LACK OF BIM TRAINING: INVESTIGATING PRACTICAL SOLUTIONS FOR THE STATE OF KUWAIT

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Abstract— Building information modeling (BIM) faces major implementation obstacles in Kuwait, despite its proven benefits to contractors and owners. This research study aims to analyze the factors that impact BIM implementation, and identifies practical solutions to overcome implementation obstacles. More specifically, the principle objectives of this study are to: (1) identify the obstacles that deter BIM utilization, (2) investigate the perception of construction stakeholders of these obstacles, and (3) recommend practical solutions that accelerate BIM utilization. A survey questionnaire was designed to pool expert opinion on the nature of BIM utilization obstacles and how to effectively overcome them. The results of the survey indicate high awareness of BIM utilization obstacles, including its biggest obstacle – the lack of BIM training. The study concludes with expert recommendations on overcoming BIM utilization obstacles. The findings of this study should be useful to the construction industry stakeholders in Kuwait, and can lead to substantial improvements in the practices of design and construction.

Index Terms— Building information modeling, construction, challenges, information technology.

I. INTRODUCTION

Evolution of building information modeling (BIM) is rapidly transforming the roles of construction engineering and management professionals in the architecture, engineering, and construction industries. The benefits of BIM adoption touch all project specialties, as they include: improved visualization, better coordination among project stakeholders, better integration of construction drawings, among others. BIM received significant attention from the construction industry around 10 years ago and since then it has been evolved with time [1]. It is considered a new approach to enhance the construction process, improve design efficiency, and support decision making, since it enhances visualization and improves communications among project stakeholders [1], [2], and [3].

Over the past few years, construction practitioners, field experts, and researchers have examined the utilization of BIM as a fundamental information technology tool to support construction efficiency and accuracy. The perceived advantages of BIM technology include: reducing the likelihood of construction errors on jobsites, improving documentation accuracy and quality, accelerating the rate of construction, and providing the owner with a clear visualization of the project and how much it costs [4]. BIM advantages do not stop at the point of modeling the project in a 3D graphical representation. It extends to enabling the tracking of the construction process by linking 3D building objects to their corresponding activities in the schedule in a 4D model, using time as a fourth dimension. The aim of this simulation is to optimize the sequencing of the project activities, and visualize the schedule [5]. BIM could also be utilized to simplify quantity estimation of building materials, especially when quantities could be directly linked to cost databases. Hamm [6] also discussed how BIM can be integrated with cost factors to generate 5D simulations. Using these comprehensive simulations and information, building design can be facilitated and streamlined. The most appropriate materials for a particular project can be specifically determined, and value engineering procedures could be implemented using full visualization techniques [3].

It is worth noting that the transitional period from conventional paper drafting to BIM was not a short term period; it extended over a few decades and featured enormous changes. In 1963 Ivan Sutherland invented SKETCHPAD, which is considered the prototype of CAD. Initially, the technology did not gain rapid support but eventually it became popular [7]. In 1982, ArchiCAD was developed and considered the first prototype of BIM as it was the first software capable of creating 3D models as well as storing data of building elements. Later, in the early 1980s, drafting tables in many design firms were replaced with workstations running CAD software [8]. Recently, object-oriented CAD structure (OOCAD) replaced the two-dimension symbols with objects (building elements), with the capability of representing the behavior of building elements [9]. Owing to the uncertainty and uniqueness of construction projects, designers are tasked to build their projects virtually before actual work starts on site. From this premise, BIM technology emerged and is now one of the leading innovative technologies which adopt a virtual design/construction approach.
[10]. In 2000, Revit had been developed to utilize a single database for the entire project, in what was considered a revolution in BIM world [11]. According to Kia [12], BIM software can be categorized into three main groups, considering the type of software use. These three groups are: (1) BIM for modeling, (2) BIM for design analysis, and (3) BIM for 4D modeling.

There is no doubt that any client wants his project to be completed on time, within target budget, and with optimum quality [13]. BIM can easily facilitate that if it is utilized in an efficient manner. The utilization of BIM technology on a particular project in the design, construction, and project operation stages should maximize the quality of work, speed up the construction process, improve the productivity, and reduce costs [14]. To illustrate this precisely, the benefits of BIM can be categorized into four main categories: (1) organizational, (2) design-related, (3) managerial, and (4) construction-related benefits.

With respect to the organizational benefits; BIM can facilitate the process for accessing information, improve the coordination process among the different specialties on a given project and improve conflict detection [15]. Additionally, with respect to the design-related benefits, BIM facilitates simulating changes keeping the cost of these changes minimum [16]. Further, BIM improves the visualization through the use of 3D models that include the details of all building elements, which means fewer errors in the design stage [16]. Furthermore, in regards to managerial benefits, BIM reduces construction-phase errors, RFIs and change orders [16]. BIM also has several other benefits including: fewer construction rework, easier quantity take-off process, improving project planning and monitoring, and facilitating payment processing [15], [17], [18], and [19].

Despite all these BIM benefits, BIM adoption faces some barriers that slow down its implementation. Through the course of this research, several barriers were recorded. Human resistance to change is always the first challenge that may face any new technology. In addition, unawareness of BIM technology and its numerous benefits could hinder its utilization and adoption by construction stakeholders. Moreover, it was reported that engineering schools do not commonly offer BIM courses, which leads to a shortage of trained personnel who could use BIM. Consequently, extra expenses are associated with BIM implementation to cover the training of existing staff or hiring new BIM experts. Furthermore, the acquisition of new hardware and software could cost construction companies significant amounts of expenses.

II. PROBLEM STATEMENT

Over the past fifty years, construction projects in Kuwait suffered from various problems, including the need to minimize waste, eliminate inefficiency, improve productivity, while complying with the requirements of new legislations for eco-friendly construction [20]. Although it is difficult to achieve such outcomes promptly, the adoption of a collaborative and integrated procurement delivery system by using innovative tools could contribute to achieving these goals.

Worldwide, the construction industry is currently at the BIM technology milestone in the timeline of evolution toward optimal construction delivery. Hence, the moment for changing the way of construction in Kuwait has approached and the time to follow up the latest technology is reached. However, BIM adoption is still limited and slow in Kuwait with limited interest from construction project stakeholders. Therefore, this research was conducted to investigate the problems associated with the utilization of BIM in Kuwait.

III. OBJECTIVES

This study investigates the problems that face BIM utilization in the State of Kuwait and proposes solutions to overcome them through a comprehensive survey of construction industry stakeholders. More specifically, this study aims to: (1) identify the barriers that deter utilization of BIM, (2) examine the awareness of engineers, architects, and construction stakeholders of these barriers, and (3) recommend practical solutions to facilitate BIM utilization.

IV. RESEARCH METHODOLOGY

To accomplish the aforementioned objectives, the study is divided into two phases, as shown in Fig. 1. The first phase is designed to identify and characterize the barriers that face BIM utilization in Kuwait through a questionnaire survey. The second phase is designed to investigate the approaches that would encourage the utilization of BIM among construction stakeholders.

![Fig. 1 Summary of research methodology](image)

V. QUESTIONNAIRE AND SAMPLING

In order to collect data from project stakeholders about their awareness of BIM barriers, a survey study was
conducted. Throughout this survey, questionnaires were distributed to all project stakeholders that were identified to include: contractors, subcontractors, consultants, designing firms and construction management (CM) firms in order to cover the opinion of all the parties involved in the construction industry. As BIM market is relatively new in the region, the population targeted in this survey was relatively limited, so a sample of respondents was chosen in such a way to represent the total population as much as possible. The tricky question was “How many surveys should the sample consist of?” Using a correct sample size is crucial for the validity of surveys. After all, a sample that is too big will lead to inefficient analysis in terms of time and money, while a sample that is too small will lead to unreliable results.

One of the factors affecting the sample size is the required degree of accuracy. In this survey a high confidence level was selected to be the basis of sample size design. The required number of questionnaires was computed using the following equation [21]:

\[
  n = \frac{z^2 \sigma^2}{E^2}
\]

(1)

where:
- \( n \) is the sample size,
- \( z \) is the \( z \) value corresponding to the level of confidence,
- \( \sigma \) is the standard deviation of the population, and
- \( E \) is the maximum error.

An initial random sample of 95 questionnaires was collected and the highest standard deviation was calculated from the answers to the various questions. This highest standard deviation was found to be 1.132, and was assumed to be standard deviation of the population. The level of confidence was chosen to be 85% and hence the corresponding \( z \) value is 1.44 and the accepted error was set to be 0.15. Accordingly, the required number of questionnaires is:

\[
  n = (1.442) \times (1.1322) / (0.152) = 118.1
\]

Therefore the minimum number of questionnaires should be 119 questionnaires. Thus, the 95 questionnaires were considered good enough as they were close to the required number.

VI. DATA ANALYSIS

The survey was distributed among several construction industry stakeholders, including contractors, consultants, designers and construction management firms. The collected data was aggregated in spreadsheets, summarized and analyzed. The following sections present the data analysis in more detail:

A. **Staff attitude and knowledge:**

The purpose of this survey section was to poll experts’ opinions on their assessment of staff attitude toward and knowledge of BIM concepts.

Question (Q1) was “Have you heard about Building Information Modeling (BIM) before?”

About 97% of the respondents indicated that they have heard about BIM which is an important indicator that the results of the survey should be valid to a certain extent. Only 3% of the respondents indicated that they did not hear about BIM before. The purpose of this question is to investigate the awareness of various stakeholders about BIM, and as shown by this statistic, many of the respondents, especially those with less than 5 years of work experience – and who are normally technologically savvy, – indicated that they are aware of BIM. However, the majority stated that they did not receive instruction on BIM at the undergraduate or graduate levels. This underlines the importance of introducing BIM into the curriculum of engineering schools in order to better prepare the young engineers for their careers.

Question (Q2) was “To what extent do you evaluate your understanding of BIM?”

The purpose of this question is to tackle the degree of familiarity of the participants with BIM technology. About 32% of the respondents indicated that they are somehow understand BIM technology and almost a similar percentage of 31% of the respondents indicated they are very familiar with it. Almost equal percentages of 19% and 18% indicated that they read/heard about BIM and experts in BIM, respectively. This represents a normal distribution of familiarity of the respondents with BIM.

Many participants indicated that although they heard about BIM and how important its implementation could bring to a project, they never had the desire or the need to learn this new technology as they have been familiar with traditional working approach for many years and found it useless to learn a new technology.

Question (Q3) was “Have you been involved in projects that utilize BIM technology?”

This question shows the size of the problem that awaits BIM implementation in Kuwait. Around 84% of the respondents were not involved in projects that utilize BIM technology although they might have heard of the technology, while only 16% of the respondents were involved. Mainly all the involved participants started their BIM experience after 2013 when mega projects kicked off in Kuwait as part of the Kuwaiti economic development plan.

Question (Q4) was “Please specify the years of experience in BIM.”

As mentioned earlier, many of the involved participants started their BIM experience after 2013, except engineers and modelers who had previous experience outside Kuwait. Roughly about 85% have been using BIM for less than 5 years, 12% and 4% of the respondents have experience in BIM between 5-10 years and 10-20 years, respectively. The last two statistics came from respondents working with
international design firms.

Question (Q5) was “Please specify the number of projects your organization undertook using BIM”

About 84% of the respondents undertook less than 5 projects using BIM, 14% of the respondents undertook between 5-10 projects using BIM, and only 2% of the respondents utilized BIM in more than 10 projects. The last statistic came from international design firms.

Question (Q6) was “Are you aware of BIM benefits?”

About 90% of the respondents indicated they are aware of BIM benefits while 10% indicated they are not. Being familiar with BIM utilization benefits can encourage firm management to adopt the technology and train/develop its own staff in this regard. However, as many firm stakeholders are not aware of those benefits, many ambitious employees train themselves on their own dime which can be very costly.

Question (Q7) was “Which BIM software do you use for your project?”

About 60% of the users indicated they use Revit (Arch, Struct, MEP) which is very similar to AutoCAD and is easily learnt by those who are familiar with AutoCAD. Navisworks took the second place in the most frequently BIM software used with a 16% usage. Navisworks is frequently used to detect clashes among objects and consequently companies applying the least BIM requirements may use it. In addition, Revit and Navisworks are Autodesk products which explains how they are popular among engineers. About 8% of the respondents use Tekla, 8% use Robot, and 2% of the respondents use Bentley (Arch, Struct, Mech, Elect).

Question (Q8) was “Do you believe that implementing BIM will solve construction problems in Kuwait?”

Although 69% of the respondents thought that implementing BIM will solve major problems in Kuwait’s construction industry, this statistic could have been much higher if more employees were introduced to the benefits BIM technology could bring. About 15% of the respondents indicated that they think BIM can solve non-major problems. This may be influenced by the fact that these respondents were involved in projects where BIM was only a contractual requirement enforced against the wish of contractors. About 14% of the respondents were not sure how effectively BIM may contribute to solving construction industry problems. Only 1% believed that BIM will not solve any construction problems in Kuwait.

Question (Q9) was “Do you think implementing BIM will be required in the future in construction contracts in Kuwait?”

The majority of the respondents (about 86%) think that implementing BIM will be required in future construction contracts in Kuwait. Since BIM is gaining a worldwide interest and is rapidly growing, all participants believed that Kuwait should adopt this technology. In order to encourage implementing BIM, in the short-term it should be required in construction contracts in Kuwait. About 14% of the respondents were not sure if it would be a future requirement.

Question (Q10) was “What do you think BIM actually is?”

This question was asked because there is a huge misunderstanding among project stakeholders about the actual concept of BIM. BIM is beyond the fact of a tool that produces a 3D model; instead it is a complete process for information management that starts at the design stage and lasts till the end of the maintenance period. Although 74% of the respondents think BIM is a process for information management, they gave conflicting answers and information when asked in detail about the nature of these processes. Many respondents who indicated that BIM is a process for information management believed that BIM is just a 3D presentation of regular shop drawings while others thought that BIM is a presentation tool. About 25% believed that it is a tool/software.

B. Barriers of BIM implementation in Kuwait

The purpose of the second section of the survey is to identify and assess the barriers that would deter implementing and utilizing BIM technology. Respondents were asked to give their opinion on a prepared list of barriers that were initially identified from the literature, and to what extent they agree that the identified item is a barrier on a 5-point Likert scale (strongly agree, agree, neutral, disagree and strongly disagree). Highlighting the most significant barriers should help in identifying the best approaches to facilitate BIM utilization.

The analysis of BIM barriers was carried out on three different levels:

1- On the first level, descriptive statistical analysis was carried out on the Likert responses collected for each barrier in order to identify whether there is a consensus among respondents or not.

2- On the second level, a comparison among the anticipated barriers was conducted in order to identify those barriers that most experts agree upon. The analysis was conducted by lumping the respondents who either agreed or strongly agree upon a certain barrier into one group, and determining the percentage of those respondents to the total number of surveyed stakeholders.

3- On the third level, the survey examined whether there is a difference in opinion about the barriers among the two groups of contractors and designers (this group includes architects, engineers and consultants). This should highlight the most significant barriers for the vast majority of stakeholders.

The following sections discuss the aforementioned levels of analysis in more detail.
Analysis Level 1: Respondents answers for each individual barrier:
This section highlights the top three barriers that gained agreement among the participants (M-1, M-2, and M-3), and the three barriers with the least agreement (L-1, L-2, and L-3).

M-1) Lack of BIM training
The participants were asked to evaluate “Lack of BIM Training” as a perceived barrier of BIM. As shown in Fig. 2, about 42% of the respondents strongly agree that it is a perceived BIM barrier. In addition, about 48% of the respondents just agree that it is a barrier. About 8% of the respondents were neutral in their opinion, and only 2% disagreed that it is a barrier of BIM. No respondents disagreed strongly to this barrier. Hence, it is concluded that lack of BIM training is a significant barrier of BIM implementation.

M-2) Lack of skilled personnel
The participants were asked to evaluate “Lack of Skilled Personnel” as a perceived barrier of BIM. As shown in Fig. 3, about 47% of the respondents strongly agree that it is a perceived BIM barrier. In addition, about 38% of the respondents just agree that it is a barrier. About 14% of the respondents were neutral in their opinion, and only 1% disagreed that it is a barrier of BIM. No respondents disagreed strongly to this barrier. Hence, it is concluded that lack of skilled personnel is a significant barrier of BIM implementation.

M-3) The concept of BIM is not well understood
The participants were asked to evaluate “The Concept of BIM is not Well Understood” as a perceived barrier of BIM. As shown in Fig. 4, about 31% of the respondents strongly agree that it is a perceived BIM barrier. In addition, about half of the respondents (51%) just agree that it is a barrier. About 13% of the respondents were neutral in their opinion, and 2% disagreed that it is a barrier of BIM. Only 2% of the respondents disagreed strongly to this barrier. Hence, it is concluded that not understanding the concept of BIM is a significant barrier of BIM implementation.

L-1) Time to setup BIM technology requirements
The participants were asked to evaluate “Time to Setup BIM Technology Requirements” as a perceived barrier of BIM. As shown in Fig. 5, about 12% of the respondents strongly agree that it is a perceived BIM barrier. In addition, about 38% of the respondents just agree that it is a barrier. About 33% of the respondents were neutral in their opinion, and 20% disagreed that it is a barrier of BIM. About 15% of the respondents disagreed strongly to this barrier. Hence, it is concluded that time to setup BIM technology requirements is not considered a significant challenge for BIM implementation since there is no consensus among the participants that it is a barrier.

L-2) Time Required to Produce the Models
The participants were asked to evaluate “Time Required to Produce the Models” as a perceived barrier of BIM. As shown in Fig. 6, about 20% of the respondents strongly agree that it is a perceived BIM barrier. In addition, about 30% of the respondents just agree that it is a barrier. About 28% of the respondents were neutral in their opinion, and 20% disagreed that it is a barrier of BIM. Only 2% of the respondents disagreed strongly to this barrier. It is recognized that the opinions of the respondents are almost divided equally between the five answers. Hence, it is concluded that time required to produce the models is not considered a significant challenge for BIM implementation since there is no consensus among the participants that it is a barrier.
L. 3) People refusal to learn new software

The participants were asked to evaluate “People Refusal to Learn New Software” as a perceived barrier of BIM. As shown in Fig. 7, about 26% of the respondents strongly agree that it is a perceived BIM barrier. In addition, about 26% of the respondents just agree that it is a barrier. About 29% of the respondents were neutral in their opinion, and 19% disagreed that it is a barrier of BIM. Only 1% of the respondents disagreed strongly to this barrier. Hence, it is concluded that people refusal to learn new software is not considered as a significant challenge of BIM implementation since there is no consensus among the participants that it is a barrier.

Analysis Level 2: Barriers vs. percentages of the respondents who agreed and strongly agreed:

On this level of analysis, the categories “agree” and “strongly agree” were lumped together. It is concluded that the lack of BIM training was the most significant barrier that faces BIM implementation as 90% of the respondents agreed. About 85% of the respondents agreed that lack of skilled personnel is a challenge that slowed down the adoption of this technology. On the other hand, the concept of BIM is not well understood; consequently, its benefits are not clear enough to motivate construction companies to adopt this technology as 82% of the respondents agreed. As discussed above, BIM is not a tool or software as some people believe, instead it is a complete management process that was created in the first place to benefit construction projects and enhance their constructability. Additional cost and time related to implementing BIM create strong barriers that prevent construction companies from adopting it; cost of employing additional staff had 77% agreement, cost of training existing staff had 75% agreement, time required to train existing staff had 72% agreement. About 69% of the respondents agreed that cost of new software and updates is a challenge that faces BIM and 62% agreed on the cost of hardware and networks. Almost half of the respondents agreed on the following as barriers to BIM implementation: not requiring BIM in contracts in government project (55%), human nature to resist changes (52%), people refusal to learn new software (51%), time required to produce the model (50%) and time to setup BIM technology requirements (50%). It is clear that most of the barriers that were included in the questionnaire gained significant agreement from the respondents, thus it can be concluded that all of them are effective challenges that must be overcome to enhance the adoption process of BIM in construction companies.

It was expected that refusal to learn a new software would get a higher percentage than 51% as many employees in the construction field are far away from being up-to-date with modern technology in general. This was an encouraging sign that employees, especially those of a young age, are willing to learn the new technology. Cost of training had a high percentage agreement although most of the participants were not aware of the actual cost of training. It is well known that the savings made by implementing BIM technology is much higher than the cost of training in-house staff.

This poll also shows the importance of familiarizing the employees with the benefits of BIM as 82% agreed that being unfamiliar with those benefits is a huge barrier.

Analysis Level 3: Contractors’ opinions vs. Designers’ opinions:

Respondents were grouped into two groups: contractors and designers (this group included architects, engineers and consultants). The opinions of the two groups were compared to point out any differences. This was accomplished by comparing the means of the two groups, after converting the Likert scale into a number scale, where “Strongly agree” was assigned 5 points, “agree” was assigned 4 points, “neutral” was assigned 3 points, “disagree” was assigned 2 points, and “strongly disagree” was assigned 1 point. The purpose of this analysis is to clarify the opinion of each group. The analysis was conducted using the following steps:

1- It was assumed at the beginning that the means for the answers of both contractors and designers are equal and accordingly the calculations were carried out. It was assumed that the decision criterion is \(\alpha=0.05\)

2- The number of observations was recorded and used to calculate the mean value of each group. The pooled variance estimate (\(S^2_{\text{pooled}}\)) was calculated and was followed with the calculation of \(S(X_1 - X_2)^2\). The statistical \(t\) ratio and the degree of freedom (df) were then calculated.

3- Identify the acceptance/rejection regions. This was done through obtaining the critical \(t_{0.05}\) from the
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standard statistical tables. In order to obtain the data from the mentioned tables, three parameters are needed: The hypothesized mean difference (zero), α=0.05, and the degree of freedom df.

4- The t0.05 value determines the region of accepted possibilities. If the calculated t ratio falls in that region, no significant statistical difference is observed in the means of the two samples. Otherwise, the equality is rejected. Some examples are presented below.

1) The Concept of BIM is Not Well Understood
The opinions of contractors and designers meet since the obtained statistical t ratio (0.066) is less than t0.05 (1.989) and thus the statistical t ratio falls in the retention region. Hence, there is no significant difference between the means of the two groups. It can be concluded that the opinions of contractors and designers both fall in the “agree” region that not understanding the concept of BIM is a barrier.

2) Lack of Skilled Personnel
The opinions of contractors and designers do not meet since the obtained statistical t ratio (2.492) is greater than t0.05 (1.993) so the statistical t ratio falls in the rejection region. Hence, there is a significant difference between the means of the two groups.

It was concluded from the questionnaire that contractors’ and designers’ opinions meet on all of the listed barriers except the following:
1- Lack of skilled personnel.
2- Cost of training existing staff.

VII. RECOMMENDATIONS
The last section of the questionnaire was an open question to give the experts the chance to recommend actions and strategies in order to overcome the barriers of implementing BIM and encourage adopting BIM in Kuwait. These recommendations were categorized into three main groups: (1) spreading the awareness of BIM among engineers, (2) preparing construction firms to adopt BIM and (3) improving the implementation mechanism.

With respect to spreading the awareness of BIM, engineering schools should offer BIM courses in their graduate plans. In addition, seminars and presentations should be conducted to educate the engineers about BIM as well as encouraging BIM through social media and multimedia. However, different actions should be followed to prepare construction firms to adopt BIM including hiring expert BIM managers and conducting in-house training programs.

Finally, the implementation mechanism should be improved by taking serious actions such as increasing government support, requiring BIM in contracts and creating public databases with BIM information/models that could be used by stakeholders involved in construction projects.

VIII. SUMMARY AND CONCLUSION
This research was conducted to investigate the barriers of utilizing BIM in Kuwait construction projects. The main objectives of the research were to investigate the awareness of project stakeholders about BIM concept and its benefits, identify the challenges that face BIM adoption in Kuwait and recommend the best solutions to overcome these challenges and encourage the utilization of BIM in Kuwait construction sector. In order to accomplish these objectives, a detailed survey was conducted where 95 questionnaires were distributed among different project parties. Detailed analyses were carried out to highlight the most significant benefits of BIM as well as the most significant barriers that affect BIM implementation.

Finally, recommendations were reported to encourage the implementation process through spreading the awareness about BIM, preparing construction firms to adopt it and facilitating the implementation mechanism in construction firms.

It was concluded from this study that BIM adoption is still new and limited in Kuwait since the majority of the respondents have not been involved in projects utilizing BIM (84%) and have less than five-years of experience in BIM (85%). However, the level of awareness about BIM benefits is high as 90% of the respondents confirmed. It was concluded from the questionnaire that the most significant benefits of BIM utilization are improved conflict detection, better visualization and easier quantity take-off measures. On the other hand, the most significant barriers that face the adoption of BIM are lack of BIM training, lack of skilled personnel and misunderstanding the concept of BIM. At the end, some serious actions should be followed to encourage the implementation of BIM including offering BIM courses at engineering schools, conducting in-house training programs and requiring BIM in construction contracts.

Every new technology or process needs time to be adopted properly, yet the most important thing is to understand its benefits deeply and have the desire to learn about it in order to find the most suitable approaches to implement it successfully.

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