



Next Generation
Manufacturing Canada

Productivity Report 2024

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Remarks

Next Generation Manufacturing Canada (NGen) is the industry-led, not-for-profit organization leading Canada's Global Innovation Cluster for Advanced Manufacturing. NGen is dedicated to building world-leading advanced manufacturing capabilities for Canada, for the benefit of Canadians. The Trillium Network for Advanced Manufacturing is a non-profit organization based at Western University, and the preeminent source of objective and data-driven research and analysis about trends, opportunities, and challenges in Ontario's advanced manufacturing ecosystem. Together our organizations contribute to broader conversations about the future of advanced manufacturing in Canada, often enthusiastically and emphatically.

In this report, we contribute to ongoing conversations about productivity in Canada. Productivity is an important, complex, and often misunderstood subject. The report, which focuses specifically on the manufacturing sector in Canada, aims to contribute to these conversations by examining certain structural elements related to productivity and through its analysis of productivity in specific manufacturing industries in different Canadian regions.

The report identifies a number of challenges related to Canada's 'productivity problem.' It also shows that it's not all problematic. Manufacturing productivity remains much higher than overall productivity in Canada. Productivity in a number of important manufacturing industries—such as life sciences and electronics—has improved considerably. Finally, a number of other important industries are poised to make significant progress in the near future, not the least of which is Canada's emerging electric vehicle (EV) battery manufacturing industry.

Admittedly, this report only scratches the surface. There is more—much more—that we can do to lend our voices to these important conversations, with the intention of better understanding productivity with the intention of developing solutions and strategies to improve productivity. There is more to do to ensure that we are measuring productivity accurately and properly. And there is more to do to ensure that advanced manufacturing sector stakeholders and ecosystem partners are made aware of this important subject. Rest assured that we at NGen and the Trillium Network, working alongside our ecosystem partners, will continue to collaborate on this and other initiatives. Please do not hesitate to contact us to learn more.



A handwritten signature in black ink, appearing to read 'Jayson Myers'.

Jayson Myers
Chief Executive Officer,
NGen



A handwritten signature in black ink, appearing to read 'Brendan Sweeney'.

Brendan Sweeney
Managing Director,
Trillium Network for
Advanced Manufacturing



Introduction

Canada's productivity problem—and it is a problem—has received considerable attention from the media in 2024. Low rates of productivity growth present challenges. These challenges are related to inflation, wages, the ability to invest in capital and technology, living standards, and overall prosperity.

This is not a new problem. Underlying the problem are several factors. They include, but are not limited to, without challenges properly integrating highly-skilled immigrants and younger generations, the relatively high proportion of small businesses in Canada when compared to the United States, oligopolies in key industries, and intranational trade barriers. The productivity problem was exacerbated by the COVID-19 pandemic, when employers proved more willing to raise wages and offer improved benefits (i.e. flexible working hours) than they were to invest in new technologies as a means to address tight labour markets.

Productivity is complex and multifaceted. There are a number of structural factors that influence productivity, and their effects on specific sectors, industries, and companies are diverse. Understanding these factors is necessary to improve productivity.

This is especially true for the manufacturing sector, which is the focus of this report. For manufacturing stakeholders, there is some good news: manufacturing productivity growth slightly outperformed the overall economy over the past 25 years. The bad news is that 1) the performance of the overall economy over the past 25 years was not terribly impressive and 2) productivity growth in Canada's manufacturing sector has slowed over the past decade.

There is some more good news. Productivity has increased substantially in some manufacturing industries, in some parts of Canada. Perhaps not surprisingly, this is balanced with more bad news. Productivity has stagnated, or decreased, in several important manufacturing industries—since the late 1990s. If this is not already a concern for manufacturing industry stakeholders since the late 1990s. If this is not already a concern for manufacturing industry stakeholders.



Understanding Productivity

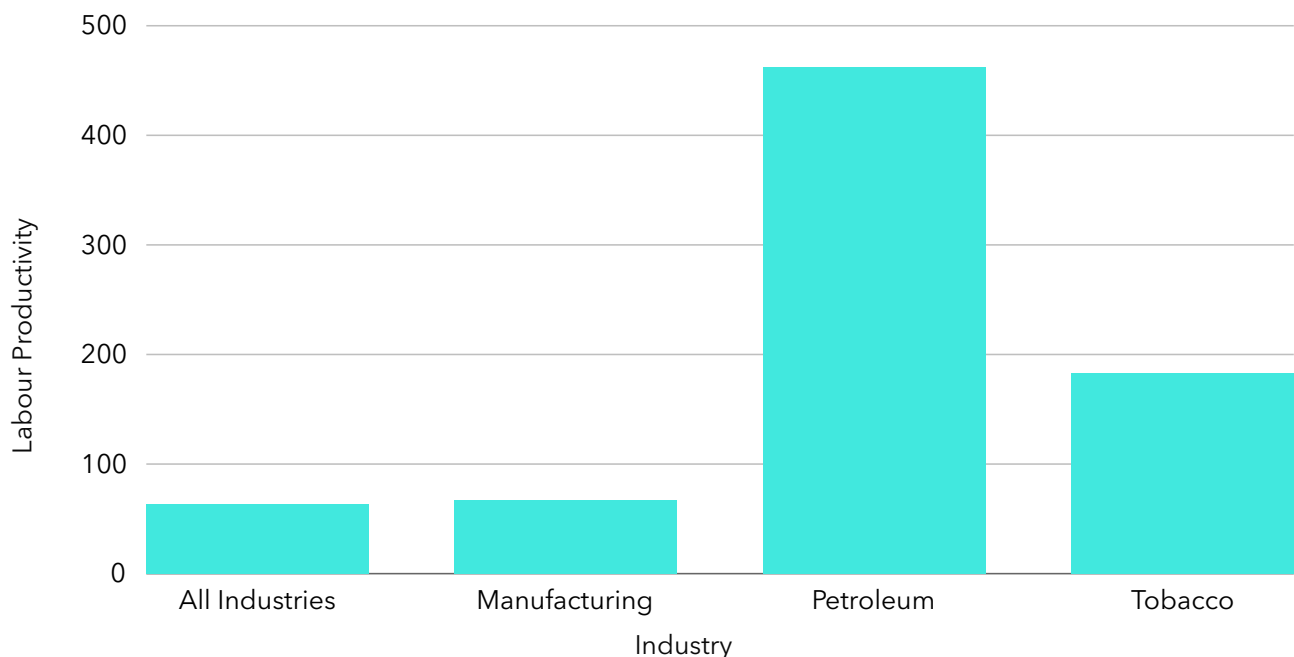
This report, like most analyses of productivity, focuses on labour productivity. This is defined as the value of output per hour worked per employee. All data related to this report are drawn from the Canadian Productivity Accounts (CPA) published by Statistics Canada. These data were most recently updated on 25 May 2024. There are other measures of productivity, such as multi-factor productivity, which output to combined inputs. While this report does not focus on multi-factor productivity, it does comment on its analytical value in the conclusion.

As noted, productivity is complex. There are several factors specific to manufacturing that influence productivity. This section elaborates on four such factors.

First, some industries are by nature more productive than others. These industries may rely on capital intensive production processes. They may rely on relatively simple inputs and produce goods of a relatively high value. If a jurisdiction's manufacturing sector is made up of a high proportion of these industries, it will likely appear to be highly productive.

This does not mean that investing in these industries is necessarily desirable or should be part of a strategy to improve productivity. For example, the two most productive manufacturing industries in Canada have historically been petroleum and tobacco products (Figure 1). Petroleum product manufacturing remains important to the economies of Alberta and certain parts of Saskatchewan, southwestern Ontario, and New Brunswick, although the extent to which this industry will remain the focal point of a sustainable manufacturing sector is unclear. Tobacco manufacturing, once critical to the economy and culture of parts of southwestern Ontario and Quebec, produces a fraction of what it once did.

Figure 1: Manufacturing Productivity (Select Industries), 2023

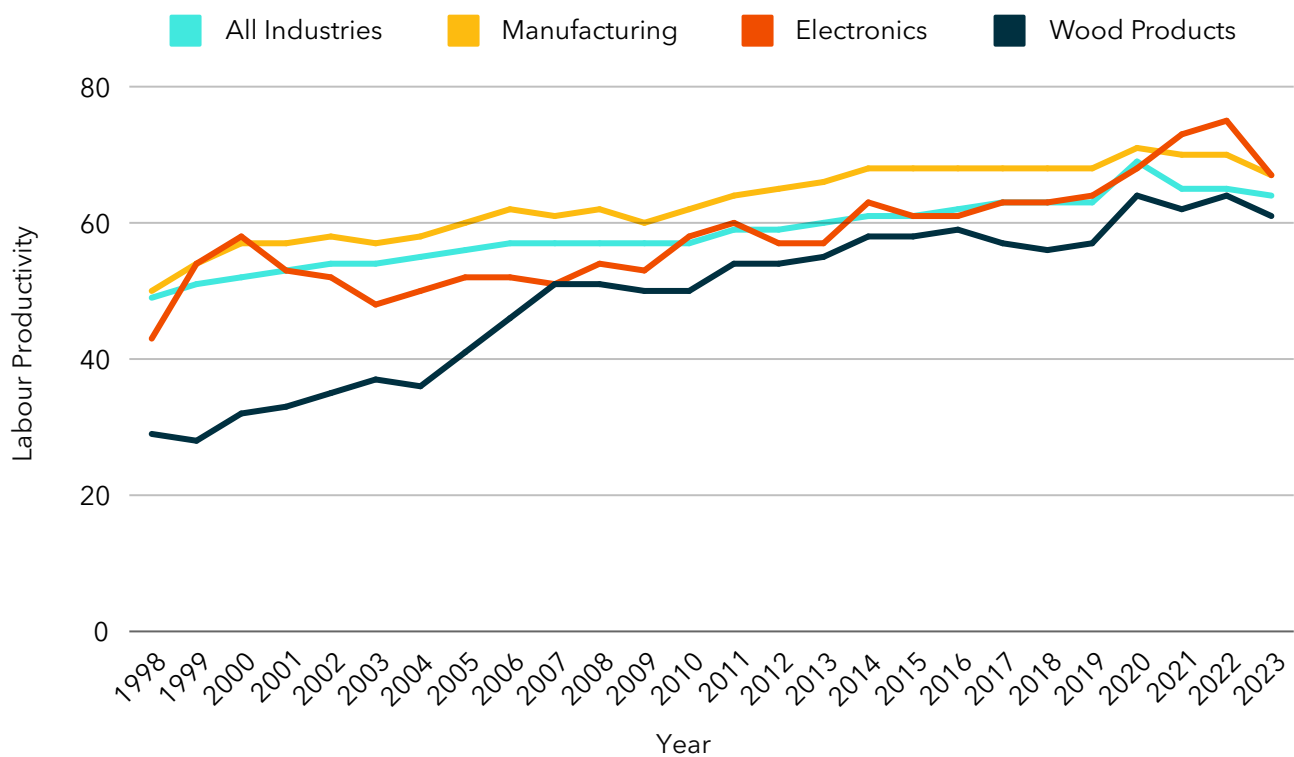


As highly productive industries such as petroleum and tobacco diminish in their relative importance to Canada’s economy, so do their contributions to overall productivity. If improving productivity is the goal, Canadian policy-makers *could* incentivize investments in oil refineries and cigarette factories. That they *could* pursue such a strategy does not necessarily mean they *should*.

Second, large factories tend to be more productive than small factories. Large factories are generally better able to integrate new production technologies and achieve economies of scale. Unfortunately, A greater proportion of Canadian manufacturing takes place in small factories when compared to the United States or other affluent industrialized countries. Productivity suffers as a result.

This raises an important point related to productivity data. Industry restructuring—over time or during periods of crisis such as the ‘Great Recession’ of 2008-09—can lead to simultaneous contraction and productivity growth. This occurs when smaller, antiquated, and less productive companies close due to their inability to compete, leaving behind an industry composed of more sophisticated companies and larger production facilities. In some cases, such as electronics manufacturing, this has resulted in an industry that is more productive but smaller in terms of employment and contributions to GDP. In others, such as wood product manufacturing, the result is an industry that is more productive, contributes more to GDP, but employs fewer people (Figure 2).

Figure 2: Canadian Manufacturing Productivity (Select Industries I), 1998-2023

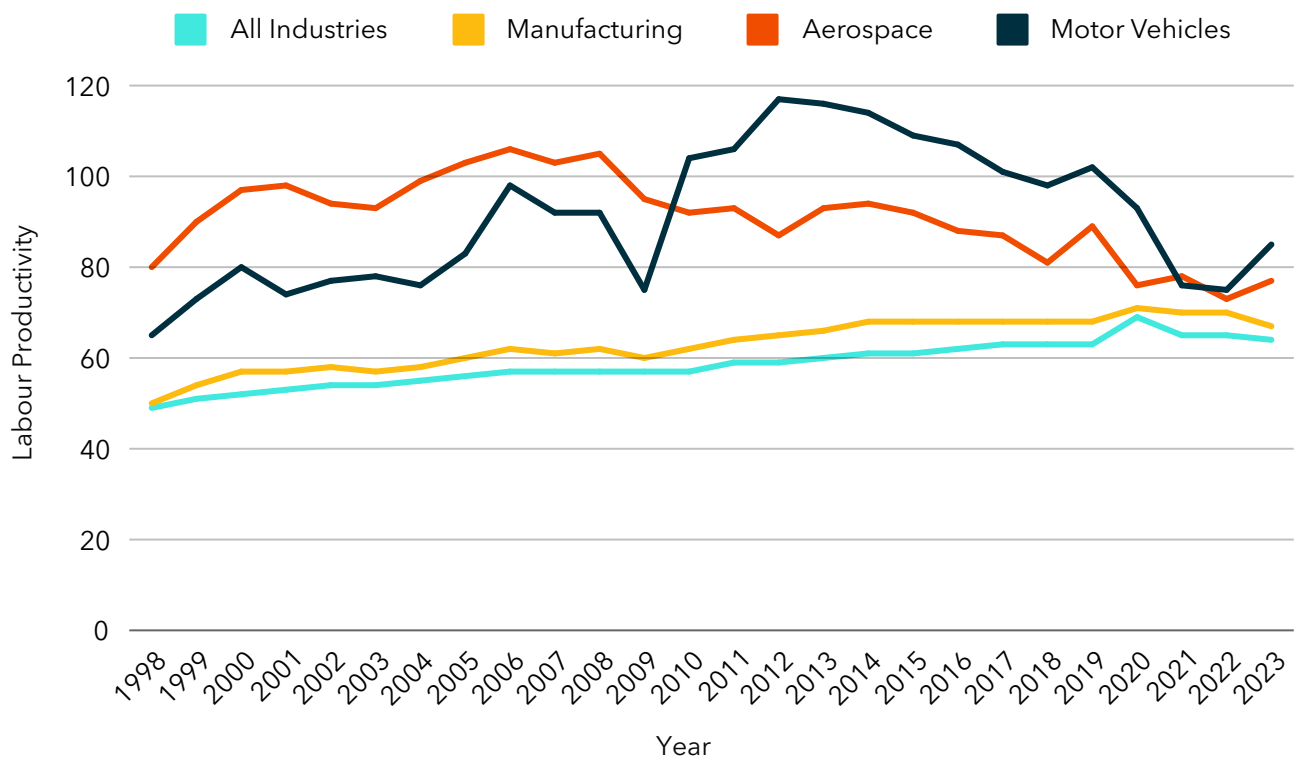


Conversely, when production in a given industry shifts from large factories to smaller ones, productivity is likely to decrease. This has been the case in Canada’s beverage alcohol manufacturing industries, where hundreds of smaller breweries, wineries, and distilleries have emerged while several large production facilities have closed since the late 1990s.

Third, commodity price fluctuations can lead to significant year-over-year increases or decreases in productivity. This is prevalent in industries that rely on commodity inputs or whose outputs are themselves commodities (e.g. petroleum, primary metals, meat, poultry). Because it is measured in output per hour, commodity price fluctuations can cause productivity in certain industries to change significantly with very little change to the quantity or volume of the product manufactured in any given year.

Fourth, capacity utilization is an important determinant of productivity. In Canada, low levels of capacity utilization by select transportation equipment manufacturers over the past decade have led to decreases in productivity (Figure 3).

Figure 3: Canadian Manufacturing Productivity (Select Industries II), 1998-2023



Canada’s motor vehicle industry productivity, which increased slightly in 2023 after nearly a decade of decline, is likely to decline in 2024 and 2025. This is the result of several assembly plants undergoing extensive retooling or operating well below capacity. The path to sustained productivity gains in the aerospace industry is less clear given its record since the late 1990s.



Manufacturing Productivity in Canada

The manufacturing sector accounted for a large proportion of productivity growth in Canada during the 1980s and 1990s. This was the result of specialization, automation, and favourable exchange rates vis-a-vis the United States. It was also the result of Canadian manufacturers' ability to adapt to recessions and changes to the global economy, including international competition and rising resource prices.

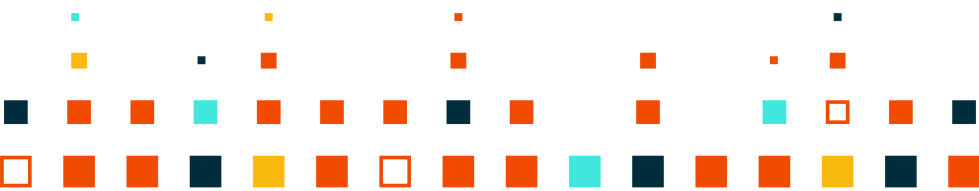
The productivity of Canada's manufacturing sector has exceeded that of the overall economy in every year since 1998. These higher levels of productivity are one of the main reasons that investing in manufacturing is important to the country's overall economy and prosperity. That premium grew from less than one dollar per hour in 1998 to more than six dollars per hour in 2014 and 2015. This has as much to do with relatively slow overall productivity growth in Canada as it does with productivity growth in manufacturing. Manufacturing productivity has decreased over the past decade, and its premium relative to the overall economy was less than four dollars an hour in 2023.

Productivity in some industries has grown considerably since 1998. These industries include wood products, pharmaceutical products, non-metallic mineral products (e.g. concrete, glass), and electronics (Table 1).



Table 1: Productivity Growth, Select Canadian Manufacturing Industries

Industry	Productivity	1 Year Δ	5 Year Δ	10 Year Δ	25 Year Δ
All Industries	\$63.60	-1.7%	+0.9%	+6.7%	+28.7%
Manufacturing	\$67.20	-3.4%	-1.6%	+2.6%	+33.6%
Aerospace	\$76.50	+5.4%	-5.0%	-17.7%	-4.3%
Electronics	\$66.60	-11.4%	+6.2%	+17.1%	+56.0%
Food	\$59.80	-1.6%	-0.6%	+6.4%	+21.0%
Motor Vehicles	\$85.10	+13.0%	-13.3%	-26.4%	+30.5%
Motor Vehicle Parts	\$59.60	+7.0%	-7.2%	+13.3%	+47.5%
Non-Metallic Minerals	\$76.20	-3.2%	+20.6%	32.1%	+42.7%
Pharmaceuticals	\$108.20	-4.4%	+10.4%	+41.1%	+45.2%
Wood Products	\$61.00	-4.8%	+8.2%	+10.1%	+112.5%



In other key industries the results are mixed. Productivity in motor vehicle manufacturing increased between the late 1990s and early 2010s but has fallen considerably since. Motor vehicle parts manufacturing productivity growth outperformed the overall manufacturing sector since 1998 but decreased over the past decade. The aerospace industry is more productive than it was a year ago, but less productive than it was five, ten, or twenty-five years ago. In food manufacturing—the largest manufacturing industry in Canada in terms of employment—productivity growth has not kept pace with the overall manufacturing sector. The fact that productivity in these industries is middling (at best) must be addressed if Canada’s manufacturing sector is to remain competitive among its trading partners.

Manufacturing Productivity in Atlantic Canada

Atlantic Canada's is home to the smallest manufacturing sector when compared to other more populous regions. It is the only region in Canada where manufacturing productivity is lower than the overall economy, and the only region where manufacturing productivity increases were lower than the average for the overall economy since 1998 (Table 2).

Productivity has increased in some industries in Atlantic Canada. The top performing industries include primary metal, pharmaceutical products, and machinery manufacturing. Several industries have made gains since the late 1990s but have become less productive more recently. These include food, transportation equipment, and chemicals.

Table 2: Productivity Growth, Select Atlantic Canada Manufacturing Industries

Industry	Productivity	1 Year Δ	5 Year Δ	10 Year Δ	25 Year Δ
All Industries	\$55.52	-3.6%	-3.0%	+1.2%	+26.7%
Manufacturing	\$50.21	-2.4%	-10.9%	-8.2%	+9.8%
Chemicals	\$87.39	+1.6%	-1.4%	+20.5%	-35.6%
Food	\$45.58	+2.8%	-0.1%	+9.1%	+23.9%
Machinery	\$49.18	-5.0%	+11.7%	+21.2%	+76.6%
Pharmaceuticals	\$105.54	-2.4%	+3.6%	+67.5%	+297.35%
Primary Metal	\$59.47	-37.6%	-36.1%	-14.0%	+181.9%
Transportation Equipment	\$64.38	+3.7%	+12.6%	+5.3%	+13.0%

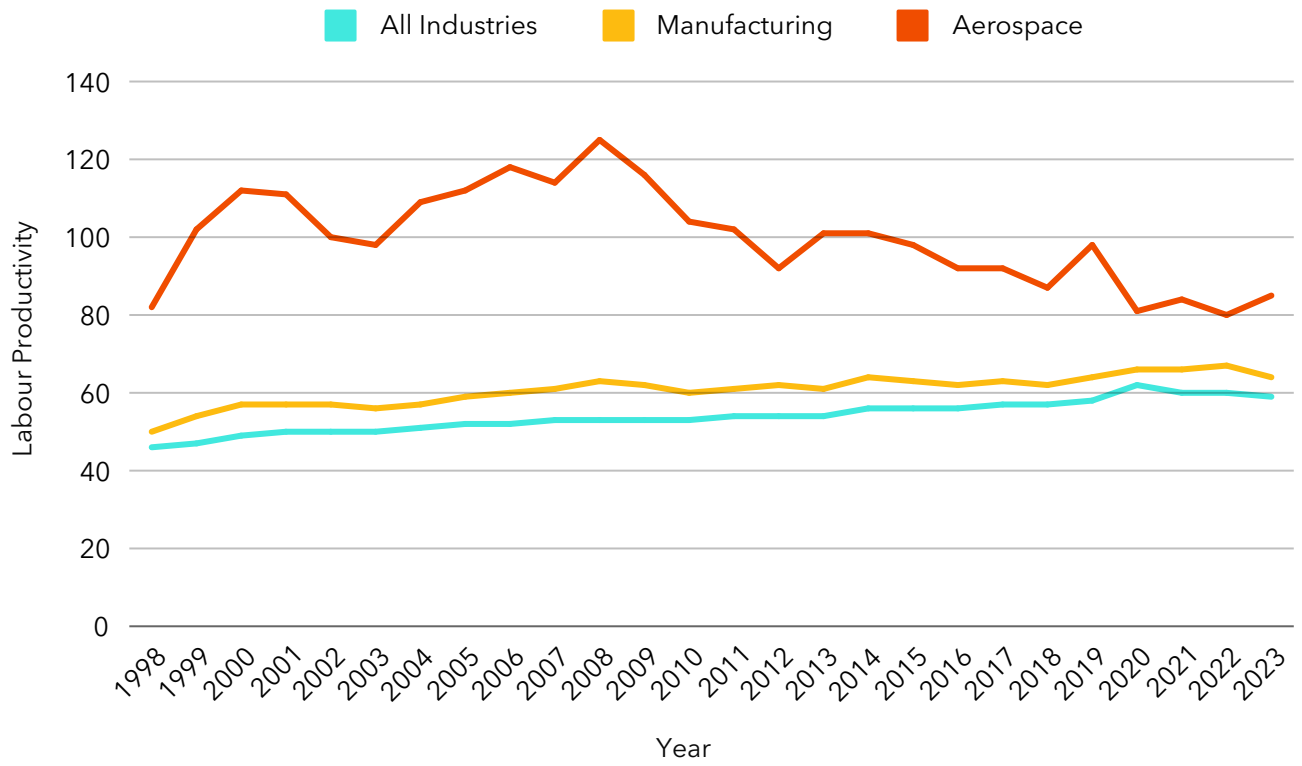
Manufacturing Productivity in Quebec

Manufacturing productivity growth outperformed the broader economy in Quebec at most intervals since 1998. Wood product, primary metal, non-metallic mineral product, plastics and rubber product, and machinery manufacturing productivity growth outpaced the average for manufacturing in Quebec since the late 1990s (Table 3). The chemical and pharmaceutical product manufacturing industries experienced strong productivity growth more recently. Productivity in aerospace, perhaps the most important industry in Quebec, increased slightly since 1998, but has decreased when compared to the early 2000s (Figure 4). Identifying the underlying reasons for this decrease is an important step in reversing this course in order to improve productivity growth.

Table 3: Productivity Growth, Select Quebec Manufacturing Industries

Industry	Productivity	1 Year Δ	5 Year Δ	10 Year Δ	25 Year Δ
All Industries	\$58.80	-1.5%	+3.5%	+8.1%	+28.4%
Manufacturing	\$63.90	-3.9%	+2.4%	+4.2%	+28.8%
Aerospace	\$84.80	+6.7%	-3.0%	-15.8%	+4.1%
Machinery	\$60.40	+0.8%	+9.2%	+8.1%	+51.0%
Non-Metallic Minerals	\$70.60	-1.5%	+39.8%	+53.2%	+59.0%
Plastics and Rubber	\$48.60	-14.6%	-6.2%	-4.4%	+30.3%
Primary Metal	\$134.30	-1.5%	+1.7%	+23.0%	+44.7%
Wood Products	\$46.60	-7.4%	-3.9%	+2.9%	+62.4%

Figure 4: Quebec Aerospace Manufacturing Productivity, 1998-2023



Manufacturing Productivity in Ontario

Manufacturing productivity grew faster than that of the broader Ontario economy since 1998 but has underperformed over the past decade. The top performers since the late 1990s include the pharmaceutical product, electronics, machinery, and non-metallic mineral product manufacturing industries (Table 4).

The paper, motor vehicle, and aerospace manufacturing industries underperformed the manufacturing average and the average for the overall provincial economy. Productivity in the motor vehicle parts manufacturing industry increased since 1998—largely the result of the closures of hundreds of antiquated production facilities—but decreased over the last five years. Productivity growth in Ontario’s fast-growing food manufacturing industry underperformed that of the overall economy since 1998 but outperformed it over the past decade.

Table 4: Productivity Growth, Select Ontario Manufacturing Industries

Industry	Productivity	1 Year Δ	5 Year Δ	10 Year Δ	25 Year Δ
All Industries	\$62.20	-2.1%	-0.4%	+6.7%	+25.9%
Manufacturing	\$67.30	-3.7%	-3.2%	+4.7%	+33.7%
Aerospace	\$64.10	+7.2%	-8.2%	-26.5%	-36.3%
Electronics	\$67.30	-15.4%	-1.0%	+22.1%	+60.2%
Food	\$67.20	-2.3%	+0.2%	+11.1%	+24.9%
Machinery	\$61.70	-1.0%	+4.2%	+32.4%	+54.6%
Motor Vehicles	\$86.50	+12.1%	-17.1%	-30.3%	+30.7%
Motor Vehicle Parts	\$60.00	+6.2%	-8.4%	+12.0%	+45.6%
Non-Metallic Minerals	\$88.50	-2.6%	+20.9	+47.8%	+64.2%
Pharmaceuticals	\$139.40	-7.8%	+16.5%	+60.15%	+60.4%

Manufacturing Productivity in Western Canada

Western Canada has the highest levels of manufacturing productivity, and of productivity generally, when compared to other Canadian regions. The manufacturing sector in Western Canada is less diversified than that of Ontario or Quebec. It is focused more on the processing of certain commodities, including oil and agricultural products, than on manufacturing finished value-added goods. For these reasons, the manufacturing sector in Western Canada is more susceptible to commodity price fluctuations than the manufacturing sector in other regions of Canada.

Western Canada’s electronics, wood product, and pharmaceutical product manufacturing industry experienced the greatest productivity gains since 1998 (Table 5). Productivity in the primary metal, chemical, and beverage manufacturing industries decreased, while productivity in the regionally-important food manufacturing industry stagnated.

Table 5: Productivity Growth, Select Western Canada Manufacturing Industries

Industry	Productivity	1 Year Δ	5 Year Δ	10 Year Δ	25 Year Δ
All Industries	\$70.23	-1.4%	+0.3%	+5.7%	+25.7%
Manufacturing	\$79.97	-1.4%	-3.8%	-2.5%	+37.4%
Beverage	\$66.27	-5.5%	-5.8%	-6.9%	-29.8%
Chemical	\$221.81	-5.2%	-14.4%	-21.9%	-20.1%
Electronics	\$76.05	-6.5%	+21.5%	+20.4%	+210.7%
Food	\$61.19	+0.2%	-11.2%	-6.6%	-4.3%
Pharmaceuticals	\$82.64	-12.9%	-5.9%	+46.4%	+34.5%
Primary Metal	\$82.86	+6.0%	-41.7%	-21.5%	-27.7%
Wood Products	\$75.54	-7.1%	+8.8%	+3.8%	+128.0%

Discussion and Conclusion:

The Future of Manufacturing Productivity in Canada

This report examines productivity in Canada's manufacturing sector over the past 25 years. It finds that, for the most part, manufacturing productivity growth in Canada has been middling, at best. There are some bright spots, however. Across Canada, productivity growth in the pharmaceutical product manufacturing industry has been consistently higher than that of the broader manufacturing sector and the overall economy. (On a related note, the pharmaceutical product manufacturing industry has also performed well in terms of GDP growth and workforce diversity). A deeper analysis of the productivity gains made in the pharmaceutical product industry may yield valuable insights and lessons that can be applied to other industries.

The relatively low rates of productivity growth in Canada's manufacturing sector are a cause for concern. They are in some ways specific to manufacturing. They are also part of the challenges facing Canada's broader economy.

The report identifies four structural factors that are important determinants of productivity for manufacturing industries. These factors, while important, are seldom mentioned in the recent discourse related to Canada's productivity problem. They include industry-specific dynamics, factory size, commodity price fluctuations, and capacity utilization. These factors are not the only variables that influence productivity, although they are often less well understood. While they have different effects on productivity in different industries, they ultimately play an important role in determining to what extent productivity will improve.

The report concludes by identifying a number of themes related to productivity that warrant further analysis. These themes include how productivity is calculated, how Canada's productivity record compares to other countries, and the role of exchange rates. This is done to better understand the nature and extent of the productivity problem, with the aim of using that knowledge to address it.

Relying on labour productivity as the standard measure of productivity is a long-standing practice. Whether or not this long-standing practice remains the most effective way to measure productivity in light of the evolution of the manufacturing sector and the broader economy is an important question. Other measures of productivity, namely multi-factor productivity, may be better able to capture the rate of return on the resources (or factors) used in an industry, and by extension the efficiencies with which those resources are deployed. This may be especially useful in an era where capital and labour are increasingly scarce. It would, however, require that more publicly available data related to multi-factor productivity are made available.



Comparing Canada’s productivity growth with that of its trading partners may yield valuable insights. Growth rates similar to those in other countries may indicate that the challenges are more closely related to the broader economic system(s) in which Canada and its trading partners operate. An international comparison of productivity growth in specific industries where inputs and outputs are similar, or where production processes are ubiquitous, may also help to determine the extent that slow productivity growth is a Canadian-specific problem or a more systemic problem.

Updating analyses of the effects of exchange rates on productivity could also prove useful. Exchange rate fluctuations were an important determinant of Canadian productivity, and competitive advantages vis-a-vis the United States, throughout the 1980s and 1990s. Better understanding the effects of exchange rates in the context of changing international trade patterns may provide valuable insights into Canadian productivity.



