

INVESTIGATING INTEROPERABILITY AND INTERFACING ISSUES ON BUILDING INFORMATION MODELLING AMONG CONSTRUCTION PLAYERS IN MALAYSIA AT PRE-CONTRACT STAGE

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ABSTRACT: This study been carried out to investigate the Building Information Modeling interoperability and interfacing issues among construction players at the pre-contract stage. The objective of this study is to identify the implementation and impact issue of Building Information Modeling to the project, to determine the barriers of the Building Information Modeling process for design and Pre-Contract Stage and to suggest the good practice to overcome the interoperability and interfacing issues with the construction players in Pre-Contract Stage. The methodology adopted in obtaining the data is through questionnaires observation and literature review. The data were analyzed by using the average index. Based on the finding, it had been found that most of the designers agreed that the implementation and impact issues are important to the project, however, the barriers of the Building Information Modeling process caused most of the designers in Malaysia were discourage to use Building Information Modeling. As the result, the suggestion of the good practice to overcome the interoperability and interfacing issues will be able to make Building Information Modeling easier to be used to shorten the time for the project to done and efficiently.

Keywords: Building Information Modeling, Pre-Contract Stage, interoperability, interfacing.

1. INTRODUCTION

In these current years, it has been an international explosion of interest in the development of BIM in the construction sector. Building Information Modeling (BIM) is a process that supports the virtual design and construction methodologies by placing all the team members together during the whole design and construction process. It is also beyond to the operations in maintenance of the building. As indicated by [1] the utilization of hardware and software identified with PC application to distinguish a virtual representation of a building in a way, which advances identification of physical characteristics of the project, is the premise of a Building Information Model. Besides that, this model passes on all information, which appended to the components of the model. As a result, these model gives data to the accompanying elements including 3D image, 2D image, time planning utilizing 4D, cost information and identified with different viewpoints like energy, management of available facilities and sustainability [2].

As indicated by [3] Building Information Modeling is unconsidered as a simple tool. However, the procedure includes the utilization of software by accomplishing construction project management. This is in concurrence with the perspectives of [4] They facilitate show the view that several contractors proceed with a false origination that the purchase of BIM software consequently advances a combination of BIM software effectively in their operations.

BIM is one of those developments inside the construction industry that is given the greatest trust to sort the issues that the industry is confronted with [5]. Yet, keeping in mind the end goal to not see BIM as a design a few relevant issues should have been managed. Reception as per these relevant issues will prompt to changes in the organizational level, with new strategies and organizational structures, as well as at a business level, to manage blocks, for example, contractual issues [5,6] coordinated effort issues and the divided handoff race that construction projects are today [6,7] The BIM model is an instrument that permits information about a building to

be gathered and sorted out [8,9]. However, to get the maximal value from this device, and others identified with it, there is a need to adjust and change the building procedure [9-12].

One of the greatest advantages of BIM is that the included gatherings turn out to be more incorporated, permitting coordination and clash detection between consults [5,13,14]. and also better comprehension amongst designers and end-user [15]. Be that as it may, the industry has generally worked as a multi-stage sprint, was every performer does its parts and after that hands it over to the following inline [9,16,17]. Keeping in mind the end goal to realize the benefits with BIM, the work process should be balanced into an interactive one where the work process urges the on-screen characters to communicate and collaborate between [5,18,19,]. Keeping in mind the end goal to get collaborate and communicate all through the project is standard procedures and concurred conventions fundamental.

2. AN INSIGHT OF THE BUILDING INFORMATION MODELLING

Building Information Modelling (BIM) to encourage the usage does not change the obligations identified with the arrangement of purposes - just the methods by which the goals are accomplished. As of now, there is no basic language that exists with the aim of acknowledgment of BIM [5,6]. The absence of a typical language, makes it testing to precisely pass on to others intends to accomplish BIM. The point of this review is to set up a typical language to build up the utilization of the philosophy of BIM. A BIM application (utilize) is characterized during the plant's life cycle for the use of building data models to execute the strategy at least one particular target. Arrangements of BIM utilize the (body), there is a mutual vocabulary that is utilized to reproduce (or expression) the utilization of BIM, including the protest (or thing) sorts, and ideas, elements, and connections [19,20]. After BIM utilizing the predefined reason, the actuator can be recognized in more detail the utilization of BIM elements, for example, a convenient element, stage facilities, author of

discipline, or stage of development. Contingent upon the particular execution of BIM, process, data, framework, development, intrigue, and the reference is resolved. These components make the BIM utilize the body and can be utilized by industry. BIM utilizes the body gave by BIM structure to the motivation behind the office lifecycle to accomplish [16,18].

BIM accommodates the utilization of the body and the protest of the fundamental terms of their hierarchical structure all through the plant lifecycle BIM execution. BIM utilizes the body that might be utilized to decide the genuine needs of all gatherings in dialect securing and arranging BIM. BIM utilizes the body can likewise be utilized to streamline the procedure and data trade [19,20]. These benchmarks are the way to American National Standard for BIM. By and large, BIM can be executed utilizing the body to better convey the reason for deep-rooted displaying straightforward development. Look into by [1,2,19] has presumed that the perspectives on what BIM is depend a ton on the specific on-screen character. Both the profession and size of the firm are components of significance concerning this distinction of discernment on what BIM is and how the on-screen character needs to utilize it. By and large, substantial firms who more probable will be included in expansive ventures will favour instruments with more prominent adaptability in modifying venture situations, smaller firms; then again, will probably incline toward more natural venture situations [1,2,19]

The experts from the AEC-business, for the most part, need BIM to join all capacities of CAD to have the capacity to proceed with advantage from these which utilize they have expanded in the course of the most recent decades. Yet, there is likewise an enthusiasm for the new abilities that BIM devices can possibly give. At the end of the day, they need BIM to contain new components while not expelling old abilities [11,14] Desires on BIM additionally fluctuate contingent upon the profession of the client. Plan experts see BIM as an expansion on CAD while extending chiefs and contractual workers consider BIM to be a cleverer archive administration framework appropriate for extricating and examining information specifically from a CAD bundle. Even though BIM engineers plan to incorporate both of these viewpoints, the study of [1,2,19] recommends that present BIM applications are not developed to fulfill both of the two.

This outcome in a circumstance where the distinctive on-screen characters have diverse desires and requests on the innovation and no joint comprehension of what BIM is [1,2,19] Currently most reviews have accentuated BIM as an upgrade to current CAD innovation while not underscoring its archive administration qualities [1,2,19] At the same time the improvement for BIM to bolster offices administration is lingering behind the advancement of BIM in the outline phases of a venture [10,11]

This advancement has restrained the enthusiasm of the non-design profession towards the reception of BIM innovation [1, 2, 20] additionally contends that the user-centric advancement of BIM must be more comprehensive since the fruitful BIM appropriations requests aggregate investments and commitment from all venture members.

3. RESEARCH BACKGROUND

Building Information Modeling (BIM) is deploying in the construction, facility management, and design to be one of the new emerging technologies in which a digital representation of the building. It is being formed to support the interoperability of data and exchange in digital format. Structured approaches used in developed countries to approve their industry thoroughly approve the Building Information Modeling in terms of communicating tools during the construction process [21, 22]. However, the projects that constructed, planned and design using Building Information Modeling were established that come across the client's expectation, in terms of completion time, cost and quality [19, 20, 23, 24].

Interoperability has used the equipment or part of another system or ability of a system to work with. Interoperability is observed with both broad and narrow perspectives by the construction industry. Interoperability is considered as the facility that communicates and manages the electronic project and product information among the collaborating firms from a purely technology-based view [25,26]. Therefore, most of the build team members had recognized interoperability at the social level. Other than that, interoperability definite as an advantage, which manages, and implement collaborative relationships between members of cross-disciplinary build teams that allow integrated project execution. Thus, these perspectives can be associated and those are interrelated. At a practice level, the interoperability of technology allows efficiency. Every team member can integrate the project delivery better if all build team members can easily exchange data across different platforms and applications [7,27,28].

Therefore, this research aims to study the barriers factors in implementing Building Information Modeling and to suggest the solution regarding the Building Information Modeling solving the interoperability and interfacing issues with the designers at Pre-Contract Stage and also will investigate the appropriate approach to enhance it. The respective respondents involved in this research are Architect, Quantity Surveyor, and Engineer. The limitation comes in setting-out the research area to distributing the questionnaire among 220 professional respondents.

4. RESULTS AND DISCUSSION

The Figure 1 shows that the mean of barriers of the Building Information Modeling process for design and Pre-Contract Stage, most of the quantity surveyors, engineers and architects are agreeing with the barrier of the Building Information Modeling process. The barriers of the Building Information Modeling process are lack of individual knowledge/ skill/ time to train, lack of Building Information Modeling exposes/ knowledge and training, time needed to produce the models, time taken to implement BIM, data sharing standards requirement issue, steep learning curve for those unfamiliar with technology, people acceptability for new technology, people refuse to study, the unsuitability of projects to the adoption of Building Information Modeling, stakeholder limitation due to high cost, cost of model copyright issue/ requirement, cost of training employed staff and cost of updates and new software.

Based on the figure above, it can be concluding that architects, engineers, quantity surveyors should be able to understand all the barriers of Building Information Modeling in order, it also can be concluding that they need be more concern on current barriers so that Building Information Modeling can be successfully use.

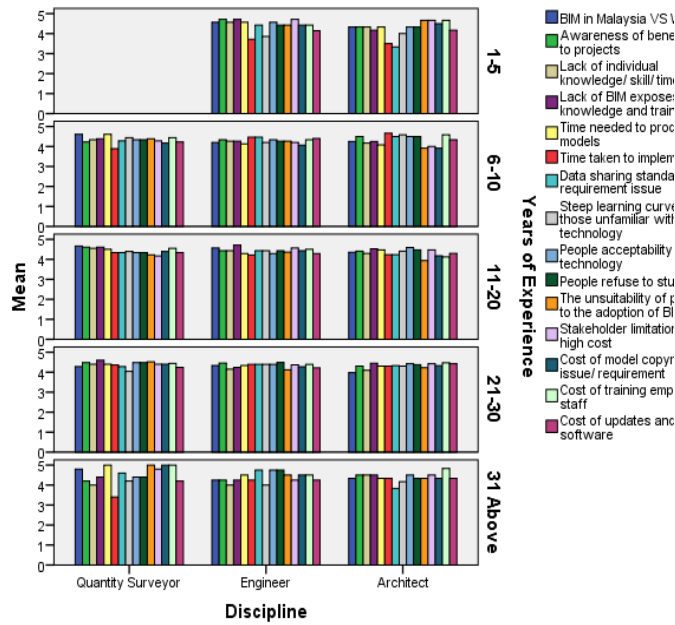


Fig (1) The Barriers of the Building Information Modeling

The Fig 2 above show that the mean of good practice to overcome the interoperability and interfacing issues with the designers in Pre-Contract Stage, most of the quantity surveyors, engineers and architects are agree with the of good practice to overcome the interoperability and interfacing issues. The good practice to overcome the interoperability and interfacing issues are regular structured meeting, team working/ comradeship esprit de core, planning, organizing, interaction, interfacing, communication, collaboration, cooperation, coordination, Building Information Modeling hardware capacity, Building Information Modeling software compatibility, common software, choice of models, proper procedure and method in implementing the document and drawing Building Information Modeling, technological advancement / obsolete, collaborating training, training available to train the staff, feedback and share.

Based on figure as shown above, it can be concluding that all of the good practice is important to overcome the interoperability and interfacing issues with the designers in Pre-Contract Stage. From the above perspectives it is built up that despite acknowledgment of issues of interoperability, there is a positive view about interoperability among respondents. The respondents likewise relate to different attributes, which help promote information leverage. The results of this study show that the lack of awareness towards certain factors including operational processes, operational efficiency and the importance of corporate strategy. However, the focus of Building Information Modeling on different types of construction projects are found to be a new

area of research in Building Information Modeling. In this study, having adopted into a random snowball sampling method and did not target Building Information Modeling adoption regionally or sector wise. Future research can focus on this area and identify if there are differences in trends.

This study had taken into account only construction projects, which have previously adopted Building Information Modeling because there is a limitation. Future research should focus on construction companies, which are yet to adopt Building Information Modeling to identify the problems associated with the adoption.

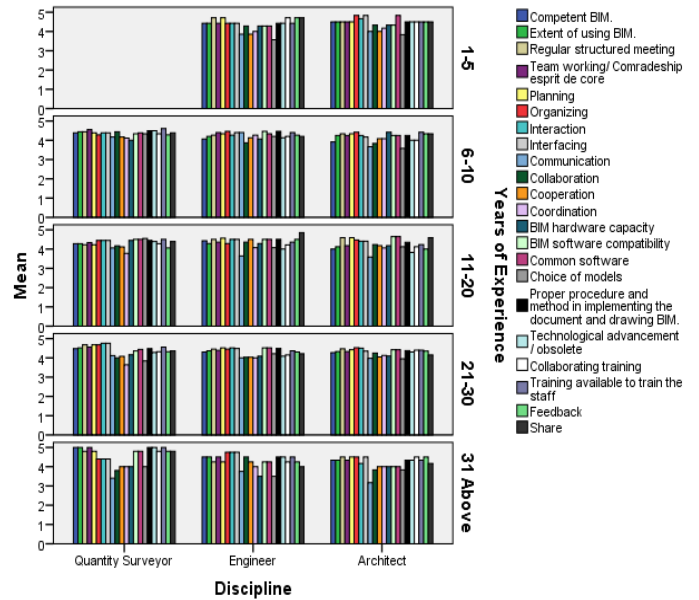


Fig (2) the good practice to overcome the interoperability and interfacing issues with the designers in Pre-Contract Stage

5. CONCLUSIONS

Building Information Modeling can be utilized to decide proper locations for the construction set down of materials and the delivery times of materials due to the dynamic planning capacity that Building Information Modeling has to offer. Coordination gets to be easier, and as-built drawings turn out to be more precise. Construction site design involves things, for example, equipment, materials and so on. These things are basic for increases in productivity. Due to the 4D and 5D opportunities that Building Information Modeling offers as a feature of its database. Capacity to render time-lapse studies into a project will help in anticipating better more productive approaches to use time and enhance planning.

Poor communication at a jobsite prompts to low profitability, and re-try work. A Building Information Modeling will have the capacity to expand communication between the Architect/Engineers and the jobsite administrator. There should be learning of Building Information Modeling on both sides so communication is through the program. A Building Information Modeling can likewise be utilized to document a career and to keep all included parties free from issues, delays, and builds advance and accomplishments. This is not important to Building Information Modeling, it identifies

with the issues of renting as opposed to owning equipment and worrying over upkeep. It is focus on utilizing new and not obsolete equipment to enhance profitability on a jobsite. Obviously a safe jobsite is a more beneficial jobsite, help to keep worker's motivation. A Building Information Modeling can give early hints about potential risks that may happen on the jobsite. About the advantages of advancing interoperability, it was observed that productivity, coordination and reduction in labour were the most generally identified attributes. Issues of interoperability between different software vendors were recognized. Besides, the respondents showed that there were a lot of efforts undertaken by software organizations to enhance this issue. The respondents have additionally recognized the utilization of Building Information Modeling in promoting visualization, information sharing, coordination, cost adjustment and forecast of delay.

From the dissertation above, it is observed that the construction industry subjects itself to a great deal of risk by investing time and money in Building Information Modeling, during an economic recession. Other than that, the advantages of Building Information Modeling, as well as a lack of awareness of value-added of Building Information Modeling, are identified. The problems associated with Building Information Modeling interoperability as well as the degree of information acquired from Building Information Modeling is clearly comprehensible. With the increase in governmental efforts to integrate Building Information Modeling into the construction industry, there will be more users of Building Information Modeling in Malaysia.

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