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Project Insights Report

Right Brain, Left Brain, AI Brain: Implications of AI on Jobs and Skills Demand in Canada

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Executive Summary

This report explores the evolving impact of artificial intelligence (AI) on Canada's workforce, focusing on job exposure to AI and how AI complements or automates tasks within those roles. The study introduces a novel framework that categorizes Canadian occupations into four quadrants based on AI exposure and complementarity. Using data from 13 million online job postings and other labour force data sets, the report examines trends in hiring, wages and skills demand across these quadrants.

Key findings are as follows:

- **AI exposure and workforce composition**: Approximately 56% of Canadian workers are in high-exposure occupations, evenly split between those where AI complements tasks and those more susceptible to automation.
- **Skills dynamics**: High-exposure, high-complementarity jobs, like those in engineering and health care, demand cognitive, decision-making and leadership skills. Conversely, high-exposure, low-complementarity jobs, such as administrative roles, often require routine digital skills that are more automatable.
- **Employment trends**: Postings for highly automatable jobs have declined post-2022, indicating an early sign of AI's impact on hiring practices.
- **Policy and practical implications**: Policymakers and workforce stakeholders must prioritize AI resilience in education, workforce development and labour policies to mitigate risks of job polarization, the growing decline in middle-skills, middle paying jobs, and maximize AI's benefits.

This study offers actionable insights for navigating AI-driven labour market transitions and highlights the importance of continued monitoring and adaptive strategies.

KEY INSIGHTS

1. AI technologies, including generative pre-trained transformers (GPTs), have begun to reshape the Canadian labour market, creating both opportunities and risks for workers.
2. High-exposure, high-complementarity occupations, which often require advanced education and decision-making capabilities, are likely to benefit most from AI.
3. High-exposure, low-complementarity roles face greater risk of automation, necessitating proactive re-skilling and upskilling initiatives.
4. Job polarization could intensify with the erosion of middle-skill, middle-income jobs, emphasizing the need for targeted workforce policies.

The Issue

Will AI replace workers? This question often brings a great deal of anxiety—it's too early to predict *how* Canada's workforce will be impacted by AI and to what degree. What's clear is that the use of AI in the workplace is growing. From 2021 to 2023, firm adoption in Canada has increased, from 3.7% to 6.8%, particularly among some of Canada's largest firms. Policymakers, therefore, must equip workers with the right foundational skills to ensure the workers are resilient in the face of technological disruption.

The most recent wave of AI technologies, GPTs, changed the discourse on AI. On November 30, 2022, OpenAI released ChatGPT3, the first consumer-facing product that operationalized large language models. The tool quickly garnered widespread attention, reaching 100 million users in just two months. It adds the possibility of AI complementing (or assisting) a worker rather than outright replacing a specific portion of their work.

AI adoption in Canada is accelerating, with firm adoption rates nearly doubling from 2021 to 2023. However, its implications for the workforce remain complex. Generative AI tools like ChatGPT have shifted the focus from automation to augmentation, where AI supports human work rather than replacing it. This shift raises critical questions about the skills required to thrive in an AI-integrated workplace and the policies needed to safeguard workers in roles vulnerable to automation.

The Canadian labour market, which encompasses over 18 million workers, is at a pivotal moment. While technological advancements promise productivity gains, they also pose risks of job displacement and polarization, particularly for routine, middle-skill occupations. Addressing these challenges requires an in-depth understanding of AI's nuanced impact on jobs, tasks and skills demand.



What We Investigated

This study aimed to understand how AI exposure – referring to the integration or use of AI within different jobs – interacts with the way tasks in those jobs complement each other. The research addressed the following key questions:

- Which occupations are most exposed to AI, and how does AI complement or automate tasks within these roles?
- How are employers adapting their hiring practices in response to AI adoption?
- What skills are increasingly in demand, and how do they vary by AI exposure?

Using frameworks developed by Statistics Canada and the International Monetary Fund, the study analyzed AI's impact through occupational exposure-complementarity indices.

This is the first study of its kind in Canada. The researchers used an analytical framework that allowed them to categorize occupations in Canada along two measures: one that looked at the level to which occupations are exposed to AI (an "exposure" measure) and another that looked at the potential for AI to assist workers in an occupation (a "complementarity" measure).

This new analytical framework allowed the researchers to place occupations in four categories based on how AI will impact those occupations:

- High-exposure, high-complementarity (HE-HC): High exposure to AI, and more tasks that workers do that can be assisted by AI. An example could be a software developer where the use of AI tools can enhance or complement many of their day-to-day tasks.
- High-exposure, low-complementarity (HE-LC): High exposure to AI, but more tasks that can be automated without human involvement. For example, a data entry clerk typically may involve high exposure to AI to help entering, sorting, or processing data and can be completed entirely by AI without much need for human decision-making or oversight.
- Low-exposure, high-complementarity (LE-HC): Low exposure to AI, but more tasks that workers do that can be assisted by AI. For example, nurses may have limited direct exposure to AI technologies in their daily tasks (low exposure), but many of the tasks they perform—such as patient data entry, diagnostic support, or administrative work—could be assisted or enhanced by AI tools (high complementarity).
- Low-exposure, low-complementarity (LE-LC): Low exposure to AI, and high level of tasks that can be automated without human involvement. A factory assembly line worker could fit this description where the worker has low interaction with AI tools and where many of their tasks can be easily automated with machines, without needing human involvement.

The researchers used rich data from 13 million online job postings to analyze the labour market trends facing occupations with various levels of both exposure and complementarity.

Though occupations can move across categories as new AI technologies emerge, for policymakers, employers and workers, the occupations that are high exposure are of the greatest interest in the near term.

High exposure, low complementarity occupations are at greatest risk of disruption, as those workers will face negative effects. In high exposure, high complementarity occupations, AI can benefit both workers and employers.

✔ What We're Learning

Approximately half of all occupations are "high-exposure," and half are "low-exposure." Similarly, around half of all occupations are "high-complementarity," and around half are "low-complementarity."

Across 506 occupations in the Canadian labour force of over 18 million, around **half of all occupations (56% of workers) have higher exposure to AI.** As per the 2021 census, this number was likely higher by the time this report was written. This figure includes occupations whose exposure and complementarity scores are mappable (or around 99% of the total labour force).

Forty-eight percent of these workers (or 27% of all workers) are in occupations that have higher exposure to AI but are also more highly complementary (HE-HC). These workers are more exposed to AI, but in jobs that have tasks that the workers can do with the assistance of AI. Fifty-two percent of these workers (or 29% of all workers) are in occupations that have higher exposure to AI while having tasks that can be more easily automated without human involvement (HE-LC).

Forty-three percent of workers are in occupations that have lower exposure to AI.

Around **half of all occupations (but 41% of workers) are currently considered as having higher complementarity to AI.** These are jobs that have tasks workers can do with the assistance of AI (both HC categories: HE-HC and LE-HC).

The occupations in the HE-HC category feature tasks that are more likely to be assisted by AI.

Jobs in this category tend to be higher-paid and are more likely to require a postsecondary education. Examples of these jobs include some engineers (e.g., civil, mechanical and chemical), certain financial and legal occupations, surgeons and postsecondary education administrators.

Skills more uniquely featured in these occupations are *cognitive and non-routine*, requiring a high degree of decision-making and greater responsibility for safety and health outcomes. Examples of these skills include planning, leadership, coaching and critical thinking.

Occupations in the HE-LC category feature tasks that are more likely to be automated.

Jobs in this category are associated with more routine tasks and lower wages than HE-HC jobs. Examples include business, finance and administration roles such as administrative assistants, auditors and accountants

The unique skills associated with these occupations tend to involve digital skills, are more automatable, and involve less critical decision-making. Examples of these skills include accounting, data analysis, information filing and proofreading.

Employer hiring trends: Demand for low-complementarity jobs is declining, while roles requiring postsecondary education and high-complementarity skills remain stable.

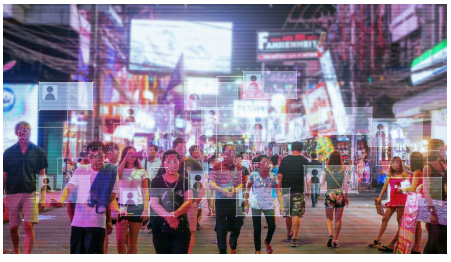
Wage trends: High-complementarity jobs command significantly higher wages than their low-complementarity counterparts.

Job posting data are timely and detailed enough to be used to track employer demand for jobs and skills. They are particularly helpful in assessing the changing demand for AI in the workplace in high- versus low-complementarity occupations.

A single point-in-time snapshot of how employer hiring is informed by AI is not simple—hiring has recently been complicated by the COVID pandemic and ongoing labour market volatility. The researchers expect that continued tracking of the workforce will offer a valuable baseline over time as employers increasingly adopt AI technologies.

Why It Matters

The insights from this study have profound implications for workforce policies and practices:



- **Education and training**: Postsecondary institutions must integrate AI-resilient skills, such as critical thinking and leadership, into curricula to prepare graduates for high-complementarity roles.
- **Workforce development**: Employment services should align training programs with AI-induced labour

market shifts, prioritizing upskilling for workers in high-exposure, low-complementarity roles.
- **Income support and equity**: Governments must adapt income support policies to address job polarization and potential displacement caused by AI.
- **Sectoral practices**: Industries should proactively invest in AI training for their workforce, leveraging AI's potential to augment rather than replace human labour.

As it becomes more widely adopted, generative AI could assist many different types of workers across the labour force. Yet AI adoption poses a risk of increasing job polarization (the erosion of middle-skill, middle-income jobs).

State of Skills:
Unleashing AI into the Skills Development Ecosystem

To reap the benefits that AI has to offer, its adoption and deployment should be a collaborative and inclusive process that recognizes and addresses genuine concerns individuals have about AI and technology more broadly.

Read Thematic Report

AI stands to benefit the highly educated, best-compensated workers in high-exposure, high-complementarity (HE-HC) occupations (associated with cognitive and non-routine tasks). It increases the potential automation of tasks for workers in high-exposure, low-complementarity (HE-LC) occupations (jobs associated with more routine tasks, with less education required and lower wages).

The job postings analysis in the report does not yet present clear evidence of AI-driven job polarization. But employment and wage trends for highly AI-exposed occupations should be monitored.

The analysis in this report should be treated as *directional* rather than *predictive*, providing a framework for assessing how AI could impact jobs and skills demand across Canada's labour market.

The practical application of this analysis should help government policymakers, education and workforce development organizations, industry leaders and employers understand how to think about and plan for the labour market transition that AI adoption will spur in the years ahead.

The report concludes with policy implications for Canadian workers, postsecondary programs and workforce development planning, and government income support policies and programs.

Policy should do the following:

- support postsecondary access and attainment;
- factor AI resilience into postsecondary program and curriculum planning;
- use AI exposure and skills demand to inform workforce development and employment service programming;
- support workers in building resilience to AI trends;
- consider the impacts of AI-related job displacement on income support policies and programs for workers; and
- continue tracking and gathering intelligence about how AI is impacting workers, jobs and the labour market.

What's Next

Continued research and monitoring are essential to addressing AI's evolving impact. Key next steps include:

- linking AI exposure-complementarity analyses to educational pathways to enable targeted skills development;
- explore career transition pathways for workers in automatable roles to transition to high-complementarity occupations;
- conduct longitudinal studies on generative AI adoption and its influence on hiring and skills demand.

These efforts will support a proactive, inclusive approach to navigating AI-driven workforce changes.

Have questions about our work? Do you need access to a report in English or French? Please contact communications@fsc-ccf.ca.

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