Construction 4.0: Digital Transformation of Construction Sector via Emerging Technologies

Synopsis

Over the past decade, digital progress has transformed whole industries, ushering in a new technological era now known as the Fourth Industrial Revolution (4IR). With productivity in the construction sector lagging other sectors, there are hopes that the continued advancement of the 4IR will spur on innovation and bring forward opportunities to improve efficiency. The construction industry has continued to operate as it has for the past 50 years. It still relies heavily on manual labour, mechanical technology and established operating and business models which results in stagnated productivity. Among the key challenges, is a lengthy period of underinvestment in innovation, digitisation and capital, which has prevented businesses from embracing technological changes. The construction industry is not known for its willingness to implement new technology but even it can't ignore the wave of new technology flowing around it. "Construction 4.0" is a branch of the 4IR referred to the digitalisation of the construction industry. Technological breakthroughs in the not too distant future look set to reignite the construction industry's growth. The emergence of new technologies is offering plenty of opportunities and creating new fortunes for the industry. In part, early promises of reduced operating costs and turnaround time are enabling greater flexibility in the areas of design and structure. This is making room for higher profit growth mostly welcomed by industry players. In an industry sometimes characterised as focused on the immediate short-term challenges of demanding clients and complex project delivery, companies are investing in long-term innovation that they expect will unlock significant efficiency, cost-reduction and revenue gains.

In construction 4.0, technologies such as Building Information Modelling (BIM) simulates physical and functional characteristics of a building and its core strength lies in the ability to make planning better that improves the work process of architects and contractors. 3D-printing bring the building industry to the next level: 3D-concrete-printing. The accuracy that comes with printing creates all kinds of assets. 3D-printing allows the printing of different types, qualities, and colors of concrete. Using robots and automation significantly reduces the production rate and time of construction. Augmented Reality (AR) is effectively used in Construction 4.0 to provide safety training for construction worker. Moreover, it accurate measurements of building plans, building materials and frameworks to reduce the risk of errors and cut construction time. Virtual Reality (VR) can also be used to improve lines of communication especially for tasks such as selecting parts in a warehouse or sending repair instructions over mobile phones. Use of robots in the building process can accelerate the completion of repetitive tasks while autonomous vehicles can provide driverless transportation of materials between sites and on-site. Drone surveillance offer the prospect of easier planning, design, monitoring and execution of projects as well use in repairs and maintenance activities. The modular building is the development of a building structure off-site, and then transported to the actual location without compromising on quality. IoT which is the backbone of the disruptive technologies reshaping the construction industry in monitoring & predictive maintenance construction equipments for asset management on sight, real time observation & tracking of the workforce that sending the progressive data to cloud for data analytics of progressive analysis & market forecasting. The capture of key real-time data points from field crews results in positive and lucrative outcomes on construction projects. Data analytics will

help firms determine the most profitable projects to pursue and how to manage them efficiently. This will allow them to improve quality and increase productivity by shortening construction times, lowering costs and reducing risks. These technologies could bring significant productivity gains for many businesses. However, unless construction sector leaders are willing to make the strategic investment necessary to introduce such capabilities, they will not be realised.

In order to stamp the 4IR's hallmarks, the Construction 4.0 needs to create new jobs, drive economic growth and provide a viable solution to address a host of formidable social, energy and environmental challenges. Taking off globally, advances such as reduced construction costs and lower environmental effects from more efficient use of scarce materials are hugely beneficial in the long run. But unlike other periods of significant change, governments and the industry need to collaborate and rethink their strategies to deal with each country and market's unique challenges. Overall, industry players must thoroughly consider the evolving needs of the industry in end-to-end project management to draw on the Construction 4.0 emerging technologies. Construction companies will certainly have to scour their operations for ways to boost efficiency to find an edge. The real challenge therefore lies in building "smarter". Without question, the only way to achieve this is to embrace technology and productivity-enhancing innovations to improve decision making and work procedures. However, before we hop on the 4IR map, let's get the fundamental right in the first place. It's not just about building faster, taller buildings, but building smart for a sustainable shared future.

By

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