ROLE OF COMPUTER VISUALIZATION AS A SUPPORT FOR ARCHITECT-CLIENT DESIGN COLLABORATION

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Abstract. This paper discusses the role of computer based visual simulations in the context of bridging the communication gap between client and design team, based on years of practising architecture in the Sumatra region, Indonesia. Its principal objective is to identify steps in design process to assess the design collaboration between bodies with different culture backgrounds, so that greater understanding and agreement can occur. It also attempts to facilitate and foster effective communication which will lead to improved design collaboration practise, in a region famous for its rich vernacular architecture. Two finished projects located at different sites in North Sumatra in which the author was involved, will be included as sample cases. *Culture may be described simply as that which makes life worth living*. T.S. Eliot

1. Introduction

In most of the projects, architects and clients principally have different expectations about successful design collaboration. Architects on one side is talking about sophisticate concept in design, about the philosophy of the design, about problem solving, while most clients on the other hand, are totally blind of the language being offered. Clients want a project that at the end (not only in the beginning) can successfully fulfil their expectation from this collaboration, such as space requirements, and a building that can represent them when it is built.

Then came the age of computer that revolutionised everything we do including the design collaboration. The development of visualization tool is expected to bridge the communication gap which will lead to successful

design collaboration. Computer visualization is taken for granted by a lot of parties to produce pretty pictures, they forgot that it is still human creativity and decisions behind the successful design collaboration.

2. Computer Visualization

To many architects the computer presents a challenge. There is not the slightest doubt that brain and computer together are capable of revolutionising our entire approach to design and presentation. For instance by assisting architects to analyse designed space and lighting in three dimensional environment, decreasing coordination time in documentation, produce visualization that in the end will also support architect-client design collaboration.

Designers use many methods to communicate ideas to themselves and others. Sketching modelling and detailing are common practise throughout the design process. However, the one overriding skill needed to accomplish all these tasks is visualization. (Dong, 1998)

Referring to Dong (1998), visualization is the ability to create mental pictures which lead to the manifestation of a design solution. Not only does visualization assist the designer with communication, it also creates a method by which the designer is better to understand, analyse, and implement design decisions.

Figure 1. Visualization – communication model

Most designers begin with the plan, and then progress to the elevations and ceiling plane. However, the computer enables designer to work interactively in three dimensional space, assessing the volumetric implications of every design decision. Working in virtual space benefits the designer's mental ability to holistically visualize and critically evaluate abstract ideas and relationships. The ability to cause designers to break free of rote habits and design methods which limit creative thinking is one of the greatest strengths of digital graphics.

Now this does not mean that manual techniques are ineffective and should be dismissed. Instead, it means that designers now have more options

available for creative thinking and problem solving than ever before. However, more options do not necessary mean better design solutions. Creativity is still a product of the human spirit; the computer remains a tool to assist designer in their creative explorations.

3. Architect-Client Design Collaboration

Client-designer collaboration has come under a sharp scrutiny. This relationship has faced a high level of dissatisfaction amongst client organisations concerning the service delivered by the architect. This is independent of the type and size of the project and the level of experience of the client. Majority of clients expected to be involved with the project during both design and construction. One of the most frequent causes of complaint is poor communication (Mahdjoubi, 1996). Latham's (1994) report laid the blame for poor communication tools, which had failed to enable clients to fully understanding the design proposal.

If the architect is to transmit his intentions to the client, then he must choose language the client understands; indeed he has a moral responsibility to choose such a language, but only few clients understand architects' drawing. So the architect's task is to convey more to the client than orthographic projection ever could. Conventionally perspectives, or more particularly models, will help him communicate more effectively and of course they will have their own intrinsic attraction. Then come the age of computer which changes the role in communication. (Broadbent, 1973)

Computer visualization has reached a stage where reality rendering is commonly put in practise. But it is also comes the disadvantage of it because this tool then is used only to amaze client with the beauty result of the rendering, and takes away client's focus from the design, which is actually the main purpose of visualization. In many cases, clients are happy when they are being presented with beautiful renderings and approve them without going through proper design collaboration. They can realise that it is not the building they want when it is built.

Real estate developers also utilise computer visualization for their marketing purpose. Rendering and walk through are used in offering their products before they are being built. It is a very cheap and effective practise considering that they can start marketing even before the land clearing starts. Generally buyers attentions are dragged to the beautiful colour pictures and environments they offer. These buyers will be disappointed when at last the buildings come into realisation, because even though the buildings are the same as in the brochure, the overall product is different like in the brochure.

Even experienced clients are amazed with what computer animation and virtual reality can do in terms of presentation technics, how the new building

can be sited perfectly on the existing environment, how the moving camera travels around the building, the glaring objects etc. What the computer visualization can do then becomes the main focus rather than what the computer visualization can help to do, which is actually the aim of it.

It is therefore crucial to develop an understanding on the role of computer visualization in the design collaboration. It is not merely mastering the technics of computer visualization, but also includes the culture factor into consideration in the design process. The missing issue is how the architect can guide the client in the design process to also consider the locality of the project, the people, their culture and architecture. As cited by Christian Norberg-Schulz (1980), "The basic of architecture is therefore to understand the 'vocation' of the place. In this way we protect the earth and become ourselves part of a comprehensive totality. What is advocated here is not some kind of environment determinism. We only recognise that man is an integral part of environment, and that it can only lead to human alienation and environmental disruption if he forgets that. To belong to a place means to have an existential foothold, in a concrete everyday sense."

There is no simple axiomatic entity in architecture from which a singular theory could evolve. On the contrary, architecture addresses itself from the outset to the diversity and complexity of cultural and psycho-sociological existence. Various analogies have been drawn between the symbolic function of architecture and the formation of personal and social identities. Other writers have emphasized the importance of being able to interact in a personal way with architecture, in order to give proper expression to the personalities and social status of the occupants (Abel, 1996).

4. Introduction to Vernacular Architecture in North Sumatra

Sumatra Island is resided by different ethnic groups and divided into 8 provinces, Nanggroe Aceh Darussalam, North Sumatra, Riau, West Sumatra, Jambi, Bengkulu, South Sumatra, and Lampung. Inside each of the provinces there are various ethnic groups with their own distinct cultures.

Medan as the capital city of North Sumatra province is the third biggest city in Indonesia and the biggest on Sumatra Island with the population of about two million people. Population of North Sumatra itself is built up by 8 main ethnic groups - Melayu, Toba, Karo, Simalungun, Dairi, Tapanuli Tengah, Mandailing, Nias along with Javanese, Chinese, Indian, and small amount of other ethnic groups - with their own distinguished culture and traditional architecture, although there are similarities amongst them. In such a diverse city, it is hard to determine which architecture is more prominent than others; in fact they influence each others and each of them stands as a

concrete expression of a complex interaction among cultural skills and norms, climatic conditions and rich solutions on living with nature.

4.1. TRADITIONAL ARCHITECTURE

Traditional architecture in North Sumatra was built on a long process of ritual; from site selection, design process, to constructing the design involving the community. They are basically identical.

Tradition as a regulator has disappeared for a number of reasons. The first reason is the greater number of building types, many of which are too complex to build in traditional fashion. The second reason is loss of the common shared value system and image of the world, with a consequent loss of an accepted and shared hierarchy – and generally a loss of goals shared by designers and the public. This results in the disappearance of that spirit of cooperation which makes people respect the rights of adjoining people and their buildings, and ultimately the rights of settlement as a whole. The third reason is the fact that our culture puts a premium on originality, often striving for it, for its own sake. As a result, society becomes dissatisfied with traditional forms, and the vernacular process can no longer work (Rapoport, 1969).

Figure 2. Karonese Traditional architecture.

Figure 3. Toba Traditional architecture

The satisfactory definition of vernacular architecture according to Rapoport (1969) seems to be in terms of process – how it is designed and built. The vernacular design process is one of models and adjustments or variations, and there is more individual variability and differentiation than in primitive buildings.

4.2. DUTCH COLONIAL ARCHITECTURE

The late nineteenth and early twentieth century was a period when the Dutch were extending their control over the outer islands of Java. Some regions of Indonesia – including parts of northern Sumatra, Sulawesi, Bali, Lombok,

Sumbawa, Sumba, and Flores – now came under colonial administration for the first time. This territorial expansion was accompanied by an important change in colonial policy, as for the first time economic exploitation and profitability ceased to be the main justifications for Dutch rule, being replaced by what was termed the ‘Ethical Policy’, with its official professions of concern for Indonesian welfare and improvement. (Waterson, 1990)

The relatively new interest in hygiene becomes a prominent feature of administrators’ reports on hitherto isolated areas which has now come under Dutch control. The concern with hygiene, however, recurs in administrators’ accounts of local architectural styles, and in a number case it became a reason for active intervention, with resultant changes not only to built forms themselves but to the patterns of interaction of the people who used them. One of the most striking features of traditional architectural style is the enormous predominance of roof over wall. Whereas in the history of Western architecture, the wall is an essential element of built form, many traditional architecture have no walls at all, but consist entirely of roof, enclosing a pile-built platform.

Berlage (as cited in Kusno, 2000) formulated this intervention as a synthesis of two elements: the modern constructive spirit, born of a rationalistic and intellectual knowledge that is universal and therefore eternal, and the spiritual aesthetic elements that are particularistic and therefore everywhere different. The task was to integrate the two elements, one representing the modernist “west’ and the other, the localized “East”.

Figure 4. Maimoon Palace

Figure 5. Jakarta Lloyd Company

4.3. TRANSFORMATION IN VERNACULAR ARCHITECTURE

Transformation is a term that is closely related with measurable change of either character of objects or the concept of idea, perception and culture. The rapid change over a short period with an extensive effect is called revolution while the steady, slower process over a longer period called evolution. The mechanism of idea and cultural transformation can be diffusion, evolution or both. (Loebis, 2003)

Vernacular architecture irresistibly undergoes dynamic transformation into new architecture by its own norm and nature (Loebis, 2001), so architect cannot impose any architectural form unless it is compatible with the cultural requirement of population. Therefore the architects can only offer the new forms. If so, the population will readily accept the offer and synthesizing it with the forms they already have into new hybrid forms.

Referring to ‘Architecture Transformation of Batak Toba’ (Loebis, 2001), there are three distinguish mode of adaptation concerning the cultural exchange by the Batak Toba (one of the main ethnic groups in North Sumatra). Firstly the physical appearance of the material culture stays intact whereas their lifestyle has radically transformed. In this case they have adapted their new activities into the old casing of previous culture. Secondly The physical environment is changed and transformed gradually, while the concept of culture, which formed this particular environment is relatively

stable. Thirdly, the physical appearance of built environment has been changed in accordance with the radical changes of culture. These modes of adaptation can also be applied to other main ethnic groups, considering they experienced similar impacts at the same time.

Changes in housing space are not ad-hoc. The reasons to encourage the user to modify and improve his living environment are a consequence of inadequacies in the initial provision of user needs. The design of the conventional house does not fulfill the basic requirements of the user while the old physical conditions of the village house do not meet the current social demand and lifestyle of the occupants. The physical adaptation and adjustment made by the occupants to fit their utilitarian needs have resulted in the extensive modification of the existing facilities and the relocation of spatial distribution. These changes also have psychological, sosio-cultural and even political implications for the individual household and community. (Wahid, 2001)

It is natural that traditional architecture undergoes transformation (Prijotomo, 2003). But still there are constantly asked questions regarding transformation of traditional architecture in Indonesia: How far the changes can be applied to traditional architecture; how the combinations of traditional and modern architecture can be synthesised into new hybrid forms, not only to show as patching. Transformation shows changes, thus become a scale to determine whether a product shows ‘similarity’ or ‘differences’. Architectural transformation measures itself on how close the differences with the precedent (or how far it still shows the similarity).

5. Sample Projects

To explore the role of computer visualization in North Sumatra, it is necessary to see how computer visualization is being applied in the design process for different projects in different areas. The intention is to have a broader view on locality approach for each project. Two chosen samples are taken from various projects planned and designed by Creating Place in North Sumatra, an architectural consultation firm in which the author was part of the design team. Each project is unique to its clients and locations, and different approaches are executed depends on level of interpretation skills and expertise of the clients. It also shows how different hybrid forms are also taken into consideration due to place consideration.

5.1. NIAGARA RESTAURANT

Niagara Restaurant is a new expansion of Niagara Hotel and Resorts in Lake Toba, which is one of the main tourist destinations in North Sumatra. It is

approximately four hours drive from Medan city. Prapat, main tourist town, located by the side of Lake Toba is unique with its Batak Toba culture, which is famous for its traditional weaving, singing, dancing, carving and architecture. Prapat is a gate way to Samosir Island, an island in the middle of Lake Toba. Hotel Niagara and Resorts is located on a high hill overlooking the famous lake. This prime location makes it obviously visible from the main road when approaching Prapat town.

The new restaurant was part of the renovation and expansion program built to support the old restaurant which was not located in a strategic location. Existing pump room building by the pool side was demolished for a new two storeys restaurant with a mezzanine. First floor or semi basement functions as rest rooms, pump room for pool, and storage. Ground floor and mezzanine are semi open eating areas with spectacular view to the lake and its mountainous surrounding. It is fully equipped with self support kitchen. A stage is prepared for local performance facing the pool.

The client representative was the owner of the project who was in charge of operational of the hotel. He had hotel management background and had been involved with the development and operation of this hotel for the last twenty years. He could understand drawings well and had requirements for a suitable tourist eating area. He was more concern with the activities and space requirements. The shape of the building was left with the architects to come up with their concept. The local government also appealed that every new tourist attraction buildings were built in the form of traditional architecture.

Part of the project team from the architect’s design team was situated in the London office when the project started, but that did not hamper the communication within the design team. Preliminary sketches and analyses were discussed intensely through the internet between the two offices to get to a design compromise before first design meeting with client. Several internet base capabilities were used from the moment the project started ranging from emailing to internet conferences which eliminated any place limitation. (Creating Place)

Main design constraint is how to put new activities to the traditional shell without suppressing each other. When we were talking about traditional building, the roof was dominant factor. So the roof basic shape was used as starting point and framed the new building. The basic shape evolved from there to suit the activities and space requirements.

The exploration of plans and forms were done by using integrated CAD software and being built up more comprehensively as the design process progressed and being finalised. Due to good understanding skill from the client, most hours were spent for design synthesis rather than presentation. Every details proposed by the architect were considered carefully before

being approved by the client. To make the building elements stood out, different line thicknesses were used to create depth effect. This applied to plan and elevation presentations.

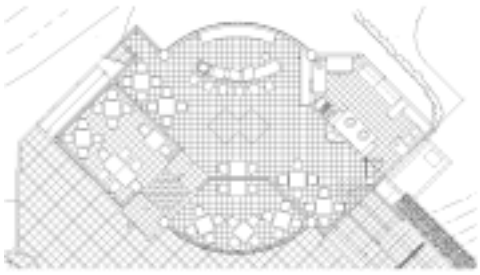

Figure 6. FF&E Plan

For traditional and cultural art work the architect was assisted by local artist appointed by the client. Every detail carving was discussed amongst client, architect and the artist to obtain the best art work and carving to suit the new building. The result is a light semi open hybrid form building rooted from Toba traditional architecture which supported the new restaurant activities (the main concern by the owner), and taking full advantage of the local climate and view. The client fully realised what the building was going to look like and had no negative reflection when it was finished.

Figure 7. Elevation

Figure 8. Photo

5.2. ST. ELISABETH HOSPITAL EXTENSION

St. Elisabeth hospital complex was designed by Dutch architect J.M. Groenewegan, and completed in 1930. This Roman Catholic Hospital consists of a number of pavilions with big, tiles covered saddle roofs, connected with each other via roofed galleries. The roof above the main building has above the entrance a parabola-like roof rider, a form Groenewegen also used in other buildings. The building has big overhanging roofs and small windows well suited to the tropical climate. The complex

was enlarged several times, as in 1934 when a new chapel for the sisters was built. In 1963 a new three storeys wing designed by Groenewegan was added.

St. Elisabeth Hospital is one of the oldest and largest hospital in Medan and located in a primary street leading to Polonia airport. The hospital gradually extending the buildings for new space as it grows. But the complex has land limitation, some of the extensions were done by demolishing old buildings or adding new floors to old building. The sample from this project is taken from the latter one.

St Elisabeth Foundation, the owner of the hospital, is a benevolent foundation supported from Holland at the time it was built. There is a tradition in the foundation that Catholic sisters are involved in the key positions in the management. Although they are from diverse education back ground, generally they are not familiar with building or design process.

As the hospital was developing fast, existing building could not cater for all new functions. Thanks to the management's decision of the foundation to group all administration offices of the complex into one building. The building chosen to be extended was ex sister's dormitory. It was a two storeys building at the side of the complex and would be extended into four storeys by adding new structure. The new building would be supported by new lift.

Design collaboration involved the architect's team and client's team which was mainly the Chairman, Secretary, and Supervisor from St. Elisabeth Foundation, they were the decision maker. But because the planning involved a lot of departments, several presentations were planned for Senior Manager from each department.

The management desired to update the hospital into a competitive working environment without ignoring employees working culture and the established value of existing complex. Conventional established working culture will be upgraded to suit the latest development of office system with new proposed way of zoning the working area, along with the new installed networking and communication system.

Analyses and preliminary design proposal were presented as hand sketch drawing concentrating on zoning the service areas such as toilets, storage, and kitchen that needed certain pedestrian and vehicle access. At the same time architect started to suggest to client the new proposed working environment. There was a breakthrough for the hospital to accept new office concept while compromising their requirements on the working culture of the employees.

The design presentation to the whole team included FF&E Plans with furniture layout and isometric drawing. One side isometric communicated better with these clients as it explained the space organisation and activities

route in three dimensional space. On the other side it is a quick practise for architect's team to create isometric from plans.

Figure 9. First Floor Isometric Plan

The main design concern was the approached in planning, on how the working culture and the value of established complex of St Elisabeth Hospital were analysed and put into synthesis with the new emerging technology and activities.

Computer visualization was used extensively to support the collaborative design process to explain the design intention. Step by step computer visualization presentation technics from simple to complex were produced as the design got finalised. Basic two dimensional drawing, wire frame and detail object modelling were prepared for final rendering. Local improved material library were established to support the visualization in terms of explaining the selected colour, texture, and material. Lighting was set in a way to produce right colour and sun angle to create reality rendering to be communicated with the client.

Figure 10. Rendering – Reception

Figure 11. Photo – Reception

Figure 12. Rendering – Directors

Figure 13. Photo – Directors

Figure 14. Rendering – Front Elevation

Figure 15. Photo – Front levation

Maximum effort was made in the final visualization using several integrated CAD and graphic software to produce rendering which match the built one. At the opening of the project, the management showed appreciation to the construction team; architect, structure engineer, and the contractor. It was proved that by providing the new synthesis for working space and facilities, it could encourage the employees to modify and improve their working culture.

6. Conclusion

Computer visualization technology is developing fast and should be balance with the architecture skill. It is necessary for architects to understand their client, their culture and architecture. It is up to the design team to formalize strategy to design collaborative practice with clients with different backgrounds. Through out the design process, architect and client consolidate a design from the beginning to the final. During the design process computer bridges the communication gap in visualization by bringing the client to experience the space before realisation, adjoining him with the proposed building and starts the adaptation process.

To build a traditional building is impossible. Vernacular architecture is another approach. Transformation of physical environment is better adapted by the clients along with the improvement of CAD technology and computer visualization method. To assist the collaborative design practice in this region it is necessary to prioritize research on architecture transformation in regional scope as a base to develop computer mediated design collaboration tools.

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