Future Skills Centre | Centre des Compétences futures

Project Insights Report

Skills for Infrastructure Innovation

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Executive Summary

At a time when significant investments in housing and infrastructure are required, Canada's construction industry faces a productivity crisis, record retirements and forecast skilled labour shortages. Exacerbating the challenge, the structure of Canada's construction industry (which is dominated by micro-firms) and its cyclical nature have resulted in lagging adoption of digital technologies and investments in research and development.

This report examines global and Canadian infrastructure trends, highlights innovative practices (e.g., digitalization, green construction, modular methods, regulatory reforms) and analyzes the implications for the workforce and skills required in the coming years.

To address these crises, innovation is needed, including digital transformation to improve efficiency; sustainable infrastructure practices to address the built environment's substantial share of greenhouse gas emissions; advanced construction techniques to accelerate construction timelines and address labour shortages; and regulatory and policy innovations to enable and scale these solutions.

The impact on sector employment and skill requirements is immense. New competencies are needed—from digital skills to operate building information modelling (BIM) and robotics, to expertise in energy-efficient building, prefabrication and modular construction. Technology adoption will increase labour productivity; however, it will also make some jobs redundant. Efforts to attract new tech-savvy professionals to the sector, diversify the workforce and support workers with suitable upskilling and re-skilling programs will be critical.

Governments and industry stakeholders are urged to invest in innovation and productivity (through incentives for technology adoption and pilot projects), modernize regulatory frameworks (to encourage sustainable and modular construction and reduce approval bottlenecks) and strengthen workforce development (via enhanced training programs, support for apprenticeships, immigration pathways for tradespeople, and initiatives to improve diversity and inclusion on work sites). By taking coordinated action, Canada can leverage emerging infrastructure innovations to not only build the roads, transit, housing and utilities its growing population needs, but also create quality jobs and a future-ready workforce.

KEY INSIGHTS

1. The Canadian construction industry is characterized by a high level of fragmentation, with the majority of firms having zero to four employees—this structural factor combined with the cyclical nature of the sector has hampered technology adoption, resulting in lagging productivity.

2. Regulatory and policy levers—from zoning bylaws to building codes to procurement rules—are powerful tools to catalyze innovation. These zoning innovations aim to spur more efficient land use, increase affordable housing supply and create more livable, transit-supportive communities.

3. By 2030, technological adoption will mean only 36% of construction tasks will be performed by workers; an estimated 27% of workers will require upskilling within their current jobs, and 17% will require re-skilling to transition to alternate roles.

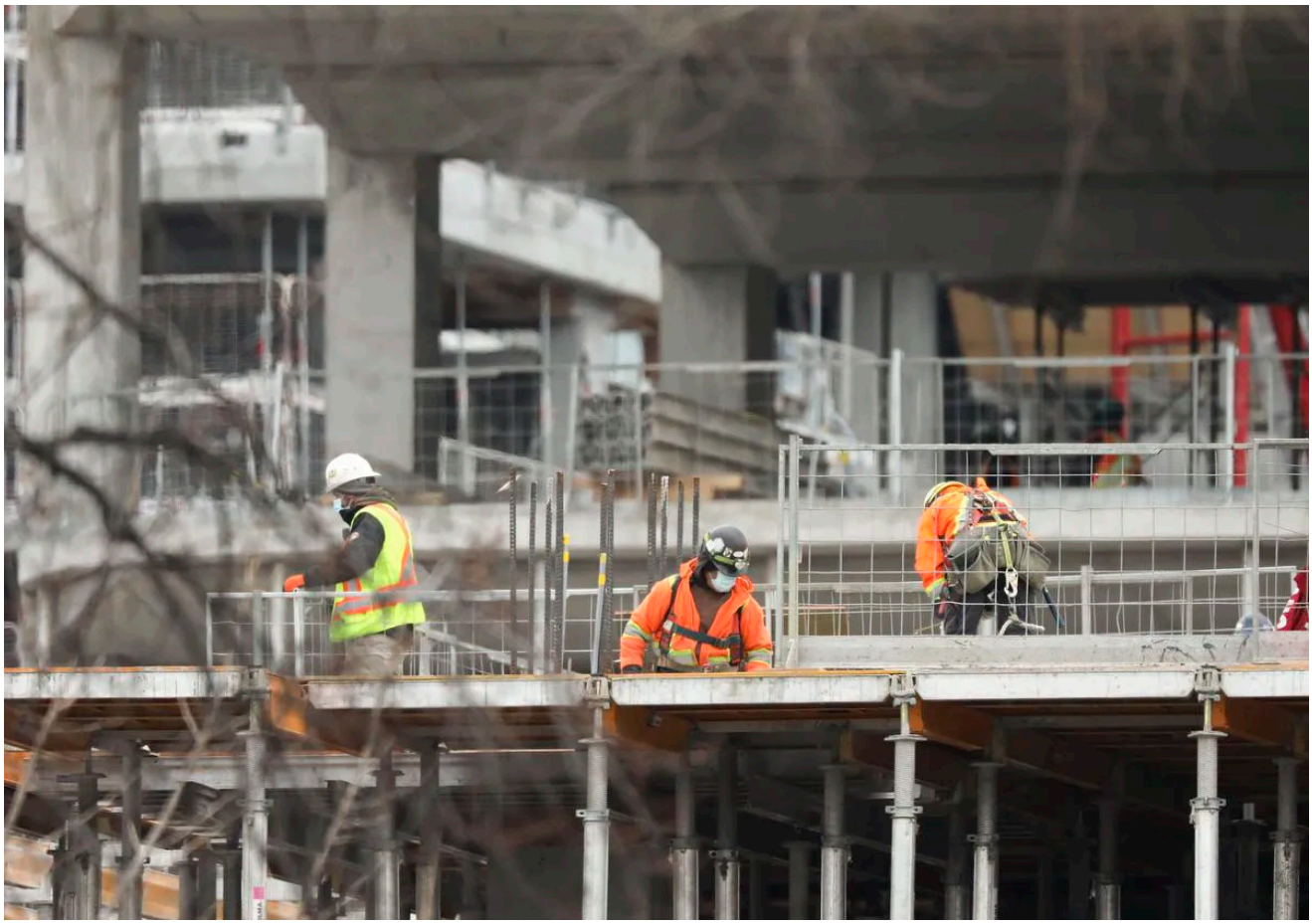
The Issue

Canada faces a pivotal moment in addressing aging infrastructure, rapid urban growth, housing affordability challenges and the urgent need for sustainable and resilient development. In Canada, decades of underinvestment have led to an infrastructure deficit: a significant share of roads, bridges, and transit and water systems are in fair or poor condition. Meanwhile, population growth in urban centres (5.2% nationally from 2016–2021) has intensified pressure on housing and transit, contributing to a housing affordability crisis. Canada needs an estimated 5.8 million new homes by 2030.

The implications for employment and skills are profound. Construction remains a significant employer (with about 1.6 million Canadian workers and contributing about 8% of GDP) but is confronted with a looming labour shortfall. An estimated 269,000 construction workers—roughly one-quarter of the workforce—are expected to retire by 2034, far outpacing the number of new entrants and contributing to a projected shortage of around 108,300 workers. However, this estimate reflects the current run-rate and does not incorporate the accelerated pace of infrastructure development and housing construction required. Considering these factors, a shortage of up to 500,000 workers is estimated over the next six years.

To meet these challenges, innovation is required across multiple fronts, including the following:

- digital transformation (e.g., BIM, automation, data analytics) to improve efficiency;
- sustainable infrastructure practices (e.g., low-carbon materials, green design) to reduce environmental impact;
- advanced and modular construction techniques (e.g., prefabrication, 3D printing, mass timber) to speed up building and address labour shortages;
- regulatory and policy innovations (e.g., zoning reform, updated building codes, streamlined approvals, new procurement models) to enable and scale these solutions.



What We Investigated

The report discusses the current skills gaps, future workforce projections (including the need to attract more youth, immigrants and underrepresented groups) and strategies for upskilling and re-skilling existing workers to meet the sector's evolving needs. It addresses the new competencies demanded—from digital skills to operate BIM and robotics, to expertise in energy-efficient building and retrofitting. Finally, the report investigates the implications for policy and practice. It examines regional and international best practices on how governments and industry stakeholders can invest in innovation and productivity (through incentives for technology adoption and pilot projects), the ways in which regulatory frameworks can be modernized (to encourage sustainable and modular construction and reduce approval bottlenecks) and the implications for workforce development.

What We're Learning

The international trends and innovations reviewed show that change is not only possible but already happening—from digitalized construction sites to cities rewriting zoning rules. For Canada, the challenge is to scale up these innovations across a fragmented industry and to ensure the workforce is prepared to implement them.

New technologies will place significant skills demands on the sector but will also help attract younger tech-savvy workers. Further, the shift toward green building may attract more women to the sector, given their demonstrated greater propensity toward occupations where the social impact is clear.

The adoption of digital technologies will increase labour productivity and help mitigate the present shortage of skilled tradespeople. It will also place construction jobs that require medium to low education at high risk of redundancy within the next 10 years. Efforts to support workers with suitable upskilling and re-skilling programs will be critical.

Skills such as communication, problem solving, learning agility and collaboration will become increasingly important as technology (e.g., BIM) necessitates collaboration across disciplines at every stage of the project life cycle.

Technical skills such as digital literacy and coding will be required across the construction workforce. The need for specialist skills in human-machine communication, data analysis, quality control, automated manufacturing, BIM, cybersecurity, digital twins, virtual reality and augmented reality will accelerate.

Why It Matters

In light of Canada's fragmented construction sector, collective approaches are needed. This could include supporting the formation of consortia or joint ventures so smaller firms can invest in and/or leverage shared resources like training facilities or fabrication plants. The government can expand grants or tax credits for construction firms (especially small and midsize enterprises) that invest in research and development or pilot projects, or adopt proven technologies (drones, 3D printing, etc.). Governments can also support the sharing of best practices through industry networks and innovation hubs and require or encourage the use of BIM on publicly funded projects.

The construction industry contributes C$183 billion to Canada's GDP and employs 1.6 million workers. Its impact on the economy, employment and the availability of essential infrastructure, such as hospitals, long-term care facilities, roads and transit, is profound. With over 1.8 million households in Canada in "core housing need" (meaning they cannot access housing that meets basic standards of affordability, size and condition), the call for action has never been more urgent. A coordinated effort across all levels of government, industry and educational institutions is requisite.

State of Skills:
Quality of Work

As Canada navigates continuing labour shortages in critical areas of the economy, policymakers and employers are looking for more effective approaches to recruit and retain workers

Read Thematic Report

What's Next

As a next step, this report will be shared with sectoral stakeholders, including government policymakers and industry, to share knowledge and develop inclusive skills strategies informed by evidence.

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

How to Cite This Report

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The Future Skills Centre acknowledges that the Anishinaabe, Mississaugas and Haudenosaunee share a special relationship to the 'Dish With One Spoon Territory,' where our office is located, bound to share and protect the land. As a pan-Canadian initiative, FSC operates on the traditional territory of many Indigenous nations across Turtle Island, the name given to the North American continent by some Indigenous peoples. We are grateful for the opportunity to work in this territory and commit ourselves to learning about our shared history and doing our part towards reconciliation.