

Global status of Building Information Modeling (BIM) - A Review

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Abstract:-The adoption of Building Information Modeling (BIM) has enhanced the construction industry by means of increasing quality of project, accurate quantity take-off, improved planning, scheduling, and visualization, consequently diminishing project contingencies, time and cost. BIM has been adopted by several countries, many researchers and institute have attempted to measure the BIM status across the world for which many quantitative and qualitative surveys have been conducted. The implementation of BIM technology is by no means equal in different countries all over the world. This study involves the finding of awareness and adoption of BIM in different countries in the world, for which 8 different countries were adopted which have large construction market. The survey data is collected from different research documents, Smart Market report, NBM National BIM reports and BIM surveys. The awareness and adoption of BIM in different countries is compared and plotted, it was found that awareness and adoption of BIM in North America is 71% giving highest percentage whereas in India it is at lowest level of awareness and adoption i.e. 22%. This paper explores the status of BIM in percentage users, heard but not using and non-user in different countries in the world.

Keywords: *Building Information Modeling (BIM), awareness, adoption, different countries*

I. INTRODUCTION

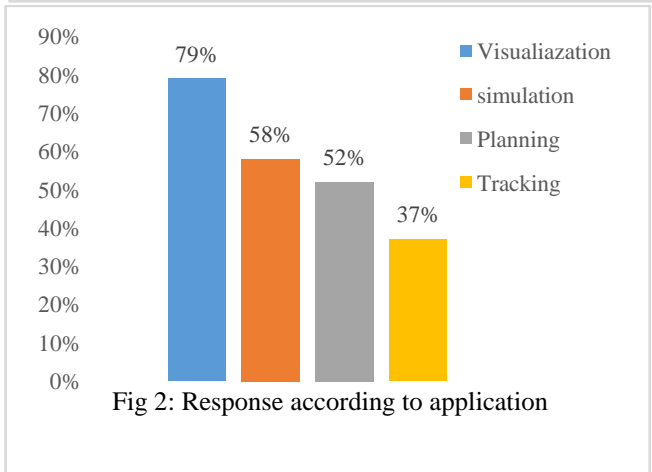
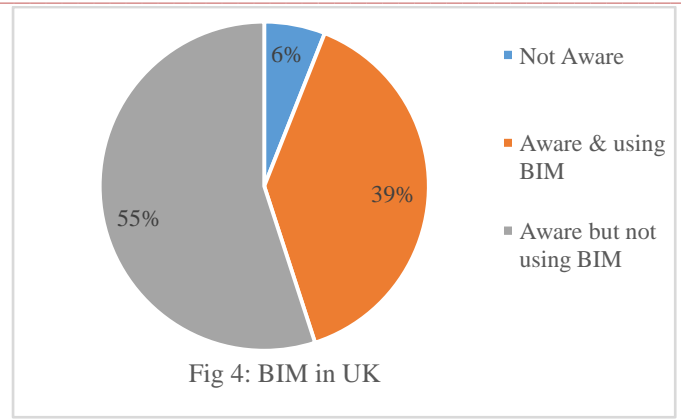
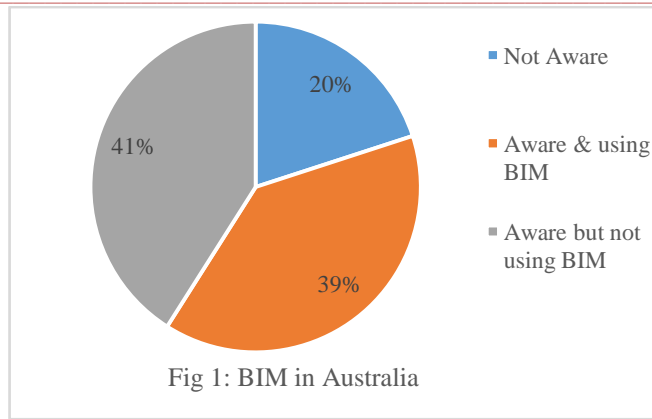
Construction industry is one of the biggest revenue generating industry in the globe. The architecture, engineering, and construction (AEC) industry has put their efforts to develop techniques which will minimize the project cost, increase productivity and quality, and reduce project delivery time [1]. Due to an increasingly competitive environment, construction companies should be more efficient in planning and scheduling to complete the project in time and within budget to achieve the desired goal of the project, hence there is a need for a system which runs more efficiently (saves time and money, requires less resources and without compromising the quality), that facilitate better coordination and communication among project team members, and also communicate the same idea of the project to all stakeholders involved in the project life cycle. Building information modeling (BIM) offers the potential to achieve these, since BIM is a new technology, hence there is huge variation of BIM usage in different countries. The implementation of BIM technology is by no means equal in different countries all over the world. There are some countries in which this concept has been introduced years ago and many others that are just starting to get on board. Moreover “the level of awareness, knowledge and interest varies with country, from discipline to discipline and from client to client [2]. The countries like North America, Canada, Australia, Singapore, United Kingdom and European Nordic countries like Finland, Denmark, Norway and Sweden

have shown their interest with remarkable level of BIM implementation [3].

The objective of the study is to find the current status of BIM among the people who are aware of this technology in percentage, usage of BIM among the people who are aware and not aware of BIM across the world.

II. LITERATURE REVIEW

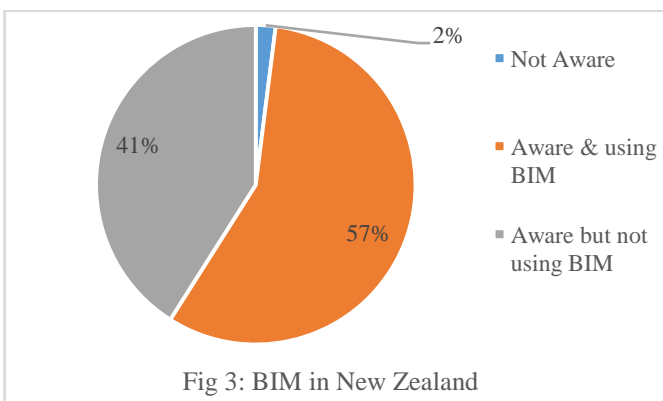
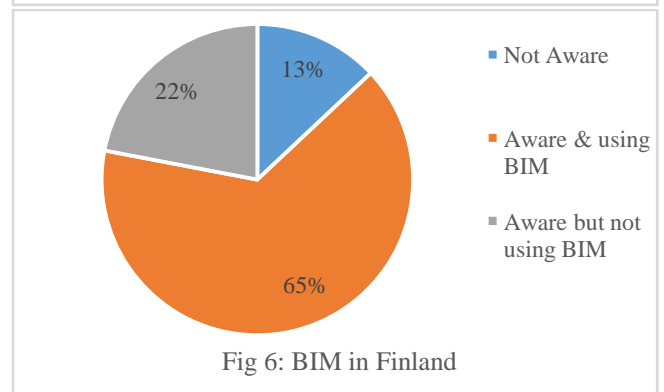
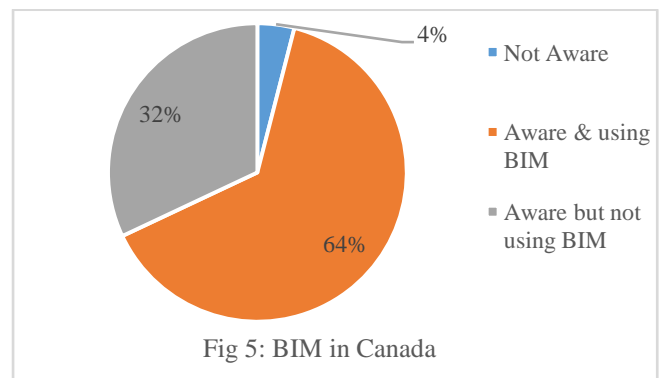
Author discussed about the use of BIM in project planning and scheduling in Australian construction industry, for which a quantitative and qualitative survey research method was adopted. The survey was conducted in the form of questionnaire and was sent to construction professionals including Architects, Engineers, Developers, Contractors and Sub-Contractors whom were known personally and found them from company’s website. The questionnaire was performed in Google Docs Form and was sent over 200 construction professionals out of which 41 responded. When the respondent data collected was analyzed as shown in Fig below, the survey results indicated that use of BIM in Australian Construction Industry is not developed as other countries. Respondent believe that BIM needs to be advanced to a stage which is easier for people to use and more user friendly [4].



The survey conducted in United Kingdom (UK) reported that, 39% of the respondents are aware of BIM and implementing this technology in their projects, 55% are just aware of BIM but not using it and 6% of the respondents have not heard about BIM (Fig: 4). The awareness of in UK is quiet less than New Zealand but according to survey report this number will rise up to 97% with 5 years of time period, [6].

Countries like Canada and Finland are one of the highest user of BIM, data gathered through survey shows that 64% of respondents in Canada are aware of BIM and implementing in their projects, while 32% have just heard about this technology but have never used and 4% have no idea about BIM. Whereas in Finland 65% of respondents are aware of BIM and using it, 22% are just aware and 13% are unaware of BIM [6].

According to BIM survey report, the adoption of BIM in New Zealand is growing rapidly. The survey data shows that it is gaining traction with a steep increase from 34% in 2012 to 57% in 2013 of respondents are aware of and using BIM. The percentage of unawareness of BIM has declined from 12% in 2012 to 2% in 2013. 84% of the respondents believe that BIM is used for visualization, 74% believes that it increases the coordination of construction document, 52% believes it has brought cost efficiency and 48% quoted that it increases the speed of construction. However, New Zealand is significantly behind other countries, but it has being forecasted that BIM awareness and adoption will increase up to 95% in next five years i.e. till 2018, [5].



Construction Market in the Middle East is at large number hence new technology will provide an additional benefits to company, for which a survey was conducted to find out the awareness and operations of BIM in Middle East, the States in the Middle East chosen for survey were UAE, Saudi Arabia, Qatar, Oman, Bahrain, Kuwait and Jordan. There was a noticeable concentration of respondents operating BIM in UAE are (77%), Saudi Arabia (41%) and Qatar (35%), with Oman, Bahrain, and Kuwait, being 22%, 19% and 18% respectively. Jordan had the lowest representation, accounting for only 7% of respondents. This distribution is largely proportionate to the areas of high construction activity (i.e. with increased activity in the UAE, Saudi and Qatar) and can therefore be considered a reasonable reflection of the market. Hence the overall user of BIM is 31.28%, [7].

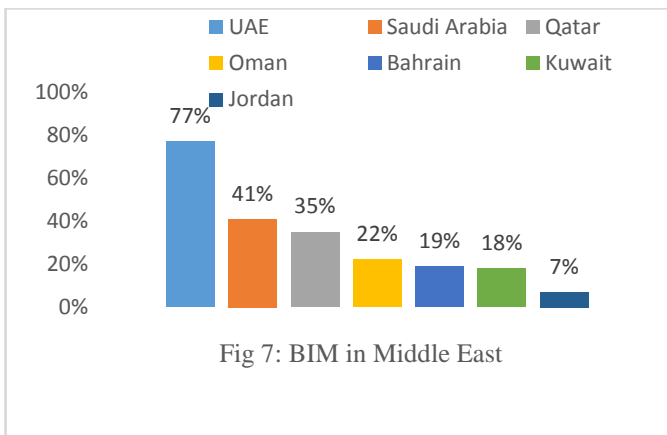


Fig 7: BIM in Middle East

The general BIM adoption of the construction industry in North America has increased from 28% in 2007 to 49% in 2009 and up to 71% in 2012. according to survey conducted it was found that contractors have over taken the Architects in North America, which is gives the clear sign of benefits of using BIM, [8].

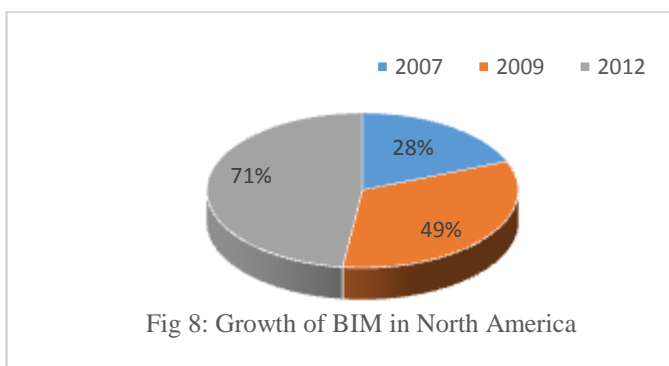


Fig 8: Growth of BIM in North America

In India Construction sector is second largest industry contributing to the Indian economy. Increasingly, large construction companies in sector such as hotels and airports are starting to implement BIM in India with distinct benefits but at

a very high cost. Indian industry has unwillingness to adopt new technology immediately, SmartMarket Report published in their blog that, Tesla Outsourcing Services, an Indian company that delivers engineering, CAD and BIM services to clients worldwide reported in a blog post that, according to a report by Autodesk, “Designers across the have started implementing BIM technology in their respective construction projects; whereas their Indian counterparts have still not captured the full potential of BIM technology. According to this report the international firm using BIM in India with India’s construction market valued currently at \$140 billion (₹840 billion) and a forecasted growth of \$620 billion (₹37,200 billion) by 2020 [9]. Survey done by Indian built environment sector, RICS school of built environment and KPMG found that 22% of respondent currently use BIM, 27% respondent reported that they are aware and actively considering BIM usage. Surprisingly 43% respondents claimed to be aware of BIM but are not sure about implementing it in their organization near future. Additionally 8% respondents are not aware of BIM [10].

Kumar and Mukharjee discussed to check the status of BIM application in India, the study was carried out through survey to check the acceptance of BIM till date, 21 question were been designed to the current status. The question ware sent to AEC industry practioners in different parts of India. The main objective of this questionnaire was to identify the percentage usage of BIM among Indian AEC companies & to record the benefits of BIM as comprehended by companies using BIM. The survey data provides an information that 87% of the respondents that at their respective terms, they are interested to adopt BIM. The survey explores the importance of utilization of BIM to support planning, scheduling & tracking of the job site operations in India, [11].

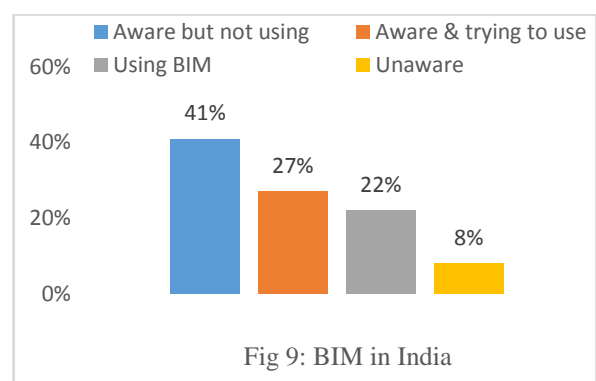
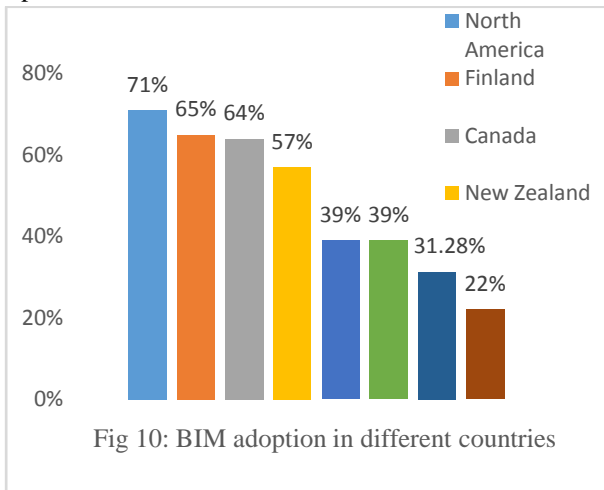


Fig 9: BIM in India

III. COMPARISON OF BIM AWARENESS AND ADOPTION IN DIFFERENT COUNTRIES

The Survey data collected from various source of BIM surveys conducted by many researchers, Smart Market report, NBM National BIM reports and BIM surveys, was analyzed and plotted in clustered column chart, Fig shown

below shows a comparison between awareness and adoption of Building Information Technology (BIM) in different countries across the world. The adoption in North America is highest in adoption and implementation of BIM among all other countries where as India is at the lowest level of BIM adoption.



Conclusion

From the study it is concluded that adoption of BIM in different countries is increasing day by day, Building Information Modeling has become essential for efficient project management, better coordination, communication, visualization etc. the BIM adoption among all the countries, North America has shown tremendous increase from 28% in 2007 to 49% in 2009 and 71% in 2012 and it is growing at the faster rate, among all the countries India has found to be at the lowest level in BIM adoption, the cumulative adoption among these countries is found to be 48.53%.

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