CICA
World Construction Association

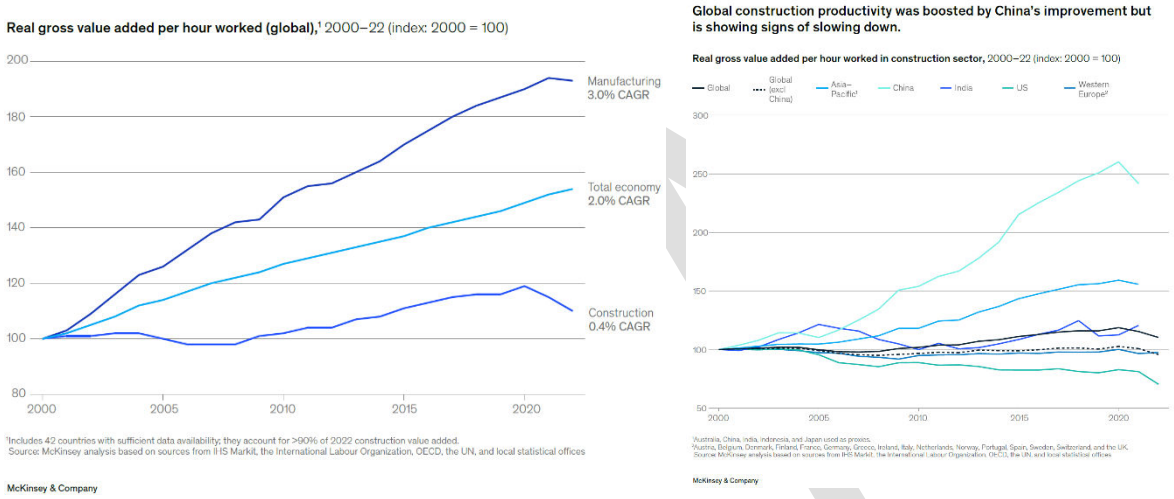
CICA Construction 5.0 Working Group Position Paper

“Transforming Productivity and Talent for a Sustainable Future”

Date: November 2025

Situation and Purpose

The construction industry is a critical pillar of both society and the global economy, accounting for approximately 13% of global output and providing essential infrastructure across all sectors. Progress toward the United Nations' Sustainable Development Goals (SDGs) hinges on advancements within this sector. Current demands for new builds, renovations, clean energy facilities, and data centres are expected to propel global construction annual expenditures from $13 trillion in 2023 to a projected $22 trillion by 2040, with an annual growth rate of 3.2%.



Despite this positive outlook, the industry faces considerable challenges: productivity has increased by only 1% per year over two decades—significantly below the annual 3.2% growth required—and the talent shortage continues to worsen. While Chinese construction has doubled its productivity, most regions have experienced declines. Furthermore, workforce demographics exacerbate the situation, as substantial segments approach retirement (41% in the US by 2031; 25% in the UK within 15 years), while younger talent is discouraged by relatively low wages and challenging working conditions. If not addressed, these issues may result in a $40 trillion shortfall in necessary investments and delays in public projects due to insufficient skilled labour, ultimately impacting the world's economic health, societal wellbeing and achieving UN SDGs.

A 2016 McKinsey analysis found that construction projects typically take 20 percent longer to finish than scheduled and are up to 80 percent over budget. a 2019 study in the *Journal of Building Engineering* examined 2,700 projects and found that 44 percent of construction projects end at a loss.[1] Urgent enhancement is required.

Leading investors are fostering collaborative contracts, requiring tenderers to demonstrate their innovation capacity and demand for lean/agile methodologies to be used during performance. Some industrial organizations have hosted contech startup competitions, compiled Contech maps to highlight emerging startups, and support incubation centres and accelerator programs for contechs. These collective efforts nurture promising startups, facilitate the adoption of cutting-edge technology, and advance sector-wide innovation. But this cannot be considered as common enough.

[1] Lukman A. Akanbi et al., "Investigating profitability performance of construction projects using big data: A project analytics approach," *Journal of Building Engineering*, November 2019, Volume 26.

The construction industry's inherent fragmentation and lengthy project timelines present additional hurdles in managing complexity, volatility and uncertainty. This position paper seeks to clarify the concept of Construction 5.0 and outlines how it can catalyse meaningful industry transformation through progressive management practices.

Construction's transformation is not optional—it is essential to build the resilient, inclusive, and net-zero future the world demands.

What is Construction 5.0?

While Construction 4.0 focused on digitisation and automation, Construction 5.0 brings people, planet, and purpose to the centre of technological progress.

Construction 5.0 represents a paradigm shift towards a sustainable and purpose-driven sector by integrating advanced digital technologies—such as artificial intelligence, robotics, digital twins, and the internet of things—with human-centric values, environmental stewardship, social inclusion, and global responsibility. This approach aligns construction operations with the UN SDGs at every stage, from project inception through delivery and asset management

Core Principles of Construction 5.0:

- **Human-Centric Collaboration:** Prioritises upskilling, diversity, health, safety, and inclusivity through digital tools, enhancing user experience and accessibility.
- **Sustainability and Circularity:** Advances net zero ambitions, circular economy principles, green procurement, resource traceability, biodiversity, and climate adaptation.
- **Digitalisation and Smart Automation:** Deploys AI, robotics, IoT, and digital twins to drive transparency, quality, innovation, and sound decision-making.
- **Social Value and Inclusive Growth:** Generates local employment, develops accessible infrastructure, and provides opportunities for marginalised communities.
- **Partnerships, Ethics, and Governance:** Fosters cross-sector collaboration, ethical data handling, equitable procurement, stakeholder engagement, and innovation.
- **Customisation, Resilience, and Life-Cycle Performance:** Promotes adaptable design, modularity, and resilience to maximise long-term value.

By embedding these principles into each phase of construction, Construction 5.0 helps address economic, environmental, and societal challenges, effectively supporting the UN's 2030 Agenda. In essence, it aims to **IMPROVE THE WAY WE BUILD, TO BUILD A BETTER WORLD**.

(See App1-Table1- Detailed UN SDGs Relevance with Construction Sector, App2-Table2- Comparison of Construction 4.0, 5.0 and 6.0.).

Facilitating Industry-Wide Change

Significant industry challenges require a holistic, collaborative approach involving clients, investors, governments, and all other stakeholders. Although unified cooperation will take time, companies should

act proactively. Leading organisations are already capitalising on opportunities. Adopting a Construction 5.0 mindset strengthens operational excellence, talent attraction, and productivity.

While this paper underscores the importance of enterprise-led transformation, it encourages collective action from all participants. Accelerated change is vital, but gradual implementation—enabled by pilot projects and scalable solutions—is more realistic. Employee retention must be prioritised before significant technology investment.

Achieving transformation necessitates investment in people, systems, and technology. The focus should extend beyond technology development to include nurturing sustainable growth among construction firms and fostering technology providers' engagement with the industry—recognising that many construction companies are not naturally strong technology adopters, which can discourage tech startup's involvement. The challenge thus extends far beyond the remit of Construction 4.0's digital transformation agenda.

Current Industry Dynamics

Some international contractors have exited the market or suffered significant losses, while innovative entrants—such as manufacturers and technology firms like Tesla's The Boring Company—pioneer disruptive techniques.

Traditional management models, designed for mass production in stable markets, are ill-equipped for today's complex projects and volatile unpredictive environment. Present-day demands call for a digitally fluent and agile workforce capable of rapid, informed decision-making. The new generation of professionals values autonomy and collaboration, rather than rigid hierarchical control.

Contemporary management approaches—including Agile, Project Management 2.0, and Management 3.0—emphasise adaptability, intrinsic motivation, teamwork, and responsiveness to a VUCA (Volatile, Uncertain, Complex, and Ambiguous) environment. Herein, "agile" refers specifically to methodologies that support organisational learning and adaptability.

Integration of Construction 5.0 principles with agile management yields success when harmonised, as outlined below:

- Transparency and Trust: Agile management depends on trust and transparency for optimal, timely decisions. Digital tools enhance transparency, provided there is a foundation of organizational trust.
- Human-Centric and Social Value Focus: Modern approaches champion moral values, human behaviours, and psychological drivers to boost productivity—not command-and-control tactics. Alignment with the UN SDGs and clear social commitments strengthen institutional appeal to stakeholders.
- Iterative and Incremental Progress: Adaptive, collaborative processes informed by the OODA (Observe-Orient-Decide-Act) loop facilitate iterative improvement, early issue identification, enhanced flexibility, and continuous feedback.
- Autonomous Cross-Functional Teams: Breaking traditional silos, cross-functional groups foster innovation and shared accountability. Servant leadership shifts the focus from top-down directives to empowerment and team achievement.
- Leadership Transformation:

- Project and Department Managers: Their role evolves from directive leadership to facilitation—helping teams make effective decisions and realise their potential. The project manager becomes a product owner, defining value and setting strategic objectives of the project.
- C-Suite Executives: Focus shifts from micro-management to strategic leadership—ensuring organisational safety, supporting innovation, reducing employee turnover, and retaining expertise.

Embracing these five agile fundamentals cultivates continuous improvement, drives innovation, appeals to future generations, and integrates digital, safety, and sustainability goals into core business practices.

As traditional models reach their limits, agile methodologies offer a framework for adaptability, transparency, and collaboration.

CICA's Position

CICA is actively involved in promoting Construction 5.0 through several dedicated working groups and initiatives, such as achievements by Collaborative Contracts, Affordable Housing and HSE Working Groups. The Construction 5.0 Working Group addresses company and technological advancement, maintains open collaboration with technology partners, and engages the industry through events and publications.

CICA's Recommendations

As the global voice of contractors across more than 40 countries, CICA plays a central role in advancing Construction 5.0 adoption worldwide.

Ownership of the construction process spans multiple stakeholders—from planning to deconstruction. Since each participant seeks to optimise individual outcomes, a collaborative platform is essential. Such a platform should unite investors, developers, financiers, designers, contractors, facility managers, educational institutions (for both white and blue-collar roles), and the wider public. Contractors and their associations, given their experience and financial involvement, are ideally placed to spearhead this effort. Alignment with the UN SDGs should take precedence over narrowly defined client interests.

Effective transformation demands genuine commitment and active participation throughout the value chain.

Transformation has two primary drivers: enhancement of business models and processes, and technological advancement. Reference to the construction process should always encompass the full lifecycle, from conception to demolition.

Contractors:

1. C-suite leaders should prioritise transparency, trust, and strategic vision over micro-management.
2. Commitments to the UN SDGs must be clearly articulated to align teams and address sector challenges.
3. Foster a collaborative environment by reducing hierarchical barriers, establishing cross-functional teams, supporting diversity, and implementing agile and lean methods to promote accountability and continuous improvement.

4. Focus on continuity of work with new projects to retain the experienced employees and lessons learned.
5. Enable project-based, holistic oversight by forming shared goals with subcontractors, encouraging self-organisation, and rewarding overall project outcomes.
6. Replace rigid planning with adaptive roadmaps driven by customer needs and iterative progress.
7. Recognise and develop employees, supporting ongoing enhancements in work practices.

Regional and National Federations:

1. Raise awareness of the industry's impact amongst national and international bodies, including the Multilateral Development Banks, OECD, the UN, and government authorities.
2. Collaborate across the supply chain—including designers, material producers, and subcontractors—to cultivate sector-wide understanding, using inclusive forums.
3. Establish Contech incubation centres, acceleration programs, and demo-days to bridge startups with industry leaders and investors. Invest in technologies enhancing productivity rather than controlling systems.
4. Foster lifelong learning in partnership with universities and training providers; engage youth and encourage greater diversity, especially women's participation.
5. Support platforms and networks for knowledge sharing and connectivity.
6. World Bank: the WB (LATAM) is in the process of reviewing its international processes, in order to do some capacity building (have more efficient and qualified workforce for procurement). They could adopt the C5.0 recommendations.

Tech companies are our new most important clients with the demand of data centres and infrastructure for them. They won't be as patient as ordinary people and investors. If we cannot satisfy their requirements they will disrupt our industry as they did to the life of every individual and society.

Industry-wide transformation cannot wait for perfect alignment; it begins with enterprise-level action that scales through collaboration.

By adhering to these recommendations and embracing the principles of Construction 5.0 through agile management approaches, the industry can achieve sustainable growth, attract and retain talent, and remain resilient and competitive amid evolving global challenges.

References:

McKinsey-June 2020-**The Next Normal In Construction**

McKinsey-September 2025-**The Infrastructure Moment**

McKinsey-August 2024- **Delivering On Construction Productivity Is No Longer Optional**

Appendix 1

Table 1- Detailed UN SDGs Relevance with Construction Sector:

UN SDG	Construction Sector's Relevance & Contributions
1. No Poverty	Job creation for local workforce and remote work opportunity all over the world with accommodation options. Main actor of affordable and resilient housing.
2. Zero Hunger	Resilient agri-infrastructure, cold chains, logistics, and precision construction for food security and supply. Smart warehouses, climate-resilient rural road networks, greenhouses powered by renewable energy.
3. Good Health & Well-being	Healthy buildings, good performing infrastructure, good performing hospital buildings and health at job sites.
4. Quality Education	Delivery of schools/learning spaces. On site trainings.
5. Gender Equality	Inclusive hiring and promotions.
6. Clean Water & Sanitation	Resilient and good performing water infrastructureand efficient WASH facilities at construction site.
7. Affordable & Clean Energy	Constructing renewable energy infrastructures and infrastructure for other industries.
8. Decent Work & Economic Growth	One of the biggest sectors providing job opportunities.
9. Industry, Innovation & Infrastructure	Digital twins, IoT, BIM for resilient infrastructure, modular and DfMA for productivity leap and new collaborative business models for innovation.

UN SDG	Construction Sector's Relevance & Contributions
10. Reduced Inequalities	Digital inclusion for marginalized actors, barrier-free design, project focus on underserved areas
11. Sustainable Cities & Communities	Green/blue infrastructure, circularity, participatory planning, resilient smart city solutions
12. Responsible Consumption/Production	Circular construction, waste minimization, lifecycle management, resource tracking
13. Climate Action	Carbon-neutral builds, climate adaptation, digital scenario planning for risks
14. Life Below Water	Eco-sensitive marine/coastal construction, pollution prevention with proper sanitary filtration systems, habitat restoration
15. Life on Land	Biodiversity-friendly construction, reforestation, environmental impact tracking, nature-based solutions
16. Peace, Justice & Strong Institutions	Quality design and environment for everyone
17. Partnerships for the Goals	Integrated digital project platforms, public-private-people partnerships, open innovation, and global best-practice sharing

** Prepared with the help of taiyo.ai.*

Construction 5.0 is strategically positioned to help the built environment sector deliver on the full spectrum of the 17 SDGs—not only through greener and more efficient infrastructure, but also by advancing social inclusion, equitable economic growth, and transparent, accountable governance worldwide.

Appendix 2

Table 2- Comparison of Construction 4.0, 5.0 and 6.0.

Construction 5.0 is recognized as the next evolutionary stage in the construction industry's industrial revolutions—moving beyond pure digitalization (Construction 4.0) towards a balanced, human-centric, and sustainable ecosystem. It bridges the automation boom of 4.0 with the anticipated hyper-intelligent, fully autonomous vision of Construction 6.0. Below is a definitive explanation, a principles summary, a comparison, and an analysis of why Construction 5.0 is critically important at this juncture.

Theme	**Construction 4.0**	**Construction 5.0**	**Construction 6.0**
Main Focus	Digitalization, automation	**Human-technology co-creation, sustainability**	Hyper-autonomy, full AI, decentralized AI
Key Tech	BIM, IoT, robotics, cloud, prefabrication	**Advanced AI, co-bots, digital twins, green tech**	Artificial general intelligence, swarming robotics, distributed ledgers
Human Role	Operators of digital systems	**Creative partners, augmented by technology**	Supervisory or minimal—machine-dominance
Sustainability	Enabled, but not central; efficiency-driven	**Central, net-zero/circular as baseline**	Presumed embedded; planetary systems focus
Customization	Prefabrication and modularity	**Mass customization, user-driven outcomes**	Full user-automated design & build
Value Creation	Efficiency, cost, productivity	**Societal, environmental, and economic value**	Global optimization, potentially post-human
Status	Widespread adoption in some regions	**Early adoption, innovative regions/projects**	Theoretical/futuristic

* Prepared with the help of taiyo.ai

Construction 6.0 is largely conceptual as of 2025; some elements appear in research, but no mainstream implementation.