

DIGITAL TRANSFORMATION WITH BIM ADOPTION: THE KEY TO UNLEASH THE PRODUCTIVITY IMPROVEMENT IN CONSTRUCTION INDUSTRY

by

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Global phenomenon of low productivity has overshadowed the effort to modernize the construction industry. This, in turn, has caused the construction industry to register low growth rates over the last 50 years compared with other industries.

Research and survey had reviewed and identified root causes for low productivity from three dimensions of the industry perspective. The first dimension relates to **external forces** such as the increasing complexity of project, over-regulation and informality practices that distort the integrity of the market. The second dimension is about the lack of cohesive **industry dynamics** caused by high fragmentation and opaqueness of process operation, misaligned incentives in contractual structures, and suboptimal owner requirements. The third dimension is concerned with **organizational-level factors** such as under investment to design processes, poor project management and execution, insufficient skilled labor as well as under investment of digitalization, innovation and capital. Generally, the root problems outlined above are by any means associated to the deficiencies and ineffectiveness in communication and information management system of process flows within and across the construction industry.

In Malaysia, the Construction Industry Board (CIDB) was officially launched in December 1994 with the role to regulate safety and health issues of the construction industry. Subsequently, in mid-1999, CIDB introduced Industrialized Building System (IBS). The main aim of IBS is to ensure safer, healthier, better quality and efficiency, as well as sustainability of the construction industry. In early 2007, the IBS Centre as a resource centre for IBS became operational. This was followed by the implementation of the *Construction Industry Transformation Programme* (CITP) of 2016 -2020 in 2015. CITP is currently our nation's heartbeat for construction sustainability efforts. CITP holistically addresses the productivity and sustainability issues by exerting intervention efforts concerning the three aspects of the industry ecosystem that coincided with the perspectives of root causes contributing to low productivity discussed in the paragraph above.

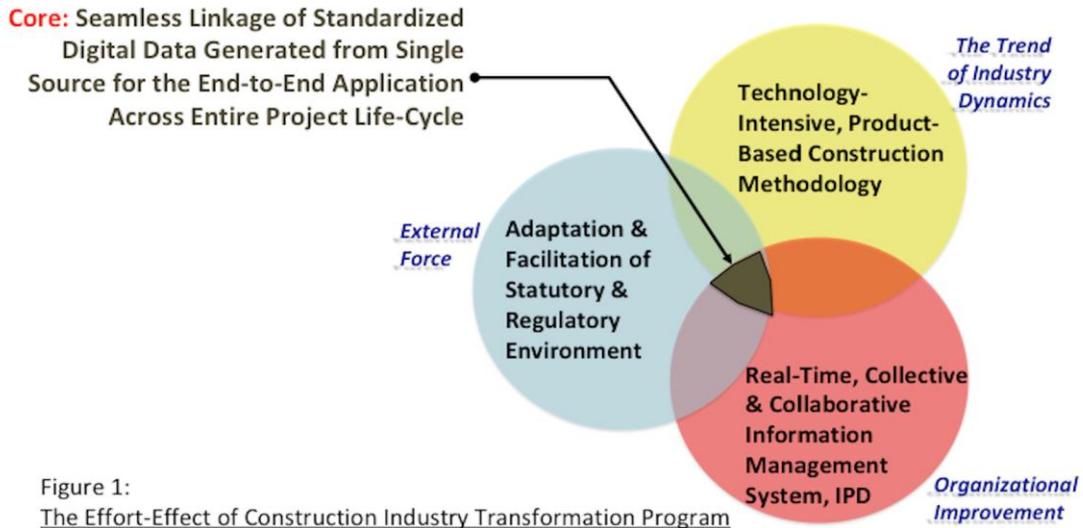
Firstly, legislative and regulatory efforts were made to facilitate the harnessing of industry-wide cooperation, transparency with digitalization in information and process control, as well as development of technological based human resources. These efforts included amendment of OSH Act, CIDB Act, UBBL, introduction of new regulations like OSHCIM, IBS and BIM (*Building Information Modelling*) adoption policies by CIDB, roadmap to realize BIM submission for

building plan approval and the setting up of MBOT (Malaysia Board of Technologist) under Act 768.

The second aspect of the CITP efforts that renewed the forwarding energy of the construction industry, are the transformation of labor-intensive construction methodology towards technology-intensive and product-based approach. The capacity of construction companies are gradually being uplifted towards manufacturing and equipment reliance to perform *Prefabricated Prefinished Volumetric Construction* (PPVC) technology in the near future. To comply with new regulations that were devised to synergize and realize such transformation, the project owners and designers will soon find themselves being held responsible to consider and review the construction methodology and management requirements at early stage of project prior to the award of construction contracts.

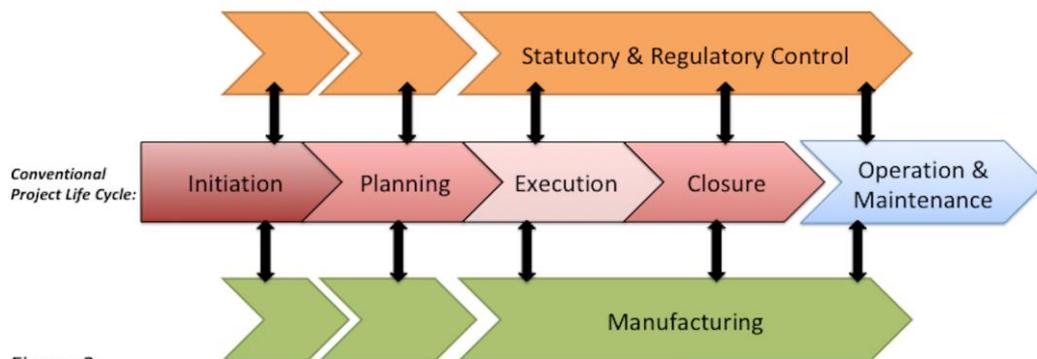
Thirdly, beyond the mandate on the adoption of quality management system at organizational level, the emphasis has extended to driving the industry towards improvement of information management system to achieve real-time, collective and collaborative efficiency operation wise. The leaders in the industry are articulating the concept of “shifting the effort” with regard to achieving *Integrated Project Delivery* (IPD) by employing digitalization technology to improve the management of both the process and process flow. This leads to the adoption of BIM (Building Information Modeling), a digitization technology oriented information management system over the whole life cycle of a built asset including its operational phase.

Piecing the whole perspective together and analyzing it closer, it is critically logical to derive that the core engine to empower these efforts to taking effect will be the establishment of a big data environment that allow real-time digital collaboration with compatible linkage capacity from end-to-end of the project life cycle with cross-industry encompassment. Illustration of this idea is as in Figure 1. This entire concept put into real practice under an international standard is indeed the fundamental of Digital Transformation to the construction industry.



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Hence, through digital transformation, the industry shall expect the achievement of high productivity that is in parallel with the ‘disruptive change’ of improvement in information management system that enables seamless linkage of processes over the entire project life cycle and beyond. The efficiency of the digitalization will also synchronize and connect external processes including statutory and regulatory control as well as those of the manufacturing industry that is critically essential in the context of IBS. Ultimately, the digitalisation transformation of the construction industry will improve the productivity cross industry nationwide. The expanded perspective view of project life cycle is illustrated in Figure 2.



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In conclusion, digital transformation is the key to unlock the productivity puzzle of the construction industry. Without doubt, digitalization is facilitating the adoption of BIM across the construction industry. However, nationwide refined focuses and efforts are currently critically lacking in considerations to the following areas:

- Establishment and enrolment of an international BIM standard for practice;

- Early stage adoption of BIM as project innovation by the professional service sector;
- Upgrading the education system to instill BIM skill in human resource capacity building; and
- Capturing the value of the common data environment and digitization into the parallel processes of the supply chain in the manufacturing industry.

These are the essential and immediate challenges with BIM adoption effort that Malaysia must address to deliver productivity as its intended primary purpose.