario. "People, especially those with family businesses, if they aren't going to make a profit, they're saying, 'I'm out.' And we're going to see a huge shift in the supply chains, specifically in the automotive industry and in other areas where people are starting to sell their business to multinationals."

She criticized the Wynne government for making policy without adequate study or due diligence. This led to some discussion about manufacturing needing a more unified focus.

"The thing that's really missing in Ontario and Canada is leadership from the top," said Drexler. "There's no vision of what manufacturing is in Ontario and what it should be, which leads to a lack of direction for investment, commitment to technology and investment in programs."

Valade observed common concerns across all sectors of manufacturing. "When I listen and get involved in different associations and roundtables, I find that each manufacturing sector has its own movement. We're repeating all the same

"There's no vision of what manufacturing is in Ontario and what it should be, which leads to a lack of direction for investment, commitment to technology and investment in programs…"

— Simon Drexler

Strategy

Priorities for managing environmental impact

52%	Invest in machinery, equipment, technology
49%	Innovation (products, processes, technology, management)
45%	Introducing new products
42%	Sell more to current customers
36%	Scale up operations
29%	Hire employees
29%	Expand sales and distribution channels
24%	Mergers and acquisitions
24%	Strengthen supply chain links and relationships
23%	Business model transformation
23%	Collaborations, alliances, joint-ventures, partnerships
22%	Focus on opportunities in North America
17%	Diversify industries served
16%	Enter new export markets
14%	Sell more to adjacent markets
9%	Online channels, use of social media
1%	Other

concerns and not getting as far as we could if there was one voice."

In Ontario, the cost of electricity is a major issue for many manufacturers, among them the members of the Coalition. A major complaint is the global adjustment that's tacked on to the hydro bill to cover Ontario's renewable energy commitments.

For Bamford, a $35,000 monthly bill could be $3,000 for the electricity, $25,000 for the global adjustment and the rest for other charges, such as delivery.

The Wynne government has attempted to mitigate high costs by extending eligibility for the Industrial Conservation Initiative (ICI), allowing smaller-scale industrial consumers to pay the

Strategy linked to budget

- **34%** Key strategic projects and major capital items to support strategy are included in the budget.
- **33%** Budget development is integrated with the strategy planning process.
- **23%** Changes to the plan trigger revisions to the organization and department budgets, as required.
- **10%** Department, cross-department, and key strategic projects are included in department budgets.

Strategy for development and planning

- **47%** Plans are both developed and refined throughout the year, as needed.
- **27%** Annual plans are developed within the organization and selected departments using existing company data.
- **18%** A formal process is in place to develop plans using various measurement tools and performance analysis.
- **8%** Plans are developed to implement the strategies using a formal process of strategic planning tools, third-party data and assessments.

Financing next three years

72%	Internally-generated cash flow
35%	Bank financing
17%	Government programs
15%	Private investors (owner, family, etc.)
13%	Asset-based financing
10%	BDC
9%	Private equity
8%	EDC
7%	Leasing
2%	Public offering
1%	Subordinated/mezzanine debt
1%	Other
8%	Not applicable

global adjustment based on their percentage contribution to the top five peak demand hours over a 12-month period.

But the Coalition contends the change is of little worth because most mid-sized manufacturers don't meet the 500,000-kilowatt threshold.

"ICI really only works if you're running flat out three shifts, 24 hours. Our company did qualify to become Class A, but when Toronto Hydro looked at our two-shift operation, it said we could apply for the ICI but it would be $25,000 more a year. So for most SMEs, there is absolutely no relief for hydro prices. We could have told them that, if they had sat down with [manufacturers]."

Finding the people with the right skills continues to be a concern for 44% of executives. It was fifth on the list of challenges they face over the next three years, and another issue panellists felt was not adequately addressed by governments.

There's no significant engagement at the federal level while the provinces do their own thing, Valade noted, approaches she sees as doomed to failure. "When you look at the European models, and Germany being a leader, every job is considered a skilled trade. If we brought all of [them] under [one] umbrella we could elevate what skilled trades means in Canada."

Skilled trades is an area Jervis B. Webb has tackled. McFarlane agreed governments don't do enough. "We had

We're repeating all the same concerns and not getting as far as we could if there was one voice…

— Doris Valade

to take it on ourselves in the last year. I've actually gone from maybe 1% to almost 10% of a skilled workforce now in apprenticeship programs because I have no choice."

Valade thinks company programs should be mandatory. "Every company should understand the value, and until they do, combined with strong government support, Canada as a manufacturing country will not succeed." And there continues to be a lack of information, marketing and understanding about manufacturing in the home and within the educational system. She said awareness has to begin earlier – at the elementary level. "I co-chaired a roundtable and a council in Burlington back in 2001. The same concerns we discussed in 2001 still exist today. How sad is that?"

Although colleges are engaged in skills fulfilment, Al Diggins agrees manufacturers also bear some responsibility. He is the president of the Excellence in Manufacturing Consortium (EMC), which is working to better align the needs of industry with post-secondary curriculum. Its Manufacturing GPS is a massive, live database that involves 200 post-secondary institutions. "Hopefully they are listening to what manufacturers are saying so they can start designing programs ahead of time."

But much depends on delivering the kids. "They're not interested," Diggins said. "Most kids are generalists, they have ball caps on and they want the world at their feet. We've got a lot of work to do with parents."

Peter Howard identified another issue. He's the vice-president of sustainability for Pond Technologies in Markham, Ont., which makes algae-based super foods and other products utilizing carbon capture technology. The company hires a lot of electronics technicians and engineers, but finding the technicians is becoming very difficult. Engineers are no longer getting technical training. "You have engineers graduating from the top schools who don't really know which way to turn a screwdriver. Combine that with the shortage of people who understand enough simple computer technology to install some of the things that come out of the engineer's mind. It's a concern."

That leads to an interesting point. Automation and advanced technologies may be transforming the skills needed in industry, but as Sunil Chand noted, you still need people who understand the steps required to manufacture a product, especially in a digital world where there's a growing risk of cyber-tampering.

"How do you know if you're depending 100% on technology to manufacture something, that it's done right all the time? If somebody has tampered with your technology and taken something off spec, you may not be aware unless there's a human variable in place to detect and investigate the anomalies when they occur," said Chand, leader of Grant Thornton's national cybersecurity practice.

Automation doesn't necessarily mean a lot of lost jobs. Accountants didn't disappear when computers were brought into the workplace. They became analysts, Drexler said. "The same thing is going to happen in manufacturing. When you have more data coming from your factory floor, you're going to analyze it, understand how to improve it, look for patterns, look for trends and make improvements based on that feedback. It's a transformation that happens over time."

And there's another aspect to consider: redeployment of workers. "I see it all the time in the Kitchener-Waterloo area and I see it in almost every company that I come across: 'We're trying to grow our business, we're trying to grow our plant. We can't get enough resources. We want the automation to do 40% of Joe's job so I can take 40% of Joe and make him do a value added task.' And that's really the investment."

Maybe so, but there will be some job casualties. When Mitchell acquired Select Food Products from a third generation family ownership, it was run under a maintenance strategy. There wasn't a lot of reinvestment in the latest and greatest technology, leading him to conclude a massive upgrade to the manufacturing line was in order. And there will be an investment in another production line that will increase throughput and efficiencies but decrease the head count.

"The people we need to maintain and run those systems have a completely different skill set from the current people.

I've actually gone from maybe 1% to almost 10% of a skilled workforce now in apprenticeship programs because I have no choice...

— Andy McFarlane

Investment

Investment plans over three years

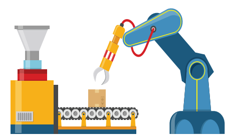
79%	Machinery, equipment, technology
68%	Training
50%	Research and development
45%	Productivity projects
30%	Upgraded, new plant facilities
28%	Business intelligence, data analysis systems
17%	Digital transformation
15%	Sustainability, reduce carbon footprint
7%	No investments planned

New machinery, equipment, technology

	2016	2017	2018
Up to $99,999	26%	29%	27%
$100,000 to $499,999	29%	26%	27%
$500,000 to $999,999	8%	8%	11%
$1,000,000 to $4,999,999	10%	11%	12%
$5,000,000 to $9,999,999	3%	3%	4%
$10,000,000 to $19,999,999	0%	2%	2%
$20,000,000 or more	0%	1%	1%
No significant investment	22%	20%	18%
Mean	**$1,040,344**	**$1,366,828**	**$1,426,125**

Reasons for not investing

22%	Recently completed significant investments
22%	Too costly to replace older equipment
19%	Weak market demand
16%	Shortage of qualified staff
15%	Depreciation of the Canadian dollar
11%	Excess production capacity
8%	Government policies
4%	Other
35%	Not applicable



Plant expansion, upgrades, new facilities

	2016	2017	2018
Up to $99,999	32%	29%	24%
$100,000 to $499,999	20%	21%	21%
$500,000 to $999,999	4%	7%	8%
$1,000,000 to $4,999,999	7%	6%	9%
$5,000,000 to $9,999,999	1%	2%	2%
$10,000,000 to $19,999,999	1%	1%	1%
$20,000,000 or more	1%	2%	1%
No significant investment	36%	33%	35%
Mean	**$827,146**	**$1,096,023**	**$1,015,924**

Hopefully they [post-secondary institutions] are listening to what manufacturers are saying so they can start designing the programs ahead of time…

— Al Diggins

The unfortunate side effect is that not everyone in our company is going to make that journey with us. And my concern is, what will those people do?"

Drexler participated in a roundtable that involved tech innovators who agreed they have a role to play in retraining. He described it as a social responsibility. Using OTTO Motors as an example, it could teach people about self-driving vehicles and how to repair them. "Why couldn't a lift truck driver, or someone who is a general labourer not join that training session? Most companies building new technology have infrastructure in place. It's really just a matter of opening it up and [providing incentives]. How we justify that business investment is the challenge."

Improving productivity

Globally, manufacturing is being transformed by the evolution of the smart factory. It's all part of Industry 4.0, which includes automation and data exchange, cyber-physical systems, the Industrial Internet of Things (IIoT), the cloud and cognitive computing.

Of those who are applying advanced technologies to improve productivity, 60% employ CAD/CAE/CAM; 57% custom manufacture; 42% use automation technology; 35% computerized processing, fabrication and assembly technologies; and 23% use control technologies and systems to monitor processes in real time. Twelve per cent do not utilize any of the listed technologies.

Yet Canadian companies are under-employing much of the smart technology that their global competitors are applying to advance their businesses.

Most companies recognize the importance of productivity improvement: 90% are providing or intend to provide employee training over the next 12 months; 74% have (or intend to) develop a productivity improvement strategy, 71% will invest in automation technologies and 59% plan to implement lean, Six Sigma and continuous improvement strategies and most (68%) are not planning to outsource support roles or production. But 59% are not implementing digital transformation technologies. Shop floor production equipment and operations data are mostly collected, analyzed and reviewed manually (46%), while 36% use automatic collection methods and 18% don't measure.

IIoT connects and optimizes machines through the use of sensors, advanced analytics, business intelligence and decision-making.

Survey results reveal only 9% of respondents are applying IIoT technology while 20% are in the process of evaluating its relevance, but 33% aren't familiar with its capabilities.

Of those applying IIoT, most (21%) are doing so to improve efficiency and productivity, and 11% to provide more visibility into their production processes.

The biggest obstacles to deploying IIoT are not knowing how to start (36%), lacking knowledge about the technology and how it would apply to operations (34%), it's too costly to upgrade machinery, equipment and systems (26%) and concern about exposure to cybersecurity threats (15%).

"Canada is at a deflection point where we can pick up the ball and start to lead our companies into the fourth industrial revolution, or we're going to get left behind, said Drexler, who does a lot of presentations about 4.0. "There really is no in-between…It's about centralized operational data and being able to really bring it in from the shop floor so you can truly understand what's happening and make a specific investment to improve your business."

Germany is a 4.0 leader and Italy has recently implemented a program that encourages investment in 4.0 technologies.

"Somebody at some point figured out the manufacturing does not happen by itself," said Johnson who referenced Italy's hyper amortization program. It allows 250% depreciation of high tech purchases related to 4.0, such as 3D printers, scanners, nanotech, big data, robotics and smart materials. Super amortization allows 140% on capital goods. Investing

We haven't done a good job inspiring people to go from thought to action. We haven't even inspired them to have the thought piece, let alone action…

— David McPhail

Ready for an attack?

Six ways to mitigate the risk

Good cyber hygiene strengthens relationships with customers and suppliers. IMAGE: FOTOLIA

By Kim Laudrum

Most Canadian manufacturers are concerned about the threat of cyber attacks, according to the **PLANT** Manufacturers' Outlook 2018 Survey. Yet almost half say they are not prepared to handle the risk of a breach.

"Once you install digital technology – which manufacturers will have to do to remain competitive – you have to protect your company from risk," says Sunil Chand, director of cybersecurity, Grant Thornton LLP.

A little more than half of the Outlook 2018 respondents (53%) have plans in place to combat a breach or loss of proprietary data, personal or financial information. About half (52%) can weather a phishing attack.

But most respondents are not ready to fight off risks from data encryption, ransom of operations, or control of their financial information, management or communication systems. A breach through a third party vendor or an external targeted cyber attack would find most manufacturers vulnerable.

How serious could a breach be?

"The costs could be astronomical if it affects production," Chand points out. "Using Industry 4.0 or any network to automate production provides manufacturers with tremendous opportunities. But understand the technology can pivot. The company could then be open to competitors or malware that could damage the company's systems."

Chand cites a breach at Target in 2013. The American retailer was careful about its "cyber hygiene," yet confidential customer information, including credit details, was accessed externally by the breach. The recovery cost is $500 million and climbing. How did it happen? An HVAC supplier's network credentials were compromised.

It's far less costly to be proactive than to think about what should have been done after a breach.

The loss of important data and analytical capability could negatively affect management's ability to make informed decisions. And a breach could disrupt supply chains. "If you can't protect your supply chain, customers will lose faith in you. A cyber breach affects your ability to deliver," Chand says, and that can have a huge impact on business relationships.

"Your cyber hygiene is important to everyone in your supply chain. It can be a hurdle to get over but if you are proactive and develop a solid cybersecurity profile, it will help grow your business," Chand says.

From a marketing perspective, having a cybersecurity profile is not just a differentiator. Chand says it's a determining factor in awarding contracts. This is especially true in the automotive sector where one-hour delays for parts are not tolerated.

Manufacturers need to think about what could happen to disrupt production. "How do you ensure patented parts remain confidential? How do you make sure no one changes specs on the production line without appropriate approvals?"

Here are six ways to mitigate cybersecurity risk:

1. Understand what and where your business assets are. A manufacturer's assets are not just brick and mortar. They are people, knowledge, processes and technology. A technology that supports 60% of your prospects is a significant part of your business. Think about data. Think business processes.

2. Scan and patch IT systems regularly. Use penetration testing and technical testing of systems and data as often is necessary. Patch holes in technology on a regular basis.

3. Back up your systems. Do it regularly and test systems so you know they're working. If you encounter a ransomware attack, go back to the source of the last truth to recover.

4. Enable what you need; disable what you don't need. When you deploy systems to support manufacturing operations, who, for example, needs to have access to what machinery and the systems that control it?

5. Train your employees to be human firewalls. The top reason for breaches? People did not apply patches. How do hackers get in? Often

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someone clicked on a suspicious link or a system isn't patched when it should have been. Train your employees. Identify who needs to know what, when and where. For example, train accounts payable staff to be skeptical of e-transfers from unknown clients. Follow proper protocols.

6. Get help to develop a breach incidence notification plan. Chand warns mandatory breach notification will soon be required by law. If employees or customers have been put at risk because of a breach, the company will need to notify the privacy commissioner. The privacy commissioner will want to know if you have an incident response plan; and items to consider include – but are not limited to – who should be notified, what vendors are affected and who are the lawyers involved? Enlist the help of people who know how to ask the right questions to develop a cyber incident response plan that mitigates your own company's risk and the damage that might be inflicted on your customers or others.

"At the meeting of the G7 nations in 2016 the main threat to economic viability was identified as cybersecurity," Chand observes.

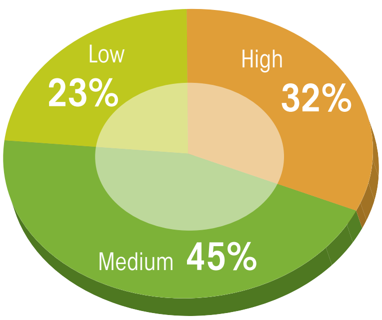
Indeed, 90% of the Canadian manufacturing economy is small- to medium-sized enterprises and they are a critical part of the supply chain for larger firms. If they aren't prepared for attacks, there could be ripple effects. On an aggregate, macro level, even a small breach could put the economy at risk.

It's far better, and less costly, to anticipate a security breach and try to prevent it than to try to deal with it after the fact. England's healthcare system experienced a WannaCry ransomware attack earlier this year. It affected more than 100 other countries. But the patch for it was released months earlier. Chand says the attack probably could have been prevented.

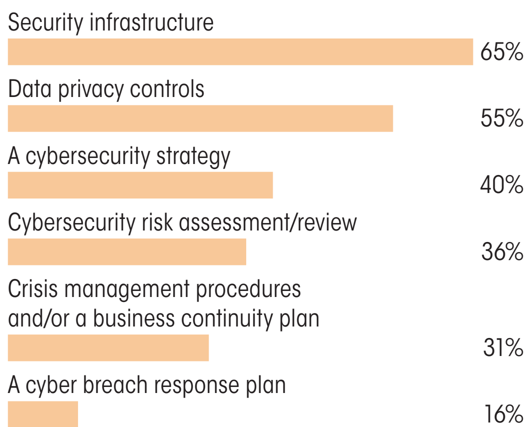
It takes years to build a business based on trust. That trust will evaporate in a second if you put customers and suppliers at risk.

Kim Laudrum is a business writer specializing in manufacturing issues and is a frequent contributor to **PLANT**. *E-mail klaudrum@rogers.com.*

Concern about security risks

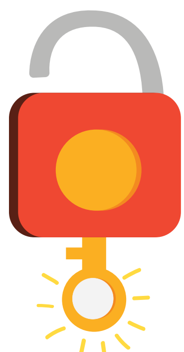


Protection measures



Preparation for breaches

	Very prepared	Preparation underway	Not prepared
Data breach or loss of proprietary data, personal or financial information,	53%	33%	14%
Data encryption or ransom of operational/control, financial information, management or communications systems	45%	39%	17%
Phishing attack	52%	33%	15%
Breach through a third party vendor	43%	36%	21%
Targeted external cyber attack	41%	34%	25%



$1 million at 140% over five years yields savings of $96,000. At the 250% rate, 4.0 purchases deliver $360,000.

Drexler warned manufacturers must invest in new technology to become more innovative.

"If you look at the macro trend for manufacturing in Canada as a percentage of our GDP, it's been steeply declining for the last 50 years. It's foolish to think that's going to change if we don't stand up and do something different."

McPhail has participated in almost all the **PLANT** outlook panels as the resident productivity expert, and he is often amazed – and not in a good way – by the number of respondents who are not measuring their production data, or they're doing it manually. But this year he was shaking his head over the high percentage of executives who still don't understand what the IIoT is, and those who aren't applying it.

"We haven't done a good job inspiring people to go from thought to action. We haven't even inspired them to have the thought piece, let alone action. The question many companies ask is, 'How do I actually take that and apply it and actually extract value from it?'"

MEMEX is demystifying these concepts by positioning them as data-driven manufacturing, then focusing on how to monetize the strategy.

And when Drexler speaks at events, he tells every audience, 'This is happening. If you don't want to believe it or you don't want to invest in it, it's going to happen without you.'

He said there are 2.5 billion devices connected to the industrial internet of things. "In 10 years, it's going to be 20 billion devices. Data from the manufacturing floor is the future of manufacturing. We need to get onboard, whether it's government or a groundswell of companies, to align and ensure manufacturing in Canada doesn't get left behind."

Miller agreed advanced manufacturing is the future for Canadian companies, he described the Italian program as "great" and loved the term data-driven manufacturing, but he sees it all as being very internally focused.

"I think the best way to figure out how you create value is by looking more externally to your customers. What are my customers going to want in the future? How do I set up my systems? If you do that, you can charge higher premiums."

Cybersecurity risks

The inevitability of digital technology brings with it new risks. The threat to nations, governments and businesses, including industrial networks via the internet from hackers intent on larceny, random mischief or competitive sabotage is spreading worldwide. It's recognized by G7 nations as a growing threat to their economies.

The survey shows hacking into company networks to steal confidential information or create havoc continues to be a concern for manufacturers, although most companies (45%) see the risk to be at a medium level. Thirty-two per cent list it as high and 23% identify it as a low risk.

I think the best way to figure out how you create value is by looking more externally to your customers…

— Brad Miller

Nonetheless, most are readying themselves for trouble. Fifty-three per cent are very prepared or preparing for data breaches and loss of proprietary data; 52% for phishing attacks; 45% for data encryption or ransom attacks; 43% for a breach through a third party vendor; and 41% for targeted external cyber attacks. Most (65%) have established a security infrastructure and data privacy controls (55%), and 40% have a cybersecurity strategy.

These results are revealing on a couple of levels.

When Chand looked at the responses, he was initially impressed by the apparent awareness and understanding of the issue, yet elsewhere in the survey he noted the high percentage of respondents who were not applying new technologies. "How can you actually be addressing cybersecurity if you're afraid to go down the technology road?"

James Weir, vice-president of sales for SYSPRO Canada (an Outlook sponsor), made another observation. "The thing that jumped out at me is, Question 16, How prepared is your company to face a cybersecurity threat? If preparation is underway or not prepared, that's the same thing. The other one is, 65% of the organizations have security infrastructure, but 16% have a breach response plan. I'm sure Equifax has security infrastructure. What they did not have was a plan."

(The US finance corporation missed installing a security patch, resulting in a data breach that compromised the personal information of 145 million people).

Many of the survey respondents have fewer than 20 employees. Valade said smaller companies don't think about what can happen to their accounting, financial and other systems. But no company is too small to be concerned about the risks.

She recounted a recent ransomware attack her small company experienced that came via an employee's home computer.

"When he logged into [the network], they came through the back door and went into our server. This happened on a Sunday. Fortunately, we have a global food safety certification and under that we also have to consider not only recalls but food fraud and terrorism…So we do backups weekly [in this case Friday].

Innovation

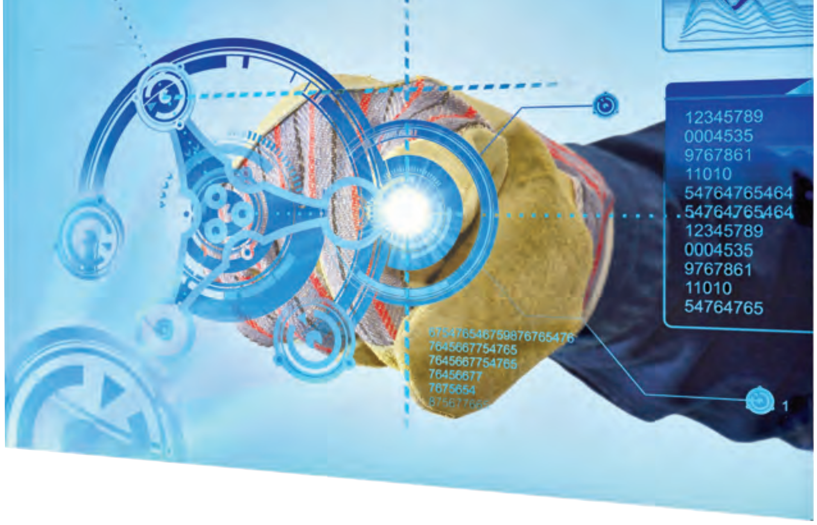
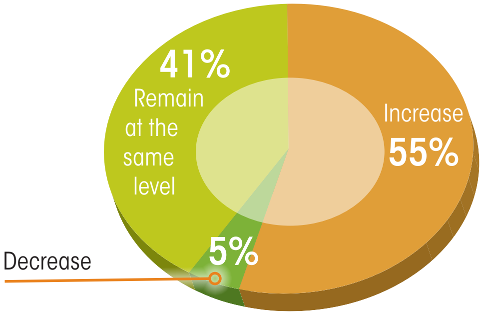


IMAGE: FOTOLIA

Investment over 5 years



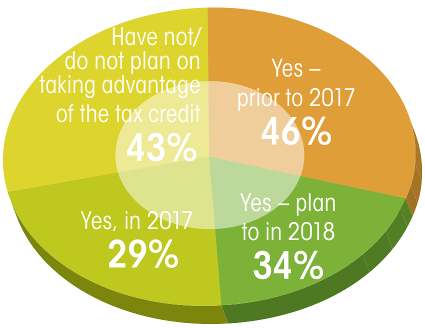
SR&ED impact on R&D investment

22% Have invested more in innovation

59% Has had no impact on innovation

19% Will invest more in innovation

Using SR&ED



Investment in Innovation

	2016	2017	Projected 2018
0%	11%	9%	6%
1-3%	41%	38%	33%
4-6%	19%	22%	22%
7-10%	7%	9%	12%
More than 10%	6%	5%	7%
Average	3.9%	4.2%	4.9%
Don't know/not sure	17%	17%	21%

Innovation focus

66% Products

65% Processes

51% Technology

17% Business model

31% Customer experience

17% Supply chain

What would make innovation easier?

Higher SR&ED tax credit rates/easier eligibility	49%
Lower tax rates on income directly generated from innovation	39%
Easier access to financing to fund innovation	37%
Embedding an innovation culture throughout the organization	29%
Closer connections with sources of training and apprenticeships	22%
Better protection of intellectual property/patents in foreign countries	19%
Collaborating with other companies/organizations, pooling resources.	18%
Immigration reform allowing more skilled labour to enter Canada	17%
Government sponsored public profile/recognition programs for successful innovators	14%
Developing virtual prototypes versus manufactured ones	11%

How can you actually be addressing cybersecurity if you're afraid to go down the technology road?...

— Sunil Chand

We also identified who had remote access to our systems and we limited them to only the information they needed. So we were able to segment the financial from the [manufacturing] inventory."

The company was up and running within four hours.

Why her company? Malabar Super Spice's IT provider explained perpetrators send out thousands of probes until they find a vulnerable IP address. Not everyone pays the ransom, but one client spent more than three months paying someone to recover all the company's information.

McFarlane said Jervis B. Webb's cybersecurity is handled by the US head office. "Sometimes there are too many approvals… but that's because they're being careful to not expose themselves."

MEMEX encounters a lot of legacy manufacturing equipment when it's setting up manufacturers to collect real-time production information. McPhail said there's no way to upgrade – for example – a Windows 95 controller, but there are ways to make it secure.

"It has to be a priority because if it isn't, you're setting up a potential risk that most people don't understand."

Drexler identified cybersecurity as another area where there's a skills gap. "A lot of companies rely on third-party IT consultants to help them run their business. [These consultants] may not be up to speed with the latest threats, and there's not really a way to validate that they're keeping up with best practices and training."

Chand shared the importance of ensuring contractually that providers regularly scan, patch and monitor systems to ensure they're functioning as they should.

"Ensure the services they're providing frequently undergo third-party assessments. And obtain evidence. Also ensure they're obligated to let you know if an incident occurs that affects your business. When you look at monitoring, if they're hosting your system, when was the last time they did a third-party assessment, or a technical scan? What were the results? What did they/you do with the results?"

Chand identified a number of factors business owners should address, such as (but not limited to):

- What are the critical assets and the risks (prioritize based on revenue generation, regulatory/legislative)?
- Are you scanning and patching systems regularly?
- If you're using an unsupported legacy system, is it segregated, or better yet, what are your plans or your vendors plans to update?
- What are the best practices for your industry and are you challenging your service providers to demonstrate they're following a best practice (such as ISO27001/2, NIST)?
- Are you backing up regularly? Do you test back-ups? And do you have an incident response plan?

Before SYSPRO, Weir worked for a security start-up. "What everything is evolving to is the data. The data is really the only thing that you want to protect."

He explained that in the US, health data is one of the most valuable things on the black market. Doctors were being held up for their phones to get patient information. The company he worked for developed a system that even if the encryption on the phone was cracked, a secondary cloud-based encryption protected the data.

Anything that's active and transmits or receives data must be a secured...

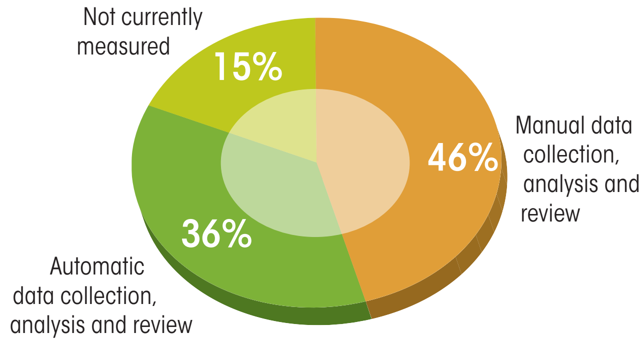
— James Weir

Productivity

Advanced technologies used

CAD/CAE/CAM	**60%**
Custom manufacturing	**57%**
Computerized processing, fabrication and assembly technologies	**35%**
Automation	**42%**
Control technologies/systems to monitor processes in real-time	**23%**
3D Printing/Rapid Prototyping	**15%**
Advanced robotics	**15%**
New materials (such as composites)	**17%**
Scalability	**7%**
None of the above	**12%**

Measuring plant floor data

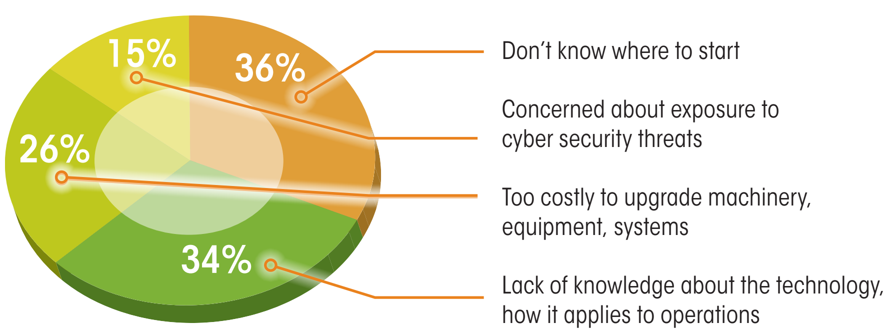


IIoT engagement

9%	Currently applying IIoT capabilities
8%	Have a plan, investing in technology for deployment in next 12-14 months
20%	In the process of evaluating its relevance to operations
33%	Not familiar with IIoT capabilities
29%	Not applicable

IIoT application

IIoT obstacles



Productivity improvement (next 12 months)

	Have taken	Plan to take	Do not plan
Developed a formal productivity improvement strategy	**42%**	**32%**	**26%**
Lean, Six Sigma, other CI measures	**37%**	**22%**	**41%**
Investing in automation technologies	**36%**	**35%**	**30%**
Digital transformation (IIoT, Industry 4.0)	**15%**	**26%**	**59%**
Outsourcing manufacturing	**26%**	**16%**	**58%**
Outsourcing support roles	**14%**	**18%**	**68%**
Employee training	**59%**	**31%**	**11%**
Specialization of product offering	**32%**	**28%**	**40%**
Enterprise-wide business intelligence/analysis	**22%**	**28%**	**50%**

"Everybody's aware that any IoT device in your organization is a potential unsecured access point. Anything that's active and transmits or receives data must be secured. If you have thousands of sensors in your warehouse, you have thousands of liabilities. Ideally you want to secure the data regardless of your infrastructure. That's the next evolutionary phase of cyber-security," Weir said.

The green factor

There's growing emphasis on climate change and the reduction of emissions in developed economies, which in Canada is resulting in regulatory levers such as cap and trade and carbon pricing. The Trudeau government's climate change measures have 36% of executives very concerned and 36% somewhat concerned.

Yet the survey revealed only 23% of companies are very engaged with reducing their carbon footprints. Most (51%) are only somewhat engaged and 26% are not engaged. But 52% said government moves to reduce emissions have not raised the priority level of their responses and 44% do not include carbon reduction measures in their formal business strategies. Fifteen

"Our first commercial plant is actually going to go in at the Lake Erie Works Integrated Steel Mill. We've got some provincial funding for that and we're also doing a plant with Markham District Energy..."

— Peter Howard

PHOTO: FOTOLIA

per cent are doing so, 20% are working on it and 20% are applying measures informally.

Howard works for an innovative clean tech company that's very engaged with carbon reduction. Pond Technologies is proving there are opportunities for manufacturers to develop or use green technologies to reduce greenhouse gas emissions.

"We have algae photo bio-reactors that will take the raw smoke stack emissions from any manufacturing process, bubble it through the tank and that turns it to algae," he explained.

Pond has a demonstration plant running at St. Marys Cement, in St. Marys, Ont. Cement plants are major carbon emitters. A 25,000-litre bioreactor is taking about 100 tons of carbon dioxide from smoke stacks and turning it into algae biomass that is made into commercial products.

"Our first commercial plant is actually going to go in at the Lake Erie Works Integrated Steel Mill. We've got some provincial funding for that and we're also doing a plant with Markham District Energy, a co-generation site," he said.

Bamford is a fan.

"We're a country that's blessed with natural resources. If we have carbon capture we don't have to throw the baby out with the bath water, we can develop our resources responsibly and turn them into other things. What an amazing story for Pond."

Investing in innovation

Innovation is key to growth. Fifty-four per cent of manufacturers described it as very important and 40% said it is somewhat important. Their efforts are prioritized as products (66%), processes (65%), technology (51%) and customer experience (31%).

Average investment in R&D for 2018 will be 4.9% of revenue with most (33%) spending 1% to 3%, 22% spending 4% to 6% and 12% spending 7% to 10%. Twenty-one per cent are unsure what they'll be spending.

As of 2014, the federal government reduced the benefits available from the Scientific Research And Experimental Development (SR&ED) tax credit and made the program more difficult to access.

Most (43%) of the respondents don't plan to make use of the tax credit, but 34% will use it in 2018.

When asked how the SR&ED has affected investment in R&D, 59% say it has no impact, while 41% have or will invest more in innovation because of it. Over the next five years, investment will increase for 55% of the companies and stay at the same level for 41%.

What would make innovation easier? Forty-nine per cent say higher SR&ED tax credit rates and easier eligibility for the program, 39% want lower tax rates on income directly generated from innovation activities, and 37% identified easier access to financing.

The Trudeau government has positioned itself as an innovation booster. There's a $1.26 billion fund to attract high-quality investments. The panel was asked if federal and provincial government efforts are helpful, and the general view was, yes, but there are some issues.

Drexel said there are some great things happening in the Waterloo region, notably: accelerators such as MaRS and Communitech, which are helping companies innovate and grow; support services that are primarily government funded; and SR&ED tax credits, plus the supercluster program that accounts for much of the federal money. "We've been talking about the lack of top-down vision and the superclusters have the potential to provide some of that, depending on the initiative that's chosen."

But looking at the survey results, he noticed the investment for most companies is $500,000 or less. "There's only so much transformation and innovation that amount of money is going to get you."

Canada has great universities and lots of innovators but he acknowledged the difficulty in scaling a business, because of the lack of venture capital. "One of the opportunities for the government is some extension to the SR&ED program. It helped us build OTTO Motors."

He suggested extending the credit to help reduce risk would make companies more innovative, help them progress toward

Industry 4.0, and help with scale.

In the food industry, Mitchell cited Going Forward 2, a federal-provincial initiative that promotes innovation and market development, but he said other programs through the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) with their long lead times can be difficult to access.

Valade said one way government can help is by supporting incubators. “You could set up incubators in every sector of manufacturing, and with that you’re promoting the start-ups, you’re promoting the ideas, you’re helping them to develop a business plan and potentially a prototype.”

She described an incubator in Toronto called Food Starter where new ideas (such as an insect protein bar) are developed. It’s resourced with a full kitchen, different types of equipment needed to manufacture a product, and there’s business plan support. “Then they feature a lot of these new products and help market them.”

Miller agreed governments need to focus more on helping to create the environment for innovation. AGNORA has taken advantage of the Smart Program via Canadian Manufacturers & Exporters, which provides funding through the federal and Ontario governments for improving productivity.

“We bought a glass printer. It was about a $2 million spend and we got $100,000.”

He described the Smart money as easy to access, while the Southern Ontario Development Fund was cumbersome, with a lot of paper work.

Financing investments is an issue. Some companies turn to “angel” investors, “all of them wanting to give you $25,000 in exchange for 80% of your company,” Howard mused.

But outfits such as the National Angel Capital Organization, help fill a gap, added Miller. “Other than BDC, the banks just aren’t willing to look at companies at that early stage.”

He said government could help by acting like an angel investor, but as a lender rather than taking equity in the company.

As manufacturers contend with change driven by technology and geopolitical turbulence, the roundtable panellists shared these observations: Canada offers many advantages, but governments, while helpful in many ways, also create impediments with poorly aligned policies. There needs to be more common purpose, which would be greatly enhanced if manufacturers could speak to governments with a unified voice. Companies are also urged to learn about and embrace rapidly evolving technologies. Recognize the importance of Industry 4.0 because it’s the future. But remember that business is about people. Listen to your customers, motivate your employees and keep them happy. Canada’s economic fundamentals are strong. It’s up to manufacturers to make the most of the opportunities.