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## Empowering talents to spearhead Construction 4.0

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**THE** Fourth Industrial Revolution (IR 4.0) has captured the interest of stakeholders in the construction industry in recognising the potential of modern technologies in enhancing collaboration, coordination and communication to deliver a sustainably built environment.

Also referred to as Construction 4.0, it comprises a variety of interdisciplinary technologies - digitising, automating and integrating the construction process at all stages of the value chain - based on the digitalisation of the construction industry and industrialisation of the construction processes.

According to the World Economic Forum, the adoption of digital technology has been proven to boost productivity, streamline project management and procedures, and enhance quality and safety within the construction industry. Consequently, construction projects are anticipated to achieve higher levels of productivity, safety and sustainability.

The Construction Industry Development Board (CIDB) has unveiled the Construction 4.0 Strategic Plan (2021-2025), outlining a roadmap for the digital revolution within the domestic construction industry. This strategic plan introduces cutting-edge technologies including Building Information Modelling, cloud collaboration, Artificial Intelligence, Internet of Things, Augmented Reality, Blockchain, Simulation, Autonomous Systems, Robotics, Big Data, 3D Printing and Additive Manufacturing. By incorporating these technologies, the plan

aims to bolster construction competitiveness and productivity, fostering significant enhancements in the industry.

Construction 4.0 has given rise to important concepts like Smart Cities, Digital Twins, and Green Buildings. These concepts play a crucial role in urban development, incorporating advanced digital technologies, new government models, sustainable resource management, renewable energies and information technology knowledge.

To align with Construction 4.0, industry stakeholders must undergo significant transformation by embracing emerging technologies. However, the construction industry is encountering a shortage of digital talent required for the successful implementation of Construction 4.0.

According to the 2030 Workforce Report, 20% of construction industry workers feel inadequately equipped with digital skills and unprepared for ongoing technological advancements.

Closer to home, the construction industry is grappling with an approximate shortage of 400,000 employees. To address this, CIDB is closely collaborating with industry associations and the Human Resources Ministry to find effective solutions and resolve the issue.

Despite the availability and maturity of many technologies, construction companies still rely on manual labour, heavy machinery and a business model that has not seen much change in the last 50 years.

There is an urgent need for smarter resources. The adoption of digital technologies is hindered by several primary limiting factors, including skills shortage, inadequate training opportunities and budget constraints.

Human capital components, such as intellectual agility, knowledge, skills and competencies, are considered the most critical factors for the successful implementation of Construction 4.0 technologies.

According to a 2020 survey among construction professionals in Malaysia, 53% of respondents were unaware of the implementation of IR4.0 technology in the construction industry, while 34% had adopted some of the technologies during their working experience. Interestingly, the remaining 13% were unsure of the connection between listed technologies and IR 4.0.

After presenting the respondents with a list of technologies associated with IR4.0, their perspectives underwent a significant shift. The proportion of respondents who became familiar with IR4.0 technologies increased to 47%.

The construction industry is widely recognised as a key driver of Malaysia's economic growth, and its leaders must transition from traditional practices to embrace digital and modern technologies.

Consequently, industry leaders and higher education providers must collaborate closely to cultivate future technology talents. This collaboration is of paramount importance, especially considering the potential elimination of millions of jobs globally, including construction jobs, due to technological advancements by 2030.

There is a need to redesign curriculum structures to develop a digitally skilled workforce that is prepared for the industry's demands. This can involve exploring innovative teaching and learning content, delivery methods and platforms, particularly in light of the significant evolution of education post-

pandemic, which has led to the emergence of innovative e-Learning approaches.

Numerous pedagogical approaches have been tested using gamification, simulation-based experiential learning through AR/VR, AI and machine learning-powered automation, micro-learning, outcome-oriented learning and mobile learning, among others, to enhance online teaching and learning.

The challenge of digitalisation in any industry is the lack of human interaction. However, blended education endeavours to maintain a balance by emphasising meaningful face-to-face interactions while integrating digital technologies.

The writer realises that knowledge and skills are not stagnant in a digitalised world and pedagogies need to evolve to attract millennials and Gen Z, who are tomorrow's tech-savvy leaders.

Therefore, it is imperative to revolutionise construction management programmes by integrating digital technology and sustainability principles. This will enable the development of graduates who are well-prepared for the future workforce. These individuals will play a pivotal role in driving economic sustainability within the construction industry, supporting the development of green buildings and the realisation of Net-Zero Carbon goals in our cities and structures.

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