Review Paper Impact And Adoption of BIM in Construction Industry

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Abstract- *The goal of emerging technology in the past few decades has been to create new information systems to automate manual tasks. Large-scale projects in the construction sector require a specialized method of data organizing and analysis in order to create a database free of duplicate or redundant information. Building Information Modelling (BIM) is a collaborative process that creates data modelling using cutting-edge technologies. Building information modelling (BIM) offers the construction industry ongoing transformational prospects and boosts teamwork. The main elements influencing BIM adoption across the worldwide construction sector are people, process, and technology. The interaction between people, process, and technology perception of construction experts is the main topic of this research. Along with the level of influence, the overall causal link is studied in respect to effects on BIM adoption. In order to assess the strategic application of BIM technology in the construction industry, this study also includes a SWOT analysis. The SWOT matrix for the adoption of BIM presents the advantages, disadvantages, possibilities, and dangers. The findings also show that designers and general contractors profit from project BIM implementation efforts significantly differently, and that this difference is directly related to their respective roles in BIM-enabled processes for exchanging resources among organizations. In order to do this, the research uses three sets of criteria as indicators for improving design quality: utility, form and aesthetic values, and building construction quality. The research also suggests a fresh conceptual framework to establish potential relationships between the various study variables. As a result, it has a number of implications for practitioners and decision-makers on the value of BIM in raising design quality.*

Keywords- BIM, building information modelling, construction, SWOT, adoption, implementation.

I. INTRODUCTION

Building Information Modeling (BIM) appears to be a well-organized process that enhances communication quality because all BIM enabled projects are carried out in an integrating environment based on information sharing capability (ISC) and collaborative decision capability. This is due to the speed of technological developments in the construction sector (CDC). Around the world, construction projects have been troubled by a number of performance issues, including poor design, cost overruns, and timetable slippages. Building information modelling (BIM) has gained popularity over the past ten years as a cutting-edge technique for producing, distributing, and exploiting project lifecycle data, making it a promising tool to address these performance issues. It takes a lot of time and effort to communicate data and evaluate design information from documents and drawings. The study investigates if implementing BIM can speed up these procedures and determines whether using BIM improves or regulates building quality. BIM is a typical inter organizational innovation, distinct from other technologies like two-dimensional computer-aided design (2D CAD), whose implementation process not only necessitates the cooperation of numerous project participating organizations but also has the potential to have performance impacts that cross organizational boundaries.

Building information modelling (BIM), a collaborative environment, is replacing traditional 2-Dimensional (2D) computer assisted design (CAD) as the industry's dominant paradigm. Due to decreased rework, less conflict and variances during construction, and increased clash detection, BIM users also experienced an increase in productivity. In order to increase productivity in building design and construction, BIM is a process for creating and managing building data throughout the building's life cycle using three-dimensional, real-time, dynamic building modelling software. This process includes building geometry, spatial relationships, geographic information, quantities, and component properties. BIM is also described as "the information management process throughout the lifecycle of a building (from conception to demolition) which mainly focuses on enabling and facilitating the integrated way of project flow and delivery, by the collaborative use of semantically rich 3D digital building models in all stages of the project and building lifecycle" (project-based integration perspective).

Building information modelling (BIM) is now the construction management approach that is growing the

quickest both globally and in India. It is gradually becoming the norm for construction projects in several nations. In the construction industry, there may be a lot of misinformation about this technology, a lack of knowledge among the majority of participants, and extreme caution in its application. The global literature, however, underlines the key benefits of BIM. Methods for gathering 3D building data utilizing digital BIMs and reducing their complexity in 2D and 3D (geometrically and semantically). BIM are object-oriented, semantically rich, and up-to-date; as a result, they enable views to be queried for required building components. This indicates that, in accordance with the BIM concept, it is crucial to collect information but, more importantly, to organize, standardize, and use the information that is already there in the model. As they expand across all phases of a building's life cycle, BIM models are now able to contain both geometric and semantic information, in contrast to traditional CAD models.

Objective

- To study about BIM and it impact on Construction Industry.
- To study the effects of BIM adoption in Construction Industry.
- SWOT Analysis of the use of BIM technology in construction industry.
- To know about BIM education and career preparation.
- Impact of BIM on building design qualit

II. REVIEW OF LITERATURE

In this connection the following literature has been reviewed.

IMPACTS OF BUILDING INFORMATION MODELLING (BIM) IMPLEMENTATION ON DESIGN AND CONSTRUCTION PERFORMANCE: A RESOURCE DEPENDENCE THEORY PERSPECTIVE (2017)

This paper develops and empirically tests a model for understanding how building information modelling (BIM) implementation in construction projects impacts the performance of various project participating organisations by strengthening their interorganizational collaboration capabilities. It does so by drawing on resource dependence theory. Both designers and general contractors benefited from increased efficiency and effectiveness thanks to BIM. The findings also show that the benefits of project BIM implementation activities for designers and general contractors are significantly different from one another, and that this difference is closely related to the different roles that designers and general contractors play in BIM-enabled interorganizational resource exchange processes. The findings contribute to a deeper understanding of how and why project participating organizations benefit differently from the implementation of interorganizational information technologies like BIM. They also validate the resource dependence theory perspective of BIM as a boundary spanning tool to manage interorganizational resource dependence in construction projects.

This research established a model to evaluate how the use of BIM in construction projects improves the performance of project participants by enhancing their interorganizational collaboration capacities, drawing on the resource dependence theory. The model was tested using two distinct sets of survey data gathered from designers and general contractors involved in BIM based construction projects in China. This allowed researchers to delve deeper into the question of whether and how different participating organizations benefit differently from BIM implementation. Results of data analysis using the PLS technique and the bootstrapping mediation approach show that information sharing and collaborative decision-making capabilities enabled by BIM as a whole have a significant impact on the performance gains enabled by BIM (including the enhancements in task efficiency and task effectiveness for both designers and general contractors). These findings support the resource dependence theory's point of view in the context of construction projects and show how BIM plays a crucial boundary-spanning role in helping project participants manage interorganizational dependence and hence enhance project performance. Further comparison of the data sets reveals that the benefits of project BIM implementation activities for designers and general contractors are significantly different, with the benefits for designers being primarily restricted to the improvement of task effectiveness and the BIM enabled task efficiency improvement for designers being significantly less substantial than that for general contractors.

IMPACT OF BIM ON BUILDING DESIGN QU T OF BIM ON BUILDING DESIGN QUALITY (2019)

The goal of emerging technologies over the past few decades has been to create new information systems to automate manual tasks. Large-scale projects in the construction sector require a specialized method of data organization and analysis in order to create a database free of duplicate or redundant information. Building Information Modelling (BIM) is a collaborative process that creates data modelling utilizing cutting-edge technologies. Based on a review of the literature, the current study puts forth a set of hypotheses that connect BIM deployment with improved

information sharing capability (ISC) and collaborative decision capability (CDC) in the building industry's construction sector. Consequently, it uses ISC and CDC as intermediaries to link the level of BIM use to the improvement in design quality. In order to do this, the research uses three sets of criteria as indicators for improving design quality: utility, form and aesthetic values, and building construction quality. The research also suggests a fresh conceptual framework to establish potential relationships between the various study variables. As a result, it has a number of implications for practitioners and decision-makers on the value of BIM in raising design quality.

For practitioners, decision-makers, and academics, the outcomes that could be attained via the adoption of BIM to improve design quality, constitute a powerful motive. The study emphasises the significance of utilising BIM to improve the design and construction team's information sharing and collaborative decision-making capabilities, as well as the beneficial effects of such an improvement on building quality. In order to make the BIM model submission one of the mandatory deliverables to receive a permit in accordance, the research recommends them to alter specific sections of the Lebanese building laws and regulations. They may even be able to compel developers, consultants, and contractors working on large-scale projects to utilize BIM extensively. by adding a long-term perspective to the mediation role given by information exchange and collaborative decision-making abilities, it enhances the previous models. It therefore paves the path for the integration of BIM use with architectural design and execution courses and encourages students to enrol in training programmes at architectural and engineering firms that utilise BIM. The research contributes to the BIM literature by offering a novel conceptual model that connects BIM enabled information sharing and collaborative decision capabilities to the building design quality while evaluating if using BIM can improve architecture design quality. Finally, the results of this study add to the body of literature on BIM by demonstrating that the usage of BIM benefits all parties involved in construction by raising design quality and streamlining the data management and transfer processes.

EFFECTS OF PERCEPTIONS ON BIM ADOPTION IN MALAYSIAN CONSTRUCTION INDUSTRY (2015)

Building information modelling (BIM) offers the construction industry ongoing transformational prospects and boosts teamwork. The most frequently cited elements influencing BIM adoption across the worldwide construction sector are people, process, and technology. The troubling precedent that Malaysia's implementation of BIM has set has increased academic attention on these delicate concerns surrounding technology adoption. As a result, the interaction between people, process, and technology perspective of construction professionals is the main emphasis of this article. Along with the level of influence, the overall causal link is studied in respect to effects on BIM adoption. Overall, the model investigation supported the theoretical framework about the influence of Malaysian construction industry experts' perceptions of BIM on the adoption rate of BIM. The findings point to areas where stakeholders in the building sector might improve their understanding of BIM technology.

This study intended to investigate the connections between several constructs influencing BIM adoption in Malaysia. This was accomplished by evaluating the strength of the relationships between the constructs and the SEM model fit indices. The model was developed with the argument for construct correlation and mediation to determine the rate of BIM adoption. The proposed hypotheses were further strengthened by the structural model's goodness of fit in comparison to the measurement model. Based on the findings, it is advised to strengthen grey areas like training, awareness, and professional collaboration in the building industry. The development of supportive BIM policy should continue. The methodology for future research can be used to gauge the opinions of other significant players in the construction sector.

A SWOT ANALYSIS OF THE USE OF BIM TECHNOLOGY IN THE POLISH CONSTRUCTION INDUSTRY (2019)

The goal of the SWOT analysis presented in this article is to assess the strategic application of BIM technology in Poland's construction sector. The strengths, weaknesses, opportunities, and risks related to the adoption of BIM are presented in a SWOT matrix prepared by the authors. All components of the SWOT matrix are presented in depth using literature evaluations, personal experience, and market reports. Calculated basic metrics describe BIM's strategic position on the Polish construction market. In order to promote and advance BIM in Poland, a matrix of strategic tasks and actions is established at the end.

Due to the existence of more strengths than weaknesses and opportunities than threats, the SWOT analysis reveals that the implementation of BIM in Poland presently enjoys a positive position on the market. Regarding the adoption of BIM in construction, it is challenging to anticipate quick dynamics of change in Poland. An aggressive development strategy, which is advised in "maxi-maxi" situations, appears to be the best tactical solution for the application of BIM technology. This approach is built on

making the most of advantages and capabilities to speed up the dynamic application of BIM for everyday use. When the circumstances allow for it, the benefits of BIM should be fully utilized. The adoption of BIM should be encouraged by leveraging the enthusiasm of businesses that are market leaders in the construction industry and reminding them of the need to lower investment costs. In a few years, the establishment of BIM-specific fields of study at universities should enable the staffing gaps that prevent proficient usage of various BIM software.

IMPACTS OF BIM ON TALENT ACQUISITION IN THE CONSTRUCTION INDUSTRY (2013)

The construction business is being rapidly transformed by BIM. When construction organisations adopted BIM implementation, significant changes were made to organisational structure and business operations. Companies must answer a crucial question to be competitive in the market during the transition: how to match intellectual readiness with the difficulties and business opportunities presented by BIM. One of the focuses appears to be effective talent acquisition. The necessity for a closer examination of the present talent acquisition tactics in the construction sector is justified by the use of dedicated BIM job titles and the establishment of the "BIM department" as an independent functional unit in companies. This study examined the effects of BIM on several critical areas of hiring, such as identification (gap analyses of talent shortage and needs), profiling (job descriptions), qualification (job requirements), sourcing (intellectual pools), recruiting (candidate screening and interviews), and retention/management. This study has uncovered some fundamental problems that businesses have or will have while hiring BIM specialists. Additionally, it aims to spark debate among professionals on how best to modify current hiring practises for the BIM environment. Last but not least, the research contends that more industry-academia engagement will promote BIM talent development, cultivation, and recruitment.

The construction sector as a whole is being significantly transformed by BIM, making it crucial for businesses to handle the dual technological and process problem in the BIM transformation. After evaluating the difficulties and effects of BIM on workforce planning, an online survey was undertaken to determine the major characteristics of the industry's present practise of BIM talent acquisition. The survey's findings imply that BIM is a trend that is growing and has more commercial potential. Although the effects of BIM on hiring were demonstrated, relatively few businesses have developed comprehensive plans to deal with these effects. To improve the current situation, more complex strategic planning and financial investment are desired. Organizational learning, knowledge management, and industry-academia partnerships in BIM education are three initiatives working to satisfy the growing demand for BIM expertise that deserve a stronger commitment and further development.

III. SCOPE OF WORK

The study demonstrated a link between the adoption of BIM and the improvement of three indicators: usability, form and aesthetic qualities, and building and construction quality. It would be important to carry out a quantitative analysis utilizing ISC and CDC as intermediaries to determine how much BIM installation has affected each of these metrics. In order to show any potential variances in the results that could be caused by cultural differences or variations in construction laws, it would also be useful to quantitatively test the suggested conceptual model's validity in various geographic locations.

Benefits of BIM

- It is possible to improve documentation.
- A decrease in the construction project's costs.
- Cutting down on waste from construction materials.
- Execution of drawings is automated.
- Strong attention from industry titans in the construction sector
- The use of BIM technology in numerous nations
- Raising awareness among all parties involved

Demerit of BIM

- No universal software platform
- High labor requirements for the proper BIM model.
- Errors in accurately portraying the building's original form.
- Implementing BIM in a corporation comes at a high expense.
- Lack of BIM-related legal guidelines and requirements.
- Lack of knowledgeable and experienced personnel
- Refusal on the part of users, clients, and contractors to use BIM

IV. CONCLUSIONS

Due to the availability of more strengths than weaknesses and opportunities than threats, the SWOT analysis reveals that the implementation of BIM in India now enjoys a positive position on the market. In terms of the adoption of BIM in construction, it is challenging to anticipate quick

dynamics of change in Polish. An aggressive development strategy, which is advised in "maxi-maxi" situations, appears to be the best tactical solution for the application of BIM technology. This approach is built on making the most of advantages and capabilities to speed up the dynamic application of BIM for everyday use. When the circumstances allow for it, the benefits of BIM should be fully utilised. The adoption of BIM should be encouraged by leveraging the enthusiasm of businesses that are market leaders in the construction industry and reminding them of the need to lower investment costs. In a few years, the establishment of BIM-specific fields of study at universities should enable the staffing gaps that prevent proficient usage of various BIM software.

This was accomplished by evaluating the strength of the relationships between the constructs and the SEM model fit indices. The model was developed with the argument for construct correlation and mediation to determine the rate of BIM adoption. The proposed hypotheses were further strengthened by the structural model's goodness of fit in comparison to the measurement model. One statistically significant association was used to construct the significant link. Based on the findings, it is advised to strengthen grey areas like training, awareness, and professional collaboration in the building industry. The development of supportive BIM policy should continue. The methodology for future research can be used to gauge the opinions of other significant players in the construction sector.

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