

Economic and Social Reports

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Release date: January 28, 2026



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Potential occupational exposure to artificial intelligence and automation among certified journeypersons in Canada

by Allison Leavage  and Tahsin Mehdi 

DOI: <https://doi.org/10.25318/36280001202600100001-eng>

Artificial intelligence (AI) and automation hold the potential to transform the nature of work, raising concerns about how different occupations may be affected (Frenette and Frank, 2020; Mehdi and Morissette, 2024; Mehdi and Frenette, 2024). Although often used interchangeably, AI and automation represent different concepts: AI encompasses technologies capable of performing complex, non-routine and cognitive tasks, whereas automation refers to systems or machines designed to perform simple, routine and non-cognitive tasks.

Recent estimates suggested that approximately 60% of employees in Canada may be highly exposed to AI-related job transformations, with AI complementing rather than replacing the work of about half of these individuals (Mehdi and Morissette, 2024). By contrast, about 1 in 10 workers may face a high likelihood (70% probability or greater) of automation-related job transformation (Frenette and Frank, 2020). However, these rates may vary substantially across occupations.

The risks associated with technological advancements are particularly relevant for the skilled trades, where work is task-intensive and specialized. Mehdi and Morissette (2024) found that skilled trades occupations such as plumbers, carpenters and welders—where men are more likely to be employed than women—may face lower exposure to AI-related job transformation relative to other occupations. However, Frenette and Frank (2020) found that the skilled trades—particularly industrial, electrical and construction jobs that are also male-dominated—may face a higher risk of automation than other occupations. These contrasting patterns highlight how different forms of technological change—AI versus automation—may affect occupational groups and gendered labour market patterns in distinct ways.

With ongoing advancements in the skilled trades and the high demand for such workers across Canada (Employment and Social Development Canada [ESDC], 2025a), it is important to understand how AI and automation may affect certified¹ journeypersons—“individuals who have completed an apprenticeship program or earned a certificate of qualification” (Statistics Canada, 2023).

1. The process for obtaining journeyperson certification varies across Canada. According to Statistics Canada (2023), “requirements for granting a certificate vary by jurisdiction in Canada. In most cases, apprentices are issued a certificate when they fulfill such requirements as supervised on-the-job training, technical training and passing one or more examinations. Trade qualifiers, meanwhile, become certified once they pass an examination.”

This article examines potential exposure to AI- and automation-related job transformation among certified journeyperson occupations using data from two sources: (1) the 2023 Registered Apprenticeship Information System (RAIS) and (2) the 2016 Longitudinal and International Study of Adults (LISA). Journeyperson occupations were identified as the set of National Occupational Classification (NOC) codes that appeared in the 2023 RAIS, limited to 19 trades (based on the 2021 NOC codes, see Statistics Canada, 2021) with certification available across all provinces and territories to ensure consistency across jurisdictions, according to the Ellis Chart (ESDC, 2025b).^{2,3}

The occupations in this group were then assessed for potential AI occupational exposure and complementarity using the complementarity-adjusted AI occupational exposure (C-AIOE) index, which was also used by Mehdi and Morissette (2024) and Mehdi and Frenette (2024). Automation risk was assessed using the methodology of Frenette and Frank (2020), which requires individual-level skill use data (e.g., frequency of job tasks such as public speaking, advising, persuading, negotiating and performing physical work). Skill use could vary across workers with the same occupation; therefore, knowing only the occupation of each worker is not sufficient for estimating the risk of automation-related job transformation. As skill use data are not available in the RAIS, automation risk was estimated using the 2016 LISA—the same data source used by Frenette and Frank (2020).^{4,5}

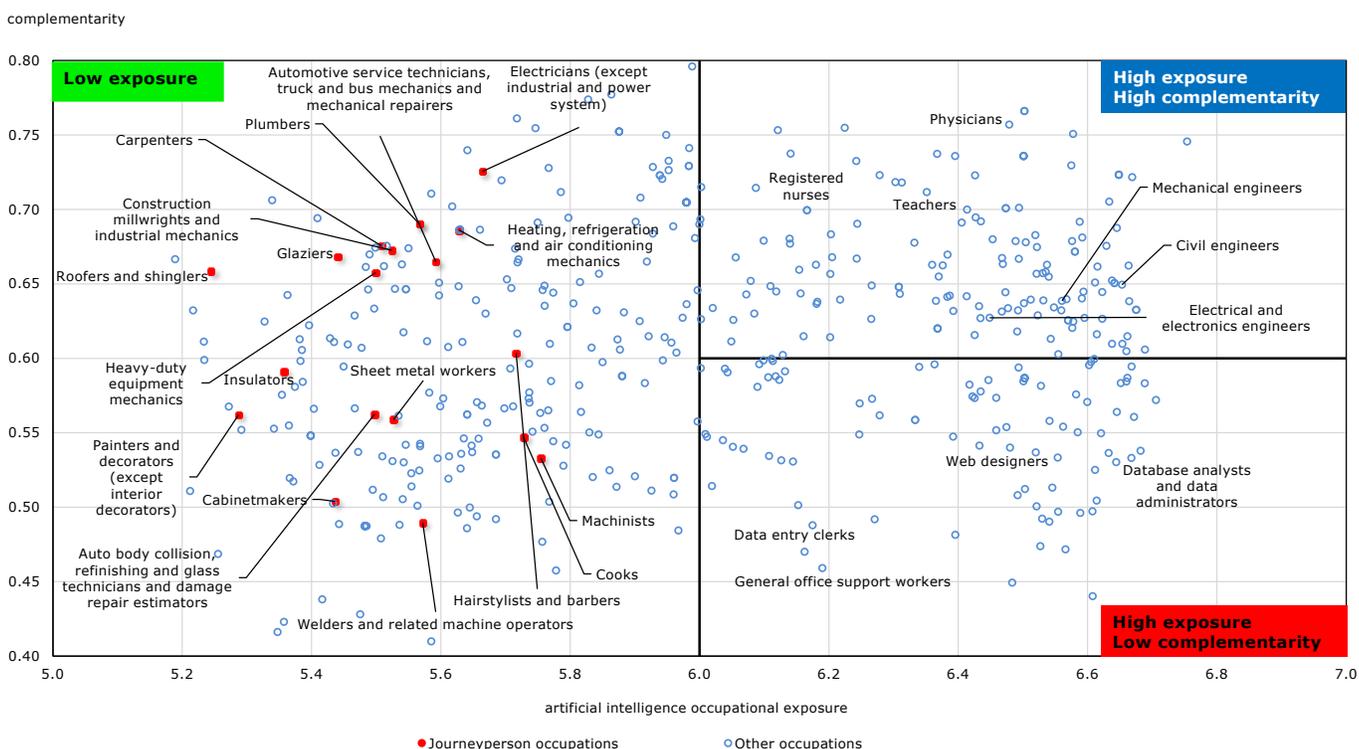
A caveat of this study is that employers may not immediately replace human labour with AI or automation, even if it is technologically feasible to do so, because of financial, legal and institutional constraints. Consequently, exposure to AI or automation does not necessarily imply a risk of job loss. At the very least, it could imply a certain degree of job transformation.⁶ For example, simple tasks could be replaced by technology while the human worker pivots to supervising the machine or reviewing the machine's output rather than being displaced. Given the uncertainty surrounding technological progress, the estimates presented in this article should be interpreted with caution.

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2. Estimates from the May 2025 Labour Force Survey showed that journeypersons represented 1.1 million employees, which amounted to about 6.2% of all employees aged 18 and older across Canada. Women represented 13% of journeypersons. Men in journeyperson occupations made on average \$35 per hour, while women made \$23 per hour. By contrast, men in other occupations made on average \$39 per hour, while women made \$34 per hour.
 3. Trades without certification available across all provinces and territories were excluded from the analysis. For example, certification for educational assistants exists in Ontario but not in other provinces or territories.
 4. Because of this limitation, the risk of automation-related job transformation was estimated only for the broader Canadian workforce and could not be estimated exclusively for journeypersons appearing on the RAIS.
 5. The sample was restricted to employees aged 18 and older across Canada's 10 provinces.
 6. This means that while AI and automation are capable of performing very specific tasks across certain occupations (e.g., coding, translating or editing documents, and drafting reports and emails), it remains to be seen whether these technologies can completely replace human labour on a larger scale.

Journeyman occupations may face relatively lower exposure to artificial intelligence-related job transformation compared with other occupations

AI exposure and complementarity⁷ were assessed using the C-AIOE index, which classifies occupations into three distinct groups based on the median exposure and complementarity scores across occupations: (1) high exposure, low complementarity; (2) high exposure, high complementarity; and (3) low exposure (see Felten et al. [2021] and Pizzinelli et al. [2023] for details on methodology). Figure 1 shows how journeyperson occupations map onto this index. The majority of journeypersons certified in occupations such as plumbers, carpenters, and welders appear to be less exposed to AI-related job transformation than others. This finding is not surprising, since the types of tasks in these occupations tend to involve more manual labour, which may be less susceptible to AI substitutability or replacement. However, the repetitive nature of some tasks within these occupations increases the potential for automation.

Figure 1
Potential artificial intelligence occupational exposure and complementarity in Canada, journeyperson and other occupations



Notes: The artificial intelligence occupational exposure (AIOE) index which ranges from 0 (less exposed to generative AI) to 10 (more exposed to generative AI) and potential complementarity which ranges from 0 (less complementary with generative AI) to 1 (more complementary with generative AI) are based on the work of Felten and Seamans (2021) and Pizzinelli et al. (2023). An occupation is considered high exposure if its AIOE index exceeds the median AIOE across all occupations, and considered low exposure otherwise. Similarly, an occupation is considered high complementarity if its complementarity index exceeds the median complementarity index across all occupations, and considered low complementarity otherwise. The journeyperson occupations were identified based on those found on the 2023 Registered Apprenticeship Information System, and which are certifiable across all provinces and territories.

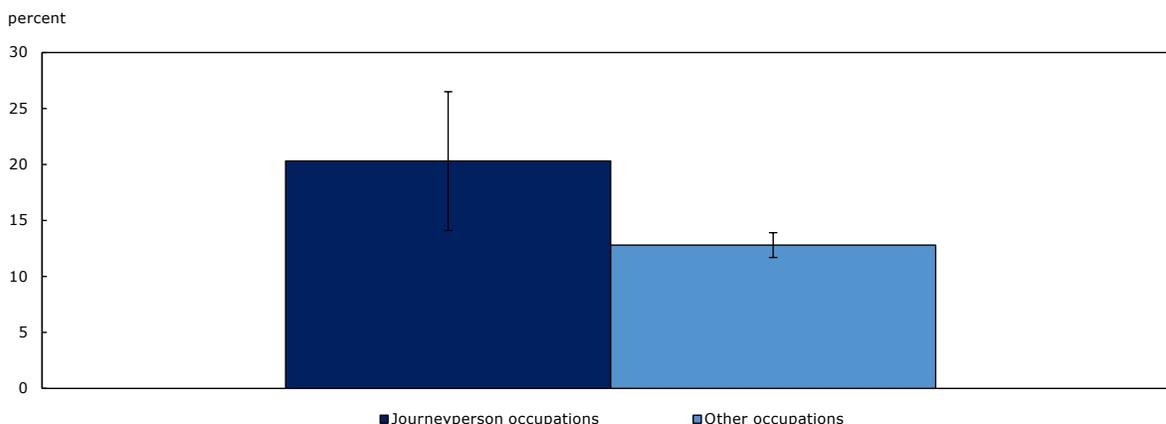
Sources: Statistics Canada, Registered Apprenticeship Information System, 2023; and Occupational Information Network.

7. Occupational exposure to AI can be thought of as the potential for AI applications to substitute, complement or transform tasks within an occupation. Complementarity is the degree to which AI technologies may augment or enhance human labour. For example, doctor is an occupation with an exposure score above the median, so it is considered to have high exposure. But this occupation also has an above-median complementarity score, so doctors are highly complementary with AI. For instance, a doctor could have an AI assistant take notes while a patient describes their symptoms, potentially allowing for more face-to-face discussion between that doctor and patient.

Journeyperson occupations may be more likely to face automation-related job transformation than other occupations

Around 20% of employees in journeyperson occupations were predicted to be at high risk of automation-related job transformation, compared with 13% in other occupations—a statistically significant difference (Chart 1).⁸ However, the difference in automation risk between men and women within journeyperson occupations was not statistically significant. This finding may be partly explained by the fact that the journeyperson occupations examined in this study—those with certification available across all provinces and territories—are largely male-dominated, with men making up more than 85% of workers in these jobs.

Chart 1
Predicted share of employees aged 18 and older who might be at high risk of automation-related job transformation (70% or higher chance of a job becoming automated in the future)



Notes: The methodology for estimating automation risk is based on the work of Frenette and Frank (2020) who used the 2016 Longitudinal and International Study of Adults survey. The estimates presented on this chart are based on a slightly larger sample than the one used by Frenette and Frank (2020). This is because Frenette and Frank (2020) had a broader focus and examined worker characteristics beyond occupation and sex so their sample was restricted to respondents who provided valid responses to many other questions. The vertical bars overlaid on the bars indicate the 95% confidence interval.
Sources: Statistics Canada, Longitudinal and International Study of Adults, 2016; and Registered Apprenticeship Information System, 2023.

Conclusion

While recent developments in AI and automation technologies have sparked excitement and concerns about their implications for the economy and society, the net impact of such advancements on jobs remains unclear. The findings in this study indicate that while the majority of certified journeyperson occupations may be less exposed to AI-related job transformation than other occupations, they could face a comparatively higher risk of automation by machines. The estimates presented in this article are intended to be forward-looking, based on current assessments of technology—they do not account for longer-term factors such as the adaptability of workers, businesses or governments, or the rate and intensity of AI adoption across industries. For example, while the percentage of businesses that reported using AI to produce goods or deliver services doubled from 6% in the 2023/2024 period to 12% in the 2024/2025 period, the percentage of such businesses reporting a decrease in employment because of AI remained unchanged at 6% (Bryan et al., 2024; Bryan et al., 2025).

The results presented in this study can inform labour market policies related to reskilling and career planning. Even if AI and automation were to have no net impact on jobs, they may still affect other facets of the economy, such as labour productivity. How workers, businesses and governments respond to these developments remains uncertain.

8. High risk of automation implies a 70% or higher chance of a job becoming automated in the future.

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Acknowledgments

The authors would like to thank Marc Frenette, Ping Ching Winnie Chan, Rubab Arim, Max Stick, Aimé Ntwari, Lahouaria Yssaad and Andrew Fields from Statistics Canada for their comments and suggestions.

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