Obstacles Facing BIM Implementation

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Abstract

Building Information Modeling is the future of Design, Build and construction field. As per analysis it is discovered that 20% of project life cycle is spent during design and construction stages while the rest of 80% is spent during operation, maintenance and business costs which are running cost stages (1). BIM implementation gives more attention during design and construction stages, so the saving will affect the coming stages not only during design or construction. Obstacles and barriers facing BIM implementation shall be raised to figure out the required solutions.

Keywords BIM – Technology – Cost – Practice – Obstacles

1.0 Introduction

Shifting is always costly and opposed by those who are considered in the comfort zone. Professionals of traditional method do not trust that such shifting will result for better results or at least the same output than that they can achieve in the current state. While shifting from traditional way of working to Computer aided design software it took almost twelve years to let people do such kind of change and currently the step is updating the methodology from only computer aided design software towards BIM which is the complete project solution. One of the major issues is to deeply understand what is meant by BIM? What are the benefits of applying BIM and the most important part is Understanding the obstacles that are facing BIM implementation? Highlighting the problems and finding out the solution or explanation is the secret key of success as without sorting out the required solutions, BIM implementation will need longer time to be used widely.
2.0 Understanding BIM

2.1 What is BIM?

BIM as an abbreviation refers to Building Information Modeling. "Building Information Modeling (BIM) is one of the most promising developments in the architecture, engineering, and construction (AEC) industries. When completed, these computer-generated models contain precise geometry and data needed to support the construction, fabrication, and procurement activities through which the building is realized." (2) "Building Information Modelling (BIM) is a collaborative way of working underpinned by digital technologies. These technologies allow for more efficient methods of designing, delivering and maintaining physical built assets throughout their entire lifecycle." (3) While using the traditional method in the construction field there was always a gap between each phase and the next one, huge amount of data was lost during the transition from phase to another, but BIM is filling the gaps and linking all the phases together. No more data loss as sharing the information and managing the process of information exchange is controlled and pre-defined at early stages. Moreover, avoiding the duplicate of data can be easily achieved because single piece of information that is uploaded during pre-concept phase can be used at construction phase, so it is a kind of development and improvement of information not duplicating resulting in full data control and trust among different parties. As far as BIM is considered new technique, implementing BIM will sure take time, but it is moving forward especially after the announcement that implementing BIM Level 2 is mandatory by UK on April 2016. BIM is not a software or 3D modelling, but it represents a complete process where modeling, visualization, automation, analysis and calculations are parts of it.

2.2 What are BIM principles?

BIM principles can be divided into three main categories each category is holding different role towards BIM implementation and each category is affected by different factors resulting in presence of some obstacles facing BIM spreading. Reaching the point that BIM is fully implemented and replaced completely the traditional way needs the three principles to be integrated together. Missing one of the principles results in partial implementation and may cause drawback and failure of the whole process.

2.2.1 People: Represented by the Owner, Designers, Engineers and whoever involved during the project life cycle. It is also describing the trust that shall be provided among different parties. Communication and coordination shall be clearly understood,
who is responsible for what and what shall be submitted to whom and when. It is considered the main principle for the process of BIM implementation. Human factor is always the main principle of anything. Not only they are responsible for implementation, but also responsible for assuring the continuous improvement of the whole process.

2.2.2. Technology: Represented by new software’s that enable modelling, clash detection, creating animation, schedules, calculations and analysis for the project. Understanding the capabilities of each software and what can be generated using it. It is very important to understand that although technology is one of BIM principles, but it is not the most important part of the process of BIM implementation. Selecting the required new technology, purchasing and having the required trainings for how to use these new software’s is very important. Owning the software is a different meaning than implementing the tool function.

2.2.3. Social and Business: For each step within project lifecycle there will be an effect on social and business for example after implementing BIM for sure reduces the amount of Request for Information (RFI) from Contractor side to consultant side so the project will move smoothly and faster which is direct impact on social and business value. Understanding the effect of BIM on the general communication between different parties and the impact of such improvement on the overall project process shall be clearly understood as it is considered as indirect effect. Building Teams and having the ideology of team work is main principal of BIM. BIM depends on collaboration, so it is useless to work without collaboration and sharing information.

3.0 Obstacles and barriers facing BIM Implementation

Although the benefits of BIM implementation and use has been announced as per PwC report (4) and mandated as per some authorities and governments, but there is still a gap between what is done and what needs to be done. Here are some issues considered as barriers for BIM implementation.

3.1 Human Factor: The main problem facing BIM implementation is people. Changing minds and explaining new things is always the hardest part and the most important part, without winning that side BIM will never be implemented.
3.1.1 Clients and Owners: They do believe that they are paying additional cost during design and construction phase which is useless neglecting the fact that design and construction represents almost only 20% of the total project life cycle and 80% later are running processes (1). Controlling the running cost for a certain project depends on the inputs during design stage and construction. The problem is that clients do not demand using BIM which is preventing consultants and contractors from using it. Clients shall understand the impact of BIM implementation from business point of view because they do not give any concern to the technical effect, once a client is starting a construction project they will be waiting for the Return on Investment (ROI) whatever the technical method the designer shall do they will never understand only from the perspective of money and saving. Some clients are smart clients and request BIM implementation as they understand that this is for the benefit of the project.

3.1.2 Managers and Decision Makers: They do not understand the benefits of using BIM and if anyone believe in the change and the importance of BIM then it is his role to literate managers and decision makers. The full system transition is costly from the perspective of initial cost, you need to purchase software, upgrade the computers, give training to current team or even hiring new staff which is for sure additional cost. Managers at such way act the same way owners and clients act, they need to understand the effect of BIM implementation from money wise especially if the managers are not involved in the technical matters. It is about preparing complete feasibility study for BIM implementation as if it is a commercial project, so managers finally can understand that they are paying currently additional cost which is equal to value and this value will be back within certain time and whatever after this duration is considered additional revenue.

3.1.3 Designers and Expertise: Designers and engineers who are familiar with the traditional method of work are not accepting the change because they do not guarantee having the same skills and power of design if they did the shifting. Moreover, they are not accepting the idea of being monitored by newly hired staff. It is very important to let those Designers and engineers understand that shifting is a kind of reorganization and they are never going to lose their position if they accepted that challenge and merge with the required skills. It requires only a kind of understanding and further learning. Getting skilled staff and expertise is a key of success and for sure it is better to be the existing inhouse expertise by supporting the inhouse expertise with the required
trainings to complete on the same track taking the advantage of being part of the firm before hiring the required additional staff. Expertise of the traditional way shall accept the current stage and be the expertise of the future. They shall understand that the traditional method is not guaranteed, and the shifting is confirmed coming whatever how long would it take to be fully implemented. New generations of designers and engineers shall analyze the market well and work on themselves to be ready for the future. A kind of coordination shall be arranged between the expertise of the construction field and the new skilled staff resulting in a group of professionals having the required skills to fully implement BIM.

### 3.2 BIM is not Software

The misunderstanding of exactly what is BIM is a major barrier until now some people think that BIM is a software, but it must be understood that BIM is connected to the complete project life cycle not only software or generating 3D models. BIM is not modelling, Visualization is considered as one of the achievements of BIM but not equals to BIM. Technology represents part of the shift to BIM, so it is not logic to consider BIM any kind of software. Learning new technologies and changing the used software is important step for shifting, but it shall be clearly understood that even if they can use the new software’s, it does not mean that they understand BIM.

### 3.3 BIM is not overhead

The Total cost of purchased software’s and additional salaries for skilled new employees is not overhead or additional cost as the purchased software is considered part of the company capital and the additional salaries for the skilled employees will be one of the factors to get more project and increase the company income. Calculating the initial cost is not the proper way for analyzing the effectiveness of BIM but shall be analyzed compared to the saving value so finally they will be sure that BIM is not costly. It is better to calculate in terms of case study and complete project life cycle.

### 3.4 BIM is applicable for all projects

BIM can be implemented for small projects and big projects as saving and improved project control is needed for all project scales.

### 3.5 Understands where your organization is

There shall be clear vision for the organization and the capabilities of it. Firms shall first adopt BIM then implement it as vice versa will never work. Firms understanding and ranking among BIM implemented firms can be divided to steps, so each firm can easily clarify the current step and what is required for the next step. Buying the software is not BIM implementation but it is only a part of the adaptation process. The phase of adaptation includes purchasing the software, installing, give training to current employees and testing the results using pilot
project before starting dealing with clients, by this they owned the software but not yet the process. Owning the process includes the full capabilities of achieving all the dimensions of BIM at least level 2 BIM starting from generating 3D coordinated drawings then preparing time schedules then analyzing the cost, after that analyzing sustainability, then facility management phase and handing over enhancing the use of Construction Operation Building Information Exchange (COBie) so all asset data are handed in form of spread sheets instead of geometric information, It is the process of information exchange from construction phase to operation and maintenance.

3.6 **Sharing Risk and Responsibilities:** The idea of that all involved parties are responsible is not accepted by most of the parties that are not used to hold responsibility or share the risk. While using traditional method, Consultant is responsible for generating the design and in case there is a problem on site consultant is totally out of the picture and contractor will hold the full responsibility unless the consultant contract includes supervision. That problem in not only between different firms, but even within the same company not all designers and engineers at the contractor company will be responsible. If there is an electrical problem, then the fault will be connected to the electrical engineers only neglecting other parties. Such methodology of work is totally wrong and creates environment of isolation resulting that each one will work individually neglecting others. The idea of sharing the responsibility and risk is not accepted by too many as they are looking for their scope only neglecting that their scope is useless unless all other scopes are done properly. Integrated Project Delivery (IPD) is depending on Deeply understanding that the success of the project is success to all parties and its failure is failure for all parties will enhance the way of communication and acceptance of sharing the risk and responsibilities. Team work shall be clearly understood depends on involving all parties from early beginning, sharing information and requirements of the project from all parties’ point of view.

3.7 **Governments and Authorities awareness:** There shall be an action from governments to mandate the use of BIM even by gradual steps not complete implementation. Although some governments have already started and mandated the use of BIM Level 2 as UK on April 2016, but the rest are still accepting the traditional way neglecting the benefits of using BIM. This barrier is mainly because some governments are still not literate enough and do not understand what BIM is exactly and what they shall achieve if they implemented BIM. Some governments as UK has already started so if UK exported the experience and the best way of implementation, the rest of governments will have the good start and will be ready to join in the next improvement. Some government are still not understanding how far BIM can save.
3.8  **Identifying clear project goals:** What are the goals of the project? Goals shall be clearly identified at the early project stages, so all involved parties shall work for the same goal. The problem raises when the client is having a goal different from other parties. Let’s assume that the client’s goal is to build commercial building and get his money back within two years and the designer goal is to build an artistic building and creating a landmark neglecting the cost and the engineers work for generating sustainable building, the previous three goals are totally different from each other and that is an obstacle as BIM can work for the three goals only in case all parties improved their communication method and clearly identified their goals clearly at early stages without hiding the actual goal whatever it is so the result will match the required target.

3.9  **Building Trust:** Auditing the quality of information by the responsible person is important, but this shall be based on trust. As an example, if the Architect shared a piece of information with Engineer let’s say lighting fixture from the interior design perspective so most probably the electrical engineer will double check the information and in sometimes to ensure that the used fixture will satisfy the required lighting level from the technical point of view. The electrical engineer shall coordinate with the architect to have the right output. Shifting to BIM mandates that all parties shall trust each other’s as single piece of information which is uploaded to the digital model by architect at concept stage will be used by the rest of the team for the all the coming stages and this information will be updated resulting in avoiding data loss and no duplicate of data which is translated to time saving and better building performance.

3.10  **New Positions:** Due to the raise of BIM some new positions have been raised like BIM Technician, BIM Coordinator and BIM manager. It is considered obstacle as there is a confusion for each job tasks and some firms are still mixing the responsibilities of the new titles. The raise of the new positions is due to the change between traditional method and BIM. Full job description including tasks shall be defined by government or international associations to avoid such confusion and reach the required target of improvement especially that BIM is not for big firms only who are considered part of the change.
4.0 Conclusion

BIM is not the future, it is now. BIM implementation is not an option anymore and all the design and build field is going to use BIM either they accepted or not, so it is better to understand what the current state is and how to improve for the coming steps. All parties should understand the benefits of applying BIM and how far will BIM implementation affect their business and what are the required changes to be done to be part of the change. Understanding the obstacles and barriers will be the first step to overcome these barriers reaching the idea of continuous improvement. Solving or compromising the current barriers do not mean that there will not be more barriers, but as far as the process is implemented some barriers are solved and new barriers will be raised and will require further attention to find out solution. It is not single task or individual responsibility, but it is about the social awareness merged with the upcoming plans for the construction.

5.0 References


6.0 Bibliography


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