Revisiting the Past through Virtual Reconstruction: The Case of the Grand Monuments of Paharpur, Bangladesh

Md Mizanur Rashid (International Islamic University Malaysia)

Hafizur Rahaman (National University of Singapore)

This study aims at developing a virtual model of the lost architecture of the Buddhist Monastery of Sompur Mahavihara in Paharpur, Bangladesh. The eighth-century monastery is one of the earliest examples of monumental architecture in Bengal and in 1985 its ruins were listed as a UNESCO World Heritage Site. From the very discovery of its ruins the monument drew the attention of architectural historians of South and Southeast Asia because of its unique architectural features and strategic location in space and time. The monument's architecture, however, is scantily documented, because after a millennium of amnesia first-hand resources are unavailable. The architectural historian's main sources are therefore the fragmentary archaeological remains, literary evidence, and epigraphic records. This study attempts to develop a virtual model of Sompur Mahavihara that can accommodate different contesting narratives regarding its architecture. It looks into history in a dynamic way and uses virtual reconstruction as a flexible tool to reconstruct the lost monument.

The aim of this paper is therefore twofold. First, it develops a methodological framework for retrieving and commemorating both tangible and intangible aspects of the monastery, perusing a critical theoretical construct, and then applies this knowledge to elaborate a conjectural virtual reconstruction. Second, it presents an online interactive platform that was created to collect public comments and contributions on the past culture and history of Sompur Mahavihara, so as to reinvent and renew the previous model. We hope this participatory approach will minimize the distance between the people and the heritage object and will engender a new way of exploring, experiencing, evaluating and appreciating heritage buildings.

The Monument

After their discovery in the early twentieth century, the ruins of the Sompur Buddhist monastery (Sompur Mahavihara) became the focus of attention for architectural historians of Bengal. The megastructure is considered a landmark in Bengal's architectural history for two main reasons. First, it marks an important transition from an unintentional and vernacular mode of architecture to the most conscious, symbolic and metaphoric mode. Second, it symbolizes a particular era in which Buddhism had its last stronghold in India under the royal patronage of the Pala kings, before gradually transforming into a more ritualistic practice than the philosophical doctrine preached by Buddha, which is known as neo-Buddhism or Tantric Buddhism.[1]

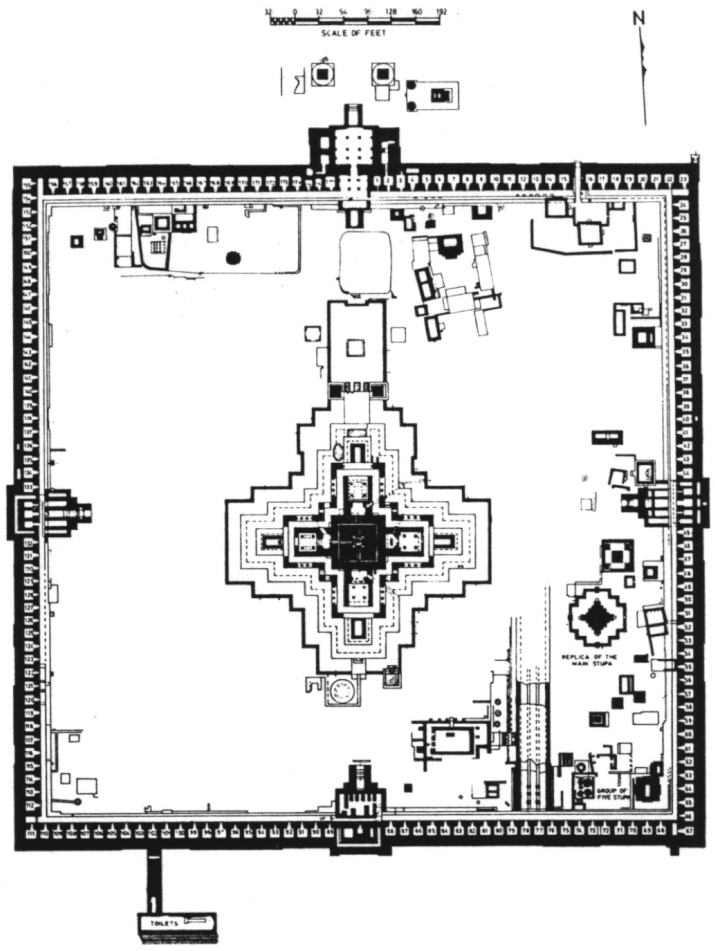


Fig. 1 Excavated floor plan of Sompur Mahavihara showing the organization of monastic cells and the central structure.

The most striking architectural feature that distinguished Sompur Mahavihara from other Buddhist monasteries in South Asia is the central cruciform structure (fig. 1 and 2). Hitherto most debates have centered on the missing superstructure, its layout and its architectural details. The

ruin of the structure rises upward in a tapering mass of three receding terraces, reaching a height of 23 meters. Each terrace has a circumambulatory passage around the monument. At the top-most terrace (of the existing ruin) there were four antechambers on the projecting arms of the cross. The overall design of this complicated architecture is centered on a hollow square shaft that runs down from the present top of the mound to the level of the second terrace.

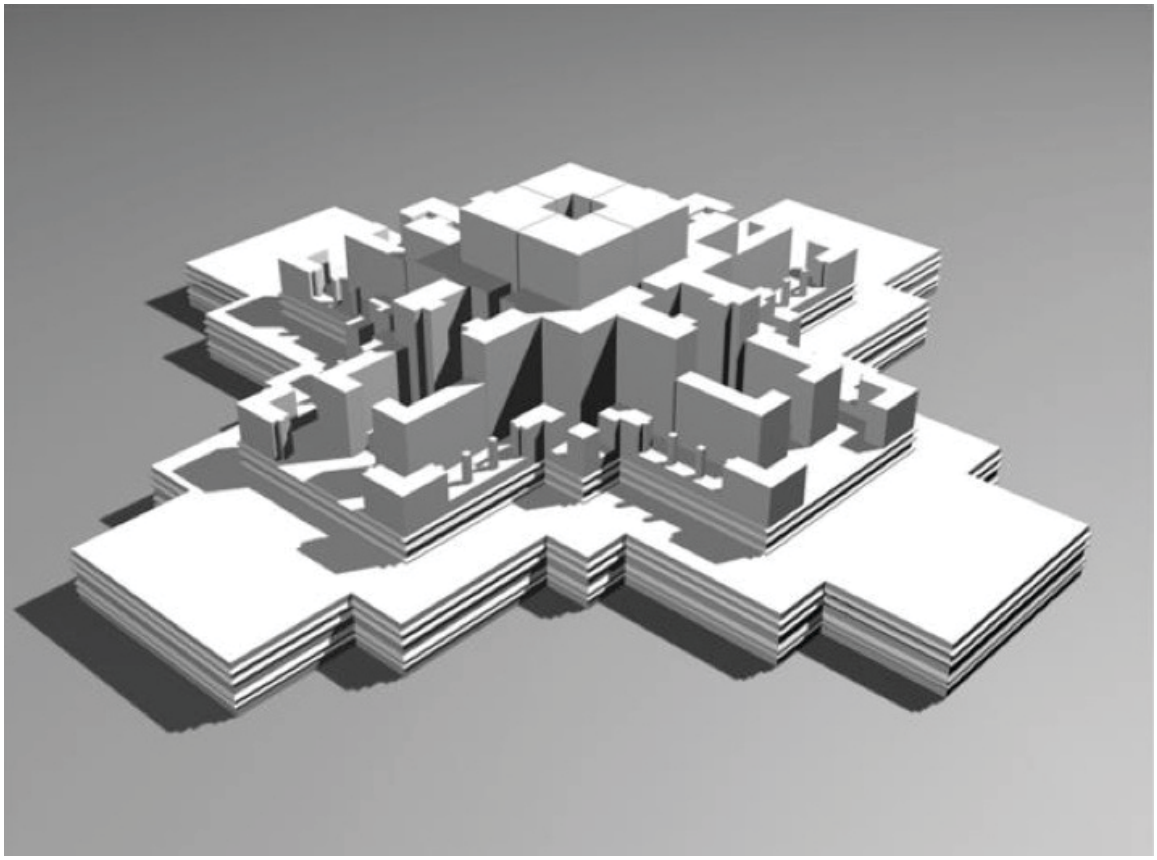


Fig. 2 Reconstructed model of the central structure.

Sompur Mahavihara is certainly the most studied historical monument in Bengal. The three-dimensional articulation of the missing superstructure of the central edifice remains at the center of the debate and several scholars have attempted a theoretical reconstruction.[2] The nature and extent of these earlier studies are no longer satisfactory, however, because the researchers did not have access to a comprehensive architectural documentation of the monument. The tacit historical record and the fragmentary archaeological remains (which are mostly at foundation level) have further confounded the situation. As a consequence, most of the work done so far is limited to archaeological excavations and to studying the artifacts from an archaeological perspective. Hence the history of Buddhist architecture in Bengal remains largely to be written.

Historical Amnesia

After the fall of the Pala kings in Bengal in the twelfth century, Buddhism in South Asia declined. The withdrawal of the royal patronage from the monasteries endangered the religion. The 'Sangha' (community of monks) and monastic life were the foundation of Buddhist religious practice,[3] which started to wane after the decline of the monasteries. In the thirteenth century the Afghan invaders gave the final blow by destroying Hindu and Buddhist religious edifices, either out of missionary zeal or to acquire building materials for the construction of mosques.[4] This obliteration of the monasteries ultimately uprooted the Buddhist 'Sangha', forcing the monks to flee. Consequently, Buddha and Buddhism were totally forgotten in the land of their birth.

The rediscovery of the history of Buddhism began with British colonial officers who were informed about Buddha and his birthplace by officials from Myanmar and Sri Lanka, where Buddhism was alive at that time.[5] Sir Alexander Cunningham (1814-1893) in particular did archaeological excavations in places like Sarnath and Bodhagaya, which were mentioned in Sri Lanka texts. Eventually these attempts took a much more concrete shape when two Chinese travelogues, Fa Xian's Records of the Buddhist Countries and Xuanzang's Records of the Western Regions, were translated into English. The latter gave a vivid description of Buddhist religious edifices, including details such as their location, size and shape. Cunningham used these two Chinese travelogues as a guide to rediscover the Buddhist past of India. They helped to map out the Buddhist religious sites and to rediscover the history of their monuments, but in the absence of any other records Buddhist India was seen through their eyes only and as such rediscovered only partially. Later, other Chinese travellers, such as I-Tsing and Sheng Chi, who also recorded other examples of Buddhist architecture, were studied as well, but places that were not travelled and recorded by anybody still remained forgotten. More recent archaeological discoveries have revealed their physical existence but cannot retrieve their memories. Sompur Mahavihara is one of them. Although a significant monument in terms of size, shape, location and, most importantly, its mention in historical records, the narrative of its architecture remains discontinuous.

As already mentioned, the major problem today is how to reconstruct the past when sources are scarce, inconspicuous, and fragmentary. Lest Sompur Mahavihara remain a forgotten chapter in the history of architecture, we need to face this challenge. To confront this situation and to continue research on this monument, a pragmatic approach is needed.

From Constraint to Opportunity

Earlier attempts at reconstructing the architecture of the monastery have failed to offer a cogent solution. Though this seems due to the fact that sources are scarce and fragmented, we feel that the main problem is the absence of a scientific framework to collate all available sources. Though certainly difficult it is not impossible to build a continuous narrative of the monument's architecture depending solely on first-hand material. The paucity of tangible sources can also be turned into an opportunity, for the followings reasons.

First, the lack of material sources implies that there are no preconceived notions about the building process of the monument, which can therefore be studied from a very neutral point of view. It may not result in a very accurate understanding of the architecture itself, but at the same time lessens the risk of a wrong interpretation of the archaeological ruins. Especially for Sompur Mahavihara, where most of the architecture is missing, the problem can be looked at in a broader perspective and in a more flexible way, and the focus can shift from the product to the process.

Second, this situation makes it possible to accommodate earlier studies and rival hypotheses. The discrete approaches of these earlier works do not necessarily indicate a disjunction. Rather, they demonstrate a range of possibilities. Putting these together in one platform offering critical analysis may elucidate the problem. The aim is not to discredit these earlier assumptions, but to develop an integrated approach that embraces all possibilities. Eventually this can establish a theoretical framework for further study, by accepting, criticizing or refuting some of these earlier assumptions.

Third, the building is part of the region's material culture. This material culture is determined by different aspects, such as the tradition and world view of the people, the custom of reverence, symbol and rituals of expressing status, gender relationship, sepulchral tradition, and so on. These aspects can be seen as layers that overlap and mutually influence each other. Because of the amorphous nature of the religion, Buddhist religious architecture is very susceptible to changes of these cultural conditions. Hence discerning the layers that acted upon the monument will help to understand its architecture. This means looking into its history in a more dynamic way and using all the available tools. Information from different sources must be used to evaluate the problem of architecture in a much broader perspective.

Fourth, virtual modelling is a useful tool for multiple verification and criticism. The goal is not to produce a photorealistic reconstruction of Sompur Mahavihara, but to develop a method of evaluation and synthesis to conceptualize the form of the structure. Abstract drawings are more effective and better understood than highly realistic ones, as Osberg has shown.[6] Virtual reconstruction is to be applied at two levels. The first level is an exact visualization of the existing remains of the structure, to be used as the basis for further study. The second level involves a comprehensive process of evaluation and verification in order to generate a process of theoretical reconstruction using all the available information. Since the available material makes it difficult to come up with a single model for the central structure, our study may end up with several theoretical models based on different hypotheses. This process of theoretical reconstruction and interpretation of the available information is a continuous one. Elements not comprehended today can perhaps be understood in the future, provided that the underlying information is preserved.[7] Even corrections, criticisms and debates can be accommodated in successive reconstructions. This is perhaps the most flexible way to use all the available resources, including those that are apparently inconspicuous in nature.

Phase 1: The Beginning

Out of caution, no definite course of research was proposed at the beginning. The reason was the limited amount of sources as well as the blurred nature of the field. The initial framework was flexible and tentative. The strategy was to proceed in stages, starting from a broader framework and then gradually descending to the next levels one after the other. The inference deduced in one level determined what type of information should be looked for at the next level. Hence the overall framework got more concrete as the research progressed. A schematic diagram (fig. 3) compares the tentative framework and the actual course of the study. It gives a clear idea of the different levels of the actual study, their objective, findings and interrelationships. In a nutshell, this gradual research progression can be called a Historical Scan. Since the available information on the monument is scarce and fragmented, and since what exists today is also confabulated to some extent, it was necessary to scan all the sources for bits of information and then collate these together in a scientific way. The early stage of the scanning process focused on historical studies to define the purpose and use of the structure. The later stage scanned through all the historical resources to resolve the technicalities of the monument's theoretical reconstruction.

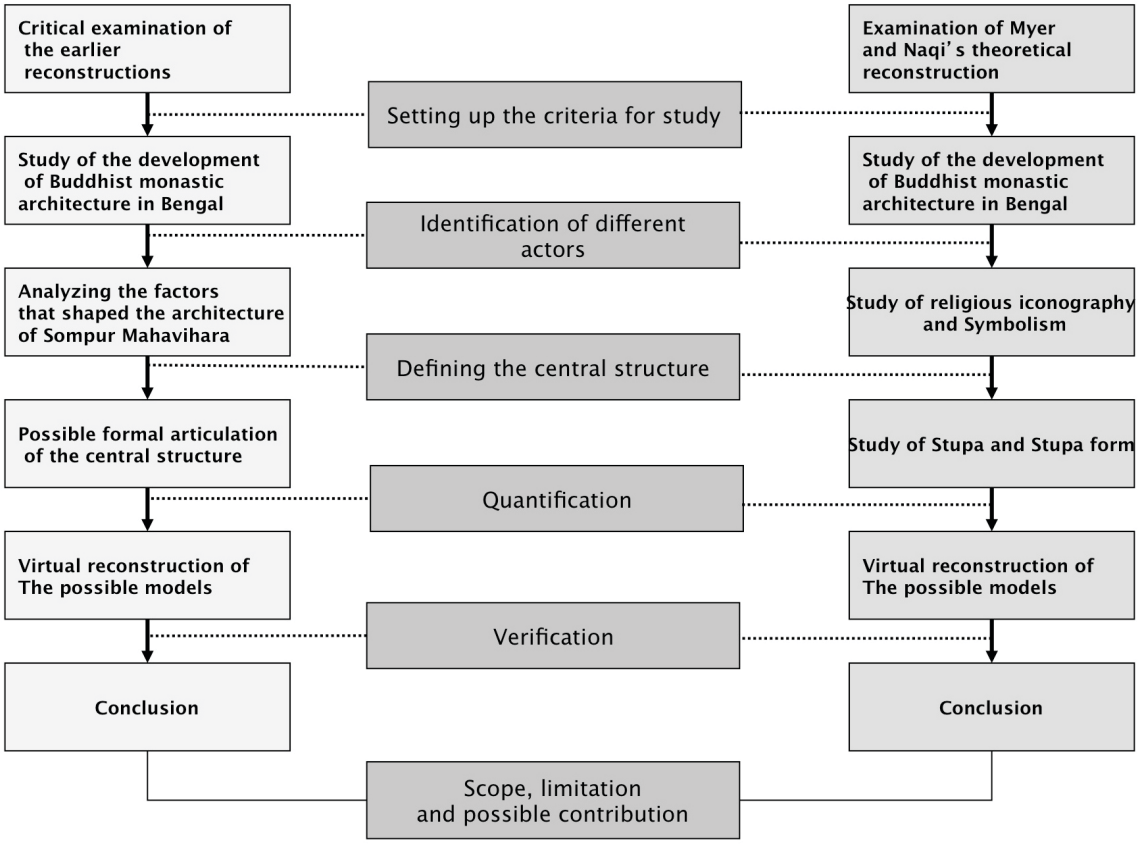


Fig. 3 A comparison between the initial research outline and the actual course of study.

Historical Scan 1 – Defining the Structure

The historical study focused on the process of resilience and assimilation through which the design of the monastery was conceived and materialized in this particular context of Bengal. First it unravelled the historical layers that combined to shape this particular form of architecture. Hybridized forms and shared architectural narratives were unique to the material culture of Bengal during the Pala period (8th-12th century). The study identified the historical processes of hybridization of the major layers and their diverse morphological outcomes. It further revealed that the architecture of this great monastery or Mahavihara was shaped by two factors: the overt effort to create a particular place with religious and symbolic meaning, and the existence at the core of a vernacular with a particular world view, culture, and attitude towards space. Accordingly, religious consciousness shaped the 'visible' superstructure, while underlying vernacular ideas defined the 'true' nature of the space. The earlier monastic architecture (Vihara) of Bengal, which adopted the morphology of traditional courtyard houses, was thus transformed into a more symbolic and metaphoric building. On the one hand, the highly esoteric and ritualistic nature of Tantric Buddhism embraced the principles of Mandala to plan and organize spaces and to determine the hierarchical relationships between them. On the other, the political zeal of the Pala rulers motivated the gigantic scale of the building as part of a grand scheme to demonstrate their power and hegemony.

After analysis and synthesis of these layers we deduced that the central structure of the monastic complex must be a manifestation of the Stupa, the most venerated of Buddhist religious edifices.[8] Before confronting the archaeological remains with the architectural characteristics of a Stupa, however, we had to perform a rigorous study of different types of Stupa, their transformation through time, and their possible manifestations in function of social and cultural factors. Finally we presumed that the central Stupa is not just a Stupa but a new type of Buddhist religious structure which evolved during this period and which is known as a 'Stupa-Shrine', a combination of a shrine with the superstructure of a Stupa.[9]

It is clear now that this unique type of 'Stupa-Shrine' was conceived to satisfy the religious, social and political aspiration of the time. Yet it is difficult to imagine that in a vernacular building industry, whose construction practice was based on using models or variations of models, some artisan came up with a unique cruciform design solely out of his own creativity. It is more likely that the final version of the design resulted from the reuse and modification of certain models to meet with the new religious and political demands.

How the designers arrived at this complicated design is a big question. A rigorous study of the available resources suggests two possible schemes. The first one (described in fig. 4 as Scheme A) is based on a typical late Mahayana Stupa with elongated drum, bulbous dome, and elaborated finials, with four Buddha statues seated on the four cardinal directions. The second one (Scheme B) is based on the archaeological discovery of a certain structure in which a conscious attempt to combine a Stupa and a shrine chamber is discernible.

It can therefore be concluded that the central structure was originally a 'Stupa-Shrine' and that the archaeological ruin on site was actually crowned with the Stupa superstructure.

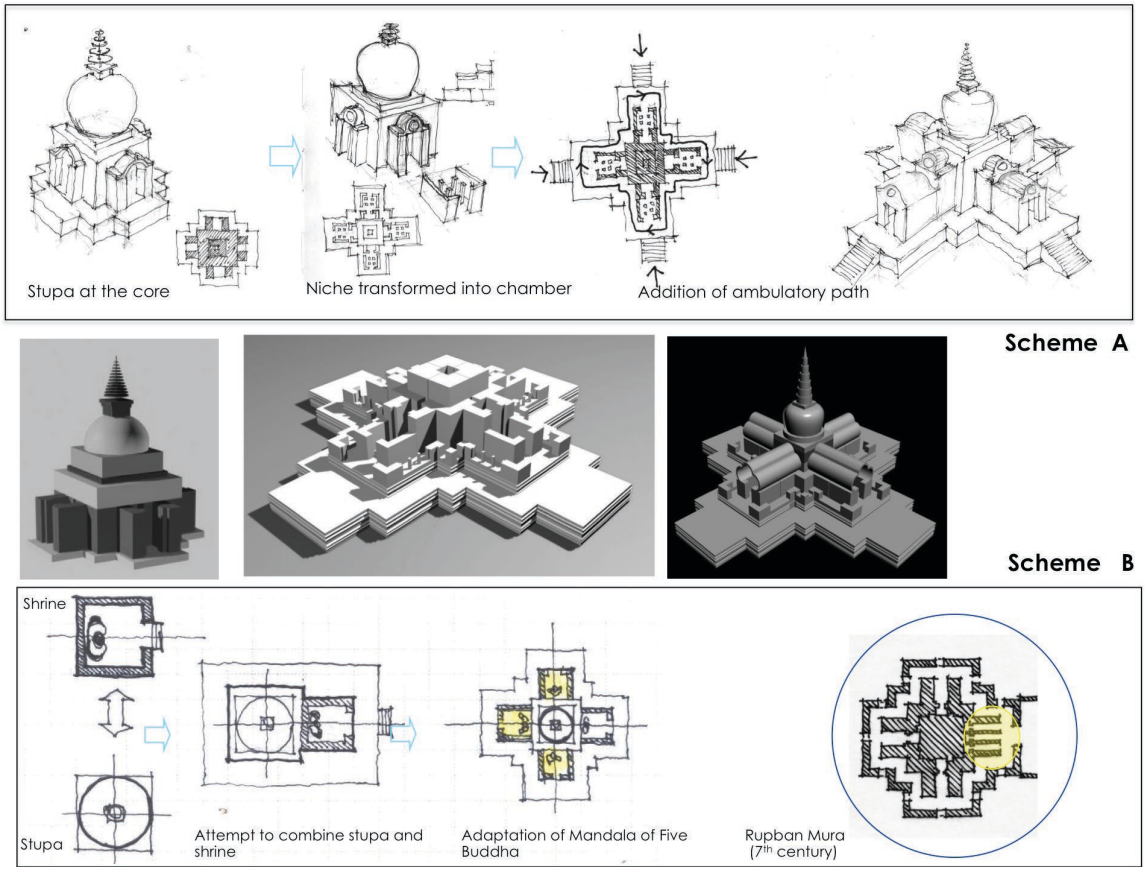


Fig. 4 Probable schemes for the design of the central structure. The three images in the middle are reconstructed views of the ruins (which are currently covered with soil) and its possible manifestation as stupa shrine (refers to the final product of both the schemes A and B).

Historical Scan 2 – Quantification and Virtual Reconstruction

As the primary objective was to reconstruct the structure virtually, some quantifiable data were needed. From the ruins of the central structure the two-dimensional layout and dimensions could be discerned. Its precise geometry suggests the presence of a relationship between the two-dimensional layout and the three-dimensional construction. Identifying this relationship may help to reconstruct the structure. This was attempted in two ways. A metrological study of Stupas with formal affinities to our case study was carried out to understand the proportional system, and historical records were scanned for information on the metrology and proportions of the Stupa. Here the ninth-century manual of *Kriya Sangraha* of Kuladutta[10] was very helpful, as it vividly describes the dimensions, forms and proportions of the four types of Stupa to be built for worship (fig. 5).

Combining the findings from both these sources helped to come up with a possible three-dimensional reconstruction of the monument.

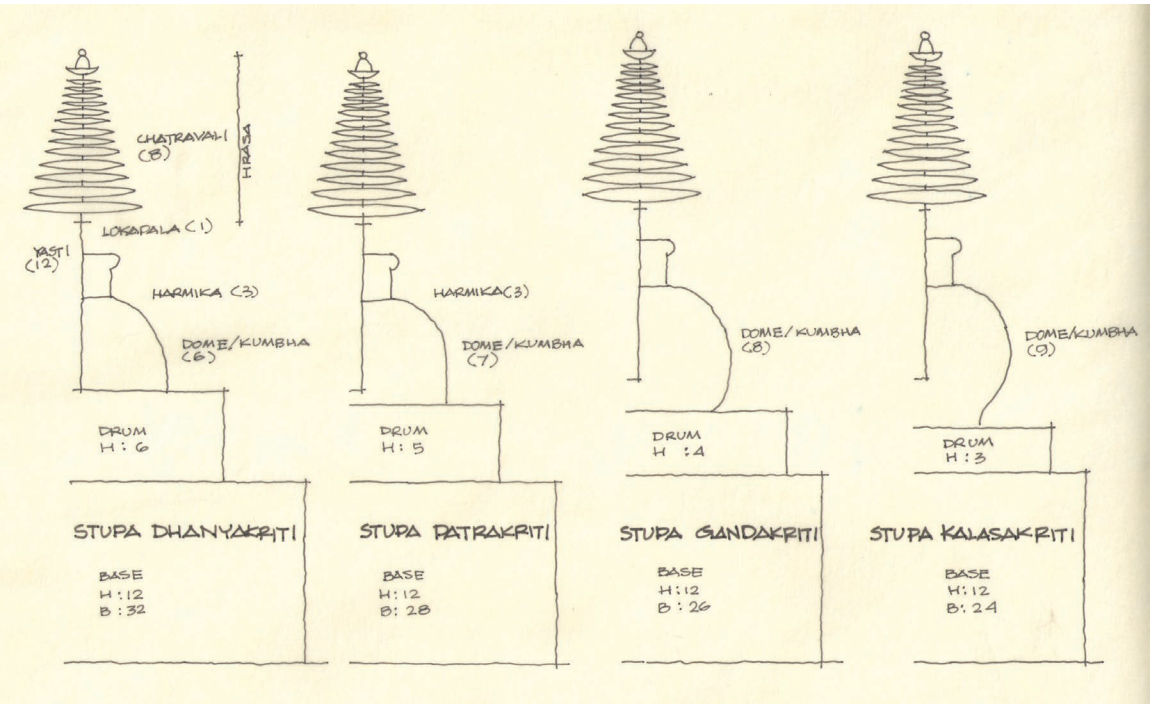
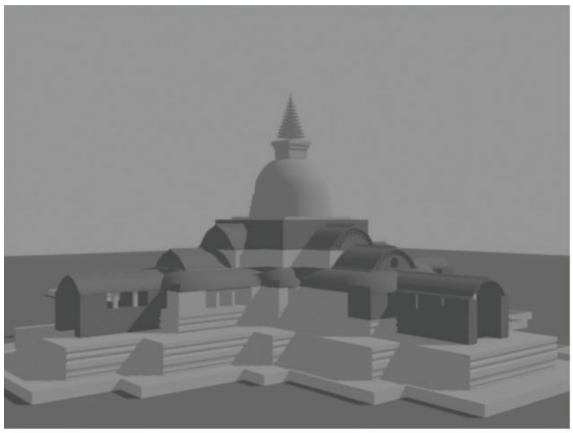


Fig. 5 Different types of stupas and their proportioning system after *Kriya Sangraha*.

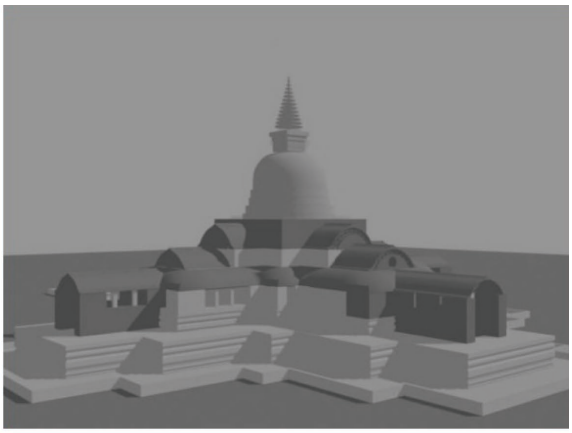
Nevertheless, this study does not necessarily reveal the exact proportioning system that was applied in the monument of Paharpur, since each Buddhist structure was treated as an individual case and highly influenced by geographical and cultural factors. Despite that limitation this study provided a frame of reference to develop a concrete shape of the Stupa superstructure. Four types of Stupa superstructures were reconstructed and then verified with the actual archaeological remains on site (fig. 6). The reconstructed Stupa form that conforms best to the archaeological ruin of Sompur Mahavihara is possibly very close to the one that was actually built (fig. 7).

Virtual reconstruction was adopted as the most flexible means to exploit all the available sources and to keep the research open for further verification. The first part of the study did not propose one particular 3D model for Sompur Mahavihara but examined various possibilities. These different models were compared with the archaeological ruins to identify the closest possible match. This process is ongoing, however, and has enough room to accommodate future criticisms and corrections.

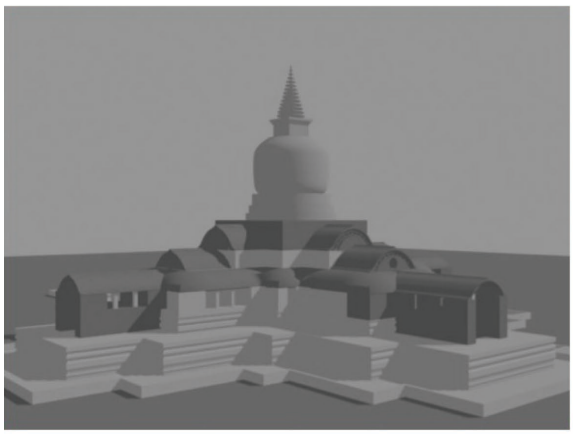
Because of the fragmentary nature of the available evidence there were some uncertainties in the study, but these gaps were filled by architectonic reasoning. This may not yield a definite solution, but it did shape the discourse, which before was amorphous. Now at least it is clear what kind of information is still missing and how it might change the form of the building.



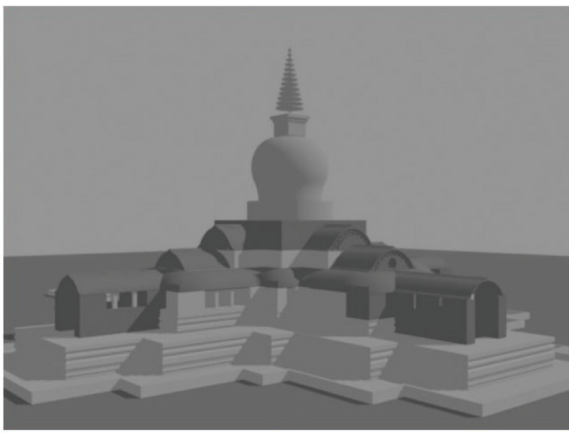
Stupa Dhanyakriti



Stupa Patrakriti



Stupa Gandakriti



Stupa Kalasakriti

Fig. 6 Reconstruction models of the central structure of Sompur Mahaviahara after *Kriya Sangraha*.

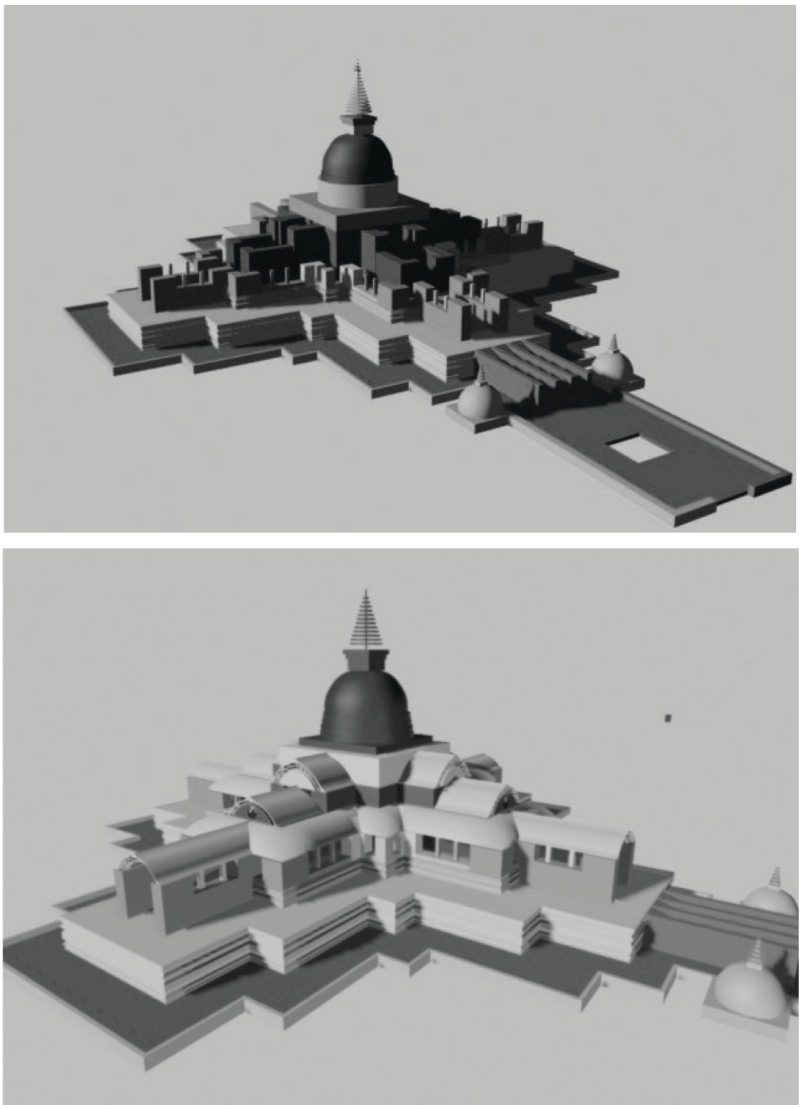


Fig. 7 Final Reconstruction model of the monument according to Stupa Dhayakriti with the closest match to the existing ruins.

All the available information was arranged in a systematic way for the next step of the study, the development of an interactive an open framework which invites feedback so as to refine the virtual reconstruction (fig. 8). The most important aspect of this framework is that it relies not just on architectural or archaeological sources, but adopts a cross-disciplinary approach. Any discovery in any discipline can be entered in this framework to see how it affects the three-dimensional form of the structure. It also shows future researchers what type of information they should look for and how this can help to understand the architecture of Sompur Mahavihara. The framework also demonstrates the scope for future refinement of the virtual model. Importantly, it is flexible and can be modified in the future if necessary.

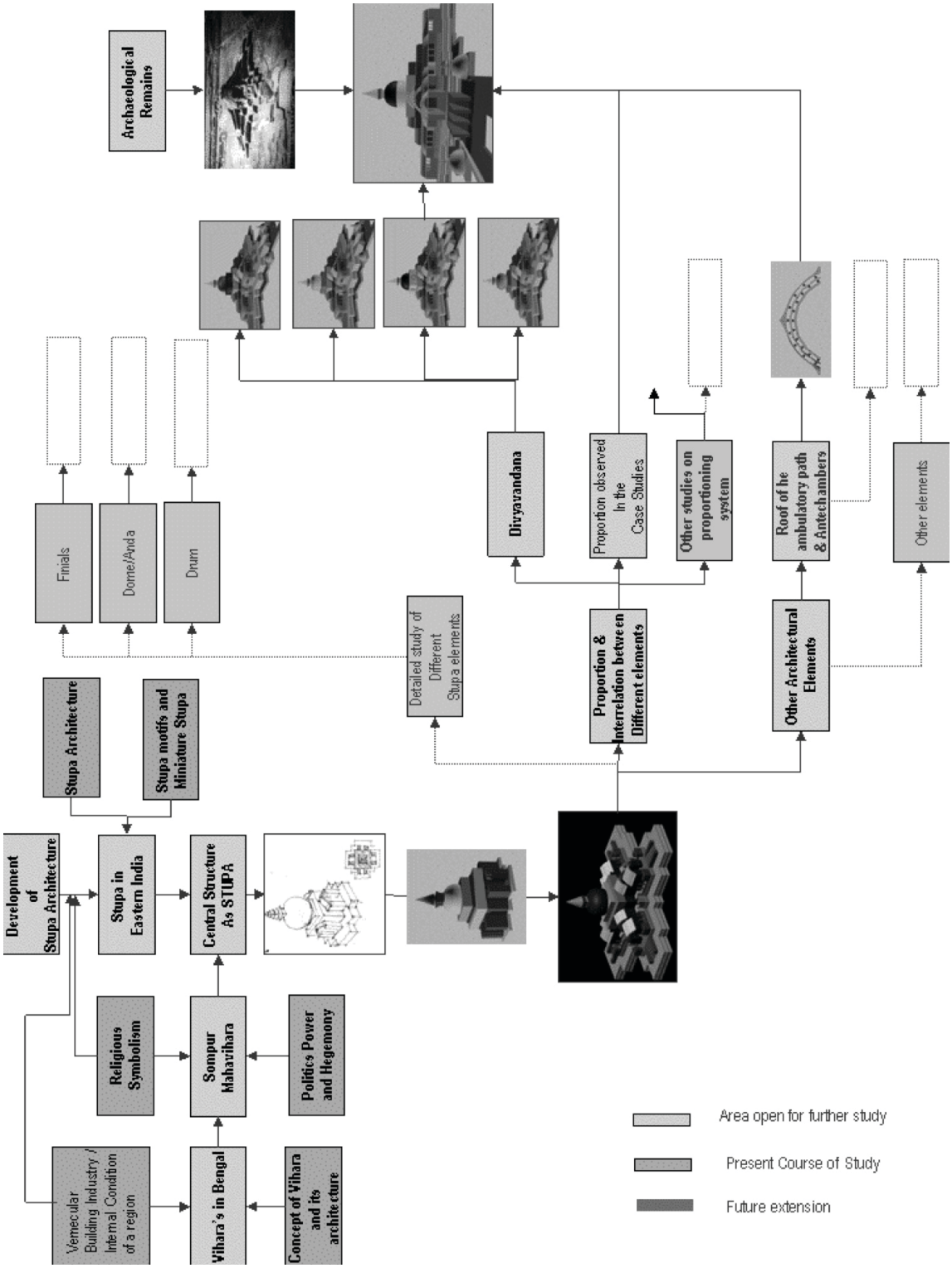


Fig. 8 Scheme showing the theoretical framework of the study with scope for future research.

Phase 2: Revisiting the Past

The question now is how the reconstruction model developed in the first phase can be used to attract feedback and interest from the wider public. This question is especially pertinent in this case as the heritage of Sompur Mahavihara is largely disregarded by the public. This is not just because the building is in ruins, but also because its context has radically changed, from a predominantly Buddhist to an Islamic environment; Muslim society simply considered it a 'pahar' or hill (which is where the name Paharpur comes from).

From this juncture emerges the concept of 'virtual heritage'. Roussou describes virtual heritage as an intersection of virtual reality and cultural heritage and states that its function is to facilitate the synthesis, conservation, reproduction, representation, digital processing and display of cultural evidences.[11] Examples of 'virtual archaeology'[12] already exist, in which archaeological sites are reconstructed for three-dimensional experiences, but it is doubtful that these successfully contribute to heritage conservation. Their end products (reconstructions of lost buildings or sites) largely remain, it seems, within academia, and only a few are published on websites or other media, or accessible to the public in museums. Virtual heritage, however, is defined more broadly: it involves not just different disciplines (architecture, computation, history, heritage, museum studies, cultural studies, etc.) but a wider spectrum of people, and will certainly benefit from a participatory approach.

The value of participation, task accomplishment and practical action for an effective embodiment with the environment is also emphasized by Dourish.[13] A successful interactive experience can only be achieved when a person is interested in the content, empathizes with it, and can imagine the alternative reality – and this can only be achieved through proper interaction.[14]

Architectural heritage can be more than the physical form. A building is a place for performing certain activities. Especially spaces inside a religious building (such as Sompur Mahavihara) are precisely guided by rituals and performances. To understand the architecture of this monument, a mere virtual reconstruction of the three-dimensional from would not suffice; it also has to embody the essence of the place. Usually in virtual environments a 'place' is a locator of objects.[15] But Kalay points out that 'places' are created through inhabitation.[16] People imbue space with social and cultural meaning, transforming mere space into a 'place'. Therefore we need to know how the design of the building is conceived through the organization of different spaces within it. As our monument belongs to the high Tantric phase of Buddhism in Bengal, its architecture was certainly determined by Tantric rituals and rites. The movements of monks within the complex, their daily life and periodic ritual performances had significant importance in the spatial organization of Sompur Mahavihara. Hence to recover the memory of this building we must examine how spaces were generated, interpreted and interconnected with respect to the daily activities and ritual performances of the monks. We have to analyse different activities and the ritual performances within the monastery and try to reconstruct the virtual model focusing on the aspects of spatiality.

A website (www.bdheritage.info) was developed in mid 2010 to present our model to the wider public and to allow for interaction and feedback (fig. 9). The model is published on the website together with earlier reconstructions by other scholars. The website also works as a virtual database where all the relevant information, research publications, images and videos are uploaded and available to the user, who can use the database for their own purposes and at the same time upload their ideas through a blog in the relevant section. Unlike most virtual heritage models, this model will incorporate also the 'intangible part of the heritage' (cultural information such as associated folk tales, local beliefs, religious beliefs, oral history, etc.). The website is continuously monitored to collate feedback and to accommodate, alter, or reject ideas for further modification of the model. Interestingly, a reasonable number of valuable feedbacks from users have been collected, and may lead to further modification of the model.

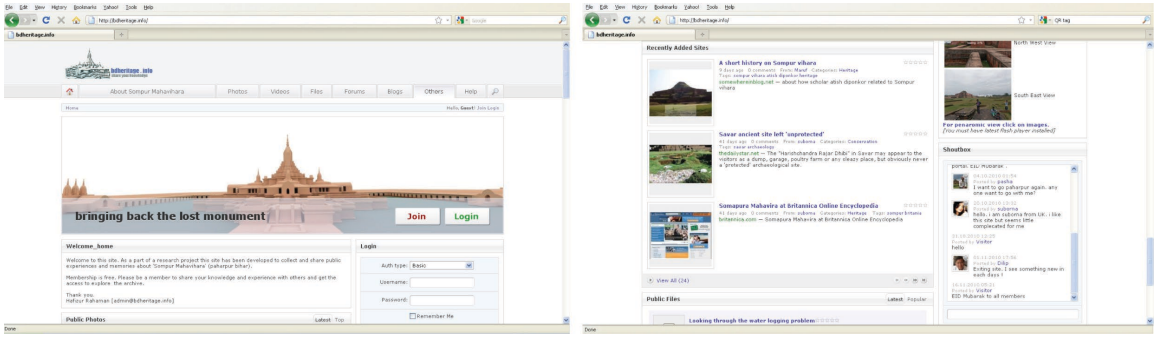


Fig. 9 Screenshots of the website www.bdheritage.info.

Another aspect currently in development is the monument's evolution through time. The history of Sompur Mahavihara is very dynamic and stretches over a period of 400 years, from the eighth to the eleventh century. The aim is to extend the virtual model to represent different phases and changes over time, what we may call 4D documentation. The website would be an excellent tool to convey such changes to the user.

The Flexible Approach – Combining the Earlier Studies

An important aspect of this study is that it continues the earlier works on Sompur Mahavihara. While criticizing earlier theoretical reconstructions it never refutes them totally, but used their contributions to develop more refined methods. Figure 10 compares the present study with the earlier reconstructions of Myer (1969) and Naqi (1999) in terms of method. Myer was more concerned with the central structure than the complex as a whole, and assumed this central structure to be a Stupa. Her approach seems to be influenced by the colonial construct of a linear progression of Buddhist architecture from South to Southeast Asia, which is probably why she identified the central structure as a Stupa that was either related with the Southeast Asian or the Nalanda type. Naqi started with studying the Vihara archetype but then focused on the central structure

without motivating the connection between the Vihara and this cruciform structure. He assumed it to be a Shikhara type of Stupa, mainly basing this conjecture on the Ananda temple at Pagan and coeval Hindu temples. Naqi's assumptions were equally affected by the colonial construct of a linear development of Buddhist religious architecture through time and space.

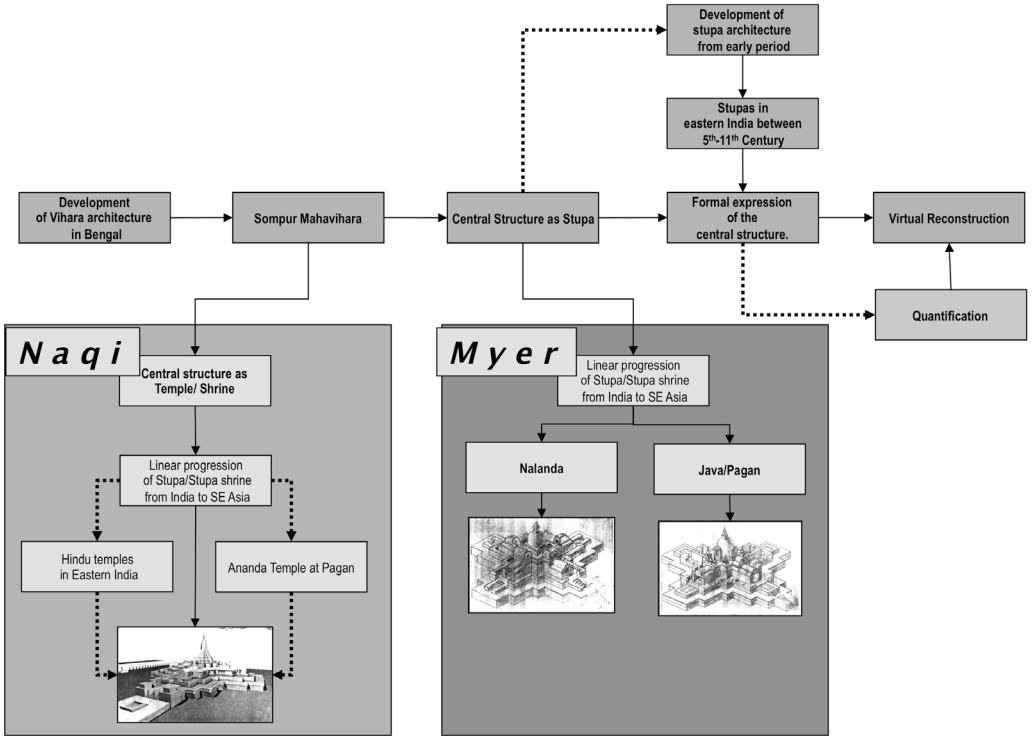


Fig. 10 Comparison of the present study with the work of Naqi and Myer.

The current study worked in two levels. The first level started from broader aspects of Vihara architecture by emphasizing regional varieties and the influence of local conditions. It tried to define the central structure with respect to the Vihara complex and to understand the preconditions that made it an integral part of monastic architecture. The second level focused on the Stupa and its architecture and was based on deductions made in the first level. At the end, the two levels were combined to create a conclusion about the form of the central structure.

These earlier reconstructions and hypotheses are all presented in the website, so that users can go through them and make their own judgement and perhaps come up with their own hypothesis by combining different findings from the different studies.

Once completed this study may demonstrate a methodology that can be adopted for other heritage sites in ruinous condition. Its main idea is to develop a process that minimizes the distance between the public and the heritage building through interaction, while at the same time conserving its memories and searching for its architectural form.

Bibliography

Barceló, J. A., 'Visualizing What Might Be. An Introduction to Virtual Reality in Archaeology', in *Virtual Reality in Archaeology*, 843 (2000), pp. 9-36.

Benisti, M., *Stylistics of Buddhist Art In India* (New Delhi, 2003).

Champion, E. and Dave, B., 'Where is This Place', in *Thresholds Between Physical and Virtual (Proceedings of ACADIA 2002)*, 2002, pp. 87-97.

Chatterjee, R., *Religion in Bengal: During the Pala and the Sena Time* (Calcutta, 1985).

Dikhshit, K.N., *Paharpur, Memoirs of Archaeological Survey of India*, Vol. 55 (Delhi, 1938).

Dutt, S., *Buddhist Monks and Monasteries in India* (London, 1962).

Forte, M. and Silliotti, A., *Virtual Archaeology* (New York, 1997).

Kalay, Y. and Marx, J., 'Architecture and the Internet: Designing Places in Cyberspace', in *Reinventing the Discourse (Proceedings of ACADIA 2001)*, 2001, pp. 230-240.

Majumder, R.C., ed., *The History of Bengal* (Dhaka, 1946).

Myer, P.R., 'Stupa and Stupa Shrines', in *Artibus Asiae*, 24 (1969), pp. 25-34.

Naqi, M.A. et al., 'The Virtual Reconstruction of Paharpur Vihara', in *Khulna University Studies*, 1 (1999) 2, pp. 188-203.

Osberg, K.M., *Constructivism in practice: the case for meaning-making in the virtual world* (University of Washington, 1997).

Rashid, M.M., 'Interpreting the Morphology of the Central Cruciform Structure of Sompur Mahavihara, Paharpur. A Cognitive Approach', in *BRAC University Journal*, 1 (2006) 3, pp. 1-8.

Rashid, M.M., 'The Conception of the Architectural Layout of Sompur Mahavihara: An Analysis of Cultural and Religious Symbolism', in *The International Journal of Bengal Art*, 9 (2006), pp. 97-110.

Rashid, M.M., 'From Stupa to Stupa Shrine. The Changing Morphology of Buddhist Religious Edifice Par Excellence', in *Protibesh/Environment: The Journal of the Department of Architecture, BUET*, 2 (2007), pp. 1-12.

Rashid, M.M., 'Defining the Central Structure of Sompur Mahavihara', in *The International Journal of Bengal Art*, 11 (2008), pp. 212-25.

Roussou, M., 'Virtual Heritage: From the Research Lab to the Broad Public', in *Virtual Archaeology*, (2002), pp. 24-25.

Roussou, M., 'The components of engagement in virtual heritage environments', in *Beyond Verisimilitude. Proceedings of New Heritage: Conference on Cultural Heritage and New Media* (Hong Kong, 2006), pp. 265-283.

Schell, J. and Shochet, J., *Designing Interesting Theme Park Rides* (2001).

Skoruupski, T. (tr.), *Kriyasamgraha. Compendium of Buddhist Rituals* (Tring, 2002).

Staley, D. J., *Computers, Visualization, and History: How New Technology will Transform our Understanding of the Past* (New York, 2002).

Illustrations

Fig. 1 Department of Archaeology, Govt. Of Bangladesh.

Fig. 2-10 Authors.

1 Chatterjee 1985.

2 There are different arguments and propositions regarding the missing part of the central cruciform structure, but in published works we came across four propositions in terms of visual representation of the superstructure. Prudence R. Myer published the first of such studies in 1969 as a journal paper, in which she proposed the missing superstructure as a stupa and illustrated its possible three-dimensional articulations. The second work was published around thirty years after Myer's proposition. In 1999 a team of architects from Khulna University led by Mohammed Ali Naqi proposed another theoretical reconstruction of the central structure and of some parts of the peripheral block (mainly the entrance hall). This work was also presented in the 'International Seminar on Elaboration of an Archaeological Research Strategy for Paharpur World Heritage Site and Its Environment' jointly organized by UNESCO and the Department of Archaeology of Bangladesh in 2004. In the same forum Mr. Shihabuddin Md Akbar, an archaeologist from the Department of Archaeology of Bangladesh, presented two possible formal expressions of the central mound. The first of these was a sketch by an anonymous Japanese architect, which he then used to develop his own version of the reconstruction.

3 Dutt 1962.

4 Majumder 1946.

5 Majumder 1946.

6 Osberg 1997.

7 Forte and Silliotti 1997.

8 A 'stupa' was originally a hemispherical mound containing the relics of Buddha and of commemorative value, but with the spread of Buddhism the form and associated meaning have changed.

9 Rashid 2008.

10 Scorrupski 2002.

11 Roussou 2002.

12 Barceló 2000.

13 Dourish 2001.

14 Schell and Shochet 2001.

15 Champion and Dave 2002.

16 Kalay and Marx 2001.