



Research Paper

Building Information Modeling (BIM) – A Game Changer in Indian AECO Industry

U Hemanth Kumar ¹B Sudharshan Reddy ²

¹Prospective Graduate student, Hyderabad, Telangana, India.

²Assistant. Professor, Department of Civil Engineering, Narsimha Reddy Engineering college, Hyderabad, Telangana, India.

Corresponding Author: U. Hemanth Kumar

ABSTRACT—Building Information Modeling (BIM) is a concept that gained its place in the developed nations like USA, UK, Australia, China, Japan, Singapore during recent times. Our paper deals with the potential benefits and Major barriers for Implementation of BIM in the Indian AECO Industry. AECO Industry in our country Contributes a respected Share in our country's GDP, which can be enhanced by using BIM Technology which is a game-changer for our Infrastructure. Identifying a Window of Opportunity, an Initiation was taken to develop IBIMA, A professional Association established in 2016. Extensive research and studies are required for Establishing a mandatory constructive system of using BIM in the AECO industry by collaborative 3D, 4D, and 5D BIM.

KEYWORDS: Sustainable, Leverage, Overrun, optimization, AECO Industry

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I. INTRODUCTION

BIM (Building information Modeling) is an associate intelligent 3D model-based method that offers design, engineering, construction, and Operation (AECO) professionals the insight and tools to additional effectively arrange, design, construct, and manage buildings and infrastructure.

concerning technologies and project delivery methods among the AECO business, Building information Modeling (BIM) is one in every of the foremost notable ones, with its ability to cut back project time delays, price overruns and litigations. Countries similar to the North American countries, the UK, Netherlands, Singapore, Asian country, Japan, Hong Kong, Australia, and few different countries have mandated the use of BIM in the public sector. several countries among the regions of America, Europe, Asia, and Oceania have a high share of BIM users for their AECO incomes. Globally, BIM awareness is spreading throughout an honest method for the benefits it's binging to the AECO business. BIM has been researched and Implemented in more than 65 countries.

Indian AECO business employs quite 35 million folks, has the second-highest flow of foreign direct investment in the service sector, and contributes to concerning 11.1% of India's gross domestic product. Recent initiatives set by the Indian government, like build in an Asian country, is serving to grow the AECO business. There are several mega projects undertaken recently, e.g., high-end roadways or expressways, railway line train comes and projected passenger train project between 2 cities of an India, i.e. Bombay and Ahmedabad. The initiation of these comes necessitates absorption on varied technical and non-technical aspects aboard technologies, particularly the infrastructure for these initiatives. This transformation from ancient practices toward BIM has enabled many advantages to the AECO business concerning project delivery. As per construction 2025 targets, BIS, hectometre Government 2013, implementation of BIM technologies and workflows among the AECO Industry will cut back among the initial price of construction and so the entire life cycle price up to 50%, and cut back gas emissions within the engineered atmosphere up to 50% and Reduce the overall time by 50%, from origination to completion, for brand new build and improvement assets. With such an enormous investment happening in Indian AECO Industry, it's significantly essential to diffuse BIM technologies and workflows by adopting standardized procedures. For this to happen it is a basic demand to compile

Indian AECO business and education community to search out and diffuse BIM technologies and processes in Indian AECO Industry, overall serving to the Indian AECO business to grow.

II. BIM IMPLEMENTATION IN INDIA

India's geographical region tube Rail Corporation restricted (Maha tube) is made the celebrated 41km-long Nagpur Metro within the state of Maharashtra to produce town with economical, fast, and property conveyance. the matter for the Republic of India is many Infrastructure comes face delay or cost. Out of 564 Infrastructure initiatives in the Republic of India, 42 % faced delay and 31% had no definite delivery date (Source: Ministry of Statistics and Program Implementation, Government of India) To avoid any value or delay difficulties, Maha Metro and Bentley Systems have collaborated to form a building Information modeling (BIM) academy. This encourages the adoption of a connected information setting (CDE) and compliance with BIM. Maha Metro has additionally adopted Bentley Systems' Open Rail CDE computer code for the Nagpur metro rail project. This digital platform currently holds 12000 3D models, drawings, and project documents. Maha Metro foresaid it expected ample to avoid wasting lots of quite \$500,000 throughout style review and \$280,000 by adopting machine-driven CAD quality assurance and title block integration. On a full, Maha metro is saving \$222 million.

Other BIM Projects Undertaken in the Republic of India include:

Personal public transit in Amritsar; Greek deity premier, Indore India; wader 4-star edifice in Chennai; Infosys's - Infosys information Park, Bangalore, Karnataka; powerhouse in Vidharbha; The piece Gurgaon, Delhi; KEF Infra's - Maitra Hospital, Kozhikode, Kerala; NMRC's - Nagpur Metro; company building in Noida; noble metal Aurangabad Industrial city; Navi city international airport; Phoenix Golf Edge, Hyderabad; L&T Ireland Club House, Powai, city; Mumbai Polycab expertise Center; Halol, Gujarat; cyprinid Abode Zresta, Hyderabad and Superstar's – Superstar, Noida. (Source: IBIMA.

III. ASSOCIATIONS

IBIMA-India Building Information Modelling Association is the leading professional national society for Building Information Modelling and Digitalization in Indian AECO-Architecture, Engineering, Construction and Operation sector. India BIM Association was initiated on 12th May 2016 by Dr. Amarnath CB. At India BIM Association we majorly focus on:

- (1) BIM education and training;
- (2) Organizing BIM summits & events;
- (3) BIM policy development;
- (4) BIM maturity assessments and certifications.

There are several Indian AECO organizations that deliver BIM projects to the local and global Clients. Some of leading India's BIM solution providers: AECOM; Atkins; Arup; Larsen & Toubro; Mott MacDonald; Hochtief; RSP; Ramboll and Neilsoft.

There are sixty plus other BIM solution providers in India.

IV. STANDARDS

The range of BIM standards has been developed to help the construction industry adopt BIM These are: ISO 19650-1:2018; ISO 19650-2:2018; PAS 1192-3:2014; BS 1192-4:2014; PAS 1192-5:2015; BS 8536-1:2015; BS 8536-2:2016

V. SCOPE OF BIM IN INDIANINFRASTRUCTURE

Few Reports added that the Ministry of Statistics and Programme Implementation estimates that the govt. has incurred INR 3.88 Lakh Cr in overrun prices. Moreover, the ministry additionally calculable that around 552 Projects have witnessed time increase still. However, Leveraging BIM is predicted to save lots of around 20% of the full infrastructure project prices by reducing the construction time. affected with the BIM technology, India's think tank Niti Aayog has urged all alternative ministries to implement it for their respective projects. Notably, BIM extends the traditional 3D infrastructure approach by investment time because of the time and value because of the fifth dimension. A Niti Aayog official said that with the implementation of BIM, even the minute attributes of the development are often modeled, monitored, and analyzed for any style updates. "The modeling any enhances the image of the look for the stakeholders to know what the project can appear as if," the official was quoted as speech communication. additionally, to implementing new-age technologies for the government's housing projects, Niti Aayog is additionally considering the employment of alternative technologies in projects like national highways constructions, flying field and subway projects, renovation of railway stations, and up the capability of the railway's infrastructure.

VI. QUESTIONNAIRE

A Questionnaire has been designed to Check the usage status and to forecast its demand. The questionnaire was sent to Various AEC industry practitioners and Professionals in different parts of South India. In the following section the responses have been analysed and presented through diagrams and pie-charts.

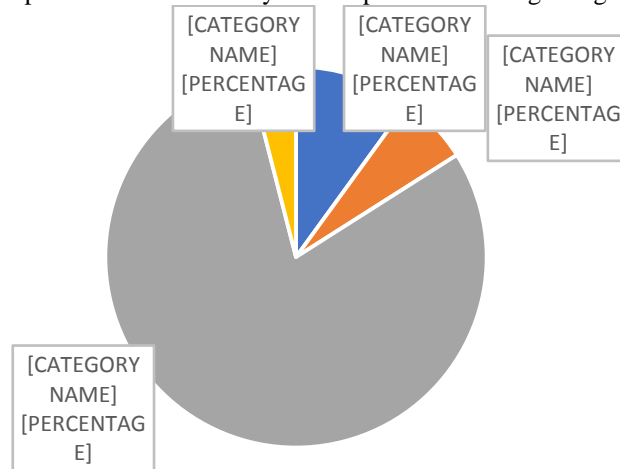


Fig. 1. Reasons for Adopting BIM

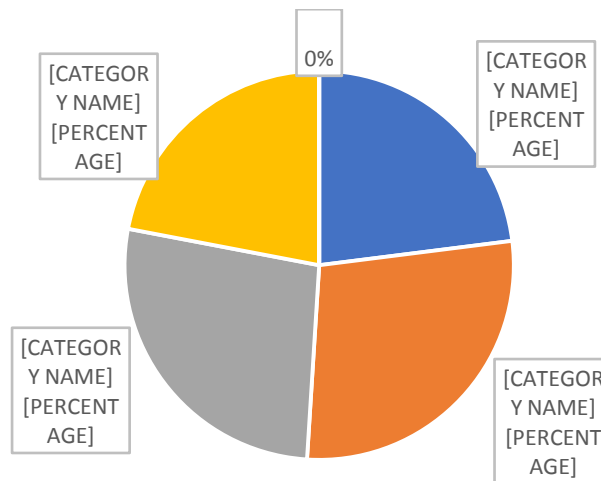


Fig. 2. Reasons for not using BIM

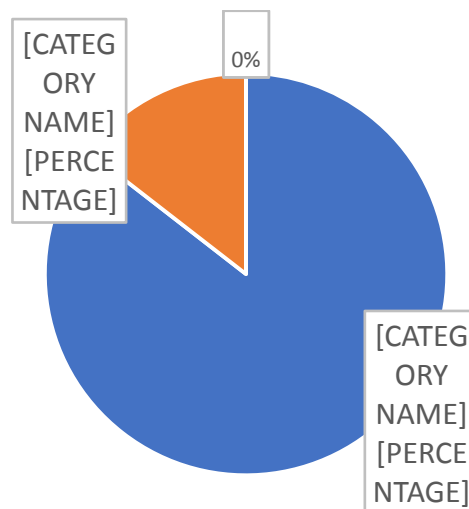


Fig. 3. Interested in adopting BIM workflow

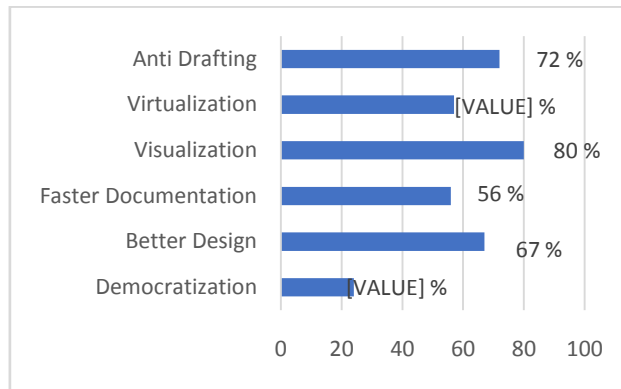


Fig. 4. Aspects of BIM that appeals most

Finally, about 85% of the survey respondents volunteered that, at their respective firms, they are interested in adopting BIM.

VII. MAJOR BARRIERS TO BIM ADOPTION



Fig. 5. Barriers Courtesy: Autodesk

The eighteen roadblocks are showcased in Figure 6. They are very much essential for our Indian AECO industry to overcome these roadblocks and to progress further in BIM implementation and Adoption in AECO projects and to stay competitive in the Global AECO industry with well developed Countries who made BIM Compulsory.

in Industry	Technical barriers	People barriers	Education & training barriers
	Expensive software	Client driven limitations	Absence of BIM education & training
	Hardware requirements	Less importance towards BIM adoption from other team members	Skill issues
	Standard guidelines	Lack of talented workforce to operate BIM tools	Organizational efforts
	Legal barriers	Work practice & process related barriers	Commercial barriers
	Liability & copyright issues	Roles & responsibilities	Insurance
National building codes	Change in practice & use of Information	Capital for investment	
Third party dependence for accuracy of BIModels	Inefficient regulatory	Key adopters of BIM (designers) will not get immediate benefits	
in Academia	Policy field players	Technology field players	Process field players
	Process of introducing BIM in AEC curriculum.	Need of BIM IT laboratory facility.	Need for revising existing incomplete BIM curriculum.
	Resolving key issues in delivering BIM curriculum.	Need of BIM technical officers.	An initiative to reduce weak ties between Industry & Academia.
	Initiative in producing trained BIM personnel.	Need of standard/guidelines for BIM tools selection.	Teaching BIM as both technology & process in universities.

Fig 6. Barriers to BIM implementation in Indian AECO industry. Courtesy: IBIMA

VIII. CONCLUSIONS

Government Mandates for BIM are very essential for Progressive Growth of AECO Industry with high benefits. The only concern is interoperability, energy & efficiency, Where the Focus is essential on them by AECO professionals, Professional Associations and Organizations. Global opportunity analysis and industry forecast reveals that World BIM market is affected by high cost of BIM software and lack of trained BIM professionals till 2015. But now various organizations deliver BIM projects. Sooner it is going to be a game changer in AECO Industry which leads to Sustainable growth in Construction Sector.

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