ISBN 978-93-84422-62-2
Proceedings of 2016 2nd International Conference on Architecture, Structure and Civil Engineering (ICASCE'16)
London (UK), March 26-27, 2016

Scope of Implementing Building Information Modeling In Architecture Engineering Construction (AEC) Firms of India

R. Padmini
MBA-CPM (RICS)-Amity University, Noida, India

Abstract: *The (Architecture Engineering Construction) industry is facing enormous technological and institutional changes and challenges in information technology and appropriate application of sustainable practices. The engineer and architect must be able to handle with a rapid pace of technological change. (Building Information Modeling) is a unique process of producing and managing a building by exploring a digital module before the actual project is constructed and later during its construction, facility operation and maintenance. In India BIM is in basic stage of adoption only, several issues about data acquisition and management comes during the design formation and planning of a construction project due to the complexity. This paper deals about the view a strategy for India's AEC firms to successfully implement BIM in their current working processes. By surveying and collecting data about problems faced by these architectural firms, will be analysed how to avoid those situations from rising and, thus, introducing BIM Capabilities in most effective way.*

Keywords: *Building, Modeling, Architecture, Construction*

1. Introduction

Building information Modelling (BIM) is a dimensional tool that supports virtual design and construction technique golf stroke all team members along throughout the whole design and construction method and on the far side to the upkeep of the building, throughout its operating life. It is one of the final documentation methods helpful for operational visualisation, and construction method like estimating, scheduling and design coordination. Main purpose of implementing BIM application is that it offers a visual method of building systems like (Mechanical, Electrical, and Plumbing) systems and it additionally identifies the matter of conflicts between the building systems. Typically, BIM is one exploitation method, intellectual modelling package effectively operating in 3D, 4D (3D + time), and 5D (4D + cost) to boost production , to scale back value and time within the design and construction phases, and to scale back in operation prices during construction. Designers all over the world consider the implementation of BIM as a brand new technology for his or her corporations. BIM adoption within the USA distended from forty ninth in 2009 to over seventy one in 2012 and from seventy one in 2012 to eighty three in 2015. The United Kingdom of Great Britain and Northern Ireland government introduced a progressive program for mandated use of totally cooperative BIM for state by 2015-2016 to scale back project delays and price overruns as a part of the economic development (UK Government, 2011 The Indian construction industry hasn't got a sound variety of BIM tools. Most of the architectural and engineering companies in India still work and believe on two-dimensional computer-aided design (CAD) drawings. The usage of previous ancient ways neither implies that the Indian designers don't seem to be greatly interested of BIM and its ability, nor will it exhibit a paucity of skilled BIM users within the Indian aec trade. In fact, they are still outsourcing for a full vary of BIM services by development companies in India, delivering designed environments for companies designed within the USA, the UK, and European countries. In India, the BIM application isn't widely practiced there needs to be a larger awareness about the same and its benefits.

2. Today Scenario of Indian Construction Industry

India's AEC industry creates enormous employment opportunities across various sectors related to the construction field. The national Gross Domestic Product (GDP) increased by $70 billion in the year 2014-15 (approximately 13% growth in GDP). The Indian construction sector is very big and has a large scope for new implementation. The major companies are sub divided into small medium large companies and we have a very high practising of contracting. Further it is sub divided into many division where nearly 40 million people are working in daily basis for less amount.

After the general election 2014 India has planned for more investments on construction and infrastructure development of the country. The planning commission has been ready to take the Indian construction industry to next leap.

New development technologies has to be implement and should be adapted by Indian AEC industry sector. For the fast growing Indian construction sector, by adapting and accepting new technology the amount of time taken for the work will be immensely reduced

3. Implementing BIM in India

BIM is widely used and custom-made within the developed countries into developing countries it's not in an exceedingly massive scale. In India, BIM technology is still in a developmental stage. India is a complete distinction to its alternate western countries in terms of BIM technology. We've less recognition to BIM in Republic of India compared to alternative countries. The most important purpose is that the price of implementing any new BIM computer code. Furthermore, the accessorial price of upgrading the hardware and educating the workers for BIM usage on the development is quite high. In India, implementing such a pricey technology may appear non satisfying to the AEC businesses, considering the very fact that, the masterful and unskilled labour is cheap, and without delay accessible.

Although we tend to see a gradual rise of implementing BIM in AEC business in next 4-5years the expansions are in an exceedingly massive scale. Main reason for slow growth is lack of masterful folks and investments. Once several businesses see full implementation of BIM full-fledged project and its output in India. The Republic of India will have an enormous impact for the tutorial and analysis fields through collaboration between the governments and therefore the industries thereby causing parallel sectors and rising economies to develop BIM implementation methods

4. CAD versus BIM

The presently used CAD technology supports drafting automation effectively however requires a lot of effort. A lot of standards have got to be enforced for prime quality of knowledge and therefore the same depends upon responsibility of users coming into data (Azhar, Nadeem, Mok and Leung, 2008).

This technique is uniquely suited to support highest level of effectiveness with least efforts. This technology has to be adopted utterly because it cannot work effectively within the current non-BIM setting and may lead to a self-coordinating model. Some software package applications that facilitate users to do three-dimensional modelling with little object attributes square measure which is sometimes used for visualizations. However, BIM technology includes modelling with activity support and consists of a lot of two-dimensional CAD references. BIM could be a model-based technology connected with an information of part data and it reflects little changes created in one read to a different. Work duplication is reduced and plenty of lower-level tasks square measure automatic, permitting designers to think about the essentials. BIM finally brings to fruition what the building trade expected of CAD within the early 1980s: it helps the complete building method with a chain of a quicker, higher quality and richer style method.

TABLE I The efficiency difference between CAD and BIM applications for a particular project in different phases

Task	CAD (hours)	BIM (hours)	Hours saved	Time savings
Schematic	190	90	100	**53%**
Design development	436	220	216	**50%**
Construction documents	1023	815	208	**20%**
Checking and coordination	175	16	159	**91%**
TOTAL	1824	1414	683	65-75%

Source: (Rick Rundel (7), 2007)

5. Acceptance Level of BIM in India: Survey Methodology

In Indian construction situation, BIM has shown sturdy acceptance potential. To establish this claim quantitatively, survey methodology has been adopted. Throughout the course of this analysis, many findings were determined for BIM

The survey was sent out to 30 Indian field of study and construction companies, out of which twenty one companies responded to the survey. Since the survey contained an explicit set of questions to be answered solely by BIM users, the survey was 100 percent completed.

The survey has been conducted between 1-25years of expertise folks in AEC business. This sub-section summarizes the responses received from survey respondents who have supported their role in their various organizations and their years of field expertise. Also, this phase uses the proportion frequency to point the results. As seen in Figure1 the bulk of respondents were senior architects (34%), followed by others (i.e., director, principle architect, project arranger, project manager, etc.; 3%), contractor/ construction managers (27%), and engineers (36%).

As seen in Figure 2, the bulk of respondents had 2-5 years of expertise (64%), 5-10 years of expertise (12%), and 0-2 years (13%).

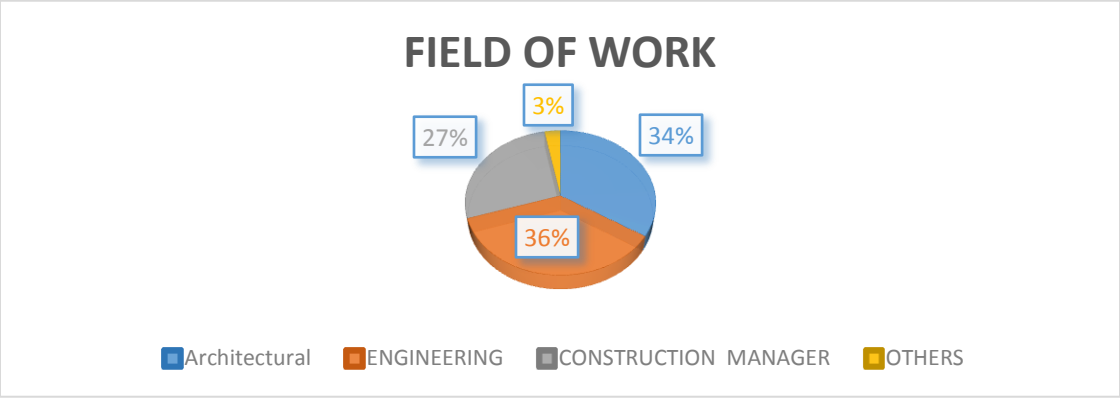

Fig. 1: Role of Respondents in Their Organizations

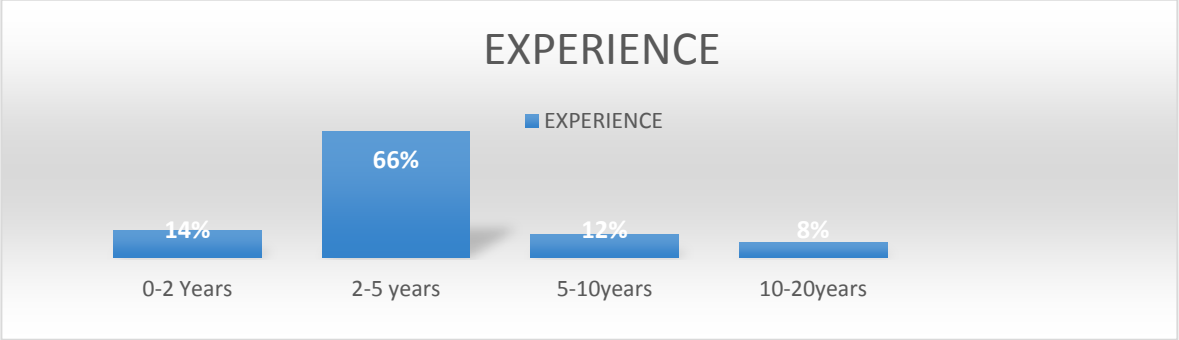

Fig. 2. Years of Field Experience for the Respondents

The size of the firm varies differently 0-10 (32%) , 11-50 are 27% , 51-100 are 21%

100-500 are 13% and 500-1500 are 7%.

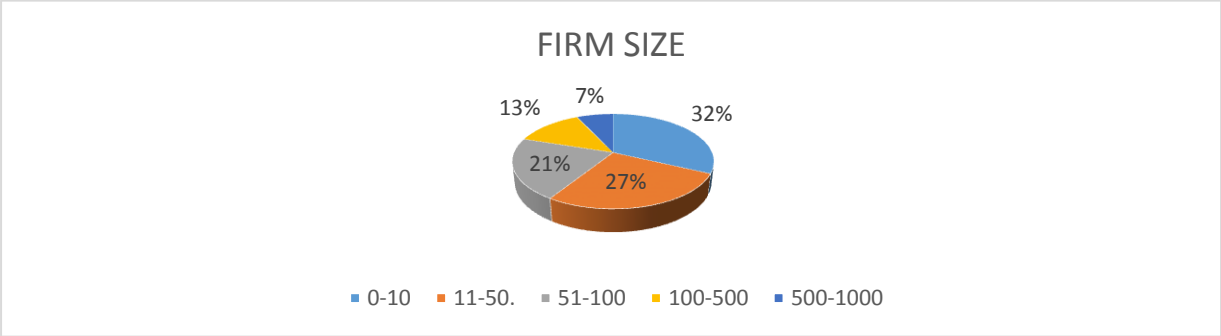

Fig. 3. Number of Employees Working in the Organization

6. Awareness of BIM

This section summarizes the responses received from survey respondents supporting their idea of BIM and level of BIM knowledge among the India construction industry. Also, this phase uses the proportion frequency to point the results. The awareness of BIM within the Indian business is growing in great way however examination to international business we'd like a faster development of growth and acceptance of BIM everywhere India. Prime AEC businesses ought to begin shifting to BIM for a better future and growth on company as wells the construction industry everywhere the India, the amount data ought to be improved and plenty of business ought to begin adopting to the new technology.

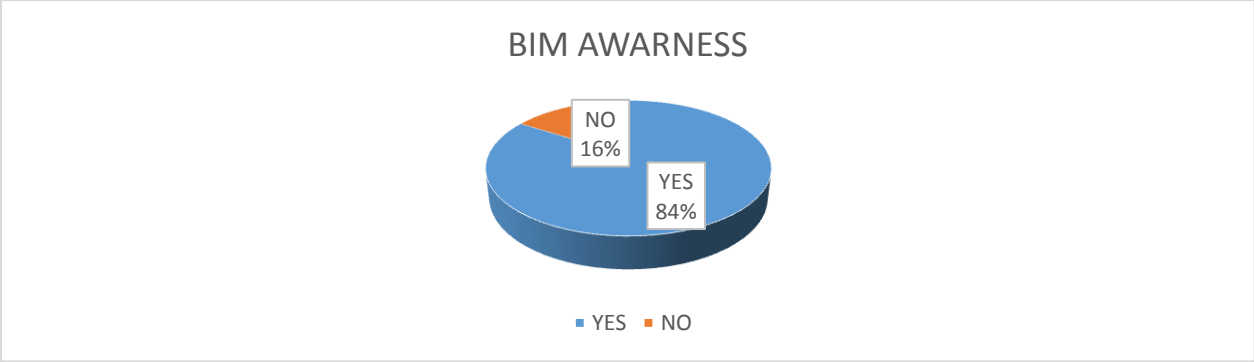

Fig. 4. Respondents' BIM Awareness

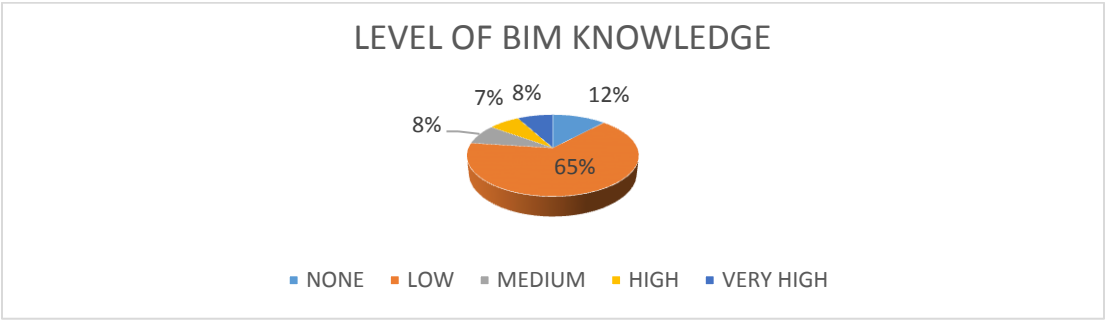

Fig. 5. Level of BIM Knowledge among Construction Industry as per the Respondents.

7. Survey Results -Reason for Using BIM/ Reason for Not Using BIM

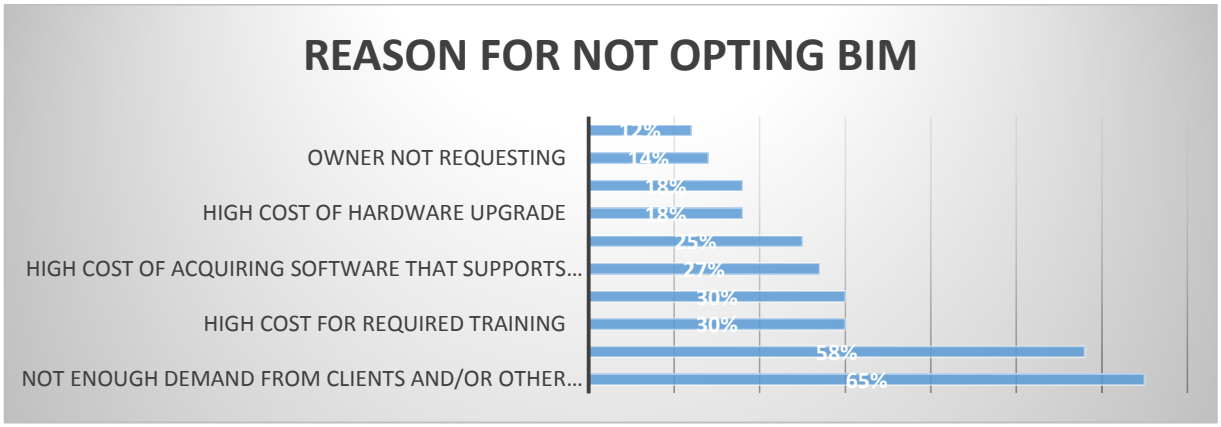

Fig. 6:Reson for opting BIM

8. Survey Results for BIM - CAD & BIM Advantages

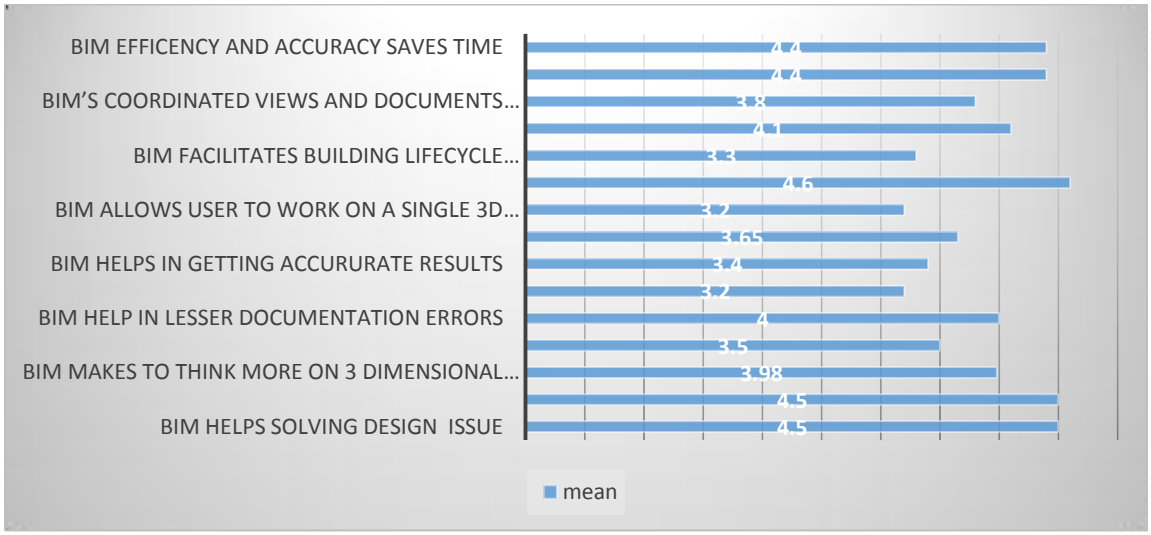

Fig. 7: BIM vs CAD

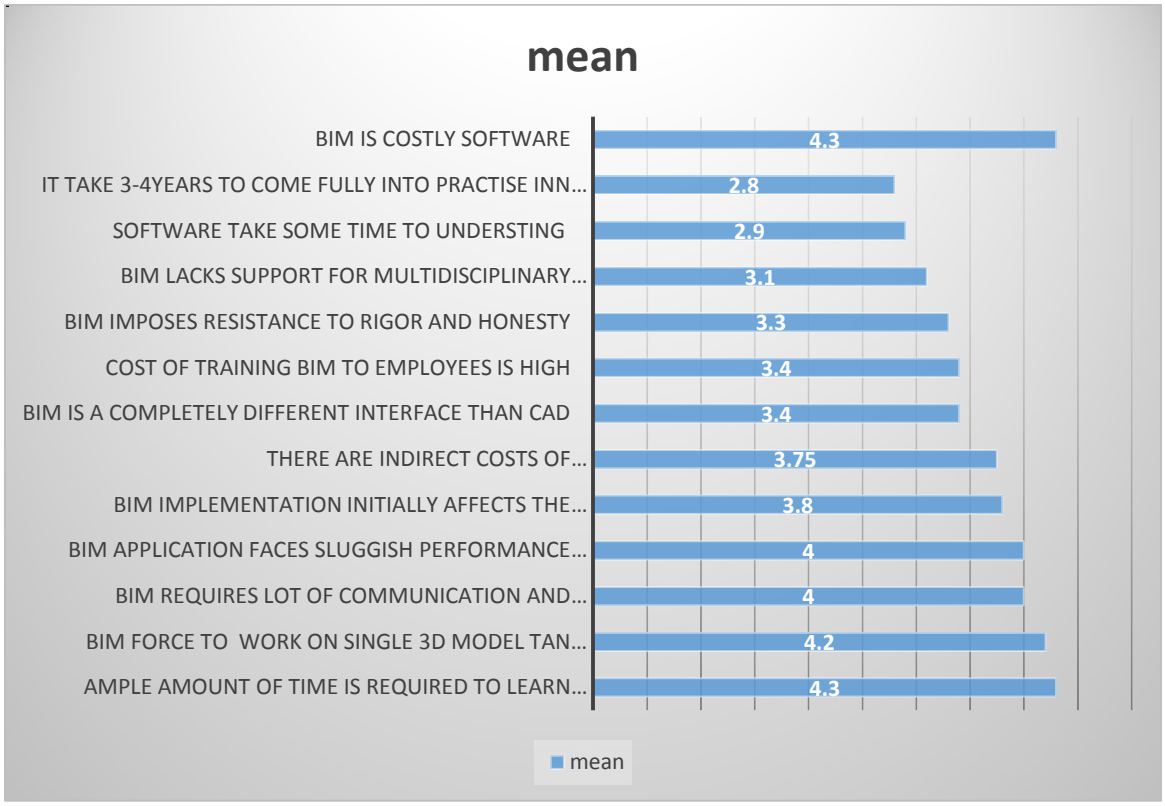

Fig. 8 Advantage for opting BIM

9. From this Survey Result:

1. Most of the architectural companies in India are sized around 11-50 people. Hence, the implementation strategy being developed by this project will focus on architectural corporations.
2. 35th respondent to the survey had detected of (BIM) solutions and applications, latest technology and business processes. Further BIM usage will increase the amount of service, quality and performance of the architectural firm and not one respondent disagreed with it.
3. 7% of those still continue mistreatment BIM i.e. thirty second of the entire respondents
4. 83.3% respondents have used BIM solutions and applications for fewer than two years. Hence, most of them haven't reached a stage where they will see come on investment created on BIM.
5. An equal and high proportion of respondents mistreat Autodesk Revit and Google Sketch Up (69.2%). Startlingly, architects think about Google Sketch Up as BIM package, thus, raising doubts over their understanding of BIM.
6. 63.6% respondents had designated a little project as their BIM pilot program. Thus, Indian architects are wise and commenced little.
7. 84.6% respondents use BIM answer in conjunction with laptop assisted style (CAD). This shows that almost all of the BIM users are still attempting to urge a position over the new system and technology and have nonetheless not fully given away their previous way of operating. The great half is that eightieth of the respondents mistreat 3 dimensional (3D) CAD over two-dimensional (2D) CAD and nearly 0.5 respondents think about BIM to be quicker, a lot of economical and simpler than CAD.
8. Amazingly, a high range of Indian architects (45.8% of respondents) suppose that the owners are going to be willing to pay further for BIM services, although seventy fifth suppose that the house owners don't possess adequate data of BIM and its varied deliverables.

10. Conclusion

The architectural companies ought to leverage BIM to boost the worth of their services and extend their core competencies, instead of simply implementing BIM for the sake of it. They must understand tangible gains in productivity, Team communications, and quality of service attributable to adopting BIM; they are not supposed to expect the remainder of the business to leap on the BIM bandwagon and may notice ways in which to take advantage of BIM currently. BIM is ready to become inherent to building design and construction because the use of BIM accelerates collaboration among project groups to increase and cause improved gain. Groups implementing BIM ought to be careful concerning the legal pitfalls and address constants in contract documents.

There is suddenly a lot of growth within the world of integrated fine arts observed using BIM. Several architects will feel the pressure to implement BIM in order to tackle challenges. Civil corporations ought to improve upon decision-making among the firm and may set up with longer horizons and additional flexibility, so that the managing changes at a quicker pace.

11. References

[1] H. Yan and P. Demian. "Benefits and barriers of Building Information Modeling". *12th International Conference on Computing in Civil and Building Engineering, Beijing (2008).*

[2] Gallaher et al., M. Gallaher, A. O'Connor, J. Bettbarn Jr. and L. Gilday,"Cost Analysis of Inadequate Interoperability in the US Capital Facilities Industry" (No. GCR 04-867): National Institute of Standards and Technology (NIST) (2004).
http://dx.doi.org/10.6028/NIST.GCR.04-867

[3] Khemlani, L. "Top Criteria for BIM Solutions", AECbytes, October issue [WWW document] URL http://www.aecbytes.com, **(November 22,2007).**

[4] Holzer Dominic; Royal Melbourne Institute of Technology, "ARE YOU TALKING TO ME? WHY BIM ALONE IS NOT THE ANSWER", Association of Architecture Schools Australasia Conference 2007, URL http://hdl.handle.net/2100/476, (October 5, 2007).

[5] Penttilä, H. Marko, R. Simo Freese, "Building Information Modeling of Modern Historic Buildings Case study of HUT", Architectural Department by Alvar Aalto in proc of ECAADE (Education and Research in Computer Aided Architectural Design in Europe Conference) published online at http://www.ecaade.org/organisation/cumincad.html, (2007).

[6] Kumar, J.Vinoth. "Reviewing the scope of Building Information Modeling for Indian Scenario", M.Arch dissertation IIT Roorkee. (Submitted in July2009).

[7] Rick Rundell, AIA. The Five Fallies of BIM, Part 1. cadalyst. [Online], http://aec.cadalyst.com/aec/Column:+1-2-3+Revit/The-Five-Fallaciesof-BIM-Part-1-1-2-3Revit-Tutor/ArticleStandard/Article/detail/470107, (November 1, 2007)

[8] GSA 01 – US General Services Administration, BIM Guide Overview Version 0.50 URL: www.gsa.gov/gsa/cm_attachments/GSA_DOCUMENT/GSA_BIM_02_Main_v09_R2C-a3-l_0Z5RDZ-i34K-pR, (Accessed on August 4, 2008).