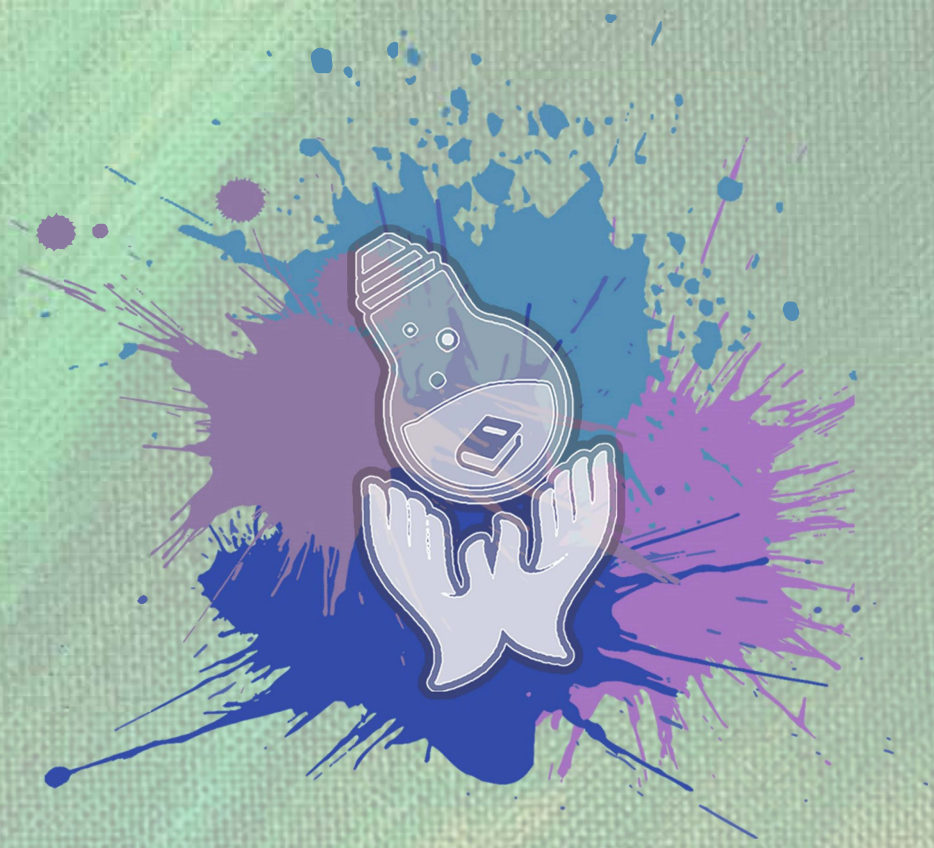
UNIVERSITI TEKNOLOGI MARA

F|S|P|U
FACULTY OF ARCHITECTURE, PLANNING AND SURVEYING

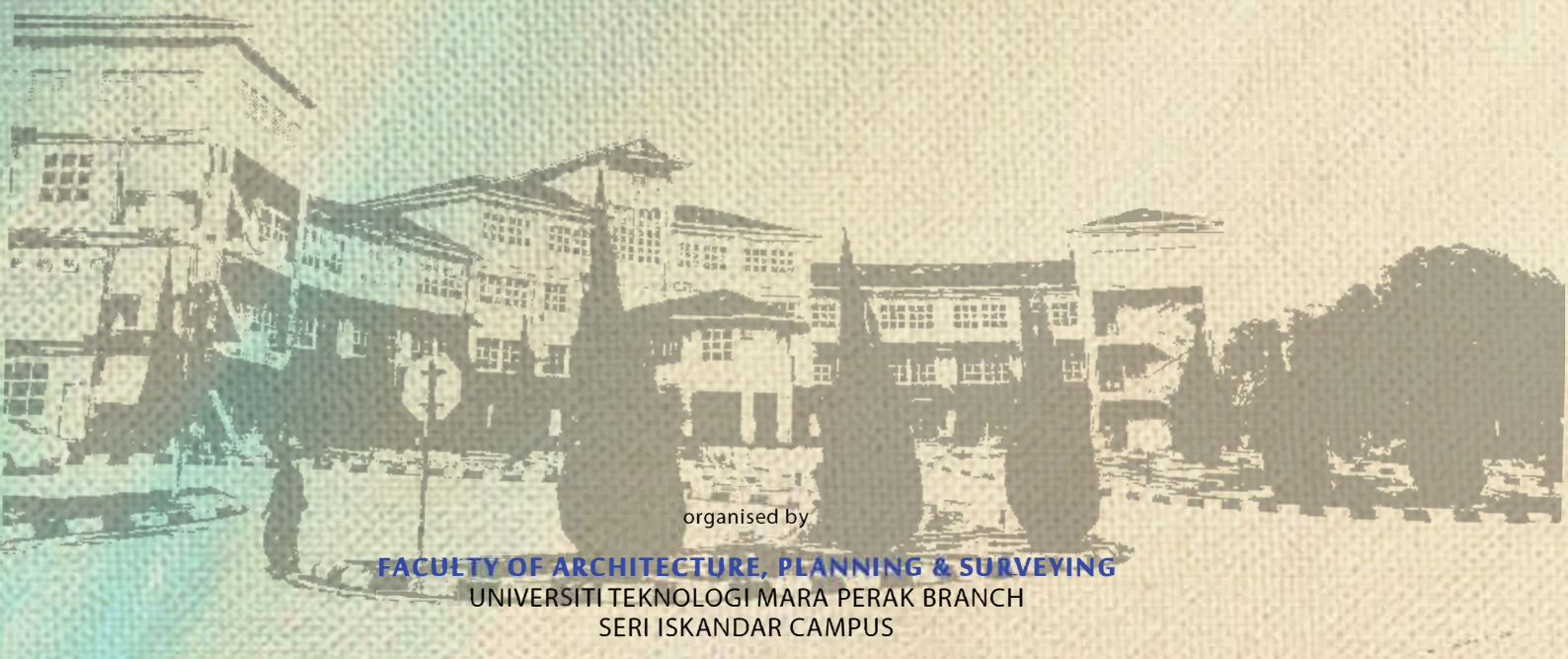
2019



4th UNDERGRADUATE SEMINAR 2019

BUILT ENVIRONMENT & TECHNOLOGY

e-PROCEEDING
eISBN-978-967-5741-97-5



organised by

FACULTY OF ARCHITECTURE, PLANNING & SURVEYING
UNIVERSITI TEKNOLOGI MARA PERAK BRANCH
SERI ISKANDAR CAMPUS

RETROFITTING OLD SHOP HOUSES USING BUILDING INFORMATION MODELLING (BIM) FOR IMPROVING BUILDING CONSTRUCTION

Endok Siti Nurul Shafiqah[1], Horace Mui K.W[2], Zainal Abidin Akasah[3], Nik Mohd Zaini[4]
[1 3 4] Department of Architectural and Design Engineering, Faculty of Civil and Environmental Engineering, Universiti Tun Hussein Onn Malaysia, 86400, Johor
[2] Dept. Of Building Services Engineering. PolyU Hong Kong
Email: zainal59@uthm.edu.my[3]

Abstract:
Building Information Modelling (BIM) is a set of digital tools that can manage construction projects effectiveness. BIM has been used by the Architecture, Engineering and Construction (AEC) industries in Malaysia. The application of BIM to retrofit existing buildings faces challenges which could be due to the multi-disciplinary nature of information exchange, the timeliness of the exchange, including the wide array of technological components which are needed to ensure an optimal exchange. So, the need to refurbish the old shop is becoming more important than the construction of new buildings. Modern technologies allow professionals to do this to turn the building structures capable to meet the users' comfort with a considerable energy saving. The aim of this paper is to identify BIM implementation of old shop building using new BIM and to model 3D simulation using BIM software. From the literature review previous BIM studies on definition and history of BIM, construction issues, application BIM tools in construction project as well as benefit of BIM. The results of the analysis were establish from surveys of questionnaire and 3D simulation. BIM helps to increase construction project efficiency and effectiveness and implementing BIM in construction projects can lead to successful construction of projects and can increase the overall quality of projects and can improve image of the construction industry.

Keywords:
Building Information Modeling (BIM); Implementation; Retrofitting; Old Building

1.0 INTRODUCTION

Building information modelling (BIM) is a collaborative tool used by architectural, engineering and construction (AEC) industries based on number of software solutions (Latiffi, Kasim, Fathi, & Mohd, 2013). In Malaysia, BIM had formally surfaced during the early year of 2007 by the Public Works Department (Latiffi et *al*.,2013). There are many definitions of BIM and according to (Pellinen, 2016) "Building Information Modelling (BIM) is a process focused on the development, use and transfer of a *digital information model* of a building project to improve the design, construction and operations of a project or portfolio of facilities." It is a technology and a process to manage construction projects. BIM can enhance the planning process, design and construction projects. This new technology that people in construction industry talked about is called BIM. It is new in the construction industry of Malaysia but not to the construction industry worldwide. In mid-year of 2000, AEC industries have started to implement BIM in construction projects. The United States of America (USA) is the first country to implement BIM.

Nowadays, BIM has been implemented in many countries such as the United Kingdom (UK), Australia, Hong Kong (HK), Denmark, Norway and Singapore by National Institute of Building Sciences(NIBS) in 2007 (Azhar, Khalfan, & Maqsood, 2015). In Malaysia, the idea to implement BIM was introduced by the Director of Public Works Department (PWD) in 2007. This step was a result of the government's awareness of the potential of BIM to reduce the construction cost and avoid design problems in planning phase. Moreover, BIM also has been seen as a concerted action to ensure collaboration between construction players such as architects, engineers, project managers and contractors (Fleming, 2006).

The Malaysian government encourages construction players to apply BIM projects because BIM has a huge potential to facilitate solving problems of construction projects. For instance, BIM can prevent disputes between construction players, manage the right quantity for each structure, decrease construction cost and avoid project delays (Jabatan Kerja Raya (JKR), 2013). As BIM application start to grow in Malaysia, there are surely barriers, problems and issues arising out from the CITP regarding to the implementation of BIM application in construction industries such as:

i. Lack the amount of knowledge available for BIM application and building that are built using BIM.
ii. Lack of skilled talent pool able to prepare plans in BIM.

The main objectives for this study are first, to identify BIM implementation of old shop building construction. Second, to develop new BIM design for old shop houses and to model 3D simulation using BIM software for simulating structure forces and moment in building structures.

2.0 LITERATURE REVIEW

The research will focus on the old building construction which is in Batu Pahat, Johor. This is because BIM is still not over and still minority with other of implementation using other type of construction industry.

2.1 BIM application in Malaysia construction industry

BIM applications in construction projects bring many benefits to construction players such as improving communication between construction players and facilitating faster design decision (Cho et al., 2017). Moreover, one of the BIM features is ease of use related to its tools; hence, the use of BIM can reduce time spent in design as well as decrease cost and duration of construction (Jabatan Kerja Raya (JKR), 2013). BIM can be applied to all construction project phases, which are pre-construction phase, construction phase and post-construction phase (Latiffi et al., 2013).

BIM Tools

2.2 There are various types of BIM tools for each construction players with its own functions. Among the tools are Revit, Tekla, Bentley, Autodesk, Vico and Cost X. Each tool comes with their own functions to manage the construction players activities in construction projects.

3.0 METHODOLOGY

Literature review is the first method used in this project through the reading of books, journal, and websites to establish the information regarding to the BIM application to improve the building construction. Followed by questionnaire, there are four part which part A is, the demographics, for part B, C and D of the questionnaire, the respondent had answered the questions based on the Likert scale from ordinal one to five in ascending order. A questionnaire survey was constructed based on the research objectives and literature review. From there, ideas and topics about the questionnaire was formulated. The participant that involved in the BIM generally were divided by five groups there are Developer, Architect, Consultant, Engineer and Contractor. To conduct the questionnaire, the sample preparation is a must. For this study, the determination of the sample for the questionnaire was done by the collected and gathered users who had experiences in BIM application before. In total there are about 100 respondents. This is important so that the respondents can answer the questionnaire send to the respondents. Other than that, there are few participants that involved the training for the BIM, such as from CIBD or other privates' sector in the construction industry.

4.0 ANALYSIS AND FINDINGS

Implementing BIM in construction projects can overcome construction problems such as delay, clash of design and disputes between construction players. BIM in construction projects gives many benefits, and its implementation can increase the quality of project. Based on the benefits discussed, BIM is useful in assisting construction players to construct small or high-risk projects successfully. Moreover, through BIM problems such as delay, increase in construction cost, accidents on construction sites and

disputes between construction players can be reduced. Building Information Modelling (BIM) offers huge benefits to the adopters, especially in architectural, engineering and construction (AEC) sector. However, those benefits could only be fully achieved if there are proper practices implements by the adopters. Without best practices of BIM, still, it is hard to exploit the benefits from the implementation. Hence, it is important to execute BIM implementation best practices strategic plan to ensure the works are clearly defined and understood which makes BIM as a useful tool to develop construction projects.

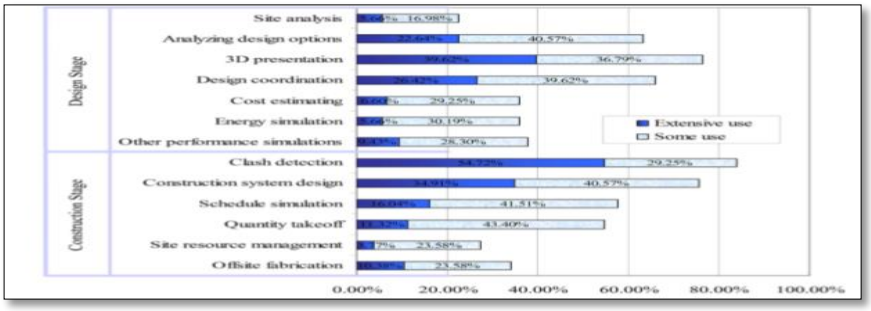


Figure 1: BIM practices in different application area
Source : Cao et al., 2015

5.0 CONCLUSION

At the end of this study, hopefully the implementations of BIM technology are expected to become more wide spread in Malaysia construction industry. It helps to increase construction project efficiency and effectiveness. Moreover, implementing BIM in construction projects can lead to successful construction of projects and can increase the overall quality of projects and improve image of the industry.

REFERENCES

Azhar, S., Khalfan, M., & Maqsood, T. (2015). (asce)ei.1943-5541.0000193 Status of BIM Adoption and the BIM Experience of Cost Consultants in Australia. *Australasian Journal of Construction Economics and Building*, *12*, 15–28. https://doi.org/10.5130/ajceb.v12i4.3032

Cao, D., Wang, G., Li, H., Skitmore, M., Huang, T., & Zhang, W. (2015). Practices and effectiveness of building information modelling in construction projects in China. *Automation in Construction*, *49*(PA), 113–122. https://doi.org/10.1016/j.autcon.2014.10.014

Cho, H., Lee, K. H., Lee, S. H., Lee, T., Cho, H. J., Kim, S. H., & Nam, S. H. (2017). Introduction of Construction Management Integrated System Using BIM in the Honam High-Speed RailwayLot No. 4-2. *28th International Symposium on Automation and Robotics in Construction (ISARC 2011)*, (4), 1300–1305. https://doi.org/10.22260/isarc2011/0239

Fleming, R. W. (2006). Implications for government. *New Directions for Institutional Research*, *1974*(3), 65–70. https://doi.org/10.1002/ir.37019740309

Jabatan Kerja Raya (JKR), (2013). (2013). Pengenalan BIM. Retrieved June 3, 2019, from https://www.jkr.gov.my/prokom/?option=com_content&view=article&id=310&fontstyle=f-larger

Latiffi, A. A., Kasim, N., Fathi, M. S., & Mohd, S. (2013). Building Information Modeling (BIM) Application in Malaysian Construction Industry Project management reference model View project Suzila Mohd UNIVERSITI TEKNOLOGI MALAYSIA Building Information Modeling (BIM) Application in Malaysian Construction Industry. *International Journal of Construction Engineering and M Anagement*, *2013*(4A), 1–6. https://doi.org/10.5923/s.ijcem.201309.01

Pellinen, P. (2016). Developing design process management in BIM based project involving infrastructure and construction engineering.