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BUILDING INFORMATION MODELING FOR HISTORIC STRUCTURES: A CASE STUDY OF HISTORIC SHRINES OF MULTAN

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Abstract- Digital documentation is a new technology that works to secure quality information and helps in technical decision-making. This technology can also be used for infrastructure conservation and maintenance. In this study, one digital documentation technique as a securing and handling instrument of the essential information has been used. In this study, the methodology of the historical building information modeling (HBIM) system has been adopted to study the historic shrine building. In two stages, this technique was applied, the first one was portrayed by the exploratory exercises needed for the building, and the second one was to thoroughly define the calculation of a portion of the complicated, historical building information modeling (HBIM) system. The model development process also revealed few challenges, which were encountered during the information collection processing and analysis procedure. This study provides a pattern to apply the HBIM technique that will help to monitor and record the time to time conservation and rehabilitation process for historic buildings.

Keywords- Building, Historic Structures, Shrines, HBIM

1 Introduction

Digital information systems can be applied for architectural heritage management by digitizing and managing existing building stock data [1]. Public and private building history administration can follow digitalization by using modern IT methodologies and technologies, like some that software which is used in the building modeling, also the establishment of special processes [2]. The goal of this contribution is to demonstrate the preliminary findings of applying this technique to a building complex that began with its historical construction configuration. The social and social qualities of Italy which, with regulations that fail to encourage proper recovery, decontamination, and new development work, are considered traditionalists about existing history raise doubts about the conditions in which these are designed. Due to the lack of special Seismic-free and power legislation, there are approximately one-twenty lakhs civil or social and non-public structures at the Federal state, with higher than seventy percent of them erected before the 1980s [2, 3]. In this way, careful consideration of the possible benefits of an organized structure classification given huge completion and extreme latest day imitative task in the condition of security, capability, and condition is necessary. While the current city development and construction guidelines do not operate with precise intercessions, a genuine development in the planning and execution, both methodological and creative, is now required. As a result, the situations that have been solidifying regarding the interdisciplinary, electronic, also with contributed executives of the development cycle (starts



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from study to incorporated plan, starts from administration and decapitation of works to upkeep and deactivate of the structures), despite being delay in a few specific circumstances, can support another leaven in the development area. There are not uncommon for new administrative changes to urge, at individual levels, and the approval of building information modeling tactics and devices for public use, first by Europeans and then by Italians[4-6]. Administrative rules, along with the capabilities of the building information modeling system, made the coordination of these devices critical, not only in terms of structure development, and in terms of the improvement and development of the present cultural structure. In this vein, the acronym heritage building information modeling was created, which stands for both ancient-BIM and HBIM [7, 8]. To summarize, one needs to illustrate using the article guideline demonstrating for the software using instruments replication of present structures, both verifiable and not authentic [9]. The establishment of robust duplicate necessitates a thorough cycle of information gathering, which includes both literary exploration and structural investigations. Furthermore, mathematical data does not address every aspect of building information modeling (BIM) or historical building information modeling (HBIM): non-realistic information might be supplied as information base fields inside particular components. The measure of information that must be kept for an object, regardless of whether it is mathematical or helpful, is defined by a list in the reference principles. A threshold called Level of Reliability (LOR) that illustrates the ontological correlation of the single computerized component with its reporter in reality as a possible solution to this problem is also used [10]. Different studies have expresses the procedure that the reconciliation of data from total station and computerized photogrammetry may also be used to construct Building Information Modeling models [11].

This study has been designed for the application of Historic Building Information Modeling (HBIM), as public and private building history administration can follow digitalization by using modern IT methodologies and technologies, like the BIM technique using Revit software which is used in the building modeling. This study will serve as an example for the start of data digitalization of historic structures leading to conservation and rehabilitation.

2 Research Methodology

Examining and research are being done to define solid and legitimate techniques both for policy management and private substances, to improve the interface to develop and supervise Building Information Modeling models for the existing structure stock. This methodology is applied in the following steps as at different levels [2] are; (1) "Describe Model", Model indicates the attributes that Building Information Modeling objects should possess as the interaction progresses; (2) "Information securing", It incorporates completely gathering exercises of mathematical and non-mathematical data; (3) "Recreation Model", for example, formation of the advanced duplicate of the structure being referred to; (4) "Model verification", involving the essential investigation and Conflict Location tasks; (5) "Model remedy", It may need the merging of fresh reviews and acquisitions; (6) "Information the board", Where the model, together with the obtained data, is delivered into the executive's stage of information.

Each phase deals with a propane activity, but that it may be quite vital to do a recursive interaction concurrently so that the results are suitable for the unique office demands. In an anticipation of this interaction, this interaction results in a model that addresses not only an informatic structural model at a time to, a compartment of all information that is effective in the chronicles but can also be used as an explicit foundation but a true strong article that can be upgraded. The finished submissions thus far and associated with local innovations with enough two-dimensional representations to refurbish the three-dimensional example model [12]. The study of the impacts of prior reviews not only revealed problems with the unquestionable quality and accuracy of the information, but also the necessity of standardizing data to create an interesting data collection. The dedication in this respect reveals the initial findings obtained by the study of an authentic structural complex, which has undergone several long-term alterations. In particular, the study of the proven – precious configuration of the Bahauddin Zakariya Complex (as shown in Fig.1) located in Multan near to a clock tower, midway having a position with the heritage of Sufism, was our focus.



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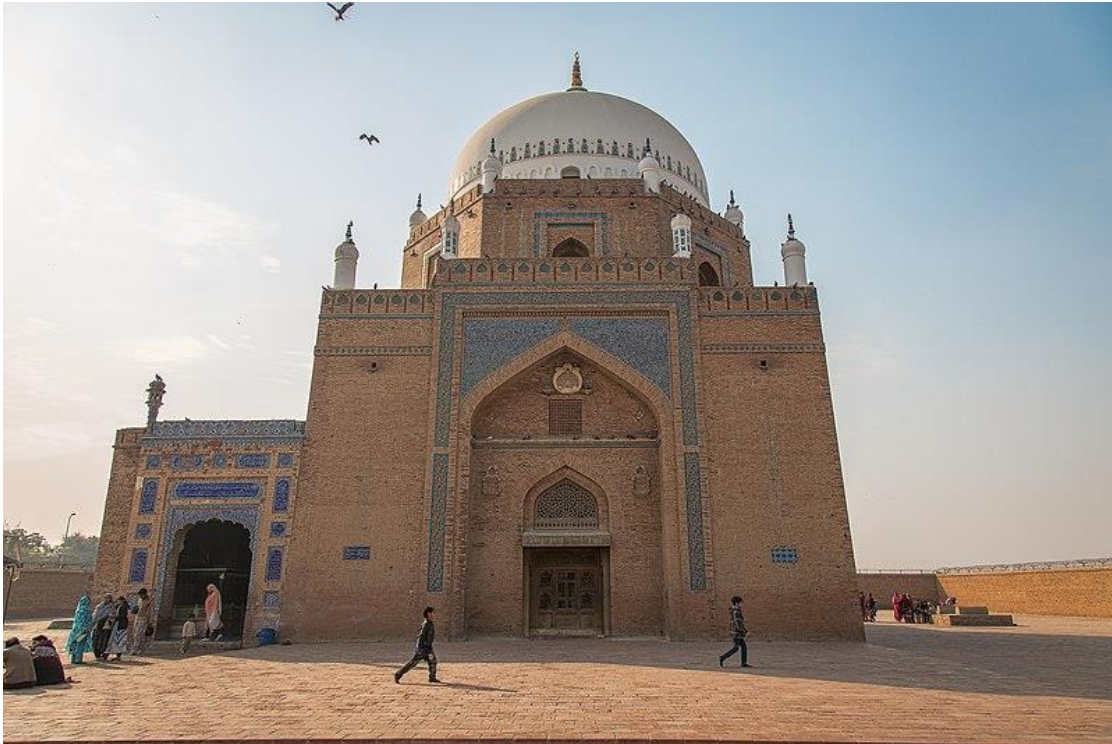


Figure 1. Case Study Area- Bahauddin Zakariya's Shrine

3 Data Analysis and Discussion

Bahauddin Zakariya's shrine is considered to be one of the most important temples in the southern part of Punjab. It was built in the early 18th century by the governor Durrani of Multan and Nawab Ali Muhammad Khan Khakwani and serves as the prototype of a particular architectural style in Multan. The sanctuary is located just to the north of the old walled city of Multan, is a large, square building, with a 51 - foot base. The walls make a great layout, which is on top of the square base. Surrounded by tapered cylindrical columns and at the very top of the tree is a white tomb. The temple is surrounded by a large courtyard of a few hundred square feet. Like most of the Muslim holy places, the grand structure creates the illusion in a vertical movement in the direction of the sky, which points to the harmony of the divine. Although the main building was built with polychrome earthenware tiles are the most well-known brands, blue tile around it. These tiles reflect a Central Asian, Persian, and Indian influence in the field of architecture. Glazed ceramic tiles are locally well-known as Kashi, and continue to be, a specialty of Multan. In the name of Kashi, suggesting a direct route to Kashgar, a city in the Province of Xinjiang in West China. In a tradition going back to the city of Kashan, in Central Iran, this also is known for its decorative tiles. However, over the centuries, Kashi Multan's work has a unique local style. The colors that are used with the tiles in the sanctuary are mainly cobalt blue, turquoise, and white and are located in the form of complex geometric patterns. These include scrolls, curves, pentagons, hexagons, and a command post. The floral patterns are inspired by local flowers, vines, and roses. Today Multan is known as the "City of Saints" because many other famous saints such as Shah Rukn-e-Alam, Sabzwari Multani, Muhammad Shah Yousaf Gardez, and Obmany Tabrez, are also buried in the same city [13, 14].



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Figure 2. Google earths image of Bahauddin Zakariya

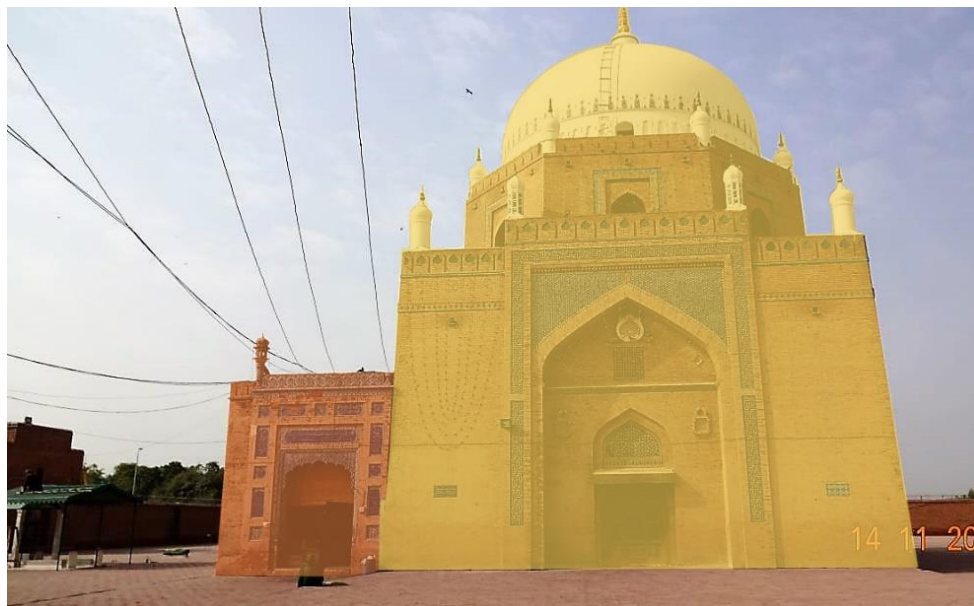


Figure 3. Scan Focus of Bahauddin Zakaria Complex Compound

The Study and observations about the complex Bahauddin Zakaria were thought carefully and thoughtfully, the project was taken over by a specialized professional as well the reliable information as shown in Fig.2. That is why it is important to understand the various tools to provide a consistent model of high quality. These operations have been divided into two distinctive phases; the first phase of the photogrammetric measurement and the second is the use of eligible equipment. For the structural study, a research review is conducted to open up an understanding about the components of the fields; and, in the course of this work, by the digital camera, the photos were taken, to make use of photographic activity, to obtain the first axis according to the set design, and the outer square as shown in Fig.3. Thus, the data developed to the point cloud can help to understand the importance of the structure inside it. Even as it is, is of no value for the next period, from the use of information modeling in the building model, the professional has revealed it



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to have a complete understanding of the features of the service, and will eliminate the need for a top-down review of archiving of all relevant parts of the building, the premises as shown in Fig.4.



Figure 4. Snapshot of the Earth Photogrammetry Developed First Point Cloud.

The important hardware to the reproduction of complex's whole amount and the specific order re-engineering was accordingly classified i.e., total station, digital camera & measuring gadgets.

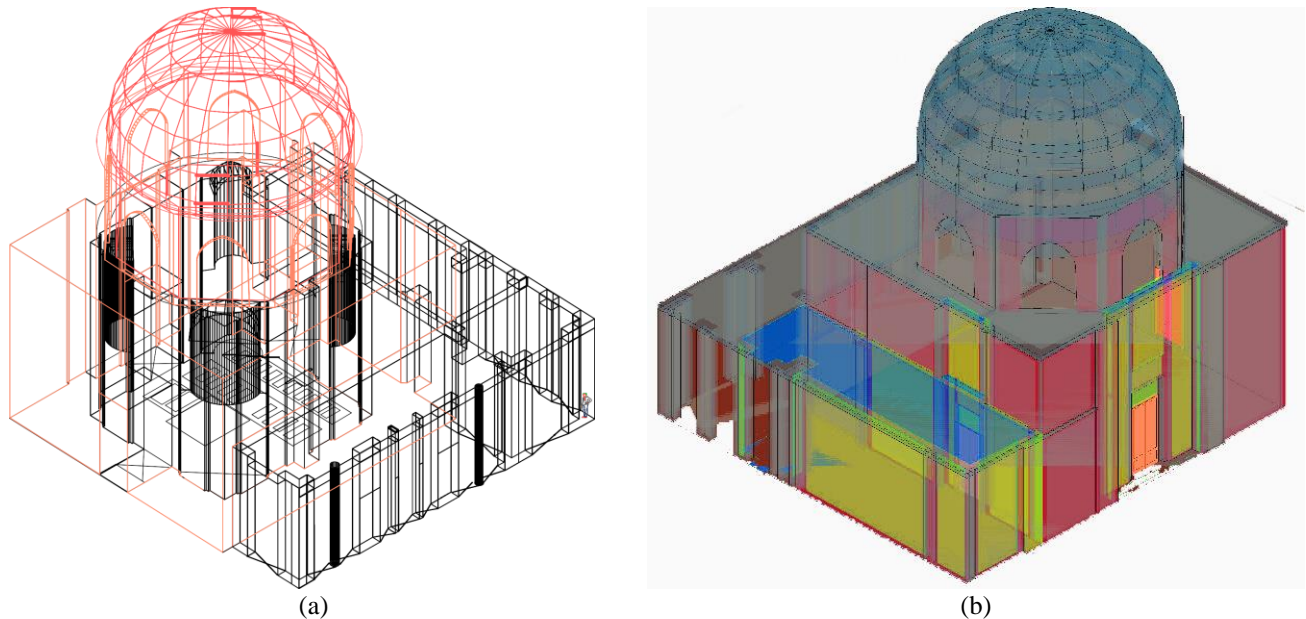


Figure 5. (a). Structural information is shown with the help of Building Information Modelling (BIM) (b). An energy model is achieved with the help of Auto Desk Revit.



3rd Conference on Sustainability in Civil Engineering (CSCE'21)
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Period of information handling and results examination, the result was considered authentic. The result was considered authentic. Preparation for the photographic shootings, setting up dot cloud, took the photogrammetric cycle, which had merely affected the group region. Later by application of BIM, structural information is shown with the help of building information modeling (BIM) and the energy model is achieved with the help of auto desk Revit.

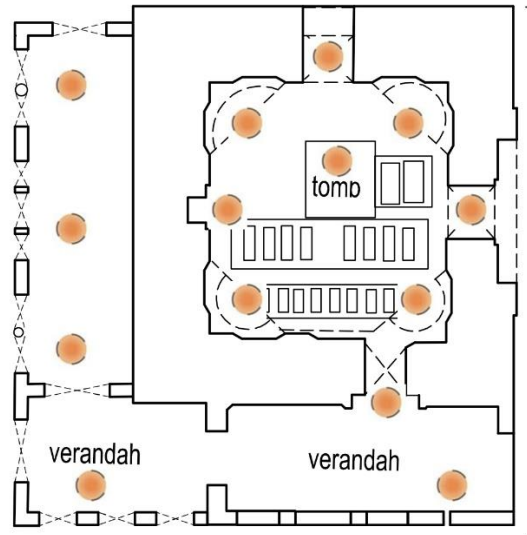


Figure 6. Study of the Building's Floor with Digital Gadgets.

The combined file including each output one had to deal with the yield files. had to deal with. In this respect, one needed to have a more "light" file that reacted to the requirements of the company at the same time. Results were regarded substantial to be accompanied by the Gadgets. Cloud was cleaned first, then the model was included in the Recap schedule. In addition, this software allowed the board to submit the file to the configuration controlled by the Building Information Modelling (BIM) stage, Revit, to carry out further manual cleaning and information.

The cloud and plants recently recuperated from the specialist office files were then taken to the building information modeling climate; the link between these two enables the integrity of the two-dimensional drawings to be confirmed as shown in Fig.6, at the next stage which exhaustively covered the 3-dimensional information. The information security measure was closed with an affirmation of the legitimacy of the information from the drawings and refurbishment of the model may be commenced here.

4 Conclusion

This study has been designed for the application of Historic Building Information Modeling (HBIM) using modern methodologies like the HBIM technique using Revit software which is used in the building modeling with the focus on the case study of Bahauddin Zakariya Shrine. This methodology helps to monitor and digitally document the shrine data and can also help in the time-to-time monitoring of structural health. Its utilization permits one to make extraordinary data sets, containing all the data, mathematical and something else, fundamental for the whole helpful existence of a structure. This information is vital if one can consider the conceivable outcomes identified with the administration and upkeep of structures. A comprehensive framework can help in the utilization of BIM technology for the digitization of records and data for complete analysis and conservation. Despite the interoperability concerns across different platform architectures, there are other difficulties, such as certain difficulties for government departments like the Archeology Department of Punjab, to alter their operational plan. These problems are combined with the difficulties mentioned with the requirement for reliable and scientifically regulated information that follows from top to bottom. Information such as mists can, for instance, be incorporated and utilized for subsequent purposes despite its rudimentary characteristics, to digitize the present structured stock and concurrently. In the first step, for example, the points mentioned can provide the



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article a thorough understanding of the issue that has been described. The social legacy of shrines gradually uses point mists that are included in an extended or computer-generated reality to provide higher structural pleasure. Therefore, it is possible to produce sketches for different reasons, using different instruments; depending on the cause, one may use arrangements that allow the administration to maintain further intricacies or rash to see and understand.

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