

How can the productivity of infrastructure delivery in Australia be improved? ICE scoping paper

December 2023

Overview

Stagnant productivity growth is a longstanding issue facing infrastructure delivery in Australia. Despite many initiatives to address it, the situation has not improved. According to the Productivity Commission, Australia is “running to stand still”.

As of June 2023, construction productivity and market capacity are defined by the federal government as a national cabinet priority.¹

In October 2023, the International Monetary Fund warned that a spending boom on infrastructure projects, mainly at state and territory levels, was pushing Australia’s economy beyond capacity and fuelling inflation.²

In November 2023, the Australian government cut 50 projects from its Infrastructure Investment Programme (IIP).³ The decision followed the findings of an independent strategic review, which found that the 10-year programme developed by the former coalition government was undeliverable.

The main reason behind the decision is a changed economic picture: high interest rates and labour shortages have since become critical issues in Australia.

The findings of the review were broadly accepted by the infrastructure sector – which has sounded warnings about the lack of capacity available to deliver the IIP – as it has provided clarity on which projects will take priority in the next decade.

However, the need to reprofile the pipeline due to serious market capacity issues highlights Australia’s infrastructure delivery productivity challenge.

Though productivity challenges in Australia are particularly acute, the country is not alone in facing these challenges. Globally, nations are facing the challenges of rising costs and diminishing workforces.

Call for insights

In an upcoming policy and research programme, the ICE will explore what needs to happen to improve the quality of outcomes (i.e. effectiveness) and reduce waste (i.e. efficiency) in Australia’s infrastructure delivery.

This paper is the first stage of that process and provides the vehicle to gather evidence on what measures can be taken to improve Australia’s productivity in infrastructure delivery and, subsequently, achieve the country’s growth and development goals.

The ICE is issuing a call for insights from infrastructure experts to identify the challenges, solutions and global lessons in this debate.

¹ Australia’s Federal Relations Architecture (2023) [National Cabinet Priorities](#)

² International Monetary Fund (2023) [Australia: Staff Concluding Statement of the 2023 Article IV Mission](#)

³ ICE (2023) [Australian government cuts 50 projects in major infrastructure review](#)

Insights gathered from this exercise will feed into the research programme, including recommendations on policy approaches and supporting measures.

We invite experts involved in improving infrastructure delivery to respond to the questions below. This consultation runs until 12 January 2024. Responses can be made by emailing policy@ice.org.uk

Questions

1. **How is Australia's productivity challenge being defined?**
2. **How are policymakers tackling it?**
3. **How is the infrastructure sector tackling it?**
4. **Australia has experienced sustained construction productivity stagnation, despite multiple attempts to address this. Considering this, why is productivity *not* improving?**
5. **What learnings can be applied from countries that have faced similar productivity challenges?**

How big is Australia's productivity challenge?

The Productivity Commission's latest five-year review reveals that Australia is experiencing its worst productivity growth in 60 years. Over the decade to 2020, average annual labour productivity growth in Australia was the slowest in 60 years, falling to 1.1% compared with 1.8% over the 60 years to 2019-20.⁴ The Commission notes that Australia is not alone as most other advanced economies are facing a similar productivity predicament: a seemingly entrenched slowdown in the rate of productivity growth.

The construction industry is one of the largest centres of value in the Australian economy. According to the Australian Constructors Association (ACA), its businesses directly add around \$150 billion in value to the economy annually while creating a further \$300 billion in value throughout the construction supply chain. This translates into direct employment for over one million full-time equivalent workers and half as many again in the supply chain.

The ACA says that the size of the construction industry means a turnaround in national productivity will not be possible without moving the needle on construction. Australia's construction industry has one of the worst productivity records in the economy.^{5 6}

- Construction industry productivity has declined by 16.5% since the peak of the resources boom in 2014 – a more significant drop than felt by other industries.
- Construction industry wages have risen more than 85% since 2001-02, while productivity fell 8% over the same period.
- Overall, productivity in the construction industry was 1.8% lower in FY 2021 than in FY 1990 – an average growth rate of -0.1% per annum since FY 1990, which is well below transport (0.9% pa) and manufacturing (0.8% pa).

⁴ Productivity Commission (2023) [Advancing Prosperity – 5-year Productivity Inquiry Report](#)

⁵ Australian Constructors Association (2022) [Disrupt or Die – Transforming Australia's Construction Industry](#)

⁶ Australian Constructors Association (2023) [Nailing Construction Productivity – A Blueprint for Reform](#)

- In FY 2019, the opportunity cost – that is, the potential foregone construction output from a 30-year period of relatively weak productivity performance – was roughly \$35 billion. Two years later, the opportunity cost had risen to \$47 billion.
- At a state level, the opportunity costs from weaker construction industry productivity ranges from \$493 million for the Northern Territory to \$15.4 billion for New South Wales for FY 2021 alone.

In 2022, before the recent reprofiling of the Infrastructure Investment Programme, Infrastructure Australia (IA) projected that investment in major public infrastructure over the next five years across Australia will exceed \$218 billion.⁷ That scale of investment, and the rate of growth needed to achieve it, has never previously been seen. There is a significant pipeline of private sector infrastructure expenditure over and above this.

KPMG's Global Construction Survey 2023 highlighted a lack of productivity gains and risk management pressures as two of the biggest challenges facing the Australian construction sector:⁸

- 87% of respondents said project performance is a continuing issue.
- Only 50% of project owners are meeting completion deadlines.
- 37% of respondents said they have missed budget and/or scheduled performance targets due to a lack of effective risk management.

Why is low productivity such an issue for Australia?

Over the coming decades, the Australian government must deliver a net zero transition, the Olympic and Paralympic Games and associated infrastructure, and provide for a rapidly growing and ageing population. In an increasingly competitive global economy, Australia is at risk of being left behind.

Australian living standards also face a long period of decline unless the productivity trend is turned around. The Productivity Commission projects future incomes will be almost 40% lower and the working week almost 5% longer.⁹

Demand for plant, labour, equipment, and materials to deliver the Major Public Infrastructure Pipeline over the next five years will be two-thirds higher than the previous five years (2019–2020).¹⁰

Australia is running out of prime working-age labour. The share of Australians aged 65 and over has doubled since 1970. This carries a key economic consequence: in the 1980s, there were six people aged 18-64 for every person aged 65 and over. By 2040, that ratio will halve. This is a particular problem in construction which relies on younger workers. The industry must come to terms with a future of fewer workers.¹¹

Engineers Australia (EA) notes the interdependent relationship between productivity and infrastructure resilience. Investment, both monetary and time, in rebuilding and repairing damaged infrastructure prevents the development of new capabilities and hinders growing demand by delaying other projects. Productivity within the sector is likely to decrease without a concerted effort to improve the resilience of current and future infrastructure.¹²

⁷ Infrastructure Australia (2022) [Delivering Outcomes – A Roadmap to Improve Infrastructure Industry Productivity and Innovation](#)

⁸ KPMG (2023) [Global Construction Survey 2023](#)

⁹ Productivity Commission (2023) [Advancing Prosperity – 5-year Productivity Inquiry Report](#)

¹⁰ Infrastructure Australia (2022) [Delivering Outcomes – A Roadmap to Improve Infrastructure Industry Productivity and Innovation](#)

¹¹ Australian Constructors Association (2023) [Nailing Construction Productivity – A Blueprint for Reform](#)

¹² Engineers Australia (2022) [Enhancing Productivity in Infrastructure Delivery](#)

IA says a “transformational change is needed” in how infrastructure is planned and delivered in Australia. Oxford Economics Australia estimates that raising construction productivity to the economy-wide average will unlock an additional \$56 billion in construction capacity every year. This would be enough to deliver over 1,000 new schools, 10,000 kilometres of road or 25,000 extra hospital beds.¹³

What are the barriers to change?

Discussions tend to focus on the construction industry’s poor track record in adopting new technologies. However, this resistance to technological change can be exaggerated and construction firms and workers are willing to adopt technology when they show benefit.¹⁴

The ACA argues that there is no shortage of opportunities and solutions to improve productivity. The challenge is one of adoption and proliferation in the industry’s basic operating system.¹⁵

The traditional approach to infrastructure planning and delivery creates silos and demands a short-term focus. This stifles innovation, challenges the financial sustainability of the sector and ultimately impedes productivity. This approach is not fit for a digital future that demands integration and collaboration. By separating design from construction and creating an in-series approach to how supplier and subcontractors are subsequently engaged, there is little flow of information and knowledge from the supply chain to the front end of the project where value is created.

The financial realities of the business means firms have limited ability to make significant investments, including in new technology. Access to working capital is severely constrained – even for large players – which leads to a lack of flexibility.

The emphasis on fixed-price tendering and the transfer of risk to contractors generates low margins and leads to dysfunctional business models.

This means firms are focused on short-term survival and have little bandwidth for innovation. The commercial environment of construction disincentivises the longer-term planning and decision-making needed to drive productivity growth.

In addition, the industry is fragmented with a preponderance of small firms. The prevailing market forces make it difficult for individual clients to change practices in isolation.

Longstanding flaws in project planning, procurement and capability, and barriers to the uptake of innovative design and new technologies, will impede productivity. Procurement processes are often unreasonably complex, with tendering and contracting issues regularly preventing small-to-medium-sized enterprises (SMEs) from equitable participation.¹⁶

Other barriers to change include:

- Politically induced changes and/or shifting project plans that creates ambiguity.
- The lack of diversity, particularly in decision-making roles, limits innovation and leaves blind spots in planning and risk-management practices.
- Barriers exist for skilled immigrants across the engineering sector, and particularly in senior leadership roles.

¹³ Oxford Economics Australia (2023) [The Opportunity Cost of Long-Term Poor Productivity Performance in the Australian Construction Industry](#)

¹⁴ Australian Constructors Association (2023) [Nailing Construction Productivity – A Blueprint for Reform](#)

¹⁵ Ibid

¹⁶ Engineers Australia (2022) [Enhancing Productivity in Infrastructure Delivery](#)

What solutions have been proposed?

Frameworks

IA's roadmap, Delivering Outcomes, provides a framework for the required paradigm shift that aligns all components of the infrastructure value chain to work together to achieve a productive, innovative and financially sustainable infrastructure industry.

The ACA recommends that all key industry stakeholders work together to develop a National Construction Strategy to drive a step-change in construction productivity.¹⁷ The strategy should reflect a shared responsibility between all levels of government, industry and the unions to drive productivity reform. The express aim should be to increase construction industry productivity to reach or exceed the rest-of-economy rate of annual productivity growth by 2033.

EA calls for governments to commit to long-term collaborative planning to mitigate the negative effects of short-term electoral cycles on infrastructure planning and delivery. It says the dissolution of the Council of Australian Governments (COAG) and the formation of the National Cabinet in March 2020, is an opportunity for bipartisan, intergovernmental commitment to long-term planning. In particular, EA recommends:

- Establishing an advisory group, comprised of representatives from across infrastructure industry, associations, and academia, to advise the House of Representatives Standing Committee on Infrastructure, Transport and Cities on best practice in planning, delivery, and maintenance of Australian infrastructure.
- Developing an infrastructure industry playbook. This would be a best-practice guide mandating key policies to optimise benefits and minimise risk in infrastructure project management, delivery, and operations, using the UK government's Construction Playbook as an example.¹⁸

An environment that encourages innovation

ACA has said that, although the private sector commissions around 75% of construction in Australia, the government is best placed to lead the way on innovation. Public sector clients are less constrained by the market and present a much more consolidated group of buyers. Productivity should be among all governments' social performance objectives as it underpins Australians' standard of living.

Similarly, the government, as the primary client for infrastructure, needs to take more risks on Australian innovation. Specifically, there is a need to take more risk on local SMEs and start-ups rather than relying on subcontractors to large corporations. There is too much focus on de-risking, which pushes providers to do what they know works, rather than focusing on opportunities. Risk and innovation need to be rewarded in the same way that standardisation is rewarded – through cost savings.

IA argues that ensuring the end-to-end process of infrastructure development is focused on improving outcomes for people and places, will create more opportunity for creativity and innovation, and for better collaboration between stakeholders.

Long-term relationships will provide certainty for the supply chain and help to establish a more financially sustainable, healthier ecosystem. Profitable and mutually beneficial transactions enable innovation and trust – suppliers have the confidence to invest in research and development, owners and delivery agencies benefit from improvements in productivity, and the community ultimately benefits from the delivery of desired outcomes.

¹⁷ Australian Constructors Association (2023) [Nailing Construction Productivity – A Blueprint for Reform](#)

¹⁸ Cabinet Office (2022) [The Construction Playbook](#)

Procurement

The optimisation and harmonisation of procurement is one of the ACA's priority areas. It recommends developing a common, nationally consistent set of procurement principles and consider developing a nationally agreed suite of standard contracts.

EA also says that review and reform of procurement processes to improve national consistency will be essential to enhancing Australian productivity in infrastructure delivery. It recommends:

- Governments should avoid using non-standard contracts and provide visibility of contracts before tender, allowing sufficient time for review. Any required amendments to standard contracts must be subject to collaborative negotiation with industry stakeholders.
- Governments implement a consistent procurement framework across all levels and between all departments associated with interrelated infrastructure, applying the ISO 55000 series of standards for asset management for consistency across states and territories.

IA recommends progressively adopting a portfolio approach to projects and programs that is more manufacturing-led, which will improve productivity and deliver better value for money. An approach that encourages the standardisation of elements of design and, where appropriate, enables the adoption of longer-term contracts across portfolios will give industry the certainty required and make it commercially viable for suppliers to invest in innovative new technologies.

Technology

The ACA highlights three groups of technology that stand out as candidates for rapid adoption over the coming decades:

- Design for Manufacture and Assembly (DfMA) and offsite construction
- automation and robotics
- digitisation and data analytics

Digital and data

Digital transformation is widely seen as key to driving productivity and innovation in infrastructure delivery. However, the potential transformative benefits of digital remain largely unharnessed by government and industry stakeholders in Australia, and the uptake of digital processes and practices remain low.¹⁹

IA says the potential of digital engineering, better information management processes, the treatment of data as an asset, and integrated digital approaches to asset management have the potential to support enhanced productivity and innovation.

Similarly, EA says the broad uptake of digital technologies at all phases of asset lifecycles will enhance productivity in infrastructure delivery and operation (including digital twins, smart sensors, building information modelling systems, digital engineering and digital asset management tools).

A common, national approach to digital transformation with some form of national oversight is seen as key to its uptake.

Design and construction methods

According to IA, design and construction in Australia is characterised largely by bespoke solution development. Unique designs, components and labour are brought to site and are subsequently required to be planned and managed with precise alignment to avoid cost or schedule blow-outs. A large amount of capital and labour intensity is spent constructing

¹⁹ Infrastructure Australia (2022) [Delivering Outcomes – A Roadmap to Improve Infrastructure Industry Productivity and Innovation](#)

infrastructure on site, from scratch. IA recommends owners should set a clear presumption in favour of Modern Methods of Construction, enabling improvements in productivity, quality and safety.

Similarly, EA says that research suggests that industrialised construction practices can reduce accidents, costs, time, labour, and waste. This will require the development of a clear set of specifications, including guidelines on the development of specifications, quality control, and purchasing. Rather than focusing on common designs, EA recommends government and industry collaborate to ensure consistent national design standards, guidelines, and specifications, which would drive efficiency and control cost.

Delivery models

Delivery models need to evolve to enable more collaboration and efficiency. According to IA, project delivery in Australia is still predominantly characterised by delivery in traditional project teams. The individual participants of these teams are incentivised through their contractual relationships to control their own processes and guard their own information. Sub-contractors have little to gain from working together.

Enterprise models

IA recommends that delivery models should shift to greater integration and delivery through enterprise models, improving productivity and delivery of outcomes. The use of Project 13 is held up as an example. Project 13 is an industry-led response to infrastructure delivery models that have failed clients, suppliers, operators and users of infrastructure systems and networks.²⁰ The platform seeks to shift infrastructure delivery from a transactional model to an enterprise-based one.

IA highlights the Sydney Water Partnering for Success Program as a case study. The model is aligned to the principles championed by the Project 13 approach. This enterprise approach, developed out of research of proven exemplar projects, has led to increased levels of replication, standardisation and continuous improvement, and ultimately productivity in delivery.

Governance and risk management

IA recommends implementing visible and effective governance to enable infrastructure delivery and ensure the focus is on the right outcomes. Good governance means being active in seeking to drive a culture of productivity, driven by communication.

EA recommends best practice risk management processes be embedded into business-case planning and project lifecycle processes. They should include all stakeholders to identify, control, mitigate and report on risks at each critical project stage. It further recommends frameworks to manage risk across the value chain and to ensure appropriate allocation, reporting and discipline, and proactive management of risk and return at all stages of the project lifecycle.

People, skills and capacity

ACA calls for a national strategic framework for lifting the overall skill level of the construction industry, including re-skilling to enable the workforce to quickly and flexibly adapt to new construction technologies and methodologies.

EA recommends governments must allocate funding for training and upskilling the labour force and subsidise programs to promote collaboration between industry and academia to encourage greater integration of current and emerging technologies.

EA highlights the [Australian Major Projects Leadership Academy](#) established by the Office of Projects Victoria to build and maintain the capability in complex infrastructure project delivery. This 12-month program has been developed and delivered in collaboration with the Oxford Saïd Business School and provides leaders of complex major projects with best-

²⁰ [Project 13](#)

practice training. EA says the Victorian model should be emulated and accessible across all jurisdictions, and brought in-house in the various state and territory project offices and departments.

Diversity

The need to create a more diverse workforce is a common theme. Genuinely diverse and inclusive workplaces consistently report higher people engagement, resilience, productivity and performance, all of which lead to better business and societal outcomes.

In 2018, the Construction Industry Culture Taskforce was set up by the ACA and the governments of New South Wales and Victoria.²¹ Its mission is to establish a new 'Culture Standard' to lift the productivity and performance of construction and address the major issues holding back the industry – excessive work hours and fatigue, poor mental health, and failure to attract a diverse workforce. The new standard is currently being piloted across a range of projects.

A recent paper has argued that the role of industrial relations in construction productivity has been neglected.²² Countries with highly unionised workforces, such as Australia and Canada, often attribute the industry's relatively low productivity to a confrontational industrial relations environment. The paper concludes that improvements in construction productivity are unlikely to be achieved by industrial relations legislation alone, but through a more complex lens where project managers and operatives develop mutually beneficial shared solutions.

Low- or no-build approaches

IA reports a common desire from stakeholders to shift away from a 'build-first' mentality towards one where existing assets are optimised. The 2019 Australian Infrastructure Audit highlighted that these low-build or no-build solutions to infrastructure problems could help to avoid or delay investment in expensive new or upgraded assets.²³ This means public funding for infrastructure stretches further, bringing productivity benefits for more users sooner.

About the ICE

Established in 1818 and with over 96,000 members worldwide, the Institution of Civil Engineers (ICE) exists to deliver insights on infrastructure for societal benefit, using the professional engineering knowledge of our global membership.

The ICE's strategy is focused on the decarbonisation of the infrastructure system, building resilience against the effects of climate change, and transforming productivity in infrastructure delivery, recognising the interlinking effects of water, transport and energy in achieving these goals.

This project supports the ICE's strategy by outlining how improving infrastructure delivery is crucial in helping to achieve better outcomes for society.

For more information, please contact:

David Hawkes, Head of Policy, ICE policy@ice.org.uk

²¹ [Construction Industry Culture Taskforce](#)

²² Martin Loosemore et al (2022) [Productivity and Industrial Relations in the Australian Construction Industry](#)

²³ Infrastructure Australia (2019) [Australian Infrastructure Audit 2019](#)