# Towards Construction 4.0: Empowering BIM Skilled Talents in Malaysia

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**Abstract**— The precision of time, cost and quality of a project are very important in Construction 4.0 because these three pillars act as the main measurement of the project's success which new indispensable technology like Building Information Modelling (BIM) is able to manage these pillars efficiently. As the technology is moving fast with the Industrial Revolution 4.0, the construction industry is facing more futuristic and complex design, material diversity, green building, smart home and so on, which makes it necessary for the construction players to transform conventional practices into digital and modern technology. However, the lack of skilled talent in BIM is a barrier to fully implement the BIM in the industry. Hence, this paper intends to review the initiatives that can be approached in preparing BIM skilled talents towards Construction 4.0 in propelling Malaysia into a technologically advanced nation. In conjunction with that, BIM education is seen to be very significant in preparing BIM skilled talents especially in enhancing their knowledge and skills in BIM. In addition, a comprehensive BIM training either in software application or on-job training should also be introduced in tertiary level education to expose the potential talents to the real job environment while increasing the awareness and interest in BIM. This study is noteworthy for the Malaysian construction industry to collaborate with the Ministry of Education in making a strategy for empowering the BIM skilled talent through the right BIM education and training.

**Index Terms**— Construction 4.0, Building Information Modelling, BIM skilled talent, BIM educational, Empowering BIM, BIM knowledge and Skill, Malaysia.

## 1 INTRODUCTION

NOWADAYS, the term Industrial Revolution (IR) has become one of the central topics among the industries, particularly, the construction industry. The words "Industrial Revolution' is derived from [1] founder and executive chairman of the World Economic Forum who defined the industrial revolution as a new transition from conventional processes to new processes using new or smart technologies which may upgrade the productivity level into the optimum level. The Fourth Industrial Revolution is a continuation of the Third revolution where the computer and automation are introduced in the middle of the revolution [2]. Due to that, the Fourth Industrial Revolution concentrate on digitalization through Cyber-physical System, Internet of Things (IoT) and networks where the convergence and application are referred to nine pillars consisting of advanced robotics, addictive manufacturing, augmented reality, simulation, system integration, internet of things (IoT), cloud computing, cyber-security and big data analytics. The integration of these nine pillars also has influenced the construction industry especially in managing and controlling the whole construction process efficiently and effectively.

Every new revolution brought its impact to the industries socioeconomically either positively or negatively. In the construction industry, the impacts indicate that with application of smart and digital technologies, it help the construction industry in enhancing the project performance and productivity level by saving the construction time, minimizing the cost, minimizing the construction defect or clash, enhancing the construction quality (including safety, client satisfaction) and also the project management lifecycle using smart technology like Building Information Modelling (BIM) [3]. In conjunction with this new revolution of the construction industry, the word "Construction 4.0" is used to describe a new construction industry with the application of smart and digital technologies. Also, Construction 4.0 is established to optimize the usage of computerization and digitalization among the construction players by encouraging them to adopt the latest technology and modern construction method to upsurge the construction productivity level towards global competitiveness and contribute to the country's economic status at the same time [4].

Traditionally, the Malaysian construction's players use a 2D CAD drawing plan as their main source in managing the project lifecycle and the construction phases must be done step by step where the first step needs to be completed first before they moved to the next step of the development process [5]. Due to this circumstance, the project might have a problem with unexpected situations like delay, defect, clash, project not according to the specification, waste and so forth [6][4]. However, by using BIM technology, any fault that has occurred in a project can be identified earlier and the modification will be done by the construction player before the construction development begins. Moreover, BIM also enables some of the construction progress to be done simultaneously which can accelerate the project progress while saving time and cost [7]–[10]. Otherwise, There are many benefits of BIM implementation in the construction field especially in managing and controlling the design, scheduling, budget, project documentation and communication between


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the project team [7]

It gives an enormous impact if BIM technology is fully implemented in Malaysia, however, since it was introduced 12 years back, in the year of 2007, the number of BIM adopters is still low [11]. According to [4][6], the main factor is "people" which refers to the BIM unskilled talent in the current construction industry. The Construction Industry Transformation Program 2016-2020 [12] stated that the low productivity level of the construction industry is caused by the limited skilled talents in using the modern construction method and practices such as BIM. Hence, it is time to understand the Construction 4.0 technology and review the initiatives that can be a new strategy for Malaysia in preparing BIM skilled talent towards Construction 4.0 especially in terms of BIM knowledge and skill of the talents. In this paper, a review of the literature on Construction 4.0 technology is discussed in the first phase of this paper to give an understanding of the Construction 4.0 technology. Then, followed with the building of skilled workforce including the employment statistics by skilled talents in Malaysia and the importance of skill formation through BIM education and training based on the initiatives taken by developed countries. Finally, BIM education in Malaysia is enlightened in the current initiative that the Malaysian education has grabbed in preparing the BIM skilled talents. This paper is basically theoretical in nature and the conclusion provide a groundwork for a more in-depth future study associated with this concept.

## 2 METHODOLOGY

A literature review was conducted to explore and discuss the initiatives that can be approached in preparing BIM skilled talents towards Construction 4.0 in propelling Malaysia into a technologically advanced nation. Data for this purpose are gathered from journal articles and conference papers through Scopus, Web of Science and Google Scholar using phrase searching keywords such as "industrial revolution", "industrial revolution 4.0", "building information modelling", "BIM", "Building information modelling in Malaysia", "BIM education" AND "Malaysia", "Construction 4.0", "Construction 4.0" AND "BIM education". Meanwhile, for the statistical report, the data are taken from the official website and annual report for particular agencies. Moreover, for books and other materials, the data was gathered from google books and library searching. After all the relevant data has been gathered and filtered, the results and findings are critically reviewed and discussed.

## 3 THEORETICAL BACKGROUND

### 3.1 Construction 4.0

In relation to Industrial Revolution 4.0, the term Construction 4.0 is being used to describe an evolving construction industry where the revolution has transformed the automated production into the high level digitalization like the Building Information Modelling (BIM) [4]. The BIM tools are used by architects, engineers and construction (AEC) industries to enhance and improve the project progress by transforming the way the project is being designed, analyzed, constructed and managed within the whole project lifecycle [7]. Besides BIM, Construction 4.0 also emphasizes on the use of Augmented Reality (AR), Cloud Computing, Internet of Things (IoT) and Big Data together with the BIM tool to ensure the information is connected between these technologies, to easily monitor the construction progress and enhance the productivity level [4].

To bridge the BIM with the project development, the Augmented Reality (AR) is used to visualize the project in virtual information into the real-world environment before the construction begins to ensure the constructability of the project [13]. It is important to use the AR together with BIM because it helps to describe the actual construction site which can be a baseline to track and control the construction progress, at the same time provide the valuable information for workers and enhancing their understanding about the project [14][15][16][17]. Furthermore, the is also AR used to support the building performance simulation and energy usage by using the sensor technologies, 3D laser technology to digitally capture the dimensions and spatial relationship of object inside the building such as building structure, water pipes and transfer all the information into the BIM tool [18].

BIM-Cloud is an integrated technology which allow access to the computational services offered via the Internet where the project teams are working together in real-time; close to monitor and control the project progress even though they are in different locations [19]. By using this BIM-Cloud, the project team is able to access and update the project information easily via their mobile device such as smartphone, tablet or PC's [17]. Besides, this technology also improves the decision-making between the project stakeholder and also ensures the project delivery targets are achieved [4].

Moreover, BIM is also integrated with the Internet of Things (IoT) where IoT is a system that connect things with the internet. Mimos (2015) has defined IoT as "*Intelligent interactivity to exchange the information and knowledge between human and things to create a new value creation and quality of life*." The IoT consists of three main technology components, namely connected things with embedded sensors, connectivity and infrastructure, analytics, and applications [21]. These components are important in managing the construction site more efficiently especially in detecting the movement logistic of the construction machinery and equipment, control the construction waste, detecting the material supply, enhance the security on-site, monitoring the construction progress. Moreover, the use of IoT also improves the communication between the project stakeholder using smart communication where the information can be easily exchanged and meeting can be done online via e-meeting apps anywhere [3].

As construction technology is improving day-by-day, the use of Internet of Things (IoT) and sensors also will increase and will lead to the large volumes of heterogeneous data

which is expected to increase exponentially in the future [22]. To deal with this situation, the Big Data was introduced to process and extract useful data from a project by analyzing the historical data to identify the pattern of the previous project; this may help more efficient future development through this information [23]. Furthermore, this technology is useful to improve the design, construction and operation stage when connected to the BIM, where the data can be shared and used in a larger community in the construction industry. Moreover, it also will decrease the project risks, improve the project efficiency, improve job site safety, increase the productivity and help the project stakeholder to make better decisions [24].

Nevertheless, based on the current Malaysian construction industry situation, Construction 4.0 is still far behind to be established because the implementation of BIM is still in the preliminary stage where the number of BIM adopters is still low. Additionally, the use of IoT in the construction industry is also still in its infancy level because the technology is still novel, and Malaysia has limited service providers including experts to fully implement in Malaysia. In terms of cloud computing and big data, Malaysia has just launched these two technologies last year in 2018 and people in the industry are not really being exposed to these technologies because a lot of projects still use the conventional approach. Thus, this research is significant to enrich the Malaysian construction industry especially in "building people" to be a skilled talent which can be one of the driving forces to achieve Construction 4.0 in Malaysia very soon.

### 3.2 Building a Skilled Talent

Skill is defined as the ability of talent to carry out and complete the tasks and duties of a given job. Moreover, skilled talent refers to an employee who has specialized training or a learnt skillset to perform the work and has varying levels of training or education. Meanwhile, the unskilled talent is referred to the talent that does not have special training or skills and most of them cannot perform the skilled talent job scope [25]. Due to the construction technology transformation like Building Information Modelling (BIM), the knowledge and skill to operate BIM are very important to ensure the BIM can perform accurately and this would need a skilled talent who have better knowledge and skill on those matters. Thus, to realize Construction 4.0, Malaysia needs to "build talent" to produce more skilled talents in the future, not only in the BIM perspective but also for other new technologies like Augmented Reality, Big data, cloud computing, sensor and other upcoming construction technologies.

According to the [26][27] in their press release of employment statistics for Quarter 1 of the year 2015 to Quarter 1 of the year 2018, the employment of low-skilled talent showed no major changes for the whole first quarter, however, in the year of 2018 the need for low-skilled talent is decreased for every employment type especially in vacancies and job created. In terms of skilled talent, the vacancies increased in every quarter which is +4.1% in quarter 1 of 2016, +0.8% in quarter 1 of 2017 and +3.9% in quarter 1 of 2018; these show that the vacancies for skilled talent are highly in demand. Nevertheless, the percentage of new jobs created for skilled talent in construction activity decreased in quarter 1 of 2018 because of the decreasing need for skilled talent in certain parts in this industry as the part has been replaced by smart technology. Furthermore, the need for semi-skilled talent dominated all the employment types; in quarter 1 of 2018, the increments of semi-skilled is between 0.5% to 10% where the new job created for semi-skilled has the largest percentages. Meanwhile, the vacancies of semi-skilled talent decreased for quarter 1 of 2018 because of escalation in vacancies for skilled talent. Table 1 shows the actual percentage of Malaysian employment statistics for the construction industry activity for quarter 1 from 2015 to 2018. Currently, the employment statistics by activity for quarter 1 of 2019 is not yet released to be put in this study, hence, the statistic will be added once it is released for the next study.

TABLE 1:
THE MALAYSIAN EMPLOYMENT STATISTIC FOR CONSTRUCTION ACTIVITY FOR QUARTER 1, 2015 TO QUARTER 1, 2018

| Quarters/Year | Quarter 1, 2015 | | | Quarter 1, 2016 | | | Quarter 1, 2017 | | | Quarter 1, 2018 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Employment by Skill | Skilled | Semi-skilled | Low-skilled | Skilled | Semi-skilled | Low-skilled | Skilled | Semi-skilled | Low-skilled | Skilled | Semi-skilled | Low-skilled |
| Position | 11.2 | 84.1 | 4.7 | 11.3 | 84.5 | 4.2 | 12.0 | 83.7 | 4.3 | 11.8 | 84.4 | 3.8 |
| Filled Position | 11.0 | 84.8 | 4.2 | 11.0 | 85.5 | 3.5 | 11.7 | 84.5 | 3.8 | 11.5 | 85.0 | 3.5 |
| Vacancies | 19.6 | 41.2 | 39.2 | 23.7 | 44.7 | 31.6 | 24.5 | 49.1 | 26.4 | 28.4 | 48.1 | 23.5 |
| Job created | 47.1 | 47.0 | 5.9 | 39.5 | 55.2 | 5.3 | 47.0 | 46.7 | 6.3 | 37.8 | 57.0 | 5.2 |

Source: [28]

According to [29] in his study on "the risks of skills shortage in Construction" has stated that the shortage of skilled talent in the construction industry has become the greatest threat to the future construction industry because it will affect the construction economy, project performance, and productivity. In conjunction, to avoid the skilled talent shortage, the collaboration between the government and private sector is seen as vital to enforce the construction players to upgrade their knowledge and capabilities concerning new construction technologies.

In relation to upskilling the low-skilled talents and enhancing the semi-skilled talents to become skilled workers in the construction industry, the government and private sectors must invest in skill formation among the nations through education, training, awareness and internship programs because it will help the industry to improve the productivity as well as the level of integration and collaboration across the various disciplines in the construction value chain [30]. It is therefore important for the industry to embrace the technology with clarity of BIM education and training.

### 3.3 Education and Training

In developing a capable worker, education is very important because with education someone can be capable. Moreover, in

achieving Construction 4.0, the need for skilled talent is higher to enable the Malaysia Construction Industry (MCI) to fulfil the demand for global competitiveness. Due to this, the government and private sector must take it as a serious issue because BIM education must be strengthening from the secondary level (for construction technical education) until the tertiary level in relation to preparing skilled talent with specialized training according to industry needs [29].

To encourage proper BIM education, there are several barriers that need to be highlighted to ensure that BIM education can be successfully implemented in Malaysia [31][32][33]. The barriers are such as lack of time and resources to provide a new curriculum; this is because to develop a new curriculum the government needs to do a comprehensive study about the relevance of the curriculum for short- and long-term education. Secondly, lack of financial or funding to provide appropriate BIM materials and educational resources due to the high cost to buy the BIM software and hardware. Thirdly, lack of support and interest from the faculty to explore and add BIM syllabus in current curriculum because BIM education will be replaced by other technologies in a few years. Fourthly, the teachers or lecturers did not have real industry experience and accreditation in operating the BIM, which can contribute to the complexity in understanding the BIM system and uncertainties of BIM software (Revit, Bentley, etc.) and finally, the lack of collaboration with the private sector or organization that run the BIM project to give an opportunity to students or talents to have their on-job training or internship programs.

In BIM education, there are several initiatives that have been done by a few developed countries such as Singapore, Australia, Finland, and Hong Kong in preparing their BIM skilled talents as shown in Table 2. These countries are selected based on their proper BIM education in the tertiary and vocational level. The BIM education and training can be a guideline for Malaysia to empower BIM education as the initiative has shown a positive impact on the number of skilled talents for those countries. Based on Table 2, it can be summarized that the BIM education initiatives of these countries are more focused on developing the talent with knowledge and training such as;

a) Introducing BIM course in universities, polytechnics and technical college by creating BIM course by itself; lots of BIM knowledge can be delivered such as BIM concept and theory, fundamental modelling for architecture and structure, BIM coordination and various BIM software training for individual BIM competency.
b) The collaboration between government and industry in holding in-house training, seminars, and workshops to enrich BIM knowledge and expose the real BIM situation to the students, graduate or practitioners in nurturing their interest in BIM.
c) The software vendors provide necessary and sufficient training and short courses for the student and practitioner in mastering their software.
d) Develop BIM education working group involving academicians, researchers, the industry, and government in discussing the BIM education improvement.
e) Creating various BIM certificates and accreditations for individuals who are involved in BIM courses, trainings, seminars or workshops.
f) Developed center of BIM learning for students (undergraduate and postgraduate) with adequate BIM material, hardware and software.
g) Upskilling students' skills by involving them in on-job trainings and internship programs
h) Increase BIM awareness programs in the construction industry.

TABLE 2:
BIM EDUCATION AND TRAINING ACCORDING TO THE COUNTRIES

| Country | Initiative | Country | Initiative |
|---|---|---|---|
| **Australia** | • Started incorporating the topic of BIM in undergraduate courses<br>• Providing special courses for BIM in technical collage especially in BIM software.<br>• Collaboration with industry in providing the BIM seminar to enrich the student knowledge regarding the National BIM Guide and BIM Management Plan including the related documentation.<br>• Software Vendors – providing training for their software package to the user and holding short courses for their software.<br>• Large Firm – Holding BIM education day, training course and in-house training for staff and interested student.<br>• Involving the universities in a BIM project called CodeBIM (Collaboration Design Education using BIM).<br>• Developing a BIM education working group between industry and academicians. | **Hong Kong** | • Some universities are offering optional BIM courses in their degree programs<br>• Technical and Vocational college providing BIM training for Diploma program<br>• The Construction Industry Council (CIC) is collaborating with training institutes to increase BIM capability for the frontline workforce and professionals.<br>• CIC with industry collaboration holding series of BIM promotional activities.<br>• Create BIM working group to enhance BIM implementation in Hong Kong. |
| **Finland** | • Universities and polytechnics provide BIM education for their students<br>• Software Vendor – providing education and training for the student<br>• Provide various courses of BIM for various players<br>• Large Firms – providing in-house BIM training | **Singapore** | • Developed a Centre for Construction IT (CCIT) for holding BIM training like BIM management training for student and professional which the involved parties will get certification and student need expose to on-job training.<br>• Upskilling and reskilling of BIM practitioner via various BIM training and certificate<br>• Collaboration between education and industry in holding BIM awareness seminar and graduation workshop for the student.<br>• Providing BIM internship program to expose the student with the real BIM job.<br>• BIM curriculum in tertiary level (university and polytechnic), holding BIM competition and student's expert program |

**Sources:** [32][34]

As discussed previously, the necessity for proper BIM education, training, awareness and on-job training is significant to be implemented in Malaysia. These elements must be compressed together into the BIM educational system for the tertiary education level and secondary level for some parts of their competency in BIM application. Furthermore, BIM education in Malaysia is still in initial progress which is more focused on spreading awareness to the key players in the construction industry by organizing seminars, workshops and BIM tours. According to the BIM education at the secondary and tertiary levels, the school and universities are still looking for the right way to achieve the best BIM education to be implemented in Malaysia as well as preparing job-ready skill talents in BIM.

## 4 BIM EDUCATION IN MALAYSIAN CONSTRUCTION INDUSTRY

As mandated by the Malaysia government, BIM implementation will become compulsory for government project worth RM100 million and above by the year 2020, and this needs lots of skilled talent workforce to participate in this project. Hence, the BIM education and training role is vital in upsurge the BIM knowledge and skill not only for current construction practitioner but must be started even from the secondary and tertiary level to ensure they are aware and

ready to embrace BIM technologies

Education only is not enough to develop skilled talent because most of it focusing on theoretical knowledge only [35]. Due to that on-job training or internship program is needed to be introduced for the tertiary level to expose them to the real BIM project implementation at the same time to nurture their interest in BIM and related technology [33]. For example, Building and Construction Authority (BCA), Singapore has taken initiative to train any BIM interest including the student to have a comprehensive BIM education by involving in-house learning hold by the Centre for Construction IT (CCIT) for short course to get BIM Modelling Skill Certification. Then, the student can continue the course with 3 to 6-month On-Job Training (OJT) before they further to the BIM Management Training to get a certificate of recognition [34]. This shows that the on-job training is vital for any talent to have more experience before upgrading their skill to the next level.

Additionally, to successfully deliver the BIM education and training, the government also needs to strengthen the Center of excellent for BIM R&D to ensure the technology is always updating parallel with the advance global construction technology [33][34][36] as a establish BIM information center. In term of awareness, besides promoting the BIM and its advantages, the awareness also needs in promoting and expose the BIM talent to the related BIM technology such as Augmented reality (AR), Cloud Computing, Big Data, Internet of Things (IoT) and the use of sensors on-site which each of them are connected to the BIM in managing the whole project lifecycle including on-site management and safety.

Currently, Malaysia's government has planned a few strategies for empowering BIM education in Malaysia to upskill BIM talent. As for current, Malaysia has planned to offer BIM courses in Technical and Vocational Education Training (TVET) as a surface to introduce BIM education at the secondary level. This course is offering based on technical perspective which is related to the architecture, engineering (structural, mechanical & electrical, plumbing) and construction (including quantity surveying) field [30]. Moreover, at the tertiary level like Higher Education Institute (HEIs), BIM course already implemented in government HEIs but the implementation is still low due to the limited expertise to teach on BIM which is not only to teach the BIM concept and theory but also to train the BIM software practice. Furthermore, limited funding in providing BIM laboratories completed with the BIM hardware, software and the BIM instructor also being a barrier for universities due to the high cost.

On the other hand, private institute, for example, INTI International University & Collage, become the first private university that offers a specific BIM course for Quantity Surveying undergraduate program. The course is conducted using the BIM module and the BIM software application is specially trained by the BIM software vendor named Glodon, for the Cubicost software. At the end of Cubicost training, the graduate student will be awarded a competency certification and accreditation from Glodon. Interestingly, INTI College has taken initiative to collaborate with the giant construction companies like IJM Corporation Berhad, Kerjaya Prospek (M) Berhad and IGB Corporation Berhad in expose their student in a real BIM implementation by having a BIM Forum to discuss current BIM situation in Malaysia and having a practical learning which the student needs to produce a BIM model for their project and presented to them as applied for ASPEN Vision City, Penang project.

In term of continues learning for upskilling and reskilling the professional, the government has introduced MyBIM Centre as a BIM training center with various intensive BIM proficiency training with affordable cost and time. The main headquarters of MyBIM Center is located in Kuala Lumpur as the main center for BIM training and it might be an obstacle for the students or professionals who are staying outside the border to have a comprehensive BIM training for a long period. To solve this circumstance, six CIDB MyBIM Satellite center has been established in universities nationwide to enable the BIM education can be widely disseminated throughout Malaysia in facilitating BIM education and training to build a high-skilled workforce in BIM. Currently, the six universities that collaborate with this program is Universiti Malaysia Pahang (UMP), Universiti Malaysia Perlis (UniMaP), Universiti Sains Malaysia (USM), Universiti Teknologi Malaysia (UTM), Universiti Malaysia Sabah (UMS) and Swinburne Universiti Sarawak. These universities are responsible to provide BIM training and development program for students in the construction-related field as well as providing services as BIM consultants for the private and public organization who want to implement BIM.

Meanwhile, the collaboration between the universities and industries in a BIM working group is very limited in Malaysia and this should be highlighted either by the university or industry to get more connected and working together soon. For example, the Australian Institute of Architects (AIA) and Consult Australia established a BIM education working group between industry and academia to produce a series of documents related to enhance the BIM learning in Australia like coordinate BIM training module, R&D and BIM standards. In Malaysia, this collaboration can be applied in developing the Malaysia BIM roadmap, BIM guide and any related BIM document.

Besides that, the need to expose the low-skilled talents to the real BIM training is a must to improve their skill and capabilities in BIM like internship programs. In addition, it really helps if the government establishes a special commission or department to monitor the movement of industry 4.0 by placing all agencies involved in producing the skilled talent under one department or commission.

## 5 CONCLUSIONS

The Fourth Industrial Revolution is a new revolution that transforms the world into computerization and digitalization technologies where the transformation will contribute to new processes using smart technology. This transition will make the process for monitoring and controlling much easier and less erroneous. In the construction industry, this transformation has changed the industry into Construction 4.0 where smart technology is used to replace the conventional process. Besides optimizing the productivity level, the use of smart technology is used to minimize the cost and time of construction development while contributing to high-quality projects.

In achieving a developed nation, the government in collaboration with private agencies are very crucial in ensuring all the preparation is ready towards global competitiveness. In the construction industry, Malaysia is still lagging behind in construction technology because of lack in knowledge, skill and training which are very important for the government to enforce the potential construction key players to involve and embrace their knowledge as well as their skills in construction technology that is widely used in the current construction industry such as Building Information Modelling (BIM). Due to that, building a ready BIM talent is seen as an essential requirement in ensuring the BIM is successfully implemented in Malaysia but to build a BIM skilled talent, the first concern is preparing their awareness, knowledge and skills. To have proper knowledge and skill upgrading in BIM, BIM education is vital not even for the current construction practitioner, but it needs to start in the early stage of preparation of the BIM talent, which is at the secondary and tertiary level of education.

Generally, BIM education in Malaysia began to grow where the government has recognized a few strategies in "building a BIM talent" by empowering them with BIM knowledge, skill and training such as establishing the CIDB MyBIM Centre as a training center for students and industry practitioners, upgrading BIM awareness and knowledge through TVET and High education institutions especially in their education syllabus for construction-related fields. Moreover, BIM education will be further enhanced by establishing a partnership between the industry, software vendors and academia in giving training, to develop the BIM education module. However, the journey of BIM education in Malaysia is not smooth as planned because of limited expertise and environment acceptance. Hence, the collaboration between the government, private and education system with the environment support is very important in encouraging the construction players and potential players to involve in BIM with comprehensive BIM knowledge, training and skill in conjunction to achieve Construction 4.0 in Malaysia. As a conclusion, to empower the BIM skilled talents, BIM education is significant to ensure the potential BIM talents have comprehensive knowledge, training and skill in working with BIM and Malaysia can improve the BIM education system to build BIM talents as well as expertise in the future.

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