

Review of the Practices of Architect POE for the Cultural Expo Architectural Projects

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Abstract: The article is the review of the practices of the Architect POE (Post Occupancy Evaluation) for the cultural expo architectural projects, including: Architect POE plan, design review, analysing phenomena, consideration and summary. This practice is of reference value to advocate the implementation of the Architect POE. Architect POE can summarize the success of architectural creation through design verification, and promote the analysis and accumulation of "evidence" for the development of Evidence-Based Design (EBD), improve the architectural design of the same kind of new projects. Architect POE can also promote the improvement of the use of the building by exploring the phenomenon of the problem and the reasons behind it, and promote the construction of industry system of construction and management.

Keywords: Architect POE; architect business; Evidence-Based Design; improve usage of existing buildings

1. Architect POE plan for the cultural expo architectural project

Post Occupancy Evaluation (POE) refers to relevant evaluation of a building and related environment after it has been built and used for a certain period [1]. Architect POE refers to the POE[2]that is made by an architect for the return visit to the specific projects designed and built by himself/herself and a study on the relationship between the building and the user. Academician Wu Shuoxian once talked about POE: "Is a completed building and its environment satisfactory? Is there anything that needs to be improved? The user has the voice in these issues."

The quantitative and qualitative research of architect POE on user experience can verify the current situation and design intention of buildings, summarize the success of architectural creation, and promote the analysis and accumulation of "empirical evidence" needed for the development of Evidence-Based Design (EBD). EBD refers to the cautious, distinct and judicious use of the best evidence from current practice and research when making major decisions with the client on the unique design of each project [3]. The establishment of user-based POE database enables the rapid development of EBD [4], that is, the decision and design of new projects are established on a scientific basis.

At the same time, Architect POE can investigate the problems of buildings, find the premature aging of buildings and the experience problems of users, promote the improvement of buildings for use, promote the construction of industrial system, promote the improvement of the quality and function of the built environment, so that it can meet the requirements of building users better. In addition, Architect POE, as a branch of architectural review, will also contribute to the theory and practice of architectural design [5].

At present, the business of domestic architects is busy, especially in the field of cultural expo architecture. As an architect business, Architect POE needs to carry out regular exploration and practice. Taking Qian Xuesen Library & Museum(Hereinafter referred to as Qian Museum) as a return visit case, the implementation of Architect POE return visit is a beneficial exploration of the practice in this field.

2. Work objective and theoretical methods

2.1 Work objective

Design verification is carried out on the use status and design intention of the buildings to analyze

the difference, summarize the success of architectural creation and promote the analysis and accumulation of “empirical evidence” needed for the development of EBD; the relationship between buildings and users is investigated based on observation and interview, and the key problems of premature aging of buildings and other general problems of user experience are found to promote the improvement of buildings for use.

2.2 Theoretical methods

2.2.1 Theoretical basis

Architect POE relies on architecture, social survey statistics, environmental behavior (psychology), phenomenology and other relevant theoretical basis. It's specially emphasized that the architect presents on the site, desalts the technical thinking, restores user identity for the physical experience of architectural research, and obtains the first-hand intuitive experience of the user with empathy.

2.2.2 Working methods

The working methods of Architect POE include: questionnaire method, interviewing method, observation method, behavior camera method, etc.

(1) It is the goal of questionnaire survey to understand people's perception and experience of architecture. The questionnaire of Architect POE adopts the evaluation method combining structural questions with open questions. At the end of the questionnaire, participants are invited to provide additional comments or suggestions [6]. The questionnaire used by the Architect POE in this round is compiled according to Appendix B of *Post-Occupancy Evaluation*, the authoritative guide in the international POE field. It is divided into two versions: “Manager Questionnaire” and “Visitor Questionnaire”, covering the concerns of the design team.

(2) Interviewing method is a method to learn about and collect information about psychological development and problems of the study objects through oral conversation. Architect POE mainly uses informal unstructured interview with free questions and answers and semi-structured interview with interviews and surveys to provide them with more details.

(3) The observation methods used by Architect POE include: preliminary observation method and key observation method. The preliminary observation method is similar to the Walk-through Evaluation proposed by Wolfgang F. E. Preiser, which refers that field investigation is performed for the evaluated object, and the evaluator records the initial problems by observation, photography and notes [7]. The key observation method requires the architect to obtain the first-hand intuitive experience of the user with empathy, immerse the architectural space situation of the building user, restore the user's identity for the physical experience of architectural observation, experience based on the user's perceptual mode, and conduct a beneficial exploration of the causes of the advantage and disadvantage result of the final cementation body in the complex process.

(4) The behavior photography method refers to the relatively complete space usage behavior within the key research scope, which is convenient for post-analysis and description, and complements the past intermittent photography observation method.

3. Design the work focus in return visit

The focus of the return visit is Qian Xuesen Library (Table 1), which is a memorial hall built in memory of Mr. Qian. It is located in the irregular land where the main campus of his Alma mater, Shanghai Jiao Tong University connecting with the city (Figure 1). It integrates collection, exhibition and academic exchange in one [8]. The main body of the building, “square stone”, is an abstract expression of the image of wind-eroded rock in the Gobi desert where Qian Xuesen used to work. The surface is marked with brick red texture. The pixelated processing generates variability and abstraction with homogeneous base, which makes the “sculpture” into the exterior wall of the building and the exterior wall texture become an important issue in the design (Figure 2).

Table 1: Work focus of return visit investigation and inquiry for architect POE and return visit project (Source: Self-drawn)

Cultural Expo construction project	Time of completion	Architect POE and return visit inquiry time	Team	Return visit investigation and inquiry work focus
Qian Xuesen Library (Qian Library)	2011	2015/2021	POE team + Design team/Design team	Establish a complete POE work framework system and questionnaire survey, thus theoretical and methodological guidance for the follow-up return visit case investigation and inquiry work is established/Observe the use of the return visit public space and the use of the exterior wall structure, and provide improvement ideas for the follow-up similar project design

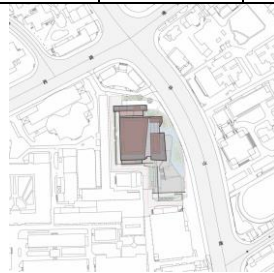


Figure 1: The relationship between the Qian Museum and the city (source: self-drawn)

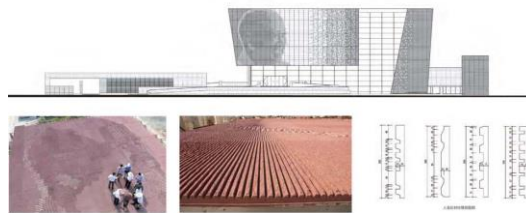


Figure 2: The facade and material research of the Qian Museum (Source: self-drawn and self-shooting)

4. Analysis of the phenomenon

4.1 The phenomenon of design validation and EBD “demonstration” and analysis

Table 2: Examples of design validation phenomena and analysis (Source: Self-drawn)

Design verification phenomenon	“Demonstration” and analysis of EBD
Coordinate with urban public facilities	The subway display channel is seamlessly connected to the exhibition hall
Urban public space and external space construction	The opening slope square has triggered citizen’s voluntary sports activities
Architectural modeling and exterior wall quality	Dynamic experience of “Qian Xuesen” portrait
Composite use of space	Composite utilization of “Rotunda” space
The matching of exhibition and architectural space	The exhibition hall between the square and rational matching of exhibition content

By the comparison of using status and design intention, the adaptability of architectural design strategy and design technique and the degree of acceptance of users are verified and the success of museum creation is summarized to provide reference for EBD analysis and accumulation of “empirical evidence” and reference for solving similar problems in the future, as well as promote the continuous

improvement of architectural design of cultural expo in the future. The issues to match with the coordination of urban public facilities, construction of urban public space and external space, architectural modeling and exterior wall quality, composite utilization of space, exhibition and architectural space, etc. should be paid attention. (Table 2).

(1) Coordination with urban public facilities and creation of “place spirit”. As a public cultural building serving the urban public, how to organically connect with the urban public facilities and jointly create the spirit of the place is a concern of the design team. According to the questionnaire statistics, visitors going to the Qian Museum have high evaluation of the relationship between the subway and the building (Table 3) : The subway exit guide is clear, and the relevant theme information of the Qian Museum can be felt in the subway passage (Figure 3).

Table 3: Evaluation of some of the architect’s concerns (Source: Self-drawn)

Manager’s evaluation of the use status of the sunken courtyard on the negative first floor	the sunken courtyard on floor -1 is utilized 10% the sunken courtyard on floor -1 is not utilized 90%
Visitors’ comments on the relationship between the subway and the building	easy to find this building after getting off the subway 80% difficult to find the building after getting off the subway 10% coming not by subway 10%

(2) The construction of urban “public space”. According to the questionnaire statistics, the managers have high evaluation on the plaza courtyard of the Qian Museum (Figure 4), which belongs to the positive evaluation range: the square courtyard has well handled the relationship between the Qian Museum and the urban space of human flow, traffic and landscape, and has also become a place for civic activities and a roller skating field for skateboarders after the museum is closed. Public space is the place where people contact and communicate with each other, which is the most important part of the city. At the same time, it is a common place for people to carry out functional or ceremonial activities, whether in daily life or periodic festivals, which makes people unite into a society[9].

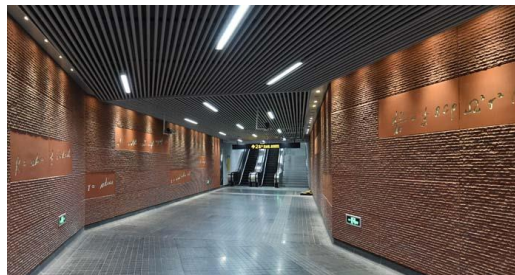


Figure 3: The subway passage becomes the theme gallery of the Qian Museum (source: self-shooting)

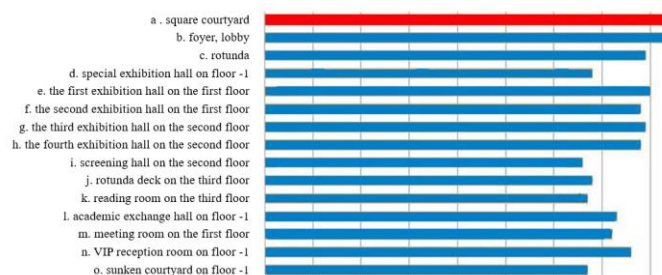


Figure 4: The manager has a high evaluation of the square courtyard (source: self-drawn)

(3) The architectural shape, exterior wall quality and immersion experience of the cultural expo. According to the questionnaire statistics, visitors and managers have high evaluation on the exterior quality of Shanghai Qian Museum and the exterior portrait (Table 4) : The exterior shape, material and the portrait of Qian Xuesen of Qian Museum are impressive, which sets off the commemorative theme of the building. When visitors come out from the entrance of the subway station, the first thing they notice is the tall exhibition hall behind the glass curtain wall, the Dongfeng2A missile entity inside and the Qian Xuesen’s portrait on the front facade. Visitors’ experience during the ceremonial procession is the real feeling of the architecture and portraits through their bodies: along with the changes of the mutual position of the portraits and the angle of light, the Qian Xuesen portrait also presents a vivid and abstract artistic effect.

Table 4: Evaluation of the architect's concern for exterior wall portrait (Source: Self-drawn)

	Manager's evaluation	Visitor's evaluation
Evaluation of exterior wall portraits	like external wall portraits 90% the exterior wall portraits are general 0% don't like exterior wall portraits 0%	like external wall portraits 80% the exterior wall portraits are general 7% don't like exterior wall portraits 13%

(4) The composite use of space. According to the questionnaire statistics, the rotunda of the Qian Museum is also highly evaluated by visitors (Fig. 5) : The Rotunda is the most important comprehensive hall after visitors entering the Qian Museum. Whether it is the entity missile or the grand scene of regular projection on the curved wall, every visitor's attention is tightly attracted to the great achievements of Qian Xuesen (Fig. 6). The composite use of the rotunda reflects the diversity and richness of museum behavior and space use [10]. The composite use of space is one of the effective ways to realize the public education function of contemporary museums.



Figure 5: Visitors have a high evaluation of the rotunda (source: self-drawn)



Figure 6: Visitors stop to enjoy the movie (source: self-shooting)

(5) The matching between exhibition and architectural space. Through questionnaire statistics and interviewing, we learn that visitors have a high evaluation of the third hall on the second floor of the Qian Museum (Figure 7) : The main function of the Qian Museum is to show the scientific achievements and spiritual character of Qian Xuesen. The recovery scenarios of Qian Xuesen's study room on the second floor exhibition hall enables visitors to intuitively understand the specific life of this great scientist (Figure 8). The Rotunda space is customized for the Dongfeng2A missile, and the exhibition and the building space are completely connected.

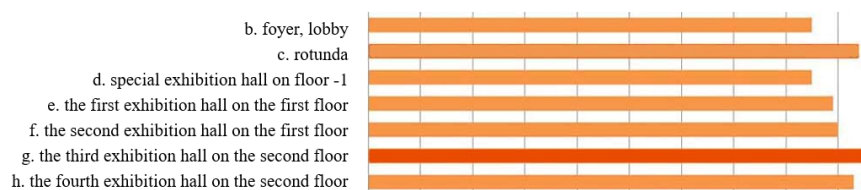


Figure 7: Visitors' high evaluation of the Third Exhibition Hall on the second floor (source: self-drawn)



Figure 8: Reproduction of the former living room of Qian Xuesen in the house (source: self-shooting)

4.2 Problem phenomena and analysis: Information feedback of operation and maintenance management to architectural design

Focusing on the relationship between buildings and users, and exploring related problems,

including: A. Premature aging of buildings refers to the phenomenon that buildings are used incorrectly, altered at will, aged rapidly, or even abandoned [11]. B. Other user experience issues, such as building space maintenance, etc. Analyze the causes of various problems and promote the improvement of building use conditions (Table 5).

Table 5: Problem phenomena found and analysis examples (Source: self-drawn)

Problem phenomena detected and user's experience issues	Symptom description	The found problems and phenomenon analysis (Premature aging, misuse, abandonment, etc.)	Suggestions
Functional space abandonment	Sunken courtyard on the floor -1	The streamlines are closed	To open up the streamline and activation space
Functional space transformation	The garage was converted into a storage room	The demand exceeds the design task capacity	Organize space reuse plan
Durability and maintenance of exterior walls	Partial serrated curtain wall needs maintenance	Partial curtain wall parts lack maintenance	Regular maintenance, timely overhaul

(1) The phenomenon that some functional spaces are abandoned or misused or undergoing transformation. For example, all the managers of the Qian Museum thought that the sunken courtyard was not utilized (Table 3), and the garage was also converted into temporary storage. Through observation and inquiry of the above positive or negative scenes, it is not difficult to find that: After years of operation and development, the requirements for cultural expo buildings have been constantly improved. The original task book cannot predict the development needs of the rapid growth of operation after many years, so the museum must explore and expand the architectural space. The architectural space needs to be as versatile and flexible as possible to adapt to the requirements of future functional change.

(2) The phenomenon of building space maintenance and other problems. Through the inquiry of the Architect POE, it is found that the Qian Museum can basically maintain its original style after years of wind and rain erosion, and only a few parts have defects in maintenance, which makes the architect team feel gratified. The frequency of building maintenance in China is relatively low, so architects need to consider the water-cement factor in the design of exterior wall construction method, so as to avoid the influence of premature aging of exterior wall on visiting experience.

5. Discussion and conclusion

In this round, Architect POE practice is only limited to the design works of the same design team, trying to provide guidance for the subsequent design and research, hoping that the same type of research can be carried out in the long run eventually and regularly. The practice of this round has verified that the surveyed cultural expo buildings' overall architectural design concept, external space image and internal space pattern are in line with the original design intention even after being put into use for many years, which is well reputed by visitors and managers. The good operation of the building over the years also reflects that the spatial pattern of the original building has to some extent adapted to the needs of the operation.

In the POE process, architects can be more familiar with the service objects and constantly improve their own business ability and accomplishment. By learning about the using status of the space, the architect is deeply aware that a good building is not only a good design, but also requires the owners to implement their ideas and measures in the whole life cycle of communication and planning, design, construction and subsequent management. Architect POE makes architects have the opportunity to visit the finished works after use, and has a further perceptual cognition of the external wall materials, interior design, building envelope maintenance and other aspects, which helps to improve the design level of architects in the use of materials, structural details and other aspects, and promotes the prevention of premature aging of buildings.

In POE, architects fully understand user's feelings and experience of the finished works, which plays a positive role in the design verification. Dr. Zhang Zhenhui from the design team said, "Currently, agent construction system is widely used in public construction in China, which objectively separates the end user from the architect. The final owner can't actually control the process in the

design and construction stage and carry out in-depth and sufficient communication with the architect in the early stage. "The architect's consideration of the function use is based mainly on the norms of universality and the experience of the past project, so it is inevitable that it is not specific to the specific user group." The terminal management of some museums fails to participate in the design assignment stage in the early stage of construction, and many of the details are just the opinions of the agent construction agency, which has a certain gap with the actual operation and management requirements. Establishing the whole process chief architect system is the need of the whole life cycle development of architecture.

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