CICA Construction 5.0 Working Group, chaired by Demet Demirer, publishes an article each month linked to the issues dealt within the group (technology integration, productivity, human wellbeing etc.). This month, we were pleased to have the contribution of Saurabh Mishra, CEO of Taiyo.AI, AI platform for the global construction industry.

If you wish to contribute, please contact Andine Canton (a.canton@cica.net).

Constructing the Future: How AI and Data Are Rewiring the World's Oldest Industry

Saurabh Mishra, Taiyō.AI, for CICA

The Construction Paradox: Building the World, Stuck in the Past

Construction is the foundation of modern civilization. From airports and energy grids to hospitals and water systems, this sector shapes how we live, work, and move. Globally, it accounts for over $12 trillion in annual spending—roughly 12% of global GDP—and employs nearly 1 in every 14 people on Earth.

Yet for all its scale and impact, the construction and infrastructure industry remains one of the least digitized sectors in the world.

While industries from finance to retail have embraced automation, AI, and real-time analytics, construction firms often operate with fragmented spreadsheets, outdated procurement systems, and decisions based on gut instinct rather than data. Operating margins rarely exceed 5%, and delays, cost overruns, and failures are common. The result: despite massive capital flows, the sector loses an estimated 20% of value annually due to inefficiencies—that's over $2 trillion in wasted investment each year.

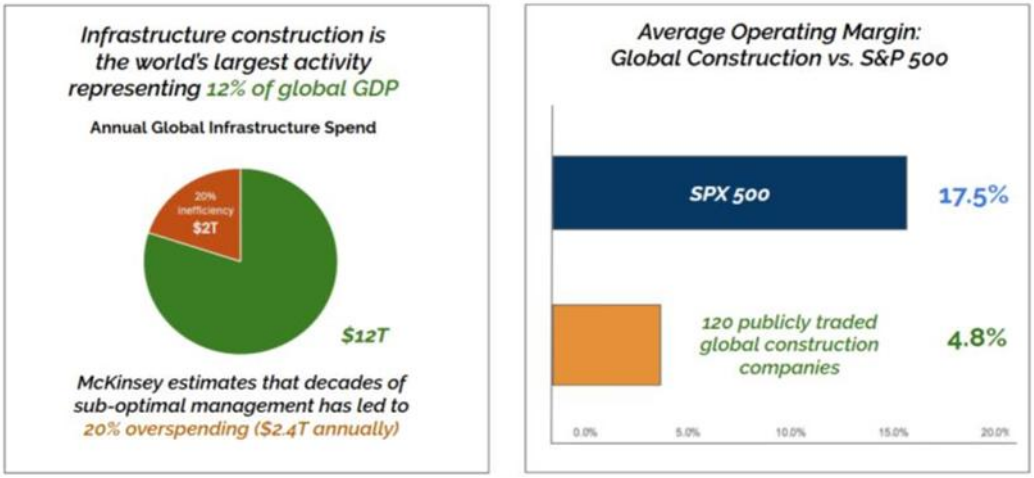


Figure 1: Public construction firms dramatically underperform compared to other industries in profitability, despite immense capital flows.
Source: Taiyō.AI, 2025.

This paradox is no longer sustainable. The demands of climate resilience, supply chain risk, urban growth, and financial accountability are rising—fast. So too is the pressure from clients, governments, and insurers to deliver more with less, and faster. And now, there is a powerful ally on the horizon: Artificial Intelligence.

AI Is Ready for Construction. Is Construction Ready for AI?

AI has crossed a transformative threshold. In the last two years, the cost of building and training powerful AI systems has collapsed, falling from $100 million per model in 2020 to as low as $450 today, thanks to efficient open models, better chips, and smart architectures.

Meanwhile, the pace of adoption of AI is setting historical records. ChatGPT hit 1 million users in just five days—faster than any consumer technology in history. It took the iPhone 74 days. It took Netflix 3.5 years.

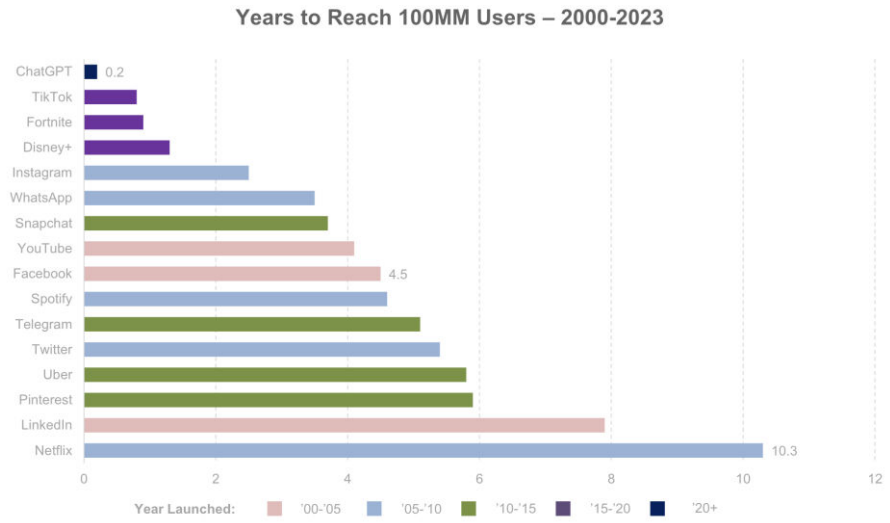


Figure 2: User adoption of generative AI outpaces every previous platform revolution.
Source: BOND Capital, 2024; Authors' calculations.

The implications are profound: for the first time, AI is no longer the domain of tech giants. Contractors, engineers, and ministries can now apply AI affordably at scale—*if* they have one essential resource in place: data.

And that is where construction's greatest opportunity—and biggest challenges.

The Infrastructure Sector's Critical Data Deficit

Construction is a complex, multi-layered industry that spans regions, sectors, and delivery methods. Projects are owned by governments, delivered by private firms, and financed through a blend of capital sources. But the data about these projects—who build them, how they're financed, what causes failure—is fractured, inconsistent, and difficult to access.

There is no universal format for infrastructure records. Critical information about contractors, contracts, permits, delays, and costs is often buried in PDFs, locked in government portals, or simply unavailable. No global system oversees or enforces data interoperability across the sector.

This fragmented reality has real consequences:

- Executives lack visibility in project pipelines
- Subcontractors face risk with limited insights
- Governments allocate billions with minimal historical benchmarking

- Insurers and investors cannot reliably model risk or return

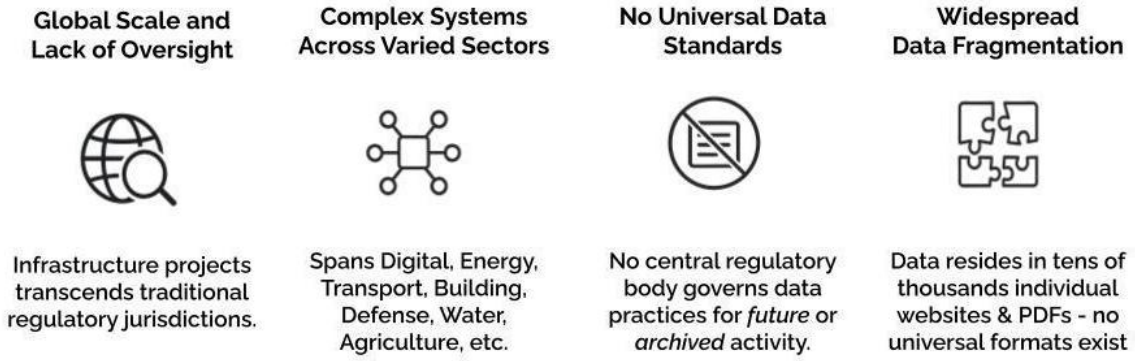


Figure 3: Visualization of the infrastructure data gap, showing siloed sources across procurement systems, agencies, and project types.
Source: Taiyō.AI Research, 2025.

This is the core reason AI hasn't transformed the sector—*not because the technology isn't ready, but because the data isn't*.

From Digitization to Intelligence: Building Cognitive Infrastructure

So, what does it mean to bring AI to construction? Not just digitization—*but intelligence.*

New platforms are beginning to bridge the gap between AI capability and construction workflows through a concept called the "data mesh"—a structured, federated system that connects siloed infrastructure records across countries, agencies, and timeframes.

The goal: turn scattered raw data into AI-ready, insight-rich ecosystems that can support early-stage decision-making, partner selection, risk analysis, and capital optimization.

One such platform has integrated over 65 years of procurement and infrastructure project history, sourced from over 10,000 government systems globally. Using generative AI, it offers tools to:

- **See Everything:** Map real-time project opportunities across geographies.
- **Learn Better:** Evaluate partners, clients, and stakeholders based on historical performance.

- **Improve Outcomes:** Identify patterns in project delays, risk exposure, and cost overruns before construction begins.

This isn't just helpful. It's transformational. For the first time, contractors and developers can act with strategic foresight—using structured intelligence to shape portfolios, not just react to RFPs.

What the Data Shows: Models, Risks, and Subcontractor Fragility

Analyzing millions of project records reveals important truths. Not all procurement methods perform equally, and not all projects fail for the same reasons.

Table 1. Comparative Failure Rates of Project Delivery Methods (Measured Against Closed Projects)

Project Delivery Method	Failure Rate (%)
Public-Private Partnership (PPP)	1.96%
DBFOM	9.73%
DBFM	2.14%
PFI	0.92%
DBOT	3.91%
DCMF	0.00%
DBFT	1.99%
Design-Bid-Build (DBB)	8.42%
Design and Build (D&B)	7.85%

Notes: Failure Rate (%) in this analysis is calculated as: Failure Rate (%) = (Non-Complete Projects / Closed Projects) × 100This approach isolates the denominator to only completed efforts, rather than total projects, which include prospective and under-construction statuses. It gives a clearer view of how many attempted and completed projects failed, thus focusing on realized outcomes. Project Categories: Prospective: Announced but not yet tendered. Bidding: In tender or procurement phase. Under Construction: Actively being built. Closed: Officially completed. Non-Complete Projects include statuses such as: Cancelled, Delayed, Abandoned, Paused, Unfunded, Inactive, Failed etc. These reflect varying degrees of project breakdown, all of which result in economic and operational loss, particularly for subcontractors tied to milestone-based payments. Sample Size: Numbers are rounded for readability (e.g., 1.1K = 1,100). Budget Figures: Reflect the total P (project value) across all lifecycle statuses.

PPP models consistently outperform traditional methods on delivery resilience. They internalize accountability, tie payments to performance milestones, and align long-term incentives. Notably,

PFI models in the UK show under 1% failure—suggesting that selectivity in partner choice and financial structure matters deeply.

From the subcontractor's perspective, the picture is even starker. Delays, abandonment, and payment uncertainty ripple down fastest to subcontractors—who are often left holding risk without information or recourse.

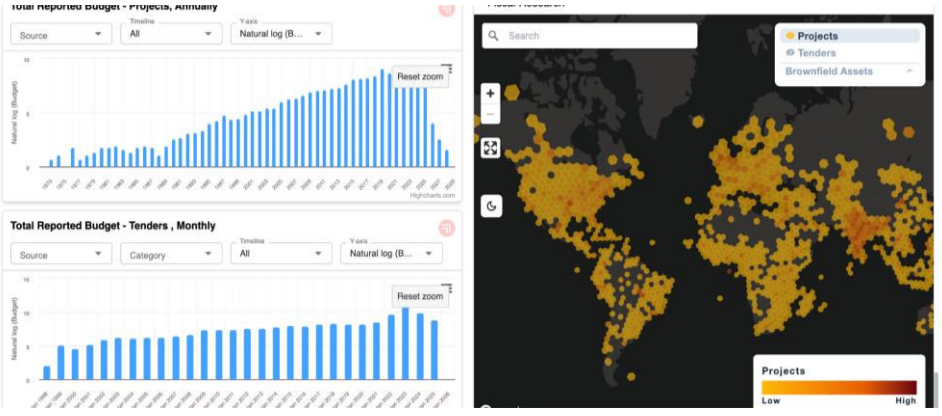
This is where AI can play a decisive role: by helping subcontractors evaluate project owners, stakeholder related judgement, delivery models, and market conditions before committing resources.

Global Variations: Lessons from the Map

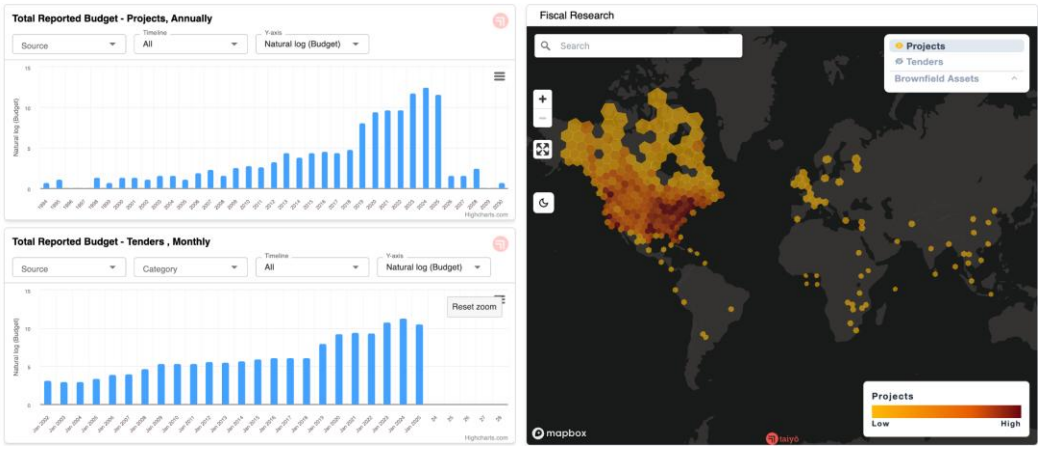
Patterns of procurement model adoption vary widely by region. North America still leans heavily on Design-Bid-Build, despite its higher failure rate. Meanwhile, Europe, Latin America, and Asia-Pacific are shifting toward PPPs, often with support from development banks.

These shifts are not just cultural. They reflect institutional maturity, data capability, and willingness to innovate. Where PPPs succeed, it is often because AI-backed data systems and strong stakeholder networks reinforce trust and transparency.

A. PPPs



B. Design-Bid-Build (DBB)



C. Design & Build (D&B)

Figure 4: Global distribution of procurement models. DBB dominates in U.S. state-level infrastructure; PPPs growing in Latin America, Europe, and Southeast Asia.
Source: Taiyō.AI Research, 2025.

The Road Ahead: Intelligence as a Competitive Advantage

The future of construction belongs to firms that can see the full picture before breaking ground. In a world of geopolitical shocks, climate volatility, and tightening capital, the next advantage won't be cranes or concrete—it will be cognitive infrastructure.

Firms that invest in data infrastructure and AI systems today will:

- **Win better projects, faster**
- **Avoid partners that increase risk**
- **Optimize portfolios with far more precision**
- **Improve outcomes and margins—at scale**

The construction industry will always be physical. *But its edge will be digital.*

The question is no longer whether AI and data matter—***it's who will use them first, best, and most strategically.***

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📩 *Want to learn more about building cognitive infrastructure for your projects? Reach out to the International Contractors Association for access to exclusive tools, global intelligence dashboards, and upcoming AI-readiness workshops.*