e-ISSN:2582-7219

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH IN SCIENCE, ENGINEERING AND TECHNOLOGY

Volume 7, Issue 6, June 2024

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 7.521

| ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.521| Monthly Peer Reviewed & Referred Journal |

| Volume 7, Issue 6, June 2024 |

| DOI:10.15680/IJMRSET.2024.0706011 |

Impact of Bim on Project Quality in Construction Industry

Pallavi Pawara[(1)], Prof. R.D. Shinde[(2)]

P.G. Student, Department of Civil Engineering, RMD Sinhgad Technical Institute Campus, Warje, Pune, Maharashtra, India [(1)]

P.G. Coordinator, Department of Civil Engineering, RMD Sinhgad Technical Institute Campus, Warje, Pune, Maharashtra, India [(2)]

ABSTRACT: In the construction industry, cost and time are commonly acknowledged as the key elements impacting project outcomes, whereas quality is overlooked despite established quality management systems. Achieving success in building projects while adhering to all requirements may be difficult. As a new technology tool, BIM has shown to be extremely effective in achieving these objectives. Its use leads to better project results, such as improved design, construction, and maintenance procedures, as well as increased compliance with rules and standards. This study explores the influence of BIM on construction quality using a two-stage strategy that includes a literature review and industry questionnaires. The literature evaluation found a substantial link between BIM and building project quality. Industry surveys acquired inputs from experts and BIM practitioners, which were then examined using the Ishikawa Diagram to determine significant issues. The Relative Importance Index (RII) was used to rate these elements on a 1–5 scale, with higher ranks suggesting better efficacy. The findings indicate that clash detection was the most influential element, followed by a robust database and degree of complexity. These findings are consistent with the perspectives of experienced industry professionals, demonstrating the importance of BIM in improving construction quality.

KEYWORDS: BIM, Project Quality, RII, Fishbone Diagram, Clash Detection, Strong Database

I. INTRODUCTION

Building Information Modeling (BIM) is a digital representation of a building's physical and functional properties. Quality control is an important yet time-consuming responsibility in the construction sector. To begin, requirements for individual components are dispersed among multiple national, industry, and local legislation controlling building quality. Second, due to the complex network of relationships among project participants, assigning blame for mistakes is difficult. Third, existing quality control efforts are mostly focused on the end component, with little attention devoted to quality control throughout the building process. ISO 9001 classifies a structured system that describes procedures, techniques, and responsibilities for achieving quality policies and objectives as a quality management system. This system encompasses quality planning, assurance, control, and improvement. The construction industry now has access to advanced quality management tools such as Building Information Modeling (BIM) and lean building approaches.

Objective

1. Determine the quality requirements for the use of BIM.
2. Evaluate the selected criteria and prioritize them according to their relevance.
3. To grasp how BIM improves total project quality.

II. RELATED WORK

Their findings imply that BIM technology has tremendous potential as a quality management tool, and they advocate for its use to improve integration and cooperation in infrastructure development projects. The integration of information enabled by the use of ICT and BIM technologies helps to an overall improvement in project quality. The paper proposes a number of arguments that relate BIM deployment to improved Information Sharing Capability (ISC) and Collaborative Decision Capability (CDC) in the construction sector of the building industry. Embracing BIM provides several benefits to construction stakeholders, particularly in improving data management and transfer procedures and elevating design quality. Compared to firms that do not use BIM in their projects, those that do are more effective in fulfilling project deadlines, remaining under budget, and pleasing consumers. Furthermore, all of the findings from this

| ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.521| Monthly Peer Reviewed & Referred Journal |

| Volume 7, Issue 6, June 2024 |

| DOI:10.15680/IJMRSET.2024.0706011 |

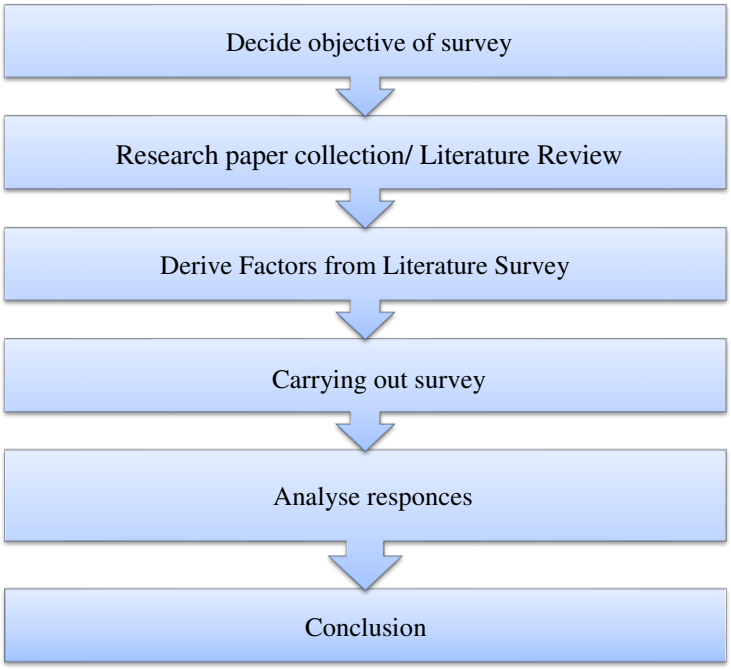
study show that senior management struggles to implement TQM concepts in building projects that do not use BIM. Addressing the knowledge gap by implementing BIM in Quality Management and providing integrated solutions for improvement. The model includes fully standardized and organized building regulations, resulting in unambiguous construction task requirements for training and verification. Using design information guarantees uniformity of information. The use of 4D technology allows quick examination and virtualization of the entire process. This research investigates and deliberates on the quality and efficacy of BIM-based construction projects. A total of 206 surveys were delivered to contractors, consultants, and government customers. SPSS (Statistical Package for Social Science) was used to analyze quantitative data. As a consequence, the three research cohorts discovered twenty-seven (27) indicators of quality efficiency in BIM-based building. The study sought to provide a guideline for BIM compliance and to examine the adoption process for reaching BIM level 3 (full integration) in the Malaysian construction sector. This effort sought to assist those participating in BIM-based building projects, notably government entities. To improve the quality control system and elevate the level of architectural design inside the BIM environment, the research developed technology breakthroughs for building elements as well as application solutions. Specifically, the study examined output data and activities completed during the design process to define exact quality control objectives across several occurrences.

III. METHODOLOGY

The methodology involves two stages of research that were carried out – the initial literature review and the industry reviews.

1. Literature review-
In this step, research from published papers that were available online had been read through and studied the various aspects to which BIM was able to contribute.

2. industrial survey-



Flow Chart - Stages of Survey

IV. DATA ANALYSIS AND RESULT

Relative Importance Index (RII)
Relative Importance Index (RII) was used to evaluate to determine the factor with the highest impact on project quality. This tool of statistical analysis helped in ranking all parameters. All responses were ranked on a scale of 1 to 5.

| ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.521| Monthly Peer Reviewed & Referred Journal |

| Volume 7, Issue 6, June 2024 |

| DOI:10.15680/IJMRSET.2024.0706011 |

The formula for RII is as mentioned below,
RII = ΣW / (A*N)
W = Weight/rank of each response.
N = the total amount of responses gathered.
W = the highest rank/weight that can be acquired
The RII value will always be equal to or less than one but larger than zero

V. RESULT

FACTORS	RII	RANKS
Clash Detection	**0.884**	**1**
Automatic detection of failed components	**0.768**	**9**
Uninterrupted flow of information	**0.794**	**7**
Strong database	**0.832**	**2**
Detailing & Accuracy with better visualization of construction activities	**0.806**	**6**
Inspection	**0.774**	**8**
Collaboration & Communication	**0.819**	**4**
Improved scheduling & sequencing	**0.813**	**5**
Degree of complexity of projects	**0.826**	**3**

Table 1: Relative Importance Index

The six detected factors had the greatest relative relevance index, ranging from 0.80 to 0.88, while the remaining three factors were in the 0.75-0-80 range. It revealed that the conflict detection component has the greatest relative relevance index, with a value of 0.884.

VI. CONCLUSION

Following are the top 5 parameters that have the most positive impact in terms of project quality through BIM

Rank 1 Clash Detection
Rank 2 Strong database
Rank 3 Degree of complexity of projects
Rank 4 Collaboration & Communication
Rank 5 Improved scheduling & sequencing

Using the Relative Importance Index for analysis resulted in collision detection being the top ranked parameter. Detecting confrontations between individual pieces, as with the conventional construction process, was difficult until structures were completed on-site. However, with BIM integration, this collision detection process may begin much earlier in the design phase, allowing for easier execution on-site and resulting in fewer mistakes and higher construction project quality.

| ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.521| Monthly Peer Reviewed & Referred Journal |

| Volume 7, Issue 6, June 2024 |

| DOI:10.15680/IJMRSET.2024.0706011 |

In the conventional construction business, the adoption of BIM has resulted in major improvements in elements such as clash detection, project complexity, collaboration and communication, and improved scheduling and sequencing. The literature study suggests that using BIM is especially beneficial throughout the design and construction stages.

REFERENCES

1. Zadeh, P. A., Staub-French, S., & Pottinger, R. (2015). Review of BIM quality assessment approaches for facility management.
2. Sadek, K., Raslan, R., El-Bastawissi, I., & Sayary, S. (2019). Impact of BIM on building design quality. BAU Journal-Creative Sustainable Development
3. Cheng, Y. M. (2018, March). Building Information Modeling for Quality Management. In ICEIS (2) (pp. 351-358)
4. Chen, L., & Luo, H. (2014). A BIM-based construction quality management model and its applications. Automation in construction, 46, 64-73.
5. Abazid, M., Gökçekuş, H., & Çelik, T. (2021). Implementation of TQM and the Integration of BIM in the Construction Management Sector in Saudi Arabia. Advances in Materials Science and Engineering, 2021, 1-9.
6. Choi, J., Lee, S., & Kim, I. (2020). Development of quality control requirements for improving the quality of architectural design based on BIM. Applied Sciences, 10(20), 7074.
7. Hadzaman, N. A. H. (2022). Study on Quality Efficiency for Bim-Based Construction Projects. International Journal of Academic Research in Business and Social Sciences, 12(9), 355-364.
8. Barlish, K., & Sullivan, K. (2012). How to measure the benefits of BIM—A case study approach. Automation in construction, 24, 149-159
9. Lee, N., Salama, T., & Wang, G. (2014). Building information modelling for quality management in infrastructure construction projects. In Computing in Civil and Building Engineering (2014) (pp. 65-72)

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH

IN SCIENCE, ENGINEERING AND TECHNOLOGY

| Mobile No: +91-6381907438 | Whatsapp: +91-6381907438 | ijmrset@gmail.com |

www.ijmrset.com