

ENHANCING BUILDING INFORMATION MODELLING IMPLEMENTATION  
IN DELAY MANAGEMENT IN MALAYSIAN CONSTRUCTION INDUSTRY

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## **DEDICATION**

*To my dearest family and friends,  
Thanks for their never ending support and encouragement.  
This journey would not have completed without the understanding of loved ones  
around that keep pushing my back to never stop moving forward*

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## **ABSTRACT**

Being a very important and complex sector, construction industry faces many types of challenges in being a successful industry. One of the most faced challenges in Malaysian construction industry is delay in completion of construction projects. The emergence of Building Information Modelling (BIM), as an alternative technology is believed to solve issues that are connected to project cost and time control as it effectively increases collaboration between stakeholders. Benefits of BIM in terms of delay include its ability to minimize early construction issues such as team conflicts and rebuilding. However, the adaptation of BIM usage in the Malaysian construction industry has yet to grow in a wide spread. The main aim of this study is to enhance BIM implementation in delay management in Malaysian construction industry. This study was based on questionnaire survey response that were collected from 86 respondents, consisting of various construction players from different working experience, to obtain relevant inputs on their opinion about the benefits, challenges and strategies in BIM implementation in delay management. The results revealed that the usage of BIM is relatively still low even though the awareness of its usage and benefits are well known. The finding also highlights the various challenges faced by different construction parties in implementing BIM. Besides, alternatives were identified as strategies to enhance BIM implementation. Thus, a proper execution of targeted strategies will overcome challenges in BIM implementation, which gives way for various types of construction projects in Malaysia to benefit from BIM by avoiding delays

## ABSTRAK

Sebagai sektor yang sangat penting dan kompleks, industri pembinaan menghadapi pelbagai jenis cabaran untuk menjadi industri yang berjaya. Salah satu cabaran yang paling banyak dihadapi dalam industri pembinaan Malaysia ialah kelewatan menyiapkan projek pembinaan. Munculnya Building Information Modeling (BIM), sebagai teknologi alternatif dipercayai dapat menyelesaikan masalah-masalah yang berkaitan dengan pengendalian kos dan waktu projek kerana secara efektif meningkatkan kerjasama antara pihak berkepentingan. Manfaat BIM dari segi kelewatan termasuk kemampuannya untuk meminimumkan masalah pembinaan awal seperti konflik pasukan dan pembinaan semula. Walau bagaimanapun, penyesuaian penggunaan BIM dalam industri pembinaan Malaysia masih belum berkembang secara meluas. Tujuan utama kajian ini adalah untuk meningkatkan pelaksanaan BIM dalam pengurusan kelewatan dalam industri pembinaan Malaysia. Kajian ini berdasarkan pada tindak balas tinjauan soal selidik yang dikumpulkan dari 86 responden, yang terdiri dari pelbagai ahli pembinaan dari pengalaman kerja yang berbeza, untuk mendapatkan input yang relevan mengenai pendapat mereka mengenai manfaat, cabaran dan strategi dalam pelaksanaan BIM dalam pengurusan kelewatan. Hasil kajian menunjukkan bahawa penggunaan BIM relatif masih rendah walaupun kesedaran tentang penggunaannya sudah diketahui. Penemuan ini juga menyoroti pelbagai cabaran yang dihadapi oleh pelbagai pihak pembinaan dalam melaksanakan BIM. Selain itu, alternatif dikenal pasti sebagai strategi untuk meningkatkan pelaksanaan BIM. Oleh itu, pelaksanaan strategi yang disasarkan dengan tepat akan mengatasi cabaran dalam pelaksanaan BIM, yang memberi jalan bagi pelbagai jenis projek pembinaan di Malaysia untuk mendapat manfaat dari BIM dengan menghindari penundaan..

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## **LIST OF ABBREVIATIONS**

BIM	-	Building Information Modelling
CIDB	-	Construction Industry Development Board
CPM	-	Critical Path Method
GDP	-	Gross Domestic Product
JKR	-	Jabatan Kerja Raya
NIOSH	-	National Institution of Occupational Safety and Health

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# CHAPTER 1

## INTRODUCTION

### 1.1 Problem Background

Historically, Malaysian construction industry has started since the time of British administration in the country. Now the construction field plays a very important role in the economic growth of Malaysia. Economic growth that involves construction is in terms of its contribution in the socio economic development and ability in supporting the gross domestic product (GDP) in terms of its ability to revenue capital formation, generation, and employment opportunity (Khan, Liew, & Ghazali, 2014).

To date, Malaysian construction industry has advanced rapidly to a much modernized and well equipped sector. According to Khan et al., (2014), by using highly erudite mechanized techniques, the Malaysian construction industry now has a prospective to supply complex heavy infrastructure and skyscraper projects that has bring about in rapid performance of many projects such as highways, expressways, bridges and tunnels, high rise commercial and industrial buildings, housing schemes, schools and hospitals and sports and spa centers, monorail, power plants and mass rapid transit rail system.

Being said so; different advancements are constantly evolving in this fast growing industry. New technologies are being developed and introduced to ease the construction activities be it on site or management. According to Jones, (2020), the Construction Industry Institute defines construction technology as "the collection of innovative tools, machinery, variations or software. With the help of advanced construction technologies, one can do job enhanced, keeping up from deteriorating behind other managers while concocting for the future. Our Malaysian construction

sector also needs to remain up-to-date with the growing construction technologies. Technologies such as telematics, autonomous heavy equipment, mobile apps, drones, virtual reality 3D printed buildings and many other connected tools, that seemed like far future a few years ago, are now being set out and used on jobsites across the world (Jones, 2020).

Being a very important and complex sector, construction industry faces many types of challenges in being a successful industry. One of the most faced challenges in Malaysian construction industry is delay in completion of construction projects. According to Dashore, (n.d.), construction delays are considered as time gap in accomplishment of activities from the quantified time as per contract or can be stated as late completion or late start of activities to the standard schedule, directly distressing quantified cost. Delay in building project can cause serious problem to all parties of a construction project which includes the client, consultants and contractor (Ahmad Hisham & Yahya, 2007). According to Tahir et al. (2018), it was found that delays can affect profound into the industry and leave the construction industry with a depraved image for decades even with fast growing progress in technology.

Throughout the years, many different approaches are being undertaken to manage and analyse delays in construction projects. Delay analyses are carried out to identify why delays occur in a construction project and the impact expected to be projected in the overall project program. The outcome of such analysis may resolve the issue in advance or may lead to legal action brought up by one party to another in the agreed contract. Therefore, many approaches for delay management are identified throughout the years of construction industry evolution. Various scheduling techniques and comparison methods using software based medium or mathematical equation based modelling have been used to analyse delays in construction projects, such as the Primavera software.



As mentioned earlier, many new technologies are being introduced in the construction industries. This includes the application of Building Information Modelling (BIM) in construction industries. BIM has been widely used by many companies across the world in the construction industries. The BIM technology has now started evolving into the Malaysian construction industry. This is proved when the Construction Industry Development Board (CIDB) has suggested the compulsory use of BIM in certain private division projects by 2020 (Bernama, 2019).

Delay being a very common problem faced by most construction companies and client, needs utmost attention for prevention or rectification. As mentioned earlier, Malaysian government has started to urge construction companies to implement using BIM, in their project planning, execution and management. According to Hardin & Mccool, (2015), BIM can be used for planning and scheduling of a construction project. The emergence of BIM, as an alternate technology is understood to solve issues that are connected to project cost and time control as it effectively rises association between participants (Tahir, Haron, Alias, Harun, et al., 2018). Therefore, usage of BIM in construction projects will definitely serve as a great tool in minimizing delays and ensure project completion on time with proper resource planning.

However, the adaptation of BIM usage in the Malaysian construction industry has yet to grow in a wide spread. Although the Malaysian government have introduced and made many efforts in implementing BIM in different areas of construction industry, the application of BIM is till slow and less favorable. This is because construction players are less aware of the real effectiveness of using BIM in construction in managing conflicts that arises in a revolutionized way.

The Malaysian construction industry is stayed behind in adopting the BIM competences related to time management. This dissertation is believed to help as a springboard to study further to promoting BIM use in the Malaysian construction industry.

## 1.2 Research Problem

In our Malaysian construction industry, delay has always been a common issue that is being faced by both owners and contractor. Delay has foremost effects on completion cost and time of construction project. Many previous researches have discussed and studies on various ways of delay management. Although schedule delay analysis and claim administration for construction projects have been given much consideration, the contractor commonly has to pay a lot of time and means to deal with the concerns of resolving delay analysis and claim preparation when stumble upon schedule delay problems (Chou & Yang, 2017).

The traditional method for determining delays was comparing the contractor's planned schedule with calculated dates to an as-built program that had replaced actual completion dates for all the activities. This method, unfortunately, has many drawbacks such as, the as-built schedules are pricey to prepare because of the volume of research needed to decide the actual dates and substantial verdict are required, since comprehensive records are not always accessible. Even if they are available, work at site does not certainly match the theoretical segments of the network schedule. It is fair to say that this method of showing a delay is inadequate unless the scheduled work program can be proven to be dependable and rational (Conlin, 1997).

Although the government has call out to all construction players in BIM usage in their projects, degree of BIM execution in construction field is incredibly low which needs considerations and heavy determination in achieving the booming construction plans. The benefits of BIM application in construction industry are through evolving and providing upgraded scheduling, improved drawing coordinated, controlling time and value and singe detailed model. Researches have established that BIM has the capacity to boost methods and tools to regulate delays, fragmentation, risks and increase teamwork in construction projects (Btoush & Harun, 2017).

There are a number of ways in which BIM helps in solving problems related to delays. This includes production of more practical design review with less design changes and errors. BIM also increases the productivity of delivery process among construction personnel. Benefits of BIM in terms of delay include its ability to minimize early construction issues such as team conflicts and rebuilding (Alenazi & Adamu, 2017).

BIM application is still said to remain in its infancy, even though applying BIM can overcome problems in construction projects. Construction players must remember of the advantages of BIM in facilitating them to enhance application of construction processes. It is observed that BIM continues to be new in Malaysian industry. BIM is seen as a rich technology to be accepted, but it's been verified to supply solutions to the delay related construction glitches. Many previous studies have highlighted the benefits of BIM yet the specific scope of BIM and the benefits that it brings in delay management is not well established to the construction personnel.

The move of altering from the traditional method to BIM implementation isn't a simple process. In addition, construction players still doubt the success of BIM due to the inadequate data that has established the value of BIM within the Malaysian context. Many case studies show the advantages that might be added by applying BIM are not in Malaysia, and that they might sense that BIM is not appropriate for the environs of the Malaysian industry.

Hence, this research is aimed to study the effectiveness of BIM approach in resolving issue regarding project delays and completion of project on time with proper resource planning.

### **1.3 Research Aim and Objectives**

The main aim of this study is to enhance BIM implementation in delay management in Malaysia construction industry. The objectives for this research are:

- 1) To study the benefits and scope of BIM implementation in delay management of construction project.
- 2) To identify the challenges in applying BIM approach to manage delays in Malaysian construction project.
- 3) To determine possible strategies that will enhance the effectiveness of BIM implementation in delay management.

### **1.4 Scope of Research**

The main focus of this study is on the delay management and using BIM in managing delays and the possibilities of reducing the chances of delays in Malaysian construction projects. This study will focus on the effectiveness of using BIM in dealing with delays issue and no other dispute or conflicts that occur in the construction field would be covered in this study. The study will be focusing on Malaysian construction players that are being introduced to BIM or that have already been practicing BIM in their projects.

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