

## **AI Readiness and Maturity of SMEs in the Australian Construction Industry**

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## ABSTRACT

*The construction industry is experiencing a gradual yet transformative shift towards digitalisation, with Artificial Intelligence (AI) emerging as a key driver of operational efficiency and innovation. Despite increasing global adoption, AI integration within the Australian construction industry remains uneven, particularly among small and medium-sized enterprises (SMEs). To achieve AI transformation in the industry, it is essential to comprehend the current status of AI readiness across technological, organisational, and environmental dimensions among SMEs. This research employed a quantitative, cross-sectional survey of construction professionals to assess their AI readiness levels and maturity stages. The study identified a significant gap between industry enthusiasm and operational preparedness. The findings reveal a growing level of awareness and experimentation, with over 70% of organisations utilising AI tools in selected processes. However, full-scale integration remains limited due to challenges related to data governance, workforce skills, and system interoperability. Organisational readiness is influenced by leadership support, training availability, and cultural openness, while environmental pressures, particularly client demand and competitive forces serve as key drivers of adoption. The study concludes that AI readiness within the Australian construction sector is transitional, requiring coordinated improvements in data infrastructure, workforce development, and policy alignment to achieve sustainable and scalable implementation.*

Keywords: AI, AI Transformation, AI Maturity, AI Readiness,  
Construction Industry

## INTRODUCTION

The construction industry, historically characterised by labour-intensive processes and fragmented operational structures, is increasingly undergoing a transformation driven by digital technologies. Among these, Artificial Intelligence (AI) has emerged as a disruptive innovation capable of reshaping traditional construction practices. AI technologies including machine learning, natural language processing, and computer vision offer capabilities that can enhance productivity, improve decision-making, and optimise project outcomes across the entire construction lifecycle. Globally, AI applications have expanded across multiple dimensions of construction. These include automated cost estimation, predictive scheduling, progress monitoring through image recognition, and risk forecasting. Such applications have demonstrated considerable potential for improving efficiency, reducing errors, and enhancing safety outcomes. However, despite these advancements, the adoption of AI within construction remains uneven when compared to other sectors, such as manufacturing and finance.

Within Australia, the construction industry plays a critical role in economic development, yet it continues to struggle with productivity stagnation and limited digital adoption. While initiatives such as the Australian Government's Artificial Intelligence Action Plan and the Digital Economy Strategy (Australian Government, 2021) aim to drive innovation, these frameworks provide limited sector-specific guidance tailored to construction practices. The industry's project-based nature, combined with its reliance on temporary teams and complex supply chains, creates significant barriers to consistent digital integration. SMEs, which constitute most construction firms, often lack the resources and technical expertise required to implement advanced

technologies such as AI. As a result, adoption is frequently limited to isolated pilot projects rather than systematic integration. The key challenge addressed in this study is the gap between interest in AI adoption and the actual readiness required for its implementation. While organisations demonstrate enthusiasm for AI technologies, many lack the necessary infrastructure, governance frameworks, and workforce capabilities to operationalise these tools effectively.

Thus, this study aims to evaluate the current level of AI readiness within the Australian construction industry by examining technological, organisational, and environmental factors. The research focuses particularly on SMEs and seeks to provide empirical insights into the barriers and enablers of AI adoption.

## **LITERATURE REVIEW**

### **AI Adoption and Readiness in the Construction Industry**

AI is widely recognised as a general-purpose technology capable of transforming industries through automation and data-driven decision-making. Research suggests that AI adoption follows a staged progression, beginning with experimentation and advancing towards enterprise-wide integration. This progression is often conceptualised through maturity models, which assess organisational capability across multiple dimensions. AI readiness is inherently multi-dimensional, encompassing technological infrastructure, organisational strategy, workforce competency, and regulatory alignment. Studies highlight that organisations achieving high levels of readiness tend to exhibit strong data governance practices, leadership commitment, and a culture of innovation.

In the construction sector, which encompasses technologies such as machine learning, natural language processing, and computer vision, AI supports automation and data-driven insights across design, planning, and site operations (Zorrilla et al, 2026; Mlybari and Elgohary, 2025). Specific applications include image-based safety monitoring, automated progress tracking, predictive cost modelling, and intelligent scheduling tools (Obi et al., 2025). However, the construction sector has historically lagged behind other industries, such as manufacturing and finance, due to its fragmented structure and risk-averse culture. Consequently, global implementation remains largely limited to isolated pilot projects.

### **The Australian Context and the SME Challenges**

While global research has extensively explored AI adoption within large corporations, limited empirical evidence exists regarding small and medium-sized enterprises (SMEs), which notably constitute the bulk of the Australian construction workforce. This lack of empirical focus is particularly problematic given that digital adoption across the Australian landscape remains highly fragmented (Hou et al., 2022). For instance, Jin et al. (2023) observed that while Building Information Modelling (BIM) has achieved a moderate level of diffusion, the subsequent leap towards AI-enhanced analytics remains minimal. This slow uptake stems from the industry's inherently project-based nature, heterogeneous supply chains, and variable digital maturity. Consequently, these factors create an environment where AI is well understood conceptually but rarely embedded organisationally (Rampini and Cecconi, 2022). This mismatch is best illustrated by Rampini and Cecconi (2022) "enthusiasm–preparedness gap". While organisations frequently express strong commercial interest in AI, few possess the operational readiness required to implement it effectively. Bridging this gap is critical, as unpreparedness

exacerbates risks related to inefficient capital investment, ethical oversights, workforce uncertainty, and fragmented digital practices. Underpinning this gap are several systemic, deeply entrenched barriers that continue to hinder broader implementation across the sector:

- **Data Quality and Complexity:** The most prominent obstacle is poor data quality and availability. Many construction firms lack standardised data collection procedures, resulting in incomplete or incompatible datasets that severely limit machine learning accuracy (Nežerka et al., 2024). Unlike the manufacturing sector, where processes are highly repetitive and data-rich, construction projects inherently generate heterogeneous, unstructured data, rendering AI training and deployment exceptionally complex (Abioye et al., 2021). This issue is further compounded by a widespread lack of interoperability between BIM platforms, enterprise resource planning (ERP) systems, and IoT sensors.

- **Cost and Financial Risk:** Implementing AI solutions demands substantial upfront investment in advanced infrastructure and specialised talent, yet tangible returns often fail to materialise until after several project cycles (Osunsanmi et al., 2021). SMEs are particularly vulnerable to this financial exposure, especially as ambiguous return-on-investment (ROI) models and fragmented data ownership actively discourage long-term capital allocation.

- **Ethics and Trust:** Stakeholders frequently exhibit distrust towards automated decisions when underlying algorithms lack transparency or explainability (Chen et al., 2025). This hesitation aligns with IBM's (2020) classification of "trustworthiness" as a core dimension of AI maturity, reinforcing the principle that fairness, bias detection, and algorithmic explainability must accompany technical performance.

- **Regulatory Ambiguity:** Current construction contracts and liability frameworks rarely define accountability for AI-generated outcomes, creating severe legal uncertainty for adopting firms (Agri et al., 2025).

Furthermore, the cyclical and heavily contractual structure of the sector discourage the collective industry investment needed to establish shared digital infrastructure.

On the enabling side, government policies promoting digital transformation, such as Australia's National Digital Engineering Policy (Australian Government, 2021), create institutional pressure that fosters AI experimentation. Similarly, industry partnerships with universities and technology vendors have proven highly effective in building organizational capacity. Furthermore, BIM-to-AI integration and cloud computing platforms provide clear pathways for gradual scaling, allowing firms to leverage their existing digital assets (Wang, 2024). To capitalise on these enablers, industry experts consistently advocate for a staged implementation roadmap: starting with localized pilot applications, establishing robust data standards, developing internal expertise, and progressively embedding AI into core operations.

However, navigating these enablers alongside deeply entrenched sectoral barriers indicates that construction SMEs require a highly structured understanding of their operational readiness. Conducting a formal AI readiness assessment provides critical clarity on current capabilities, systemic gaps, and targeted improvement pathways, ultimately supporting organisations in developing the maturity required for sustained digital integration. Accordingly, this research investigates the current level of AI readiness within Australia's construction industry by examining the technological, organisational, and environmental factors shaping adoption. The explicit emphasis at this stage is on assessing baseline readiness rather than prescribing immediate

solutions, noting that practical, scalable strategies will naturally emerge from the analysis and empirical recommendations derived from the study's findings.

### **AI Readiness and Maturity**

AI is not an isolated application, but an ecosystem of capabilities spanning machine learning, computer vision, natural language processing, and predictive analytics. Consequently, evaluating readiness demands a multi-dimensional assessment of a firm's technological infrastructure, workforce skills, leadership commitment, and regulatory alignment (Vo et al., 2024).

The maturity is inherently socio-technical, meaning technological capability alone cannot guarantee success without complementary organisational adaptation. Studies by Zeebroeck et al. (2021) highlight that organisations capturing the greatest value from AI typically possess mature data management systems, robust cloud infrastructure, and a well-entrenched culture of experimentation. Similarly, Deloitte's Global AI Survey (Deloitte, 2022) found that firms integrating AI into decision-making report productivity improvements of up to 30 per cent, but only when the technology is accompanied by deliberate human capital investment and comprehensive process redesign.

Due to the current digital transformation in the construction industry, the three major aspects: Technology; Organisation; Environment (TOE) need to be considered for AI readiness and maturity improvement (RICS, 2025). The details of the three aspects are as follows:

- **Technological:** The availability, complexity, compatibility, and perceived relative advantage of AI tools and infrastructure (Yang et al., 2024).

- Organisational: Internal characteristics, including firm size, top management support, digital culture, and human resource capabilities (Zheng et al., 2023).
- Environmental: External institutional forces, such as competitive pressures, regulatory frameworks, client demands, and strategic partnerships.

Organisational readiness is defined as the extent to which a firm possesses the resources, structures, and cultural disposition to implement technological change. Subsequently, successful AI integration relies heavily on top management commitment, as leadership and strategic alignment dictate resource allocation, change management, and cross-departmental collaboration (Sonntag et al., 2024; Felemban et al., 2024). Conversely, an absence of leadership buy-in restricts AI to fragmented experimentation without enterprise-wide scale, whilst readiness within the construction sector further depends on project governance structures that enable digital initiatives to survive cyclical procurement phases and client turnover. Beyond leadership, data maturity and governance are paramount because AI relies on high-quality, well-structured, and integrated data. Human capability and training present a concurrent operational bottleneck, with Sun et al. (2026) identifying that AI-related skill shortages, especially in data analytics and computational design persist because upskilling programmes typically lag behind technological advancement, creating a pronounced knowledge gap between executive expectations and technical reality (Singh et al., 2023). This technological transition is further complicated by cultural readiness, where risk-averse attitudes and apprehensions surrounding job displacement frequently foster employee resistance, necessitating targeted change management strategies that promote participative learning and transparent communication (Emon et al., 2025).

Thus, this study aims to evaluate the current level of AI readiness and maturity within the Australian construction industry, focusing particularly on SMEs by examining these technological, organisational, and environmental factors to provide empirical insights into the barriers and enablers of AI adoption and recommend potential ways to further increase its uptake.

## **RESEARCH METHOD**

This study employs a mixed method using a questionnaire survey and a follow-up interview to assess AI readiness within the Australian construction industry. Data were collected through an online questionnaire consisting of 11 closed-ended questions categorised into three main groups: a) Participants Demographic Profile; b) Current Status of AI Awareness; c) AI Adoption - Demand and Required Support. The survey items were structured around findings from the literature review and comprised multiple-choice options alongside a Likert scale to measure the experts' viewpoints. A purposive, targeted sampling method was used to capture data from the most relevant stakeholders, specifically focusing on construction small and medium-sized enterprises (SMEs) and professionals who either utilise AI in their projects on a daily basis or have recently initiated AI implementation. Interviews were conducted via online communication tools such as Zoom and MS Teams to efficiently organise and record the meetings as well as save time and effort to meet in person.

## **RESULTS AND DISCUSSION**

### **Demographic Profile**

Total 68 out of 200 targeted invitations to the questionnaire were valid. As shown in Table 1, the respondents' profiles reveal a near-balanced representation between male (56%) and female (44%) that reflects a gradually improving diversity trend within the construction industry, which has historically been male-dominated. The gender balance implies that attitudes toward AI may not be heavily skewed by gender bias, providing a more equitable view of readiness across the workforce.

Table 1. Profile of Respondents

| Items               | Respondent Profile   | Number of Respondents | Percentage (%) |
|---------------------|----------------------|-----------------------|----------------|
| Gender              | Male                 | 38                    | 56             |
|                     | Female               | 30                    | 44             |
| Years of Experience | 1-5 years            | 21                    | 31             |
|                     | 6-10 years           | 19                    | 28             |
|                     | 11-15 years          | 19                    | 28             |
|                     | 15-20 years          | 9                     | 13             |
|                     |                      |                       |                |
| Industry Sector     | Public               | 14                    | 21             |
|                     | Private              | 54                    | 79             |
| Project Types       | Residential          | 41                    | 60             |
|                     | Commercial           | 21                    | 39             |
|                     | Infrastructure       | 6                     | 1              |
| Role                | Architect            | 16                    | 23             |
|                     | Building Surveyor    | 1                     | 2              |
|                     | Contractor           | 17                    | 25             |
|                     | Construction Manager | 9                     | 13             |
|                     |                      |                       |                |
|                     | Quantity Surveyor    | 11                    | 16             |
|                     | Project Manager      | 10                    | 14             |
|                     | Engineer             | 5                     | 7              |

Respondent pool is dominated by young professionals aged between 25 and 34 (59%) representing a technologically adaptable workforce, while limited senior representation is shown in the AI-embedded work environment (13%).

The largest proportion of respondents (25%) work as a contractor followed by Architect (23%), while the least proportion is building surveying professional (2%) followed by Engineer (7%). Quantity Surveyor (16%), Construction Manager (13%), and Project Manager (14%) indicate a similar level of AI adoption. The range of professional backgrounds shows multidisciplinary engagement with AI adoption and utilisation, which is a positive indicator for assessing AI readiness across different functions in the construction lifecycle. It can be extrapolated that the building surveying field is relatively very low in AI adoption and utilisation due to the complexity of building codes interpretation. Especially, when performance solution is used in design instead of deem-to-satisfaction, building codes interpretation and assessments require intensive experience and tacit knowledge, which make the AI adoption and utilisation difficult.

### **Current Status of AI Awareness and Familiarity**

Total As shown in Figure 1, the results indicate that 78% of respondents either use a couple of AI tools in selected projects or processes or regularly use various AI tools part of their project workflows. Only 7% have no experience with AI tools at all.

These findings show that AI integration within the construction industry is growing, with a significant portion of organisations already adopting practical applications such as cost estimation and scheduling optimisation. The high percentage of regular AI tool users underscores a positive trend towards data-driven decision-making.



Figure 1. Familiarity with AI Tools in Construction Activities

As shown in Figure 2, the results outline the awareness of national-level initiatives by the Australian Government. Most respondents (30 respondents, 44%) fully understand and actively follow updates by the government, while 37% (25 respondents) are aware of these initiatives but lack overall knowledge. Surprisingly, 19% (13 respondents) are not aware of any such government strategies at all.

These respondents commonly mentioned that they are not required to use or understand AI-related technologies or policies, since their daily tasks are still limited to 2D drawing or document-based work, such as building code assessments or engineering report generation. This demonstrates a relatively strong awareness base but highlights some gaps in understanding the initiatives offered to the construction sector.

Enhancing awareness could promote alignment between government objectives and industry implementation, especially concerning AI-driven tools for productivity and sustainability. The lack of awareness suggests a need for improved initiatives and

communication between the government and construction professionals to ensure AI initiatives translate effectively into industry-level programs.

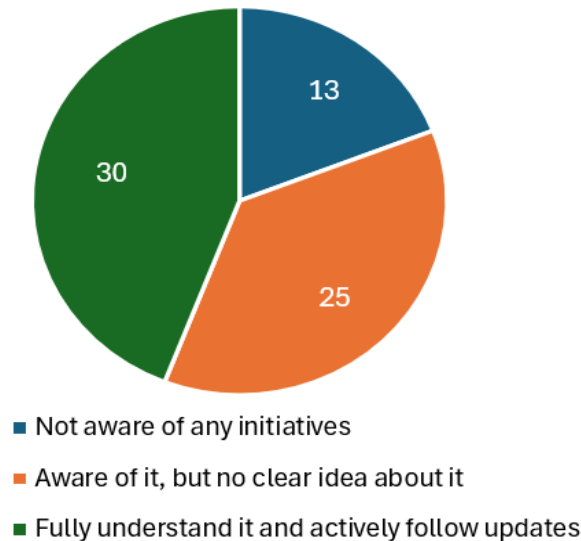


Figure 2. Awareness of the Australian Government’s AI Action Plan - Digital Economy Strategy 2030

As shown in Figure 3, the results show that 44% of respondents (30 respondents) describe their organisations as strongly supportive of innovation, with formal programs promoting AI and digital technologies. Meanwhile, 38% (26 respondents) indicate that their organisations are open but engage only in occasional trials. A small segment of respondents is either cautious, preferring to adopt new tools once they have proven viable elsewhere, or prefer keeping the organisation traditional and resistant to change.

This suggests that most firms demonstrate openness towards innovation. However, the existence of traditional mindsets within a minority still remains one of the key cultural barriers that can slow down industry readiness for AI adoption. In particular, three respondents, who indicate that their organisation is reluctant to AI adoption, commonly mentioned that job security is the most significant cause of resistance to adopting these technologies.

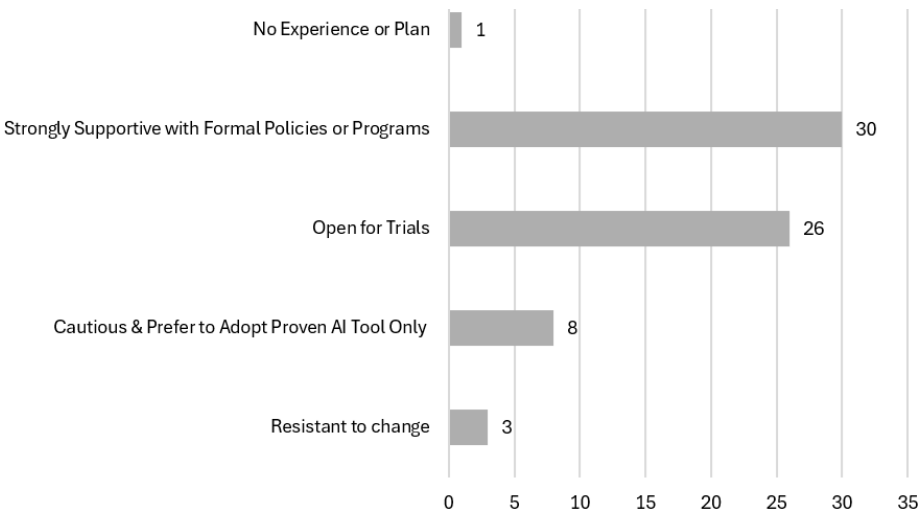


Figure 3. Organisational Attitude to Adopting AI

**AI Adoption - Demand and Required Support**

As shown in Figure 4, 33 respondents (49%) indicated that many of their clients expect AI capabilities as a standard practice in project delivery, highlighting the growing demand and pressure for digital adoption. In addition, 23 respondents (34%) indicated that some of their clients demand AI utilisation in projects. Consequently, 83% of the respondents' clients are currently interested in AI utilisation within their projects and are demanding its adoption. This pattern indicates a strong motivation

for companies to adopt AI, especially driven by clients who associate AI with efficiency, accuracy and cost optimisation.

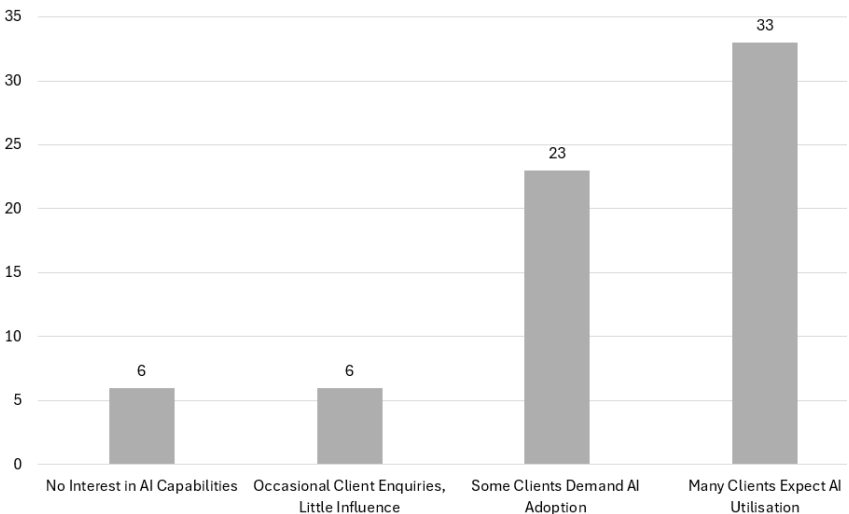


Figure 4. Influence of client requests on AI adoption

However, 18% of the mentioned clients show little to no interest in adopting AI within projects. These respondents commonly mentioned that client influence remains low since their business models and project sizes do not require advanced digital technologies (Kim et al., 2021). Two respondents commented that even digital transformation has not been fully accomplished yet, meaning the construction industry is trying to adopt AI before mastering the basics—using the colloquial phrase, "learning to run before learning to walk" (Kim et al., 2023).

As shown in Figure 5, respondents indicated their level of concern regarding AI adoption across five major categories: 1) job displacement; 2) cybersecurity risks; 3) the rapid pace of AI development; 4) transparency and explainability; and 5) ethical concerns. The results show that ethical concerns and job

displacement were perceived as the most significant concerns, reflecting fears that automation may reduce human roles in areas like estimation or site supervision, which echoes the findings of Shayan and Kim (2025; 2023). In particular, ethical concerns were directly related to industry awareness of data security and responsible AI use. All respondents commonly addressed their concerns regarding the possible theft of their intellectual property and data ownership when AI is adopted across various stakeholders.

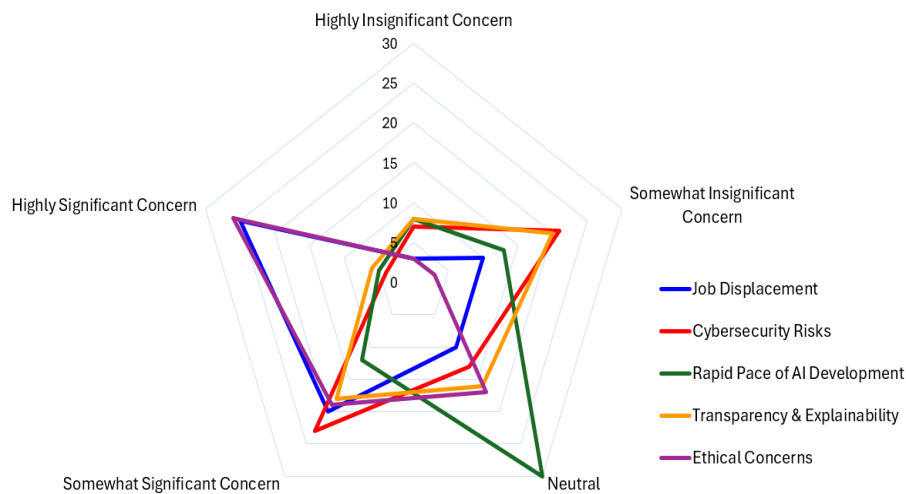


Figure 5. Most significant concerns regarding AI adoption

Cybersecurity, transparency and explainability were perceived as both the least significant and somewhat significant concerns simultaneously. Respondents who indicated cybersecurity as a low concern explained that these risks can be mitigated through proper technologies and AI engagement protocols. Furthermore, there was a consensus that transparency

and explainability could be a minor issue, since users would not be able to understand the mechanics even if an AI expert tried to explain how a system or solution works. As long as AI performs as expected, the 'black box' approach would not bother them. Interestingly, the pace of AI development was perceived as the least concerning factor among the respondents, since they have no influence over advancements in AI capability. Overall, these findings reveal that the industry views AI adoption cautiously, emphasising the need for clear policies and governance to address workforce stability and data management challenges.

As shown in Figure 6, respondents were asked to indicate the levels of importance among five types of support that local governments should provide to help individuals adapt to AI. Accessible AI education and training were perceived as the most important forms of government support, followed by data privacy and cybersecurity. All respondents emphasised the importance of continuous learning to build essential AI readiness. In particular, older construction professionals, who may not be as naturally familiar with digital technologies as younger generations, expressed an eagerness to learn and adapt to an AI-embedded working environment. Career transition and reskilling programs received the highest number of neutral positions among respondents. Respondents recognised that AI will reshape job functions and require new technical and analytical skills, but felt it will not force them to change their professions. Digital infrastructure and access were perceived as moderately important, reflecting the need for reliable connectivity and data systems to enable AI implementation.

Ethical and inclusive AI policies, data privacy, and cybersecurity were also viewed as moderately important. Since respondents do not clearly understand the government initiatives related to AI policies, the immediate priority of these policies was

perceived to be of relatively low importance. However, it was confirmed that construction professionals are aware of the importance of an inclusive adaptation to AI transformation within the construction industry.

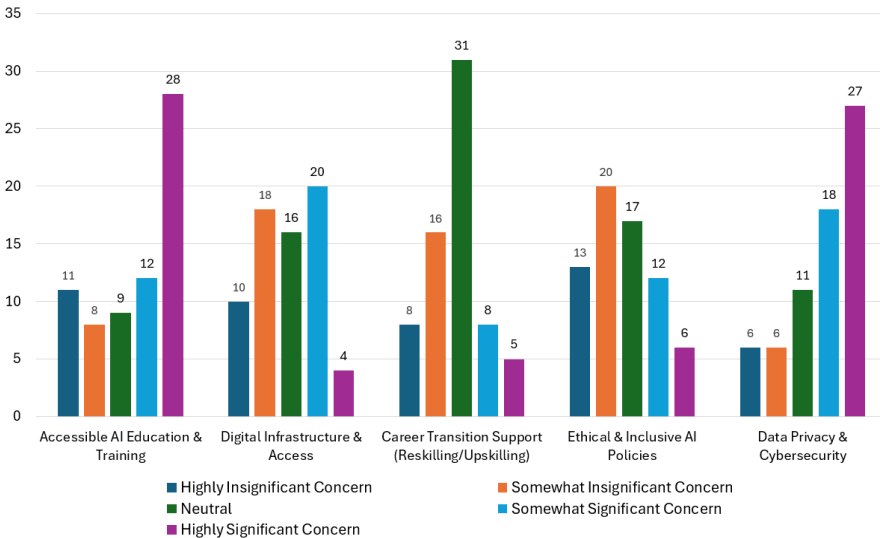


Figure 6. Required Support for Individuals Adaptation to AI

### CONCLUSION

This study demonstrates that while the Australian construction sector, particularly SMEs exhibits strong conceptual interest and growing AI tool usage. Driven primarily by escalating client demand for project efficiency and accuracy, SMEs experience market pressure to integrate AI. However, institutional readiness is unevenly distributed. While younger professionals and progressive firms champion digital innovation, systemic barriers such as traditional cultural mindsets, fragmented data

environments and a general lack of clarity surrounding government initiatives impede systematic, enterprise-wide adoption.

Furthermore, the transition introduces acute anxieties regarding job displacement, data ownership and intellectual property theft, highlighting that AI integration is as much a socio-technical challenge as it is a technological one. To bridge these operational gaps and move past isolated pilot trials, the industry requires targeted external interventions. Respondents universally identified accessible AI education, continuous upskilling and robust data privacy frameworks as the most critical forms of local government support. Ultimately, accelerating AI maturity across Australian construction requires a coordinated ecosystem: one that matches technological ambition with clear governance, tailored industry communication and structured human capital investment.

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