

**POST OCCUPANCY EVALUATION  
WITH BUILDING VALUES APPROACH**

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MASTER OF FINE ARTS

By

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May 2002

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# ABSTRACT

## POST OCCUPANCY EVALUATION WITH BUILDING VALUES APPROACH

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Evaluation of buildings and their environments has an effective role in the building process in order to assess the efficiency of designed environments. Both at the academic and professional level, the most practical, systematic and effective feedback tool available for building evaluation is post occupancy evaluation. This thesis aims at assessing this systematic technique from the point of view of building values, pointing out deficient aspects, and developing an alternative model. Rather than changing the nature of POE, the objective is to bring a new approach in order to make the context of POE more comprehensive and useful. The criteria used in POEs conducted so far is gathered by the use of some typical case studies. A brief analysis of current studies showed that all the aspects evaluated by POE are somewhat technical in terms of building performance, user satisfaction, and overall effectiveness of the building. A comprehensive POE should go one step beyond building performance, and add new aspects into its context in order to meet the need for useful design guidelines of wider perspective. Thus, building values and defined criteria are integrated into POE, regarding its deficient parts in specific cases, and programmatic needs. An alternative POE model is proposed, and the applicability of this model is tested by the use of a pilot study. As a result of this study, it is concluded that the new model is quite effective in evaluating buildings according to social, cultural, contextual, and perceptual criteria. POE can be more comprehensive by integrating alternative criteria into this system. Further studies would broaden the perspective of POEs by focusing on new trends and new values in the highly accelerating building industry.

**Keywords:** Post Occupancy Evaluation, Building Values, Building Evaluation

# ÖZET

## BİNA DEĞERLERİ YAKLAŞIMI İLE KULLANIM SONRASINDA BİNA DEĞERLENDİRMESİ

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İç Mimarlık ve Çevre Tasarımı Bölümü

Yüksek Lisans

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Tasarlanmış çevrelerin verimliliğini ölçmek için yapı ve yapılı çevrenin değerlendirilmesi, yapı sürecinde etkili bir rol oynar. Hem akademik hem de profesyonel hayatta, bina değerlendirmek için var olan en pratik, sistematik, ve etkili metod, kullanım sonrasında bina değerlendirmesidir. Bu tezin amacı, bu sistematik tekniği bina değerleri açısından değerlendirip yetersiz yönlerini belirlemek ve alternatif bir model geliştirmektir. Hedef, KSD'nin içeriğini daha geniş kapsamlı ve yararlı kılmak için sistemin doğasını değiştirmeden yeni bir yaklaşım getirmektir. Bazı tipik çalışmalar sayesinde günümüze kadar uygulanan bina değerlendirmelerinde kullanılan kriterler toplanmıştır. Bu çalışmaların analizi, KSD tarafından değerlendirilen öğelerin bina performansı, kullanıcı memnuniyeti ve genel verimlilik bakımından oldukça teknik olduklarını göstermiştir. Kapsamlı bir KSD bina performansının bir adım ilerisine geçerek içeriğine yeni öğeler eklemeli, bu sayede gereksinim duyulan faydalı tasarım prensiplerinin oluşturulmasını sağlamalıdır. Bu yüzden bina değerleri ve tanımlanan kriterler, belirli konulardaki eksik yönler ve programın gereksinmesine göre KSD'ye katılmıştır. Alternatif bir KSD modeli önerilmiş, ve bu modelin uygulanabilirliği bir pilot çalışma ile denenmiştir. Bu çalışma sonucunda, yeni modelin binaları sosyal, kültürel, bağlamsal ve algısal kriterler ile değerlendirmede etkili olduğu sonucuna varılmıştır. KSD, alternatif kriterlerin eklenmesi ile daha kapsamlı hale gelmeye açık bir sistemdir. Gelecek çalışmalar, hızla ilerleyen yapı sektöründeki yeni trendlere ve yeni değerlere odaklanarak KSD'nin bakış açısını genişletebilirler.

**Anahtar Kelimeler:** Kullanım Sonrasında Bina Değerlendirmesi, Bina Değerleri, Bina Değerlendirmesi

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# 1. INTRODUCTION

## 1.1. The Aim and Scope of the Study

This thesis aims at assessing the most commonly used building evaluation technique, namely post occupancy evaluation, from the point of view of building values. The objective is to point out the deficient aspects of this systematic technique of building evaluation, and to develop and propose an alternative model for this particular step in a building's life cycle. This is important for making the context of post occupancy evaluation more comprehensive and useful in order to meet the problems in buildings and the built environment, which have not been dealt with before, and to define guidelines for future projects.

Some major objectives of architecture are to satisfy human needs, to improve social conditions and community life, and to provide effective and functional environments. Necessarily, architecture is a profession that "... can learn from both its accomplishments and mistakes. Evaluation can provide feedback to clients and designers on the impact of the physical environment on people's behavior" (Sanoff, Integrating Programming 29). Environmental design evaluation has an effective role in the building process in order to assess the effectiveness of designed environments, because "[t]he process of evaluation is the missing link between implementation and future programming in the staging of building design operations" (Sanoff, Integrating

Programming 31). Furthermore, Zimring points out that learning skills for observation and analysis are increasingly valued—and paid for—in architecture.

Both at the academic and professional level, the most practical, systematic and effective feedback tool available for building evaluation is post occupancy evaluation (hereafter abbreviated as POE). Preiser et al. define the term as follows: “POE is the process of evaluating buildings in a systematic and rigorous manner after they have been built and occupied for some time” (3). Besides being an effective evaluation tool, “POE is a phase in the building process that follows the sequence of planning, programming, design, construction, and occupancy of a building” (Preiser et al. ix). Today, the building industry pays a great deal of attention to a building’s occupancy duration, because it has been realized that a comprehensive POE affects virtually all aspects of the building process. These aspects are defined by Preiser et al. as, feasibility, financing, site selection, architect hiring, planning, programming, design, documents, contracts, construction and building management (xi). Thus, user-oriented building evaluations continue to gain acceptance and have come to assert a much greater impact than they had originally, and have been incorporated into public building programs in many countries.

Often based on the occupants’ satisfaction levels, POEs become formal processes examining the outcomes of the design process. To be considered in more detail in the second chapter, POE seems to be a formal and comprehensive examination focusing on critical aspects of building performance. Although it provides reliable data—both positive and negative, both strengths and weaknesses—on building performance (lighting, acoustics, HVAC, noise, fire safety), functionality (layout, storage,

workspace, adjacencies) and some psychological aspects (perceptual privacy, aesthetics and safety), the problems of our built environment are not restricted only to these.

POE's weakness is that it only focuses on some broad, but limited criteria; case studies come to be examples of a usual type, especially if they are of the same kind of facilities.

In the light of the discussions above, this study aims to make an assessment of POE—and building evaluation in more general terms; without changing its nature; but integrating new criteria already existing in the building activity, hidden in architectural criticisms and problems, of which we are both aware or not.

Building values constitute both the theoretical and the practical basis for the study.

Firstly, values in building and the built environment are defined and specified, secondly they are converted into criteria for POEs, and thirdly an alternative model is proposed bringing building values to an operational level for their measurement. Pultar's framework may be used as a principle guide when classifying building values; “[a] convenient basis for identifying and differentiating values is to consider the kind of human needs that they are related to. From this viewpoint, values that affect the nature and outcome of human activities may be classified under three general categories: technical, socio-cultural and percepto-cognitive values” (The Conceptual Basis 162).

Although much of the primary task is to focus on POE, and what is understood by POE in the profession is defined as a building performance based evaluation for buildings, we can not think the building concept apart from its immediate environment. Therefore, values related to the built environment should also be considered. An extensive source

for these values is based on facilities management, environmental planning, and building design and management disciplines.

It is expected that the main contribution of the thesis will be to propose an expanded approach to building evaluation, which goes beyond the limits of present day's POEs, and allow it to gain a meaning beyond quality control, which is a familiar term in industry. The output of the study is expected to be more than suggestions for improvements of POE as follows:

1. The feedback process in buildings and the built environment will consider both the design, and social and cultural impacts on users in relation to each other, considering whether the building suits the users' needs.
2. The question "What is evaluated?" will find an extensive range of answers, with potential solutions to a broad range of problems in the built environment. Especially issues related to socio-cultural and percepto-cognitive values, contextual and sensual concerns such as re-use of historically valued buildings, new objectives in the building industry such as the sustainable architecture and green buildings, and specific type of buildings such as adaptively re-used buildings need to have guidelines developed from evaluations of these types for future projects.
3. The context of POE will be enlarged from a walkthrough supported by questionnaires and interviews—looking for "... differences between how the building was constructed and how it was designed" (Bechtel 313)—to a universally accepted and vigorous part of the building process incorporated into

the daily way of architectural practice, influencing every kind of design and planning decision.

4. An assessment of an important process in building's life cycle within the frame of building values and an effective theoretical base will pave the way for defining the deficient parts and proposing alternatives, and hopefully present much more guidance for academic, institutional and professional sectors to benefit from POEs.

## **1.2. The Structure of the Study**

The thesis begins with this introduction chapter defining the aim and scope of the work. The problem definition, method and expected outcome of the work are followed by a presentation of the structure of the thesis.

The second chapter elaborates on the theoretical basis for POE, considering its definition, its evolution and development throughout its history. POE is examined briefly from the following perspectives:

- Types of POE, such as academic, scientific, collaborative, institutional and entrepreneurial, as classified by Bechtel
- Levels of effort in POE, such as indicative, investigative and diagnostic levels, as outlined by Preiser, Rabinowitz, and White.
- Styles of POE, such as factual building report, measurable parameters and non-recriminatory forums, as discussed by Doidge.
- Dimensions of POE, such as size, generality of their results, breadth of focus and application timing, as presented by Zimring and Reizenstein.

The second chapter also presents the relation of POE to proximate fields such as facilities management, building evaluation techniques, building performance, building planning, economics and management, architecture, environmental planning, environment and human behavior studies, psychology and sociology in design and axiology. As a great deal of investment is of concern for POE in the profession for learning from valuable feedbacks and taking advantage of them in future projects, the demand for it by public and private sectors is introduced. The main idea advocated is that POE is an efficient tool in the evaluation of building performance and technical aspects—some functional, behavioral and aesthetical aspects—and other physical attributes, especially in some specific countries, such as Probe (Post Occupancy Reviews of Buildings and Their Engineering)—a methodology for building evaluation according to the performance and energy criteria—, BREEAM (Building Research Establishment Environmental Assessment Method)—similar to Probe, a tool that allows the owners, users and designers of buildings to review and improve environmental performance throughout the life of a building—, and BUS (Building Use Studies), which have already taken their places in the local government context in the United Kingdom, and effectively used for the last 5 years.

Another important portion of the second chapter is devoted to compiling the criteria used in evaluations and their specifications in order to establish a strong basis for assessing POE and defining its deficient points. Selected case studies show that POE has been conducted up till now with a broad but limited scope; it focuses on the full range of building performance aspects, however remains limited with these technical data. A critical assessment is done on the selected case studies, which are appropriate

examples of their kinds, and is followed by a discussion of the outcome in accordance with building values approach.

The third chapter deals with building values as the second major theoretical basis of the study. The emerging point of the alternative model for POE finds direct roots from the contents of this chapter. Definition of building values is given as well as their classification, from Pultar's point of view into technical, socio-cultural and percepto-cognitional values, from Hershberger's point of view into enduring, institutional and circumstantial values, and from Altınoluk's point of view into intellectual, emotional and material values. Consequently, all of these values and their correspondence with problems of the built environment are constructed within a framework to be used throughout the study.

At the end of the second chapter, an assessment shows the effectiveness of POE in physical factors, and its deficient parts as regards the rest of the building values. The parts missing in the existing case studies naturally lead to the development of an alternative model in the fourth chapter, which commences by explanation of the model, its application, usage and procedure. There are six groups of criteria suggested for the alternative model, the last of which is proposed for re-use of old buildings, therefore optional in the sense of its specificity. The suggested criteria, and the purpose of their suggestion are mentioned in each group. A pilot survey is presented at the end of the fourth chapter, followed by its evaluation and discussion. The discussion is made through the use of this pilot study conducted in a selected building, whose purpose is to test the effectiveness of the proposed model.

Finally, the outcomes of the proposed POE building survey is summarized, and the expected benefits and its usage are emphasized in the concluding chapter.

## 2. POST OCCUPANCY EVALUATION

White defines POE as “... a set of procedures and tools used to learn how well design ideas have worked in real buildings” and he sees it as a new component in the building delivery system (4). It is possible to encounter definitions similar to White’s, but with differences in detail due to buildings’ evolution throughout history from simple ones to today’s complex buildings. According to Preiser,

POE should operate throughout the life of a building, continuous feedback. This is needed since the building use is often changing and evolving. The POE acts like a doctor carrying out a check up looking at functional issues, assessing buildings in terms of both positive and negative performance aspects, i.e. comparing performance criteria with actual performance. POE was probably carried out 1000 years ago, but informally. Only recently have building types become specialized. You need feed forward and feed backward. POE feeds backward into all stages of building such as planning, occupying etc. (“Post-Occupancy Evaluation”).

Recently, building types have become more specialized, more emphasis is given to recent concepts such as energy efficiency and sustainability, and a feed forward and backward of information is now needed. POE feeds backward into all stages of a building, such as planning and occupying. Certainly the definition of POE is in a continuous evolution as the technology allows us to construct more developed and complex buildings, each time bringing new criteria along with them. Therefore, it would be worthwhile to arrange the definitions of POE in accordance with its history, and see the details with the change in time, the context of its use, and the needs of the public and private sectors.

## **2.1. Definitions, History and Evolution of POE**

The roots of POE are based in academia in the mid 1960s with “... the growth of research focusing on the relationships between human behavior and building design, which led to the creation of the new field of environmental design research ...” (Preiser et al. 8). The 1960s show an institutional setting focusing on misfits between users and buildings, especially in college dormitories and hospitals. The 1970s have systematic and multimethod POEs with an increase in use and more emphasis on the application of survey, interview and observation techniques, especially with regard to housing satisfaction. The mid 1970s witnessed the formation of design guides in military schools and office buildings. The first book on POE was published by the end of 1970s, including the following definition:

An appraisal of the degree to which a designed setting satisfies and supports explicit and implicit human needs and values of those for whom a building is designed.  
(Friedmann et al. 20)

This social science based approach to POE was comprehensive in considering the setting, clients, proximate environmental context, design process and social/historical context. Until the end of 1970s, most POEs considered user satisfaction, with little attention to the physical environment. In the 1980s, POE practice in the public and private sectors gave emphasis to the effect of the physical and organizational effects of work environment on occupant behavior and satisfaction. Zimring and Reizenstein define it as “an examination of the effectiveness for human users of occupied designed environments” (qtd. in Gifford 368). They stress what makes it different from architectural criticism: being databased. This makes POE a part of social design research:

It must be distinguished from the practice of architectural criticism, which emphasizes aesthetic criteria and is usually done by a single architectural expert who uses methods that are based primarily on his or her insight and artistic taste. In contrast, the social design research approach uses the program or occupant needs as the criteria by which the building is judged, bases its conclusions on user impressions, and employs survey and interview methods. (Zimring and Reizenstein 1981 qtd. in Gifford 368)

Developing into a discipline of its own, POE started to show different approaches with the following characteristics:

- Focusing on the assessment of the physical and organizational attributes of the building (Marans and Spreckelmeyer),
- Focusing on a programming approach with the major elements of function, form, economy and time considered throughout the POE process (Parshall and Peña),
- Introducing POE as a staff function within government agencies to optimize space utilization and identify needed improvements (Daish, Gray and Kernohan).

In addition, Gifford sees POE as the final stage of the design process, and the prelude to the design of another building (368). By the end of the 1980s, the following definition took its place in *Post Occupancy Evaluation* by Preiser, Rabinowitz and White:

Post occupancy evaluation is the process of evaluating buildings in a systematic and rigorous manner after they have been built and occupied for some time. POEs focus on building occupants and their needs, and thus they provide insights into the consequences of past design decisions and the resulting building performance. This knowledge forms a sound basis for creating better buildings in the future. ... POEs are intended to compare systematically and rigorously the actual performance of buildings with explicitly stated performance criteria; the differences between the two constitute the evaluation. (3-4)

Environmental assessment and its benefits for the profession becomes a crucial part of programming, in order to correct environmental errors and to prevent potential errors. In *Integrating Programming, Evaluation and Participation in Design*, Sanoff defines POE as a part of program development:

Environmental assessment, or the post occupancy evaluation is the practice of using methods such as surveys, questionnaires, and observations of people's behavior to discover exactly what makes the designed environment work well for its users. POEs are a procedure that involves the user in their own assessment of their everyday physical environment. (14)

In the annual IAPS (International Association for the Study of People and Their Physical Surroundings) meeting of 1988, it was stated that POE was then 25 years old with an evolution from research into an applications-oriented activity. Recent developments in the field of POE were described, such as “an apparent increase in the volume and acceptance of POEs, shifts in the sponsorship, changes in type of POE programs, and the integration of behavioral and technical assessments, moving toward the application of total building performance” (Preiser, *Advances in POE* 90). In the 1990s, building types and clients become more sophisticated and demanding. In the United States, large private sector firms started to utilize POE, and this situation resulted in changes in the building industry and rise of facilities management (90-93).

Similarly, in the annual EDRA (Environmental Design Research Association) meeting in 1989, a workshop called “The Tale of the POE: The Past 20 and the Next 20 Years” was conducted by Kathryn H. Anthony, Robert I. Selby, Min Kantrowitz, Wolfgang Preiser and Craig Zimring. It focused on the changes in POE from the foundation of EDRA in 1969 to that date, and what could be anticipated until the year 2009. It has been outlined that “[t]he focus has shifted from an early one on social science related

issues to a broader range of issues, including a greater emphasis on technological aspects ... In recent years, POEs have become more comprehensive, embracing economics, cost-estimating, health effects, and other concerns as well as aesthetics” (Anthony et al. 332-333). What was striking in the workshop were the questions regarding the future of the POE:

Do we need yet another new approach to the POE—and a new area of practice? Should POEs be viewed as a form of critical analysis that can occur at any stage throughout the building process—and not just after the building is occupied? How do we avoid “re-inventing the wheel” on each POE? (Anthony et al. 333)

These fundamental questions opened the way for POE not repeating, but renovating itself in future projects, to go beyond institutional groups, and to find a place for itself in the public and private sectors; to become a service given by the building industry. Defining POE as “a diagnostic tool and system which allows facility managers to identify and evaluate critical aspects of building performance systematically”, Preiser puts the aims of the POE as: “to identify problem areas in existing buildings, to test new building prototypes and to develop design guidance and criteria for future facilities” (“POE: How to Make Buildings Work Better” 20). Besides the facility management, it becomes a part of planning and programming of the buildings; a correctional programming:

Evaluations of an existing facility and its operations are a common means of collecting data on which to base future programs. Post-occupancy evaluations inform programmers where the client is coming from, clarify the client’s perspective of reality, and provide a wealth of information on how the client currently does everything ... For clients with recently completed or older buildings who want a closer fit between design and operations, a POE can be used to fine-tune the facility. (Goldman and Peatross 369)

An overall perspective to history and evolution of POE demonstrates that “... five types of POEs arose as the need for them changed over time. They began at different periods but continue on to the present day” (Bechtel 316). These are:

- The academic type—the first type of POEs done ... usually informally, when an architecture professor asked students to go out of the classroom, find a building, and report back on what they thought of the design. ... Most academic POEs were not written for publication and were seen only as class assignments.
- The scientific POE—with the advent of environmental psychology and organizations such as EDRA, social science professors got into the POE business and began formulating social science methods for POEs. ... [They] would choose a building and evaluate it by identifying the users, sampling them, and then scientifically collecting and analyzing data with statistically supported conclusions.
- The collaborative type—POEs done by social scientists alone did not get much use by designers. ... because of a desire on the part of many designers to learn how to do POEs on their own, a number of collaborations developed between designers and social scientists.
- The institutional type—although most of the effort behind POEs was directed at the design practitioner, the clients of these practitioners, usually government agencies or large corporations, began to learn about the usefulness of POEs and include as part of the RFPs (request for proposals). ... they became part of the institutional memory of each agency and influenced the way business was carried out.
- The entrepreneurial type—the most recent evolution of the POE was the formation of organizations to do POEs either for profit or by contract with other agencies. The Buffalo Organization for Social and Technological Innovation (BOSTI) was the earliest; ... the POE was part of their mainstay. Other organizations were Jay Farbstein and Associates, John Zeisel’s Building Technology, Inc., and Min Kantrowitz Associates. (Bechtel 312-316)

The evolution of POE from the academic context of class exercises—most of them done with walkthroughs—and a social sciences effort, to selling them as a marketable product incorporates POE more into architectural practice. The concept of offering evaluation services constitutes the main working paradigm of “... providing both the agency and the client with a continuing relationship through a building’s development and use” (Kernohan et al. 120). Particularly in the US, there are a number of organizations in both the private and public sectors, offering POE services. By the use

of building evaluations, a growing knowledge based on the relationship of users and buildings has developed and made POE a discipline of its own.

At the end of 1990s and in the 2000s, the renaissance of POE has materialized in the UK, focusing on the interrelationship of energy, engineering, and comfort. Warner and Reid Associates mention their most common types as follows: "... there are many forms of measuring energy use, user satisfaction and environmental conditions. Systems used in the UK, other parts of Europe and the US include PROBE (Post-occupancy Review of Buildings and their Engineering), BASE (Building Assessment Survey Evaluation), EARM (Energy Assessment and Reporting Methodology), and LEO (Low Energy Office)" (16).

Having been introduced in the UK in 1995, "Probe [sic] focuses on aspects of the building that can be technically measured, e.g. permeability to air ex-filtration, and measures that can be documented, such as energy consumption. Probe also uses a standard occupant survey questionnaire developed by Building Use Studies (BUS) to learn from a sample of occupants about their physical comfort, and their satisfaction with the building" (Leaman and Bordass 2001 qtd. in Szigeti and Davis 47). Probe studies focus mainly on building performance, occupant satisfaction, occupant productivity, environmental impact and energy efficiency, and "... perhaps the most comprehensive attempt ever to conduct POE from a variety of perspectives, namely technical performance, energy performance, and occupant surveys of the Probe buildings" (Preiser, "Feedback, Feedforward" 457). Especially for facility managers, this kind of information based on performance data is potentially a strong and useful concept to improve technical, economic and environmental performance, together with

occupant satisfaction and productivity. “Probe has been internationally acknowledged as a successful way of undertaking and reporting post occupancy evaluations of buildings quickly and reliably. ... Ultimately we think that post occupancy evaluation and benchmarking should become a standard follow-up to the design and construction of all new buildings, and the alteration and enhancement of existing buildings” (Cohen et al. 3). The aim of Probe is to cover the full range of post-occupancy issues including the following:

- design and construction
- design integration
- the effectiveness of the procurement
- methods of construction, installation and setting to work
- initial occupation of the building
- any unexpected requirements, changes and teething problems. (Cohen et al. 33)

Regarding these definitions and the evolution of POE in different contexts, it is possible to say that there is a challenge in the UK and North America. A sector-wide interest including government and clients in addition to architects is of concern in UK. The current strands of POE in UK according to Cooper are the following:

- 1) POE as a ‘design’ aid—as a means of improving building procurement, particularly through ‘feed-forward’ into briefing.
- 2) POE as a ‘management’ aid—as a ‘feed-back’ method for measuring building performance, particularly in relation to organizational efficiency and business productivity.
- 3) POE as a ‘benchmarking’ aid for sustainable development—for measuring progress in the transition towards sustainable production and consumption of the built environment. (161)

In addition, Doidge identifies POE in three styles within the context of its use in UK.

These are as follows:

- A ‘factual building report’—records basic parameters about area, cost etc. in order to make rudimentary comparisons between projects.

- Concentrating on ‘measurable parameters’—used more recently by BUS studies in its ‘PROBE’ analyses of area, energy, emissions, user satisfaction and so on.
- Based on ‘non-recriminatory forums’—proposed and has been developed and piloted.

From the North American perspective, “... a POE typically focuses on assessment of client satisfaction and functional ‘fit’ with a specific space. Typically, the criteria for judgment are the fulfillment of the functional program and the occupants’ needs. ... POE was seen as a logical final step of a cyclical design process, whereby lessons learned from the occupants about the space in use could be used to both improve the fit of the existing space and be fed back into design research and programming of the next building” (Zimmerman and Martin 169). The benefits of using POEs are seen to be the following:

- 1) A feedback loop to enhance continuous improvement processes
- 2) Improved fit between occupants and their buildings
- 3) The optimization of services to suit occupants
- 4) The reduction of waste of space and energy
- 5) Validation of occupants’ real needs
- 6) Reduced ownership/ operational expenses
- 7) Improved competitive advantage in the marketplace. (Zimmerman and Martin 168)

## **2.2. Process and Methods of POE**

A building can be evaluated systematically in a couple of days or in a couple of months depending on the type and size of the building, the objectives of the client and the ‘levels of effort for POE’. As defined by Preiser et al. there are three levels of effort for POE: indicative, investigative and diagnostic. Each of these is composed of three phases: planning, conducting and applying:

Level 1: Indicative POE provides an indication of major failures and successes of a building’s performance. This type of POE is usually carried out within a very short time span, from two or three hours to one or two days. ... There are

four typical data-gathering methods: archival and document evaluation, walk-through evaluation, evaluation questions and selected interviews.

Level 2: Investigative POE is more time-consuming; more complicated, and requires many more resources than an indicative POE. ... Often an investigative POE is conducted when an indicative POE has identified major issues that warrant more detailed study. The evaluation criteria are explicitly stated before the building is evaluated. Spending much more effort and time on the site, the establishment of the evaluation criteria involves at least two types of activities: state-of-the-art literature, and comparisons with recent, similar state-of-the-art facilities.

Level 3: Diagnostic POE is a comprehensive and in-depth investigation conducted at a high level of effort. Typically, it follows a multi-method strategy, including questionnaires, surveys, observations, physical measurements ... may take from several months to one year or longer to complete. ... The results of diagnostic POEs are meant to improve particular facilities and the state of the art in the building type. The methodology used is similar to that used in traditional scientific research. (53-57)

Information gathering is the most important aspect of a POE in order to measure a variety of issues and bring up an evaluation. In the POE of US Postal Service, Kantrowitz and Farbstein briefly brought up several information-gathering techniques, in which most of them are similar methods used in other studies:

- Presite visit forms—Facility managers and ... personnel completed detailed description forms prior to the site visits, providing construction history, building configuration, postal operations, and manager assessments of the facility.
- User interviews—... Customer interview questions focused on issues related to patterns of use, design, quality of service ...
- Clerk interviews—focused on how the unique operations and architectural design supported customer service and retail operations.
- Touring interview—... The approach involved taking a slow tour through the facility with a variety of people who were or had been involved in its planning, design, operation and maintenance. At designated places along the route, the facilitator asked the participants about the characteristics of the area, their opinions about how well it functions, its appearance, and other features.
- Space-use observations—... we systematically observed patterns of use at specific locations ...

- Physical environment checklist—A checklist was used to record physical characteristics ... such factors as door type and operation; types, sizes, and placement of signs; floor and wall materials; lighting; and dimensions of key fittings.
- Assessment of systems and details—We examined technical issues such as construction detailing and installation; selection of materials, fixtures, and finishes; and the performance of HVAC, lighting, security, and electrical systems. ...
- Photographic documentation—Photographs were taken to document use patterns such as queuing, interactions, and merchandise selection as well as design features such as lighting, details, materials performance (wear and tear), and so on. (90- 91)

The methods and items tested in today's POEs are outlined by Jaunzens et al. in

*Encouraging Post Occupancy Evaluation*, as follows:

POE techniques can be required for a variety of reasons, including to test:

- whether a building is performing as intended against the design brief;
- occupant satisfaction with the building in terms of environmental systems and/or facilities provision;
- whether a building is suffering from 'sick building syndrome';
- whether a building is impacting unduly on staff productivity;
- how well a building supports occupants in terms of its functional performance;
- how well an organization has achieved the culture change it was aiming for when it acquired new premises or undertook a refurbishment;
- whether there are any general management or personnel problems.

To obtain the greatest benefit from a POE it is necessary to use methods and interpret their results with an understanding of the context of the organization being studied. ... A range of POE methods exist, although organizations may also choose to develop their own measurement protocols. Within these methods a range of techniques might be implemented, for example:

- standardized questionnaires (e.g. to staff, business managers, facilities managers, customers);
- interviews (e.g. with staff, business managers, facilities managers, customers);
- observations (e.g. of staff at work, customers in use of the building);
- physical monitoring to provide a set of objective assessments. (3)

Field et al. define the POE process and methods from a different point of view, as

follows:

The POE process can be broken down into four major areas for evaluation:

- 1) The original purpose for which the building was designed;
- 2) The process by which the building was built;
- 3) The building, including its physical performance and its affect on the users;
- 4) The operation and maintenance of the building.

The various aspects of evaluation require the use of several different methods, including survey research, historical analysis of documents, and a walk-through inspection of the building. POE ... always involves physical measurements, or inspections, even if only informal ones. If the researcher does not know the nature of the finished building, he or she will not be able to make sense of users' responses to that building. (qtd. in Wehrli 198)

A range of POE methods exist, and there are some other better-known methods of POE besides Probe. Table 1 highlights these methods, within a framework of methods (format taken) and criteria (broad areas covered) used in evaluations, in which the areas of performance has been classified under headings derived by the LEAF (Learning from Evaluation and Applying Systematic Feedback) project. In the table, what is to be understood by 'product' is "how well the building achieves the pre-defined specification of fitness for purpose", 'performance' is "how well the building supports the organization's goals and user expectations", and 'process' is "the performance of the team, which includes the client, measured against the ability to meet client expectations" (Jaunzens et al. 3).

Table 1. Methods of POE

<b>Encouraging post occupancy evaluation</b>		
<b>Method Title</b>	<b>Format taken</b>	<b>Broad Areas covered</b>
Overall liking score  <b>PERFORMANCE PRODUCT</b>	<ul style="list-style-type: none"> <li>• Staff questionnaire</li> </ul>	Impact of office design on productivity: <ul style="list-style-type: none"> <li>• satisfaction with environmental systems performance</li> <li>• satisfaction with provision of facilities</li> </ul> Benchmarked against originators' internal data set.
<b>PROBE PERFORMANCE PRODUCT</b>	<ul style="list-style-type: none"> <li>• Staff questionnaire</li> <li>• Managers' questionnaire</li> <li>• Energy use assessment</li> <li>• Environmental systems performance review</li> <li>• Study of original design intent</li> </ul>	Performance of the building against the original design brief: <ul style="list-style-type: none"> <li>• energy use</li> <li>• satisfaction with environmental systems performance and functionality</li> <li>• satisfaction with provision of facilities</li> </ul> Benchmarked against developers' internal data set, ECON 19 energy benchmarks, and original design intent.
BRE Project Building Appraisal <b>PERFORMANCE PRODUCT PROCESS</b>	<ul style="list-style-type: none"> <li>• Questionnaire administered to members of the design and construction team on ongoing basis over project.</li> </ul>	Feedback for use in future projects: <ul style="list-style-type: none"> <li>• feedback on success of the briefing process</li> <li>• feedback on success of the design process</li> <li>• feedback on success of the construction process</li> <li>• feedback on success of the construction product</li> </ul>
BRE / DEGW NEW project <b>PERFORMANCE PRODUCT</b>	<ul style="list-style-type: none"> <li>• Staff questionnaire</li> <li>• Business Managers' questionnaire</li> <li>• Facilities Managers' questionnaire</li> <li>• Physical monitoring</li> <li>• Focus group</li> <li>• Observational studies</li> </ul>	Match between workplace design and organisational requirements: <ul style="list-style-type: none"> <li>• satisfaction with design, performance, and functionality of environmental systems</li> <li>• satisfaction with provision of facilities and support for business functions</li> <li>• monitoring of environmental systems performance</li> </ul>
OPI Toolkit <b>PERFORMANCE PRODUCT</b>	<ul style="list-style-type: none"> <li>• Staff questionnaire</li> </ul>	Impact of office design on productivity: <ul style="list-style-type: none"> <li>• satisfaction with performance of environmental systems</li> <li>• satisfaction with provision of facilities and support for business functions</li> </ul>
A questionnaire for studies of sick building syndrome <b>PERFORMANCE PRODUCT</b>	<ul style="list-style-type: none"> <li>• Staff questionnaire</li> </ul>	Likely incidence of sick building syndrome: <ul style="list-style-type: none"> <li>• medical symptoms</li> <li>• satisfaction with performance of environmental systems and indoor environment</li> </ul> Benchmarked against developer's national database.

Source: D. Jaunzens, M. Hadi, and H. Graves, *Encouraging Post Occupancy Evaluation* (pdf document [www.crisp-uk.org.uk/REPORTS/0012\\_fr.pdf](http://www.crisp-uk.org.uk/REPORTS/0012_fr.pdf)) 4.

### 2.3. Criteria Used in POE

The question of ‘What is actually evaluated in POEs?’ is quite important for the scope of the present study. According to Bechtel “[a]lthough it is clear that a POE is an evaluation, there is still some debate as to what is evaluated. Some would hold that the design of a building is what is actually evaluated. The opposite position is that the design by itself is irrelevant; it is whether the building suits the users’ needs. A middle

position is that a POE evaluates both the design and the human needs in relation to each other” (311-312). Besides user satisfaction in the buildings, the effectiveness of the building and the program, the overall architectural quality including attractiveness of interiors and exteriors and spatial arrangements, and the functional aspects including lighting, noise and parking space are some of the items dealt within the POE studies (Gifford 368). Therefore, it will be beneficial for the purposes of this study to gather, and list the criteria used in post occupancy evaluations conducted so far, by the use of some typical case studies. This is done in Table 2, as summarized from 26 cases, mainly in the US.

Table 2. Sample POE studies

<b>Name of the Project</b>	<b>Location</b>	<b>Type of the Facility</b>	<b>Criteria Evaluated</b>
DNR Area Offices	Detroit Lakes and Cambridge, Minnesota, US	Office	The human use patterns, building materials and construction, the design and operation of the environmental control systems
POE Application at NTT Office	Tokyo, Japan	Office	Office activity, service for customers, use of the office, ease of working, ease of service trading, comfort, efficiency of working, level of service, office operation
POE Quality of the School Environment	Sao Paulo, Brazil	Elementary and High Schools	Functional factors, environmental comfort, safety/ security, performance criteria
POE Glare Analysis in Collins Center	Los Angeles, California, US	Office	Energy performance analysis, occupant interaction with lighting controls, visual comfort
Martha Lake Elementary School POE	Lynnwood, Washington, US	School	Overall design quality, aesthetic quality of interior and exterior, amount of space, adaptability to change, environmental quality, security
Forrestal Building	Washington DC, US	Headquarters Building	Energy Performance: Lighting, distribution of luminance, physical measures of space (lighting, space, noise, temperature)

Table 2 (continued)

GHK (Gillette Company POE)	Bristol, UK	Headquarters	Orientation, lighting design, daylight, overall effectiveness of department, effectiveness of workspace, acoustic control
Evaluating the Design of Direct-Supervision Jails: The Genesis Facility and the West County Detention Facility	Orange County, Florida and Contra Costa County, California, US	Direct-Supervision Jails	Way-finding cues, hybrid housing, safety, security, flexibility and efficiency in use of space
POE and Test-room Studies	Wellington, New Zealand	School and Dormitory	Lighting, day lighting, artificial lighting
Canons House Lloyds Bank UKRB	Bristol, UK	Office Building	Access, entry and reception, vertical circulation, floor surfacing, orientation, workspace, environmental quality, amenities, aesthetics
A Web-based POE	Tucson, Arizona, US	School Building	Way finding, visual- nonvisual aesthetics, task performance, territoriality, cultural expression
POE of Barney-Davis Hall	Denison University, Granville, Ohio, US	School Building	User satisfaction (air quality, ceiling tiles, flooring, gray water, insulation, light shelves, paint, skylights) and sustainability, green renovation, flexibility in space
San Francisco Public Library	San Francisco, California, US	Library	Performance (organization, services, collection, technology, staffing and facilities) functional design, legibility, capacity
POE: The Wyeth Ayerst Chemistry Lab	Boston, Massachusetts, US	Laboratory	Lighting, privacy, services, flexibility
POE in Aviary	Tucson, Arizona, US	Museum	Visitor interest and satisfaction in terms of effects of structure on the behavior of visitors (ceiling height, the down-hill path, sparse vegetation and birds)

Table 2 (continued)

POE Retirement Home	West-side, Iowa, US	Retirement Home Building	Appearance (features of the built environment, orientation, use of colors, finishing for sensorial experiences), age related sensory perception, visual legibility (vision loss), space manipulation and designed features
Children's Hospital Garden Environment	San Diego, California, US	Healing Garden-outdoor	Healthcare satisfaction, active use of space, accessibility
POE of Way finding in a Pediatric Hospital	Salt Lake City, Utah, US	Pediatric Hospital	Way finding (floor layouts, signs, colors, and other way finding cues)
State Building Database, POE University of Minnesota Duluth Library	Duluth, Minnesota, US	Library	Building energy consumption, occupant satisfaction, design and construction process, materials, systems, details
The Wexner Center POE	Columbus, Ohio, US	Visual Arts Center	Construction and maintenance costs, roof leaks, finding of entrances, security, interior circulation—way finding, access, surveillance and safety, connections
Creative Living Inc. POE	Columbus, Ohio, US	Apartment Complex for the Severely Disabled	Analysis of the physical environment: design features describing required physical capabilities, such as overhangs, door knobs and locks
Subsidized Housing Satisfaction POE	East, Midwest, and Southeast, US	Housing Developments (including low-rise, mid-rise, and high-rise)	Architectural quality, such as unadorned boxes on asphalt parking lots, resident satisfaction, such as user control over the physical environment, privacy, maintenance, satisfaction with management
Kellogg Community College Science Building	Battle Creek, Michigan, US	Science Laboratory	Adaptable space configurations, effective use of spaces due to time schedules, satisfaction from conventional setting, use of materials
The Effects of the Living Environment on the Mentally Retarded Project	Belchertown, Massachusetts, US	Renovated Facility for the Retarded	Overall design schemes and their suitability for retarded residents, such as corridor and room designs

Table 2 (continued)

POE of Two Innovative Detention Centers	New York City, and Chicago, US	Prison-Correctional Centers	Provision of secure, humane, and detention facilities, satisfaction, privacy
POE of Yale Art and Architecture Building	Yale University, New Haven, Connecticut, US	University Building	Evaluation of different functional areas for such issues as convenience of access to the workplace, lighting, heating, privacy, noise, ceiling height, and amount of square footage assigned

As seen from this sample of POEs, which are typical examples of previously conducted studies, the criteria used in the evaluations focus mainly on functional factors, aesthetic quality, energy performance and user satisfaction. In addition to these, a site assessment appears as an important part of building evaluation, in order to determine the suitability of the facility in meeting the requirements. As Isaacs has classified, four issues to be considered in this respect are:

- 1) Location with respect to centers of population, transport, amenities, and other health services
- 2) Site characteristics and access
- 3) Balance of provision of facilities for the site
- 4) Relationships of departments on the site. (51)

For assessing whole buildings and the individual departments or functional units based on functional suitability, a set of criteria has been classified under six main headings:

- 1) Space relationships—critical dimensions of spaces
- 2) Services—suitable for function
- 3) Amenities—privacy, staff working conditions, favorable public impression
- 4) Location—with respect to other related departments and external features
- 5) Environmental conditions—heating, lighting, ventilation, noise, windows
- 6) Overall effectiveness—overall balance as assessed based on recorded details and the local team overview. (Isaacs 51)

In summary, a typical POE focuses on the functional effectiveness, layout, design, quality, value, user-occupancy, management, operation, and maintenance of a building, besides other factors related to the type of the facility, and the context it exists in. This does not mean that a POE never looks for cultural or perceptual issues in a building, however this is not wide spread in the profession. Zimring and Reizenstein have stated that "... many POEs have too narrow a focus in terms of what physical parts of the building are evaluated and what range of behaviors are measured" (qtd. in Bechtel 320).

#### **2.4. A Critical Evaluation of POE**

Regarding the importance of POE, it is a valuable tool for defining the guidelines to be used in future projects, presents useful information to various levels of building industry, and becomes an important part of the design process. It prevents us from doing the same mistakes several times because of the lack of evaluation data. Osterberg summarizes this aspect of the benefits and outcomes of POE as follows:

As Sommer points out in *Design Awareness* (1972), the lack of evaluation data not only causes bad design features to be repeated through ignorance in new architectural designs but also results in good design features being overlooked. Brill (1974) describes two basic outcomes of evaluations as 1) information about the usefulness of buildings and 2) the feeding of that information back into the design of new buildings. ... post construction evaluations can be useful in gaining an understanding of building performance. (qtd. in Osterberg 301)

At this point, there are two critical issues to consider: the effectiveness of building evaluation systems, and the missing criteria in these. Much work has been done to assess the effectiveness of the building evaluation systems, including the most common POE's, and Probe. They are highly effective, especially in the UK, and the US where building evaluations have begun to take the importance that they deserve. However, these assessments usually cover the issues related to the evaluation of building

performance aspects. In other words, building performance is the primary basis of assessing built environments.

Secondly, evaluation has a lot to do with values, and there is an act of valuing in evaluation. Whose values are referred to in an evaluation is as important as what is evaluated. Preiser indicates that “The term evaluation contains the word “value” and thus, occupant evaluations must state explicitly whose values are referred to in a given case. An evaluation must also state whose values are used as the context within [which performance will be tested]. A meaningful evaluation focuses on the values behind the goals and objectives of those who wish their buildings to be evaluated, or those who carry out the evaluation” (“Built Environment Evaluation” 473).

In addition to these, architectural practice has strong relations with ethical issues, and covers numerous practice phases, such as contractual-programming phase, schematic design phase, construction phase, and certainly POE as one of these phases. According to Wasserman et al., these phases are “... delineated in the responsibility issues which reflects the main ethical-issue areas that are part of professional practices” (184). Figure 1 illustrates a matrix figuring out the relation of the particular phase of practice and particular ethical focus under the title of responsibility issues. These responsibility issues include social purpose, cultural/societal values, community values, design values, public health and safety, professional principles, personal values—which do not coincide with those of POE—public interest, professional conduct, and business practices—which coincide with those of POE.

RESPONSIBILITY ISSUE	Social Purpose	Cultural/Societal Values	Community Values	Design Values	Public Health and Safety	Public Interest	Professional Principles	Professional Conduct	Business Practices	Personal Values	Personal Welfare
	<b>PRACTICE PHASE</b>										
<b>Professional and Community Service/ General Practice</b>											
1 Personal Choices	•									•	•
2 Public Service	•								•	•	
3 Cultural Diversity and the Public Architect		•				•		•			
<b>Office Management/Policy</b>											
4 The Client's House			•	•					•	•	
5 Rezoning			•				•		•		
6 The Mayor and the School Board			•					•	•		
7 The Neighbor's House				•			•	•			
8 The Master Plan Study						•	•	•			•
9 Building Codes and City Projects					•			•	•		
10 The Elusive Client							•		•		
11 Employee Rights								•	•		•
<b>Contractual/Programming Phase</b>											
12 Two Clients/One Project				•					•		•
13 The Real Estate Investment Project				•			•		•		
14 Adaptive Re-use/Historic Preservation		•	•		•		•		•		
15 Life Safety	•					•	•				
16 The Fee Proposal								•	•		
17 The Joint Venture								•	•		
18 The Cash Flow Bind								•	•		•
<b>Schematic Design Phase</b>											
19 The Competition							•	•	•		
20 Design Integrity	•			•			•		•	•	
21 The Client's Project Manager				•			•	•			
22 The University Architect			•				•	•			•
<b>Design Development Phase</b>											
23 Design Build				•		•	•	•			
<b>Construction Documents Phase</b>											
24 Building Material Choices					•		•		•		
25 Building Code Official					•		•	•			•
<b>Bid/Contracting Phase</b>											
26 The Public Bid Opening						•		•			
27 The Private Bid Opening							•	•			
<b>Construction Phase</b>											
28 Construction Observation					•			•	•		•
<b>Post Occupancy Phase</b>											
29 Post-Occupancy Evaluation						•		•	•		•
30 Right of Confidentiality and the Public Interest					•	•	•	•			

Figure 1. Matrix of practice phase in architecture and related ethical issues from Wasserman et al., *Ethics and Practice of Architecture* (New York: John Wiley and Sons, 2000) 185.

In summary, according to the two critical issues—effectiveness of evaluation and missing criteria—POE is highly effective in building performance issues looking for technical aspects, however it has not yet become mature enough in its contents regarding socio-cultural, percepto-cognitive, aesthetical and environmental—contextual—criteria. Therefore, the missing criteria ought to be integrated into POE in order not to be faced with poor design features, to achieve success in new architectural designs, to be able to deal with special building types such as re-used buildings, or sustainable buildings, and provide reliable data, in the sense of both technical and non-technical terms.

#### **2.4.1. Deficient Parts of POE**

Typical POE studies conducted so far have focused on functional factors, user satisfaction, aesthetic quality—in the sense of preferences, and energy performance—in Probe studies. Some missing parts of POE arising from the new trends and changes in the building industry have been partially met with the arrival of Probe, although it still needs to be considered more in the building delivery process. As mentioned by Preiser, “...what [POE] lacks is the emphasis on energy performance, sustainability and universal design (i.e. inclusive, non-discriminatory design of products, interiors, buildings, urban design and information technology), all of which are concerns which have received increased attention in the recent past” (“Feedback, Feedforward” 458). In this respect, we can think of some focused POEs addressing sustainability, energy performance, and universal design. Probe has been quite successful in energy consumption issues, however limited in the aspects of building, which could not be reliably measured. As Burns has summarized “Probe has been underpinned by three established methods—for occupant feedback, energy analysis and air tightness. So far it

has not included, for example, space utilization, cost-in-use, or aesthetic, all of which might be part of a fully rounded POE. Why? Because including these would have made the project unmanageable within the available resources; and because there were no tried and tested methods and benchmarks that we could rely upon” (133).

When examined from an overall perspective, all the aspects evaluated by POE are somewhat technical in terms of building performance, user satisfaction and overall effectiveness of the building. If POEs are to be used for the benefit of future building cycles in the beginning of the 21<sup>st</sup> century, they can provide more objective outputs for some aspects, which have not been dealt before in such a systematic manner. These aspects, such as aesthetics, community, environmental and societal values, and capital and maintenance costs will be considered in more detail in the third chapter under the title of ‘Building Values’, and a base to find out related criteria and develop alternative POE models from the building values approach will be constructed.

In order to have an overall view on the deficient parts of POEs, a framework would be useful, which separates into two parts—what has been evaluated, and what has not—outlining the analysis of POE according to the criteria it has covered. The framework is based on a figure titled “Evaluative Factors”. Developed by Friedmann et al., it lists the factors under several headings: the setting, the users, the proximate environmental context, the design activity, and the social-historical context (16). Some of the criteria under these headings fall down under the category of the evaluated criteria, and the others fall down the missing criteria of Table 3, as follows:

Table 3. Analysis of POE according to the criteria it covered until now, and the missing criteria proposed for the alternative models

A Brief Analysis of POE: Its Extents and Limits	
What Has Been Evaluated With POE?	What Has Not Been Evaluated Yet?
<p><b>Performance Criteria</b></p> <p><b>Environmental Comfort</b></p> <ul style="list-style-type: none"> <li>Way finding, territoriality</li> <li>Area requirements</li> <li>Information and direction finding</li> </ul> <p><b>Convenience</b></p> <ul style="list-style-type: none"> <li>Activities of user to be supported</li> <li>Circulation (vertical and horizontal)</li> <li>Access and orientation</li> <li>Perception of space</li> <li>Comfort</li> <li>Convenience</li> <li>Furnishability</li> <li>Environmental characteristics to support needed activities</li> <li>Efficiency and flexibility</li> <li>Goals of the facility</li> <li>Legibility</li> <li>Personalization</li> <li>Privacy and community</li> <li>Openness</li> <li>Safety                             <ul style="list-style-type: none"> <li>Accident, disaster, fire</li> </ul> </li> <li>Security from crime (and surveillance)</li> <li>Social interaction</li> <li>Visibility</li> <li>Productivity</li> </ul> <p><b>Durability</b></p> <ul style="list-style-type: none"> <li>Energy systems                             <ul style="list-style-type: none"> <li>Acoustics (including noise)</li> <li>Heating, ventilation, air conditioning (HVAC)</li> <li>Lighting</li> <li>Olfactory</li> <li>Radioactivity</li> </ul> </li> <li>Environmental impact</li> <li>Sitting and foundation</li> <li>Technique                             <ul style="list-style-type: none"> <li>Assembly</li> <li>Economy                                     <ul style="list-style-type: none"> <li>Construction cost</li> <li>Maintenance costs</li> <li>Operating costs</li> </ul> </li> </ul> </li> </ul>	<p><b>Social and Cultural Criteria</b></p> <p><b>Contextuality</b></p> <ul style="list-style-type: none"> <li>Fit between form and context</li> <li>Cultural appropriateness</li> <li>Exterior site organization/Interior spatial org.</li> <li>Authenticity of fabric</li> <li>Façade design and surface treatments</li> </ul> <p><b>The Social-Historical Context</b></p> <ul style="list-style-type: none"> <li>Social trends                             <ul style="list-style-type: none"> <li>Economic</li> <li>Treatment philosophy</li> <li>Social</li> </ul> </li> <li>Historical changes                             <ul style="list-style-type: none"> <li>In above trends</li> </ul> </li> <li>Temporal values                             <ul style="list-style-type: none"> <li>Growth, change, permanence</li> </ul> </li> <li>Conservation                             <ul style="list-style-type: none"> <li>Energy</li> <li>Labor</li> <li>Materials: precoordination</li> </ul> </li> <li>Preservation</li> <li>Sociability                             <ul style="list-style-type: none"> <li>Sociopetal, sociofugal</li> </ul> </li> </ul> <p><b>The Proximate Environmental Context</b></p> <ul style="list-style-type: none"> <li>Land use                             <ul style="list-style-type: none"> <li>Type of mix</li> <li>Density</li> <li>Distribution/ location</li> <li>Area</li> </ul> </li> <li>Supportive facilities and programs                             <ul style="list-style-type: none"> <li>Accessibility/transportation</li> <li>Cultural facilities</li> <li>Safety</li> </ul> </li> <li>Fitness to urban and regional context</li> </ul> <p><b>The Setting</b></p> <ul style="list-style-type: none"> <li>Organizational goals and needs                             <ul style="list-style-type: none"> <li>Communication</li> <li>Values</li> </ul> </li> <li>Organizational functioning                             <ul style="list-style-type: none"> <li>Who affects whom</li> <li>Management style</li> </ul> </li> <li>Symbolic elements</li> </ul>

Table 3 (continued)

	Phasing	Institutional features
	Quality of materials and finishes	Status symbols
	Maintainability	Transitory elements
	Serviceability	Upkeep
		Decorations by users or others
<b>Satisfaction</b>		
	Efficiency in work	<i>Aesthetical Concerns</i>
	Aesthetical satisfaction	Image of setting and context
	Comfort (in means of thermal, and space use)	Visual aesthetic quality (form, style, tradition)
	Fitness of space and activity	Visual compatibility
	Environmental satisfaction	Fitness of form and context
	Spatial appropriateness	Impact upon human
<b>Economic Criteria</b>		<i>The Users (Community Values)</i>
	Cost of operations	Group characteristics
	Quality in maintenance	Lifestyle
	Quality in operations	Stage in life cycle
		Socioeconomic status
		Values
<b>The Setting</b>		Participation in design and evaluation
	Ambient qualities	
	Noise	
	Microclimate	
	Air	
	Light	
	Natural or manmade character	
	Provisions for handicapped	
	Ramps	
	Braille signs	
	Adaptive environments for the disabled	
	Accessibility (architectural barriers)	
	Healthful environments	
	Learning environments	
<b>The Users</b>		<b>Appearance</b>
	Individual characteristics	Identity (denotative meaning)
	Age	Emotional quality
	Sex	Connotative meaning (status, symbolism)
	Education	
	Income	<b>Perceptual Criteria-Preferences, Attitudes</b>
	Ethnicity	Individual and group activity patterns
		Social interaction
		Spatial variation
		Temporal variation
		Emotional senses
		Intellectual meanings
		Aesthetical concerns
		Emotional
		Representational
		Surprisability and innovativity of spaces and elements

Source: A. Friedmann, C. Zimring, and E. Zube, *Environmental Design Evaluation* (New York: Plenum Press, 1978) 16.

### **2.4.2. Special Types of POE**

Starting from the first examples of POE, an evolution is seen in specialization according to the type of the facility evaluated; therefore such standardization can be conceptualized for future use. The main candidates standing out are educational facilities, military facilities, hospitals, governmental facilities including courthouses and libraries, housing facilities, office buildings and offices, and museums. These are the most common types of facilities evaluated using POEs until now, and open buildings designed to be sustainable and energy efficient, or disaster housings can be added to the list in the future. Specialized POEs for such kinds of facilities can provide economy in use of time, and a chance to focus on the most important aspects of the facility. However, a standardized POE toolkit should recognize the cultural differences and be planned thinking the same building types in different countries and cultural contexts (Preiser, “Feedback, Feedforward” 458).

### **3. VALUES IN BUILDING AND THE BUILT ENVIRONMENT**

Before discussing the concept of building values, it would be a sound approach to examine the multiple meanings of building. According to Barrett, “Buildings are for people. They are also facilitators of organizational performance. Buildings, facilities, people and organizations are interrelated to the extent that a failing in one link of the chain will affect overall building performance” (qtd. in Amaratunga and Baldry). Additionally, building can be thought as an activity, a product and a complex of phenomena at the same time:

First, building is an activity conducted by humans to answer the most basic need of shelter as well as other social individual and abstract needs; in this sense, it is a process of production and use. Secondly, building is the product of that process, the facility or structure that man builds. And thirdly, it is a complex, interacting set of physical, psychic, social and cultural phenomena that is observable in both the process and the product. (Pultar, *Building Education* 373)

Studies of value in the built environment and building involve complexities regarding such diversity in the conception of building. There are different professionals involved in different stages of building’s life cycle, such as architects, interior designers, engineers, facilities managers, users, architecture students and educators, and design review committees. Also, there are different fields, such as economics and aesthetics, concerning building process and activity. This situation requires a broad conception of value, however it is not very easy to construct a single framework of building values. Therefore, this chapter mentions building values regarding their extents and limits, and classifies them according to different approaches, and their usage in the context of POE.

### **3.1. Building Values**

Building evaluation is intimately connected with the building values, since we need values to evaluate buildings. Because “Values are the crux of the whole matter. Values are necessary to be able to evaluate! Values are necessary in order to evaluate the suitability of the client’s various goals and objectives. They are also necessary to evaluate the appropriateness of specific client needs and relationships. They are necessary to evaluate the suitability of various design decisions and are necessary for meaningful post occupancy evaluation” (Hershberger, Values 11).

A problem, which arises at first sight is measurement of values, because, in general, it seems to be hard to discuss values within technical aspects in the built environment, especially when they need to be in measurable terms. As stated by Pultar, the concept of value “...stems mainly from work that involves people’s personal, social, and moral values in affecting their behavior and has continued in that vein ... However, Kilby ... states explicitly that he ignores all of the technical meanings of value except the one in behavioral science and this is a common trait of such studies. ... Studies of value in building, on the other hand, need an alternate conception of value since building is closely connected with technical, socio-economic and perceptual phenomena and since different parties involved in the life-cycle of building do not conceive the question of value in the same manner” (The Conceptual Basis 159). Therefore, for a reliable evaluation, we need all kind of values to be put in measurable units, including social, perceptual, cultural and aesthetical issues, however difficult this might be.

### **3.2. Classification of Building Values**

There are various approaches to the classification of building values. However, to develop a strong basis for the assessment of POE, this study covers each of them briefly, and build-up a classification that incorporates some new aspects.

#### **3.2.1. Approaches to Building Values**

Two of the main aspects of a building are its use, such as a school or a house, and its functioning, with its internal and external elements. These functions are due to the architectural communication process, and include connotative, esthetical, territorial, expressional and stimulation functions (Altınoluk 11).

The building values provide the objective basis for these functional changes. These values can be classified as:

- Intellectual (its place in terms of art history)
- Emotional (its effect in the silhouette of the city or in the natural environment)
- Material (its usage value)

These values can be present in a building altogether or alone. However, it could also be possible that one of these may dominate the other, for example, while the usage value of a building may be low, its aesthetic value can be much higher. (Altınoluk 11)

Throughout history, buildings have been used for different purposes; assigning a new function to an old building is especially common. Using an old building for contemporary use brings along the problem of constantly changing requirements due to new trends and functions. Therefore, evaluating old buildings for contemporary uses becomes more complex, and needs to consider society's and the current generation's cultural values. Altınoluk's classification of building values, especially intellectual

value of a building, is useful and sound in order to point out how successful a modern function assigned to a building, and benefits the cultural background that it holds.

The second approach to building values has its roots in programming for architecture, in which articulating the values and goals has become a crucial part. Although Hershberger did not dedicate his classification directly to buildings, a great deal of it relates to buildings. These values are:

- Enduring Values: ... Survival, good life, and meaning and art, including a pleasing aesthetic experience. ... Survival: protection from the elements and one's enemies, provision of shelter to allow the occupants opportunity to take care of their human needs such as sleep, food preparation, socializing, procreation, and child rearing. This value is sometimes missing completely from programming documents.
- Institutional Values: ... there are likely to be values of human kind that are being met by the continuation of these activities and the facilities that accommodate them. If good architecture is to be achieved, the values of the institution ought to be articulated by the programmer so that appropriate goals and needs can be determined.
- Circumstantial Values: ... Often these are the only values to which the programmer and subsequently the designer actually respond. ... Most such values can be discovered in the following categories:
  - Environmental: site, climate, urban and regional context
  - Human: physical, physiological, psychological, functional
  - Societal: cultural, legal, community
  - Systems: materials, technology, processes
  - Temporal: growth, change, permanence
  - Economic: costs of construction, financing, operations, maintenance, energy
  - Aesthetic: form, space, style, tradition
- Client/ User Goals and Objectives: ... The client wants a larger facility with sufficient floor space to accomplish some new functional tasks or wants to relocate closer to the market for more community visibility, for example. Most generally these immediate goals and objectives relate to unarticulated institutional and circumstantial values of the client. (Hershberger, Values 9-11)

In many examples of POE studies, most of the effort is focused on some of the circumstantial values. Programmers generally consider values such as functional efficiency, user comfort and building economic; also as a part of the institutional values. However, the programmer has an obligation to consider all of the related values and make them clear. As an example, “If the institution is a hospital, what important human values are being served? Is it a place where doctors operate? Or a place where nurses care? Where patients are healed?” (Hershberger, Values 10) These should be made clear in the program, and the designer should express these in the design.

The third approach to building values is related to environmental values. As POE considers not only the building but also its proximate environment, we need to consider contemporary environmental values:

1. Preserve nature

We should preserve rare and endangered species and their habitats; and protect areas of special ecological, geological, historical, scenic, and recreational significance. ...

2. Conserve resources

We should confine resource use to the global steady-state level, by stabilizing populations, shifting to resource-conserving life styles, recycling recoverable resources, shifting energy use to renewable sources, and limiting our calculations of steady-state supplies to proven resources and technologies, not forecast but uncertain discoveries and advancements.

3. Control pollution

We should eliminate damaging, hazardous and noxious pollution of air, water and land.

Many of the values currently articulated are still several steps ahead of public action, but, of course, great progress has been made in the adoption of environmental policies by governments. (Mc Allister 58)

The fourth approach classifies values according to the kind of human needs that they relate to. From Pultar's point of view, "... values that affect the nature and outcome of human activities may be classified under three general categories: technical, socio-cultural and percepto-cognitive values" (162).

Technical values are related to the satisfaction of biological and biosocial human needs, as well as non-human requirements. Three generic values in this context are *reliability*, *efficiency* and *compatibility*. ... In the building context, one instance of reliability may be interpreted, for example, to mean the probability that a building will provide the requisite meso-environmental conditions. ... examples of descriptors associated with efficiency are such quantities as amount of useful space or quality obtained per unit of investment, or the thermal efficiency of the heating system. Compatibility is a value related to the inverse of the degree of conflict that the solution implemented will create with the people, and the physical and socio-cultural context, as well as other entities in the environment. A foremost example of technical compatibility is safety. ... Compatibility also pertains to the general class of socio-cultural values. ... social compatibility comprises values of past and future continuity, suitability to the social and cultural context, and conformity to good professional practice. Also affecting the formation and perception of the built environment are percepto-cognitive values, among which may be mentioned the generic values of evocativeness, mastery and 'dishabituality'. (Pultar, *The Conceptual Basis* 162)

In building, there are many values falling under same or different main value categories because of the diversity in their range. In addition, technical values seem to be more long lasting and constant in different countries, however other values can change more often according to the change in time, people and culture. Therefore constructing a firm value classification becomes a problem (Pultar 165). The generic class of values, related building values and relevant building descriptors are shown in the following figures 2, 3, and 4.

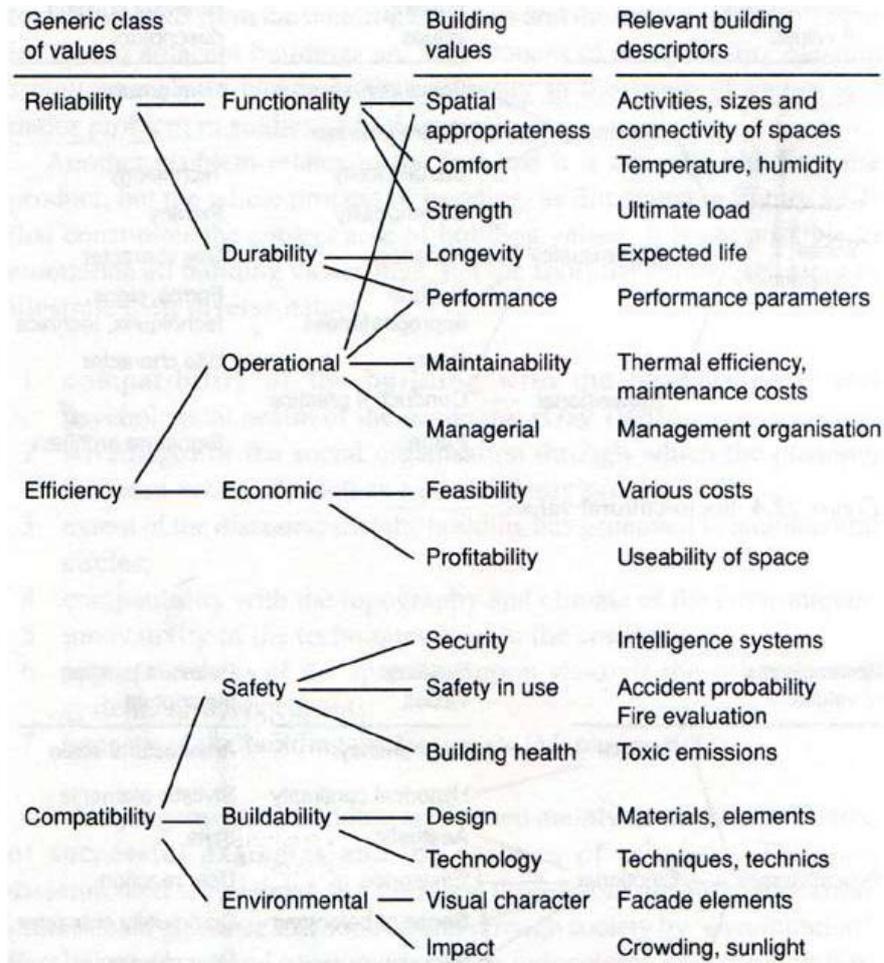


Fig. 2. Technical Values from Mustafa Pultar, “The Conceptual Basis of Building Ethics” in Warwick Fox, *Ethics and the Built Environment* (London: Routledge, 2000) 163.

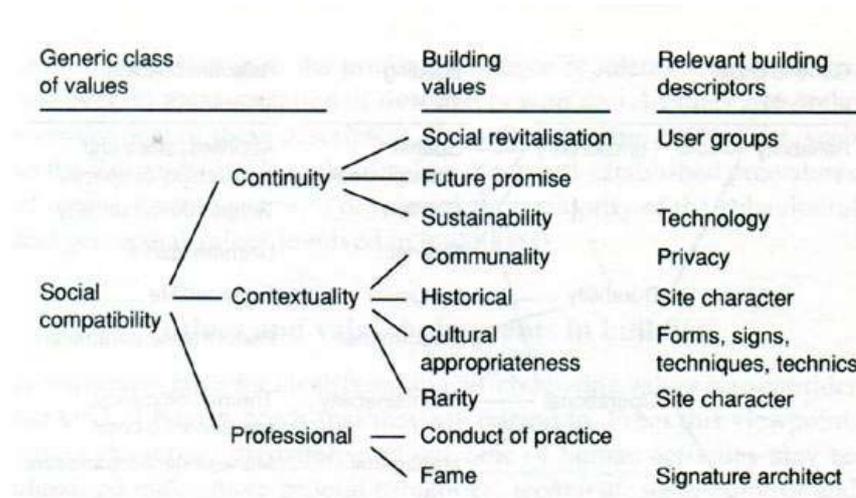


Fig. 3. Socio-cultural Values from Mustafa Pultar, “The Conceptual Basis of Building Ethics” in Warwick Fox, *Ethics and the Built Environment* (London: Routledge, 2000) 164.

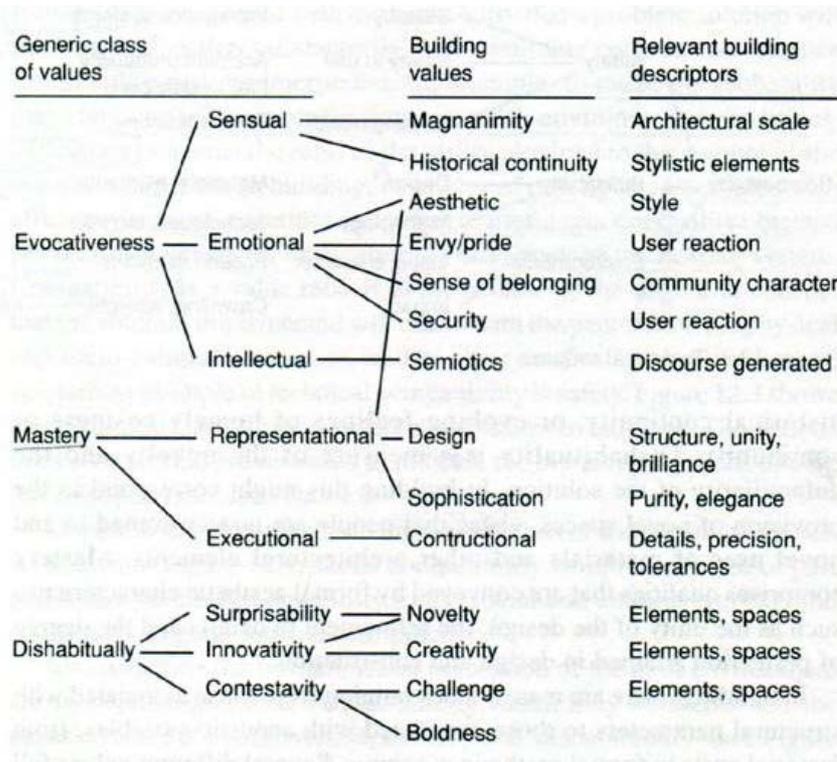


Fig. 4. Percepto-cognitive Values from Mustafa Pultar, “The Conceptual Basis of Building Ethics” in Warwick Fox, *Ethics and the Built Environment* (London: Routledge, 2000) 164.

### 3.2.2. A Structure/ Classification for Building Values

The importance of values for both programming and evaluation should be mentioned briefly of the outset. A comprehensive POE looks for how well a building works for users and its intended purposes. As every kind of information and detail from each phase can improve performance of the existing place, future programs, and design reviews (Nasar, *Design by Competition* 3), a comprehensive POE should go one step beyond building performance, and add new aspects into its context in order to meet the need for useful design guidelines of wider perspective. Therefore, building values should be clearly expressed and integrated into POE, and underlying value systems of the architects, designers, and decision makers should be considered in the programming phase. Hershberger sees articulating the values and goals in design as the most important—but the least accomplished—responsibility in programming for architecture. According to him:

... too few programmers and clients consciously and systematically articulate such values during the programming process. They tend to jump directly to identification of client goals, user needs, and space requirements, obvious to the fact that they each have underlying value systems that are influencing the decisions they make. If they were to articulate and prioritize these values, as well as the values of society and any other values that should be heeded, then they would have established a framework on which appropriate decisions about goals, needs, space requirements, and the like could properly be based. (Hershberger, Values 8)

In order to assess POE with a building values approach, the different values and value classifications mentioned above should be re-organized to integrate them as a usable basis for this study. Missing values can be added, other values will be examined and classified, and related criteria to be evaluated in the buildings will be mentioned shortly. In most cases, a specific value can be an element of more than one group; e.g., architectural style and character are both aesthetical values, and their descriptors are related to technical, perceptual and sometimes cultural values.

Below, building values are classified under thirteen groups in order to be used in the assessment of POE. These groups embrace a range of factors such as environmental, cultural, and physical performance. They concern the main values that can work as a basis in building evaluation; most of which make a building what it ought to be. Some value groups, which are technical in terms of their context, are concerned in current POE studies, such as functional appropriateness, efficiency, and building performance.

### **3.2.2.1. Aesthetics**

Aesthetics is the most controversial and problematic part of building values, because it is usually related to emotions and feelings arising from different kind of motivations in the built environment. The insufficient controls of aesthetic bring

serious problems regarding the built environment of communities. There are some good examples of regulations issued by governments, however these applications are too scarce, and usually bring problems in their application. In fact, the problem is the identification of the range of aesthetical issues and items to be dealt with, and the process of measurement, in order to put them in a usable and controllable form. The main aspects of aesthetical values in buildings and the built environment are as follows:

- Visual aesthetic quality (massing, scale, ratio of window openings to wall surfaces, height, setbacks, landscaping, building color or materials)
- Visual compatibility of site and landscape (signs, off-street parking and loading zones, conservation of existing vegetation, specific landscape elements required, percentage of open space required, underground utilities required, percentage of site to be landscaped, public art required or encouraged)
- Visual compatibility of a building (general compatibility, style or character, massing or volume, silhouette or profile, height, color and finish, materials and texture, façade articulation, historic preservation of sites, maximum or minimum lot size restrictions, maintenance of a high design standards)
- Visual clutter (signage controls, silhouette and profile review, underground-utility requirements, and pollution controls) (Preiser and Rohane 426- 429)
- Fit between form and context
- Balance between human use and architectural form (Alexander 353)
- Aesthetic impact upon humans (proportion, balance, rhythm, color, texture, etc.)
  - Order (coherence—entrance, edge, landmark, vista, skyline, groundline—, clarity—structure, articulation, closure—, continuity—

system, sequence, rhythm—, balance—pattern, emphasis) (Sanoff, Community 103)

### **3.2.2.2. Communication**

As applicable for other disciplines, communication between different levels and fields is vital for the identification and solution of problems in the built environment. A building ought to communicate with both its inhabitants, and managers, in order to inform them about potential problems that arose, or may arise. Also, advantages of efficient communication are vivid in the profession, especially between architect and layman. Values related to different levels of communication in building process are as follows:

- Building's communication with its inhabitants (use of visual means of communication, such as printed signs and iconographic symbols, and auditory means of communication, such as ringing bells and spoken announcements) (Fitch 131)
- Profession's communication with users. "For an evaluation method to be useful it must be able to present the impacts it assesses in reasonably clear terms. Communication is critical. If evaluators do not describe impacts in forms that are understandable and meaningful to users of the information, what good is their work?" (Mc Allister 42).
- Architectural communication (architects communicating their intentions to laymen, especially physical attribute of buildings constituting 'code's for architects. These physical attributes are pleasantness, organization, potency, novelty-excitement, and spaciousness.) (Hershberger, A Study of 190-191)

### 3.2.2.3. General Compatibility

A building ought to be compatible and harmonious with its environment, with its users, and with the contexts that it exists. General compatibility refers to a diversity of issues regarding environmental and aesthetical subjects. A building ought to work efficiently with its environment, hold an aesthetical harmony, and involve in social life in a compatible way. In the sense of buildings and the built environment, general compatibility referring different perspectives are as follows:

- Safety (security—privacy, activity, safety in use—, and building health—sick building syndrome causing reduced productivity and stress)
- Buildability (use of design, and technology along with different elements and materials, techniques, and technics)
- Environmental (visual compatibility with the proximate environment—elements, character—impact)
- Social compatibility (continuity—for future promise and sustainability—, contextuality—communality, historical, cultural appropriateness and rarity—, and professional—professional practice and fame) (Pultar, The Conceptual Basis 163-164)
- Contextual compatibility (space—exterior site organization, interior spatial organization—, massing—exterior massing, interior semifixed arrangements—, style—façade design, interior surface treatment) (Groat 234-235)

#### **3.2.2.4. Participation**

Participation can seem to have similarities with communicational issues, however what it differs is the building's self invitation toward users and their backgrounds. A building and its proximate environment may dispose meanings to individuals, in the sense of cognition. Depending on the perceiver's background, a building can share meanings with users, such as symbolic and formal. Sometimes, it may impose these meanings. How it achieves this burden becomes a matter of evaluation, in order to be close to the intended purpose of the design. Values regarding the involvement of a building with its users and environment can be thought in three different ways, which are along these lines:

- With its users (invitation of access—entrances, doorways, and stairs—, possession of human scale, evocativeness of interest)
- With its context (appearance and meaning of the building—symbolic meaning, formal meaning, denotative meaning, connotative meaning) (Nasar, *Design by Competition* 65)
- With its proximate environment (façade, relationship with the landscape it exists) (Berleant 95-97)

#### **3.2.2.5. Functional Appropriateness**

Functional appropriateness of a building refers to the suitability of a particular space to its intended use—function. There is a variety of building descriptors used in the evaluation of how a building provides such kind of suitability. Most of them are applying to levels of comfort, because comfort is one of the most reliable values to

measure the suitability of functions. The values regarding functional appropriateness may be listed in the following manner:

- Spatial appropriateness (usefulness and overall attendance of a space, spatial arrangements, space utilization, sizes and connectivity of spaces, linkage—access, interaction, overlap—, diversity of use—choice, variation—, zoning or spatial clustering of related functions)
- Levels of comfort (physical ease, visual rest, friendliness, temperature and humidity, the indoor climate—hygrothermal building performance especially during winter period—, human factors and ergonomics)
- Strength (ultimate load of building)

#### **3.2.2.6. Efficiency**

A successful building provides a shelter for different kind of activities, and a comfortable atmosphere for occupants to perform these activities in the most efficient way. How buildings accomplish in efficiency issues is one of the most common concerns of building evaluation. Efficiency can be taken up in different levels, such as programming, operation, and economics. These levels may require knowledge on different disciplines. For example, operational effectiveness of a building can be studied along with management studies, and economic efficiency of a building has to deal with mathematical calculations for various costs. Values related to efficiency in buildings are as follows:

- Program effectiveness (usefulness and overall attendance of a space)
- Functional effectiveness (lighting, noise, parking space etc.)

- Operational efficiency (maintainability issues regarding thermal efficiency and maintenance costs, and managerial issues regarding management organization)
- Economic efficiency (feasibility issues dealing with various costs, and profitability issues dealing with utilization of space) (Pultar, The Conceptual Basis 163)

### **3.2.2.7. Privacy and Social Contact**

Privacy and social contact in a building can be taken into account under both socio-cultural goals and values, and technical aspects, because their descriptors in the building relate with technical solutions concerning social issues. Levels of social contact can change in different cultures, and for different individuals. Similarly, privacy problems, whose descriptors may tend to change according to different cultures, have solutions using technical approach in buildings. Values on the subject of privacy and social contact are as follows:

- Visual privacy
- Audial privacy
- Social and territorial privacy (spatial connections or separations, aspect of personalization- possibility of marking the environment) (Voordt et al. 73)

### **3.2.2.8. Building Performance**

Building performance issues are related to technical aspects of a building. Effective and evaluative judgments in most of the evaluations look for environmental satisfaction of users, usefulness of spaces, spaciousness, permanence, potency, complexity, lighting, thermal comfort, acoustics, and fire safety as the physical attributes; which overall form

the technical aspects of buildings. Technical values and their parameters in buildings are as follows:

- Lighting (satisfaction of space-activity requirements as Flynn indicates “ ... psychological uses of focal emphasis, color tone, silhouette, sparkle, and other patterns of spatial light” 161.)
- Acoustics (control of wanted or unwanted sound-noise control-, efficiency in sound transmission according to purpose)
- Fire-safety (fire egress routes, efficient use of sprinkler systems, adaptation of regulations)
- Building services (noise control, maintenance, visual compatibility of service elements and fittings)
- Thermal performance (thermal resistance of external building envelope, position and continuity of insulation layer, tightness of external building elements and propensity to water penetration, orientation of building) (Paciuk 336)

#### **3.2.2.9. Cultural Aspects**

Buildings are one of the most effective vehicles for cultural expression. The use and manifestation of cultural aspects in buildings are of great importance for the continuity of cultural values. How buildings go through cultural aspects consider issues, such as the use of form, fabric, and history. Values regarding cultural aspects are as follows:

- Building fabric, form, space, function

- Extraneous factors (design philosophies, environment-behavior theoretical approaches, national concerns expressed through standards and regulations) (Paciuk 339)
- Historical preservation
- Land use (attitude to land—in the sense of building’s proximate environment—brought by culture—“harmonious balance of man and nature”) (McHarg 287)
- Contextuality (in consequence of its site, its historical importance, uniqueness of a particular style, external appearance for passerby)

### **3.2.2.10. Design Review**

Design review is not a value system but rather a procedure containing requirements and considerations for the provision of carefully considered appearance of the built environment. It deals with conceptual design strategies, and unites a variety of aspects, some of which already involved in value groups discussed here. The crucial point of design review is its potential context in assessing the effect of these regulations on the look of the city. Allied values essential for design review are as follows:

- Contextualism (positive relation with the setting)
- Amenity/ comfort (protection from sun and heat, or access to sun)
- Visual interest (balance of various forms and materials)
- Cultural history (contribution to heritage and to vitality) (Gammage 85)
- Visual continuity, hierarchy, and replication
- Contextual compatibility (suitability of the building to its environmental setting, in the sense of land use, historical and cultural context, balance etc.)

### **3.2.2.11. Percepto-cognitive Values**

The formation and perception of the built environment are due to some aspects in buildings, which evoke the users interest, and cause different feelings, such as the differentiation of public and private, feeling of lonely or community. Also, use of architectural elements, materials, and specific styles affect perception and cognition of users. In line with these, percepto-cognitive values are as follows:

- Evocativeness (senses, emotions, and intellect of observers and users are evoked—magnanimity, historical continuity—, emotional—aesthetic, envy/pride, sense of belonging, security—, intellectual—semiotics)
- Mastery (qualities that are conveyed by the representation of formal characteristics, such as aesthetic, design, sophistication, and the refinement in details, precision, and tolerances)
- Dishabituality (surprisability and provision of novel spaces, innovativity by creativity in use of elements and space, contestativity—challenge, boldness, novel use of elements and space) (Pultar, The Conceptual Basis 164)
- Territoriality (visual motifs and physical arrangements- boundary definitions—, visible expressions of use—maintenance, embellishment, intensity of use, activity of users) (Brower 184)

### **3.2.2.12. Environmental Performance**

Buildings have environmental impact because of their use of resources, both in the construction and use phase, such as land, water, and energy. Thus, operation of

buildings in the sense of environmental performance is a matter of evaluation, regarding following values:

- Design and procurement
- Operational (management of energy and running costs, policies and procedural issues)
- Potential environmental impact
  - Energy (operational energy and CO<sub>2</sub> issues)
  - Transport (related CO<sub>2</sub> and locational issues)
  - Water (consumption, and leakage related issues)
  - Materials (environmental implications of material selection)
  - Land use (greenfield and brownfield site issues)
  - Site ecology (Ecological value of the site issues)
  - Pollution (air and water pollution issues) (*BREEAM 98*)
- Energy use and loads (delivered energy-operational, lifecycle energy use, greenhouse gas production, heating and cooling, plant load)
- Indoor thermal comfort (highest and lowest operative and radiant temperature, relative humidity, and discomfort degree hours)
- Life cycle costs (initial, operating, and maintenance costs)
- Life cycle CO<sub>2</sub> gas production (Soebarto and Williamson 686)

### **3.2.2.13. Historical Values**

These values are related to adaptively re-use of buildings for different functions.

Historical values are professional issues to be dealt with, as they refer to both socio-cultural and technical knowledge with a historical focus. The shell of the older building,

the traces of construction techniques and materials, and the preservation of the architectural value of the past are three of the most important aspects. Most of the old buildings hold a historical style and architectural significance. The major historical values in the sense of buildings and the built environment are as follows:

- Historical value of the environment (form of the historical environment, effect of the culture of production on building; techniques, materials, and quality) (Davis 160-161)
- Integrity, uprightness, correctness, truthfulness
- The quality of artistry (Warren 46)
- Authenticity of fabric
- Use, beauty, and ability to provide a historical source (Lemaire 50-55)
- The historical and architectural significance of building, along with its size, location, and economic potential.

### **3.3. Context of Values**

In general, POEs conducted until now, both at the educational and professional levels, have been concerned with nearly half of the aspects mentioned above. Most of them can be classified under the title of technical aspects and architectural quality. However, the rest of the values related to buildings and built environments still remain unaccounted for. New POE strategies can be developed to involve such non-dealt with values. Attempts at achieving that should consider socio-cultural and regional differences where the evaluation takes place.

It should be always recalled that regional differences should be taken into account before conducting POE. A specific value distinct for a building may be crucial within that region and context, however the same value may not hold much importance somewhere else, and may become meaningless. In other words, some building values acquire meaning within the region and context in which they exist. For example, grey-water recycling as part of sustainable architecture is one of the most important concerns in Austria, the Europe region. However, it might be of much less importance in another region (Todd and Geissler 249). The cultural and socio-cultural values exist in a social-historical context including social norms, unemployment levels, and demographic profiles. Therefore, before evaluation of a building, the type of POE should be decided on, and the criteria to be used in POE should be carefully selected according to what kind of information is needed.

#### **4. PROPOSAL FOR ALTERNATIVE POST OCCUPANCY EVALUATION MODEL**

In this chapter, the building values described previously are integrated into POE, regarding its deficient parts in specific cases, and programmatic needs. The effectiveness of POE related to physical factors is a matter of fact. However most of the building values are missing in these POEs, and need to be kept in mind in current studies. Using a building values approach in the evaluation phase of a building means that an understanding of an extensive limit of factors impacting the building, in addition to its operational, social, cultural, and perceptual levels. Thus, the set of criteria based on building values will be identified, and considered in this POE survey proposal. It should be always bore in mind that some projects may have unique criteria that not listed therein.

A framework for implementing an alternative model based on the building values approach can be suggested through a diagram, as shown in Figure 5.

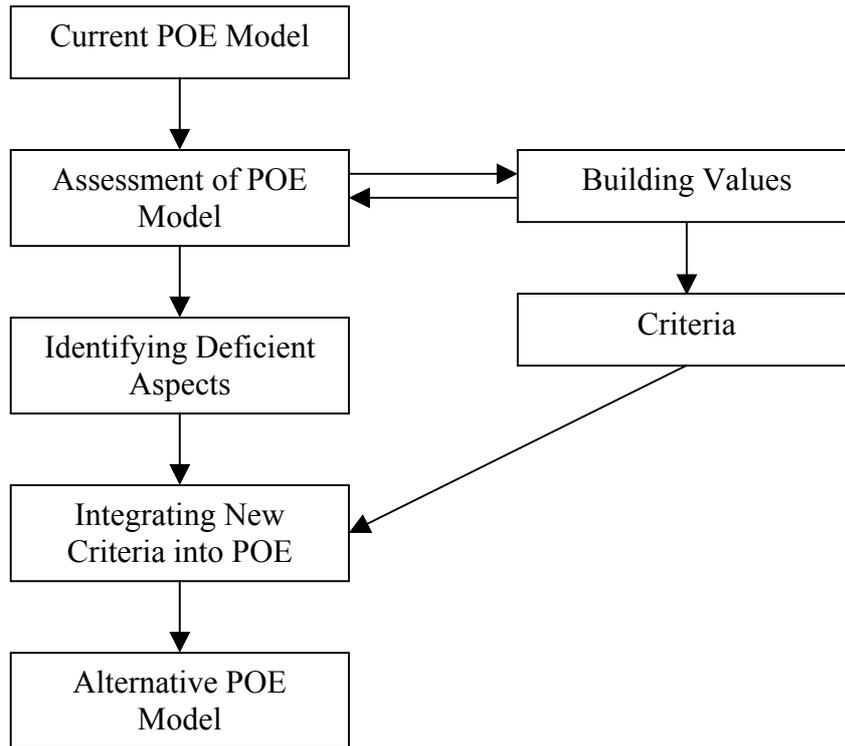


Fig. 5. Framework for implementing alternative model

The alternative POE model has some stages in common with current POE model, such as a planning phase, a field research phase, and a phase of applying the results. What it differs in is its focus in the building, thus the criteria used, according to the aim of the evaluation. Standard POE procedures can be used in the sense of feasibility and budget, research planning, data collection process, data analysis process, and reporting of findings. In Table 4, a comprehensive example is shown as a POE model development:

Table 4. POE model consisting of three major phases and nine steps

PHASE I: PLANNING THE POE		
<p><b>Step 1.1: Reconnaissance and Feasibility</b>  <i>a. Purpose:</i> To initiate the POE project; to establish realistic parameters regarding the (client) organization's expectations of the evaluation; to determine the scope and cost of project activities; and to obtain a contractual agreement if the evaluation is out-sourced.  <i>b. Activities:</i></p> <ul style="list-style-type: none"> <li>• Development of client contract</li> <li>• Discussion and selection of appropriate POE effort level</li> <li>• Identification of liaison individuals</li> <li>• Review of structure of (client) organization</li> <li>• Preliminary inspection of building to be evaluated</li> <li>• Determination of existing building documentation</li> <li>• Identification of significant building changes and repairs</li> <li>• Interviews with two to three key personnel</li> <li>• Development and submittal of POE proposal for approval</li> <li>• Execution of contractual agreement</li> </ul>	<p><b>Step 1.2: Resource Planning</b>  <i>a. Purpose:</i> To organize the resources necessary for effectively conducting the evaluation; to develop cooperation and support at all levels of the (client) organization.  <i>b. Activities:</i></p> <ul style="list-style-type: none"> <li>• Obtaining agreements from building occupants to participate in POE</li> <li>• Definition of project parameters</li> <li>• Development of work plan, schedule and budget</li> <li>• Presentation of resource plan to (client) organization</li> <li>• Formation of POE project team</li> <li>• Development of preliminary outline of final report</li> </ul>	<p><b>Step 1.3: Research Planning</b>  <i>a. Purpose:</i> To develop a research plan which ensures that appropriate and credible POE results are obtained; to establish performance criteria for the building; to identify appropriate data collection and analysis methods; to develop appropriate instruments; to allocate responsibility for specific research assignments; and to devise quality control procedures.  <i>b. Activities:</i></p> <ul style="list-style-type: none"> <li>• Identification of archival resources on client organization's documents</li> <li>• Identification of prospective participants or respondents</li> <li>• Contact with potential respondents in (client) organization</li> <li>• Authorizations for photographs and surveys</li> <li>• Presentation of outline of research plan</li> <li>• Inspection of building</li> <li>• Assignment of project tasks to available personnel</li> <li>• Scheduling of research tasks and personnel</li> <li>• Development of research instruments</li> <li>• Continued development of outline for evaluation report</li> <li>• Classification and development of performance criteria for the evaluation</li> </ul>
PHASE II: CONDUCTING FIELD RESEARCH		
<p><b>Step 2.1: Initiating the On-Site Data Collection Process</b>  <i>a. Purpose:</i> To prepare the evaluation team and the (client) organization for on-site POE activities; to coordinate the timing and location of POE activities to minimize disruption of routine functions of the organization.  <i>b. Activities:</i></p> <ul style="list-style-type: none"> <li>• Coordination with building managers and users</li> <li>• Building orientation for the POE team</li> <li>• Practice runs of data-collection procedures</li> <li>• Reliability check among observers concerning data collection</li> <li>• Set-up of POE team area in building</li> <li>• Preparation of data-collection forms for distribution</li> <li>• Preparation and calibration of data-collection equipment and instrumentation</li> </ul>	<p><b>Step 2.2: Monitoring and Managing Data Collection Procedures</b>  <i>a. Purpose:</i> To assure collection of appropriate and reliable data.  <i>b. Activities:</i></p> <ul style="list-style-type: none"> <li>• Maintain liaison with (client) organization's management</li> <li>• Dissemination of data collection instruments such as survey forms</li> <li>• Collection and collation of data recording sheets</li> <li>• Monitoring of collection procedures</li> <li>• Documentation of POE process</li> </ul>	<p><b>Step 2.3: Analyzing Data</b>  <i>a. Purpose:</i> To analyze data; to monitor data analysis activities in order to ensure reliable results; and to develop findings that are useful and insightful.  <i>b. Activities:</i></p> <ul style="list-style-type: none"> <li>• Review of reliability of raw data</li> <li>• Data entry and aggregation</li> <li>• Data processing</li> <li>• Review of results of data analysis</li> <li>• Interpretation of data</li> <li>• Development of findings</li> <li>• Structuring of results</li> <li>• Completion of data analysis</li> </ul>
PHASE III: APPLYING THE POE RESULTS		
<p><b>Step 3.1: Reporting Findings</b>  <i>a. Purpose:</i> To report the findings and conclusions of the POE according to the organization's needs and expectations; to provide clear and accurate data that support the findings and recommendations.  <i>b. Activities:</i></p> <ul style="list-style-type: none"> <li>• Preliminary discussion of findings</li> <li>• Development of presentation formats</li> <li>• Organization of report contents and other presentations</li> <li>• Preparation of documentation</li> <li>• Formal review of findings by organization</li> <li>• Dissemination of reports</li> </ul>	<p><b>Step 3.2: Recommending Actions</b>  <i>a. Purpose:</i> To make recommendations and stimulate action based on the findings and conclusions of the POE process.  <i>b. Activities:</i></p> <ul style="list-style-type: none"> <li>• Review of project findings and needs with (client) organization and building occupants</li> <li>• Analysis of alternative strategies</li> <li>• Prioritization of recommendations</li> <li>• Implementation of recommendations</li> </ul>	<p><b>Step 3.3: Reviewing Outcomes</b>  <i>a. Purpose:</i> To monitor the life-cycle implications of the recommendations.  <i>b. Activities:</i></p> <ul style="list-style-type: none"> <li>• Liaison with (client) organization</li> <li>• Continued review and monitoring of implemented recommendations</li> <li>• Reports on results of the effects of changes to the evaluated buildings and subsequent buildings</li> </ul>

Source: W. F. E. Preiser, "POE Feedback: Making the Office Work." *Haworth Office Journal* 7 (1993): 1-8. (pdf document <http://www.haworth.com/pdfs/e1030.pdf>) 6.

There are three major phases of a typical POE study, and each phase consists of three steps. The purpose and activities of each step is shown in the above table.

#### **4.1. Introduction to the Alternative Model**

The alternative model proposed here suggests new criteria to be integrated into current POE model. These constitute five groups of criteria, respectively based on aesthetics, contextual compatibility, participation and communication, design review, and sustainability. There is a sixth group of criteria—viewed as an additional part—suggested for the evaluation of adaptively re-used buildings. Excluding this additional part, this model can be used on any building type, such as those for educational, governmental, residential, and private and social organizations.

A survey proposal has been developed after the suggestion of the criteria (see Appendix A). This proposal consists of two main parts: ‘Building Information’ and ‘POE Building Survey’. The first part has been developed to be filled out by the person or organization carrying out the evaluation. It inquires detailed information about the building evaluated, such as its name, type, location, age, number of occupants, and type of environment in which facility exists. The second part has been developed for evaluators. The evaluators should be the inhabitants of the building, or, they should have some relationship with the building, such as being a routine passerby or visitor. The duration of their occupancy in building does not matter since the evaluators are going to indicate this in the ‘Background Information’ part of the survey. Following this, the second part consists of six categories of questions based on the criteria groups mentioned above. There is not any time limitation designated for this survey; evaluators are free to use time for answering all of the questions. Regardless of the occupation and background knowledge of the evaluator, the survey is open to everyone who pays attention and time for it. For that reason, some necessary explanations are given preceding the questions.

In order to test the effectiveness of the survey proposal, a pilot study has been conducted in a selected building with the help of twenty volunteer participants. The participants have diversity in being inhabitant or visitor, in being a newcomer or an old inhabitant, and in their background experience, knowledge and occupation. The evaluation of the alternative model, and related discussion can be found at the end of this chapter. Following are six groups of criteria suggested for the new model, along with their purpose for suggestions.

#### **4.2. Proposed Criteria With Focus on Aesthetics**

A building is most valuable when it provides the maximum satisfaction, including the aesthetic appeal. Aesthetics is crucial as a basis for public control and for the good of the community (Nasar, Urban Design 378). In “The Architecture Project” of University of Arizona, the study of aesthetics is accepted as an essential societal value; the values held by that specific culture’s architecture. Such aesthetics in buildings may “... offer opportunities for participation, and when they do, they contrast with the usual treatment of architectural structures as visual objects” (Berleant 95). Several aspects related to aesthetics bring aesthetic perception, in which a user can be confronted with the building with insignificant access, or—vice versa—embraced by the building with a welcoming approach. As Berleant mentions, “[a]n environment can be designed to work in this mode”, a totality continuous with the participant, “or it can be structured to oppose it. It can be shaped to encourage participation or to inhibit, intimidate, or oppress the person” (97). Therefore the aesthetical performance of a building becomes as important as its technical performance, for a maximum satisfaction.

#### **4.2.1. Purpose**

Evaluating buildings with emphasis on monumentality, symmetry, geometric balance, harmony etc. will provide valuable feedback for design guidelines or design reviews, especially "... where there are recurring construction programs or repetitive building types" of certain districts (Preiser and Postell 6). The purpose here is to optimize the public architectural image, and provide user comfort and delight both in the exterior and the interior of a building. Because,

[n]obody wants an ugly building. Corporate image is often considered to be strongly reflected in the presence and façade of a building that is "different". This superficial "identity" is effective only as long as a building remains alone in its style and place. When similar buildings compete for attention, the result is often rather boring. ... A contextual solution based on beauty beyond the façade and universal, everlasting human needs will remain beautiful in its surroundings regardless of its neighbors. (Lam 7)

#### **4.2.2. Criteria Suggested for Aesthetics**

Building features can be studied under two main types of aesthetics: formal aesthetics, and symbolic aesthetics. The attributes of formal aesthetics are those that relate to the structure of forms, such as shape, proportion, rhythm, scale, complexity, color, illumination, shadowing, order, hierarchy, spatial relations, incongruity, ambiguity, surprise, and novelty (Lang 11, Nasar, Urban Design 382). The attributes of symbolic aesthetics cannot be defined solely by physical attributes, because they are appreciation of the associational meanings of buildings and environments, such as naturalness, upkeep, intensity of use, and style (Nasar, Urban Design 389). Criteria related to both types of aesthetics are studied below.

The part of the POE model with focus on aesthetics is based on the basic aesthetic concepts valued by cultures, such as balance, order, integrity, and meaning. According

to “The Architecture Project”, important aspects of these aesthetic concepts are as follows:

- Balance—The use of related aspects listed below can be evaluated in buildings and their proximate environments
  - Urban scale: Scale is how we perceive the size relationship of one thing to another. Typically, we use ourselves, that is our bodies, as the measure in determining whether something else is “large” or “small”. The largest architectural scale is that of the city, called the urban scale. It encompasses buildings, streets, bridges, plazas, parks, monuments, etc. At the urban scale we see buildings in relationship to one another, as solids in relationship to open spaces and as a much larger structure in relationship to ourselves.
  - Building scale: The building scale is comprised of individual buildings. Our "measure" of a building will be in relationship to our bodies, whether we are considering the outside of the building or the inside space that is created.
  - Detail scale: The smallest scale is the detail scale. This scale encompasses the elements that are related to the hand in size, such as bricks, tiles, mosaics, paintings and sculpture. Often associated with the "decoration" or ornament in a building, these elements are essential for two reasons: for scaling down and for variation and interest.
  - Size relationship: The primary size relationship at the urban scale is between the city and the human being.

- **Balanced proportion:** Proportion is the ratio of one part of a building to another. Although, proportion may be measured mathematically, aesthetic judgment is usually rendered on visual evidence and is culture specific. The assumption is that a well-proportioned building is one that is balanced. One of the key factors in the quality of an interior space will be found in its proportions.
- **Vertical proportion:** In this case, it is the ratio of the height by the width.
- **Symmetry in plan:** Symmetry is the correspondence in size, shape and position of parts on opposite sides of a dividing line or axis. If a line is drawn on the axis, either in plan or in elevation, one half of the building could be reproduced as a mirror image of the other half.
- **Symmetry in elevation**
- **Asymmetry:** This means "not symmetrical", which is, unequal in size or shape on either side of an imaginary line or axis. The plan or elevation may not have an axis at all, but may be a composition of unequal parts. Asymmetrical plans rely on the placement of these unequal parts to create balance.
- **Light and shadow:** Visual interest of light and shadow can be created by the placement of parts of the building in relationship to the whole, where some parts are pushed to the outer limit and catch the sunlight, and other areas are recessed and in shadow.
- **Small parts within a larger form:** The small detail scale parts serve to balance the larger building scale form.
- **Textured pattern:** Pattern can be used to create balance in architecture, especially when patterned surfaces are complimented with un-patterned

surfaces. A "pattern" in architecture can be made with color or texture. It can be created with one material and various textures, or various colors and one texture. A pattern could also be created by light and shadow.

Below are three examples of pattern at the detail scale.

- Color: Often used in architecture to create a balanced composition, color evokes emotions from the person experiencing the building, and used in patterns, in fields, and in colored light.
- Interior/exterior balance: Balance can be created in architecture at the building scale by reinforcing and expressing the relationship between the interior and exterior. The relationship between the interior and the exterior can be balanced in several ways. One such way is the use of glass to reduce the perception of a division between interior and exterior space.
- Order—axis, hierarchy, repetition, and spatial sequence are the basic ordering systems in architecture. Symmetry could also be considered as an ordering system.
  - Single axis: An axis is simply an imaginary line. The use of an axis is a method for ordering the complex functions of a building and directing the movement of a person through those spaces.
  - Hierarchy by location: The building's prominent location within the city, such as its occupancy of the highest ground and the best view, is considered as hierarchy by location.
  - Hierarchy by shape: In an urban setting, most of the buildings are rectilinear in shape and orthogonal in plan, and any other shape tends to draw attention to itself.

- Hierarchy by size: Seen both at the urban scale and at the building scale, hierarchy based on size usually means that the largest structure is the most important. At the building scale, the largest room is usually the most important room.
- Hierarchy by articulation: At the detail scale in building, a higher level of articulation or detail is most often used to draw attention and create richness in a particular area of the building.
- Repetition: The repetition can be in the form of spaces or forms, and colors or textures. The forms can be structural or non structural and seen in plan and/or in elevation. Repetition will have a rhythm, either very simple or more complex.
- Spatial sequence: Spatial sequence is the connection rooms or areas that have different functions.
- Integrity—indicates the state of completeness and wholeness in a building in the sense of use of materials, and strength and firmness of the structural parts
  - Structural integrity
  - Appropriate use of materials: The use of materials has quite an affect on level of performance in buildings, especially when we consider changes in priorities regarding different seasons.
- Meaning—visual features, and the effect of their appearance on human beings convey meanings, which can be symbolic or metaphorical in their nature
  - Symbolism: An individual may experience slower emotional responses associated with mental processing. These responses capture symbolic meanings, which can be in the form of capturing place identity, such as church or office building—denotative meaning, or in the form of

inference about the quality and character of the place and its users—  
connotative meaning. Note that there are also formal meanings,  
regarding rapid emotional responses to features of form, such as shape,  
proportion, scale, etc. mentioned above.

- Metaphor: Similar to symbolism, metaphorical meaning of a building do not contain a descriptive statement, but rather it contains a comparison by stating another thing without using the words as or like. For example, building types, such as religious buildings and state capitols do become metaphors of the institutions that they house.

A building can be evaluated from aesthetical point of view by means of balance, order, integrity, and meaning, as listed above. In addition to these, visual quality, which is an important aesthetical value in perceived environments, has its own criteria. According to Nasar, we can forecast meaning of a building and its environment by the use of some ‘appearance guidelines’, which would be successfully added to performance guidelines achieved out of POE studies (Design by Competition 75). These appearance guidelines, which are useful in investigation, development, and organization of information necessary for architectural—facility—programming, are emotional meanings, and environmental features—including six features standing out in human perception and evaluation as diversity (visual richness), order, openness, naturalness, upkeep, historical significance, and livable space (Nasar, Design by Competition 75-84).

In current POE studies, aesthetical evaluation of the buildings has been carried out regarding the emotional meanings for the users—occupants. Nasar indicates that “[w]hen people look at a building or place, they may judge how much they like it or

how pleasant it looks. These kinds of judgments refer to feelings of *pure evaluation*. People may also judge how arousing and active or sleepy and dead a place looks” (Design by Competition 76). These kinds of aesthetical evaluations include lists of adjective pairs applicable to architecture (see Kasmar’s lexicon of environmental descriptors as a comprehensive example), such as beautiful-ugly, cheerful-gloomy, elegant-unadorned, unusual-usual, pleasing-annoying, and cool-warm kind of adjectives, which are efficient in depicting perceptual cues on interiors and exteriors, but away from giving out measurable output to be useful design guidelines for future projects. Thus, measurable criteria of aesthetic values ought to be integrated into current POEs. In this respect, Nasar’s six environmental features working as criteria for the emotional meanings of pleasantness, excitement, and relaxation would be useful basis for the assessment of visual quality. What is meant by these features are as follows:

*Diversity* (visual richness) refers to the number of noticeably different elements in a scene. It refers to complexity without negative content such as clutter and disorder. *Order* refers to the degree to which a building looks organized and the degree to which it and its parts are compatible. *Openness* refers to the openness and definition of the vista. *Naturalness* refers to the perceived prominence of vegetation and water. *Upkeep* refers to the perceived maintenance and cleanliness of a place. *Historical significance* refers to the perception that a place has historical significance or a traditional style. *Livable space* refers to the presence of people. Theory and research indicate that people prefer moderate diversity and they prefer order, openness, naturalness, upkeep, historical significance, and livable space. (Design by Competition 77)

Research confirms that the emotional response of users to buildings is in the form of pleasantness, excitement, and relaxation, whose criteria in the environment are along these lines:

- Amount of natural or soft elements (such as foliage and water)
- Amount of prominence of built elements and visual nuisances (such as billboards, poles and wires, intense land uses, and traffic)
- Amount of coherence (order, compatibility, legibility)
- Provision of moderate variety, novelty, or atypicality

- Provision of defined open space, deflected vistas
- Use of familiar, popular, or historic styles and elements
- Provision of livable space (Nasar, Design by Competition 85)

In conclusion, when describing the environment, people generally use direct physical measures for concrete features, such as height, depth, color, and symmetry, or measures of more abstract features, such as level of compatibility, and the perceived prominence of naturalness (Nasar, *The Evaluative Image* 151). When assessing the environment, especially from the aesthetical viewpoint, measures of both physical characteristics and emotional responses require judgmental features. These are usually in the form of perceptual-cognitive judgments, and evaluative responses. The criteria listed above may reflect relevant dimensions to people—who made evaluative judgments—in order to have the judgmental measure. The measurement of these concrete and abstract criteria is a major problem in aesthetical studies. The survey proposal uses yes and no answers for identity questions, and a five leveled multiple choice for scale, balance, order, integrity, massing, meaning, and visual quality questions. In order to measure, these levels consist of the options of very much, somewhat, neutral, rather not, and definitely not. These could then be transformed to numbers for use in statistical operations. Also, scales of one to six, and written assessments are used in the survey that would give a general view about aesthetical features of a building, in order to develop appropriate appearance guidelines, and comprehensive architectural design strategies for future projects.

#### **4.3. Proposed Criteria With Focus on Contextual Compatibility**

Contextualism consists in the relationship of a building to its setting; this means the harmony and adaptation that a building provides when perceived in socio-cultural, historical, communal, architectural, and functional context. Gammage points out that “[t]he size, character, and setting of proposed projects should relate to their specific

contexts and functions of adjacent streets and pedestrian networks. Buildings should be oriented to public right-of-way as well as additional internal circulation systems” (87). Most of the criteria for contextual compatibility are part of socio-cultural values, including communality, historical and cultural appropriateness, rarity, and fitness of form and culture. As a vehicle for cultural expression, the building fabric is a significant parameter of contextualism. Contextual compatibility deals also with the environmental impact of a building, and visual compatibility with the environment by elements and character—which are part of technical values.

#### **4.3.1. Purpose**

An important concern of architectural-design practice is the relation of buildings to the existing urban settings. Evaluating contextual compatibility of a building to its urban setting—with an emphasis on the fit between form and culture—will provide valuable feedbacks, and generate guidelines for contextual-design strategies. The purpose is putting forward the criteria of contextual compatibility in architecture in order to provide contextually sensitive situations. The second purpose is releasing it from the context of matter of taste, whose main source is historical analyses and the speculative perspective of architectural criticisms.

#### **4.3.2. Criteria Suggested for Contextual Compatibility**

Some of the following criteria, and nature of the contextual compatibility can seem to have common points with the aesthetical criteria mentioned previously. The difference is that, contextual compatibility is generally concerned with the buildings relation to its urban setting, whereas aesthetical concerns remain primarily within the building itself.

There are several design attributes under the control of the architect. According to Groat, contextual design can be thought in terms of both interior and exterior design features, however the impact of exterior design attributes is the most frequently considered (233). Groat considered three components of design strategy: site organization, massing, and façade design, as follows:

*Site organization* has to do with the basic spatial pattern that a building imposes on the site. Tactics such as setback distances, landscaping patterns, and circulation pathways contribute to the definition of this spatial pattern. *Massing* of a building is really its volumetric composition, defined in terms of design attributes such as height, shape, and complexity of overall form. *Façade design* is used to mean the surface treatment of the planes (i.e., the elevations) that define the shell of the buildings. Manipulation of the façade is rendered not only through such stylistic tactics as Tudor or Georgian motifs, both also through more abstract features such as the proportioning of window openings or the use of color and materials. (233)

A part of the POE model for contextual compatibility is based on these design strategies. According to Groat's framework for the analysis of contextual-design strategies, important criteria are as follows:

- Space—The definition of the context is accompanied by exterior site organization, and interior spatial organization.
  - Exterior site organization—footprint of the building on the site, circulation: pathways, vehicular access, such as driveways, parking, alignment, setback distances, and angles, landscaping, such as site demarcations
  - Interior spatial organization—circulation paths, hallways, room/area layouts, level changes, placements of vertical circulation
- Massing—includes both interior and exterior features.
  - Exterior massing—shape, complexity of overall form, articulation of base, body, top, roofline, vertical projections
  - Interior semifixed arrangements—overall configuration of partitions, arrangements of heavy furniture, etc.
- Style—includes all types of interior and exterior surface treatments.
  - Façade design—overall stylistic attributes, rhythm, proportion of fenestration, use of color, use of materials, degree of ornament, detail, relief

- Interior surface treatment—overall interior style, shape and proportion of surface details, their color and materials, degree of ornament, detail, and relief (234-235)

In addition to those, Sanoff’s four-factor analysis of building appraisal—context, routes, interface, and grouping—involves an important notion to be faced in the sense of context: the building’s setting. Several criteria for an alternative POE model focusing contextual compatibility are as follows:

- Suitability of the building to the pattern of the surrounding
- Suitability of the building to the site it sits upon
- Suitability of the building to the scale of surrounding buildings
- Suitability of the building to the character of the neighborhood
- Relation between public and private areas
- Fit between building and the land used adjacent to the building
- Fit between the type of building and its intended use, and the type and use of adjacent buildings
- Fit between the appearance of the building and type of the buildings surrounding it
- Suitability of the scale of the building to its purpose on the site. (Sanoff, Visual Research 57-58)

The measurement of these criteria tend to bring similar problems of measurement with aesthetical criteria, therefore their measurement would be in the same way, as mentioned before. Inhabitants’ opinions on questions concerning space and site organization, and fit between building and proximate environment would be again measured by the use of five level boxes, in order to transform them into a numerical format.

#### **4.4. Proposed Criteria With Focus on Participation and Communication With Inhabitants**

A building is responsible for providing the satisfaction of the needs of its inhabitants. As mentioned by Coreno “... the participation of the user in the process of space

designs could increase the possibilities of optimal satisfaction of needs” (225). Therefore, building a ‘responsive’ building, rather than a building that simply warehouses occupants and related organization, requires the participation in the planning process of those, who actually occupy the building. Sanoff indicates that, in most of the institutional systems “... decisions about facilities tend to be made by a few people who are not direct building users, often ignoring the direct involvement of those who do use the building ... Only a process that allows for face-to-face contact between users and those who influence the decisions can result in a sense of ownership in the process and the project. Such widespread community participation ... is valuable for the diversity of perspective it brings to the process” (Community Participation 107-108). Thus, involving users early and substantively in the planning process is most desirable, in spite of the fact that it requires a professional arrangement in the building process. The criteria proposed here are educative in that sense; they test the awareness of evaluator by asking whether he/she had ever been involved in any part of decision-making process regarding building’s design.

Participation can also be in the form of building’s invitation to users, context, and proximate environment. Besides participation opportunities that a building should provide, it’s potential in communication with inhabitants is of concern. Buildings should communicate with their users for efficient use of building. This communication may be audial, visual, and sensual. The auditory means of communication requires the architect’s manipulation of necessary arrangements in a building to transmit the manufactured sound with maximum fidelity. The architect should also manipulate space and materials to mask or exclude unwanted sounds. The visual means of communication requires use of accessorial signs, dedicatory inscriptions, and iconographic symbols.

The third way of communication requires significant signals describing visually accessible information about the appearance of architecture. These are signals from all the rich mix of sensuous information (Fitch 138).

#### **4.4.1. Purpose**

A building's potential in participation and communication is an important factor to be evaluated, because, in the long term, the users' involvement in building process would bring efficiency in the use of spaces, and useful remarks in the building's economics. The purpose here is, first, to make users aware that it is possible to make decisions in their buildings in line with their needs, and second, to learn how building is communicating, orienting, and contacting with its inhabitants.

#### **4.4.2. Criteria Suggested for Participation and Communication With Inhabitants**

Participation in design and evaluation phases of a building can be taken in different senses, as follows:

- The building's participation with its users
  - Invitation of access—entrances, doorways, and stairs (Buildings can put one off or lead one on, and in ways that may be subtle or obvious.)
  - Relation to the human scale (Buildings that encourage participation relate to a human scale. They are not isolated objects that oppose the perceiver.)

- Evocation of interest (Buildings are a part of the landscape that evokes our active interest by reaching out to us with embracing configurations that welcome our approach and invite access.)
- The building's participation with its proximate environment (Environmental engagement and understanding refers to perception of building's façade, relationship with the landscape it exists etc., not physical traits but perceptual ones, and how they are experienced.) (Berleant 95-97)
- The building's participation with its context (appearance and meaning of the building—symbolic meaning, and formal meaning) (Nasar, Design by Competition 65)

The second group of criteria relates to the communication of the building with its inhabitants. According to Fitch, “[b]uildings can be said to “communicate,” with their inhabitants in several distinct modes ... the means of communication are [not] exclusively visual. ...the building also “communicates” by auditory means. It should be noted that all information so transmitted, whether visual or auditory, is cognitive, not sensuous” (137).

- Accessory—visual—means of communication—printed signs, such as ‘Exit’, dedicatory inscriptions, such as ‘here lies the body of ...’, iconographic symbols, such as crucifix, star of David, hammer and sickle etc.
- Auditory means of communication—use of electronics, such as amplifiers, public address systems, tapes, and recordings, ringing bells, spoken announcements

- Signals—signals used in architecture are far too complex to be isolated and evaluated by the observer. They are similar to metaphors mentioned in aesthetics, iconographic systems replete with signals of real and putative significance. If applicable, especially for specific building types, signals may be of concern as they are good sources for invitation of access, therefore communication.

In order to talk about the measurement of these issues in buildings, first the level of their presence should be evaluated. If the building provides such instances, their effectiveness can be measured by rating their performance on specific cases.

#### **4.5. Proposed Criteria With Focus on Design Review**

Design review touches on effects of aesthetical issues on the look of the city. What makes it an important part of building process is that design review procedures bring “requirements”, “presumptions”, and “considerations” which directly relates to buildings. The criteria listed for design review may hold common parts with contextual compatibility, aesthetics, and preservation of historical issues in demand for re-used buildings. These three are the most common issues affecting visual appearance of large cities and metropolitan areas.

##### **4.5.1. Purpose**

In most cases, design reviews are designated from city councils, and turn out to be considerations. It is undesirable to create any artificial style or theme, and enforce it citywide. The purpose here is to create or protect a particular style, and to improve aesthetic quality of the built environment. When a building is evaluated, a design review

becomes a parameter to be studied, in order to revise and improve these considerations. It would aid for a positive development impact, in order to establish in a more carefully considered appearance for the city as a whole.

#### **4.5.2. Criteria Suggested for Design Review**

The design review process should address "... design quality in its broadest sense: responsiveness to climate, relationships between individual uses, appropriateness to surrounding context" (Gammage 86). Regarding these factors, there are several criteria proposed for the evaluation of a building's potential in design review.

- Contextualism—positive relation with the setting. Positive relations can be achieved by examining the next largest (and smallest) context of the site. Ignoring the context can often assure poor relationship.
- Amenity/ comfort—it is important to understand that urban conditions such as paved areas and buildings generating reflected heat create aridity and require mitigating design features that enhance habitability. Shaded areas, courtyards, colonnades, and other areas should be provided as site amenities to promote human comfort. Protection from sun and heat is a priority in summer, while access to sun is a priority in winter.
- Visual interest—an environment that contains a harmonious balance of various forms and materials can be visually interesting.
- Views—dwellers and visitors alike appreciate being reminded of the beauty of their environment. Protecting views of it assist in fostering appreciation of the environment, as well as allowing the environment to aid in orienting people. Protecting major vistas and panoramas that give special emphasis to open space,

mountains, and special manmade or natural landmarks is a good way to enhance views.

- Cultural history—there may be layers of history upon the site which has been built. The historical and cultural qualities that are inherent and distinctive to the area should be enhanced and promoted. Contribution to heritage and vitality are important aspects in that sense. (Gammage 85-88)
- Visual continuity—design and sophistication of buildings, and their relation with each other, provide a visual continuity.

#### **4.6. Proposed Criteria With Focus on Sustainability—Green Building**

It was mentioned in the second chapter that POE is being questioned as too narrow a focus, and lacking in the emphasis on energy performance, sustainability and universal design (Preiser, Feedback, Feedforward 458). Environmental assessment of buildings became more evident when thought in view of the realities of resource depletion and global environmental degradation. As public's concern and knowledge on environmental issues became stronger more mature—with rapidly arising environmental responsibility—the notion of sustainability in the scope of building arose. Different systems for environmental assessment of buildings emerged into the market, including Ecoprofile (Norway), ESCALE (France), Eco-Effect (Sweden), Eco-Quantum (Netherlands), BREEAM (UK), LEED (US), and BEAM (Hong Kong). The scope of some of these methods is shown in Table 5. These methods have provided theoretical and practical lessons across a broad range of considerations beyond established single performance criteria, including energy performance and level of greenness in buildings, and therefore contributed to bring up environmentally responsible building practices (Cole, Lessons Learned 355).

Table 5. Scope of environmental assessment methods in comparison with each other, according to the outline of Green Building Assessment (GBA) method as a basis

Scope	Assessment method			
	BREEAM	BEPAC	LEED	GBA
Resource consumption				
Embodied energy	X	X		X
Operation energy	X	X	X	X
Land		X	X	X
Water	X	X	X	X
Materials	X	X	X	X
Environmental loading				
Airborne emissions	X	X		X
Solid	X	X	X	X
Liquid waste		X		X
Other loadings				X
Indoor environment				
Air quality	X	X	X	X
Thermal quality	X	X	X	X
Visual quality		X		X
Noise and acoustics				X
Controllability of systems				X
Longevity				
Adaptability				X
Maintenance of performance			X	X
Process				
Design and construction		X		X
Building operation		X	X	X
Contextual factors				
Contextual factors				X
Loads on immediate surroundings		X	X	X

Source: D. Crawley and I. Aho, "Building Environmental Assessment Methods: Applications and Development Trends." (*Building Research and Information* 27.4/5 (1999): 300-308) 307.

However, it should be noticed that, sustainability is a concept covering a range of disciplines, embracing more than environmental issues. It has never been used as criteria of POE with more emphasis on alternative issues other than energy use, materials, and waste handling, such as adaptability, participation and social means. Also mentioned by Cole, "[s]ustainability has environmental, social and economic dimensions, embraces all facets of human activity (e.g., industry, transportation, food production, etc.), and spans local actions through to redressing the major inequities that exist between developed and developing nations" (Building Environmental 234). The criteria used under the title of Green Building Challenge (hereafter abbreviated as GBC) assessment framework remains limited at assessing only environmental performance.

These criteria are proposed for the alternative POE model, besides additional contribution on contextual issues that relate to site selection, building location, and proximity to amenities, in order to position building under the extensive scope of sustainability, and to engage economic and social issues.

#### **4.6.1. Green Building Challenge**

Most of the criteria used in environmental assessment of buildings are included in GBC process, which is the most commonly known and applicable assessment framework in European countries. A short definition and process of GBC is as follows:

The Green Building Challenge (GBC) process is a unique international collaborative effort that draws on the individual and collective experience of the participating countries. The process consists of the definition, structuring, and scoring of a range of collectively agreed performance criteria—the GBC assessment framework, the development of a software version to operationalize the framework—*GB Tool*, its testing on case study buildings and the presentation of the results at major conferences. ... The GBC framework is the identification and organization of critical environmental assessment issues and the definition of specific performance criteria, default assessment scales and weightings. (Cole, Lessons Learned 356-357)

There are six general performance areas in GBC'98 (*GB Tool* derived from the conference in 1998) defining 'green performance':

- Resource consumption
- Environmental loadings
- Indoor environmental quality
- Longevity—covering adaptability and maintenance of performance
- Process—covering design and construction process and buildings operations planning
- Contextual factors—covering issues of location and transportation, and loadings on immediate surroundings

In addition to these performance areas, GBC'2000 focused on new areas, as follows:

- Quality of service—capturing the issues of flexibility and adaptability, controllability of systems, and maintenance of performance that were previously included under *longevity* in GBC’98
- Economics—requesting life-cycle costs to receive costing data, replacement times of building systems
- Pre-operations management (Cole, Lessons Learned 358)

Through the building practice, a variety of different terms, such as ‘green design’, ‘ecological design’, or ‘sustainable design’ are used to indicate environmentally progressive buildings. There is a distinction between the notions of ‘green’ and ‘sustainable’ agendas: “[g]reen performance is most usefully described in relative terms in comparison to similar buildings in the region, while absolute energy and mass flows are a prerequisite for assessing progress through sustainability” (Cole, Building Environmental 230).

#### **4.6.2. Purpose**

In order to achieve continuity for future use, attain socially compatible environments, and “... meet the needs of the present without compromising the needs of future generations”, sustainable development ought to be integrated into building process (WCED-World Commission for Environment and Development qtd. in Fisk 466). The outputs of POEs focusing also on sustainability have great potential to provide verifiable data to achieve higher environmental standards, to provide basis for making informed design decisions, and to conduct objective assessment of a building’s impact on the environment. It is evident that simple assessment and design tools measure environmental impacts to a restricted extent with limited criteria. Existing life cycle assessment tools calculate environmental effects from the viewpoint of use of energy and materials. They fail to accurately address specific building problems related to social and humane concerns (Glaumann et al. 277). These criteria offer sustainability

issues into POE, in order to find sustainable solutions which are both energy conserving, and healthy, and arrive at useful solutions for similar cases. In addition, the building's intention in its design does not matter. As the level of sustainability is not exceptional for green buildings, every building has a potential to have sustainable solutions in a diversity of areas.

### 4.6.3. Criteria Suggested for Sustainability in Buildings and the Built Environment

The scope and boundaries of existing environmental assessment methods consists of three primary dimensions in which one of them is criterion. The criteria to be proposed have tendency to range between two ends—ecological and human—as shown in Figure 6.

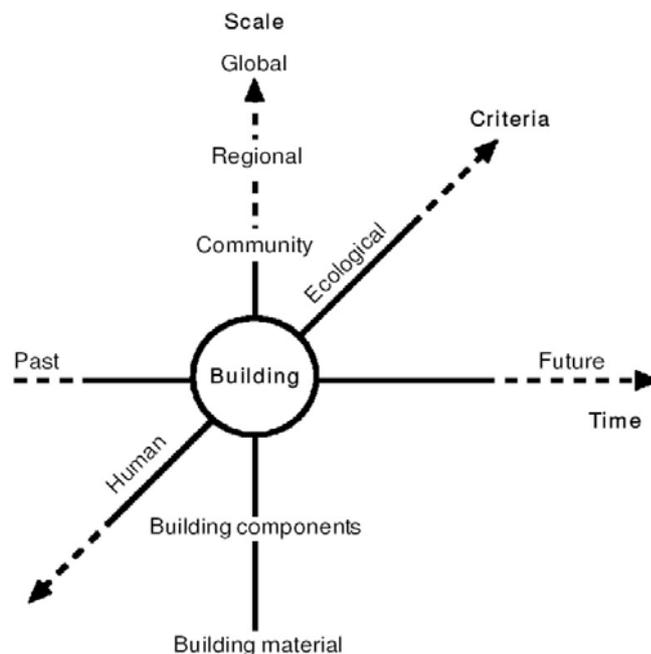


Fig. 6. Three dimensions of environmental assessment—scale, time, and criteria, Raymond J. Cole, “Building Environmental Assessment Methods: Clarifying Intentions.” in *Building Research and Information* 27.4/5 (1999): 239.

Cole defines criteria as follows:

The *Criteria* dimension references the extended set of considerations within environmental assessment, distinguishing between *ecological* concerns (resource use, ecological loadings etc.) and *human* concerns (indoor environmental quality, economics etc.) Each of these sets of issues can be further subdivided into: 1) Performance criteria that can be currently quantifiable and that can be confidently defined and assessed, such as energy use, water use etc. These are shown as solid lines. 2) Performance criteria that can currently only be described qualitatively such as loss of biodiversity etc. These are open to wider interpretation and therefore their assessment is less certain. These are shown as broken lines. (Building Environmental 239)

When dealing with different building types and cultural contexts, criteria may tend to change according to the level of importance given to specific issues. For example, saving water and the importance given to water disposal are highly related to the water resources of the region—arid or water rich. Secondly, some environmental issues, such as transportation impacts, associated with buildings go beyond the limit of individual buildings. The context has to be accounted for during the planning phase of evaluation. According to Todd and Geissler, regional concerns to be considered in defining standard practice are:

- The building design/construction context—standard professional practices, skills and capabilities of professionals, codes and standards, styles and preferences, patterns of building use, current building stock etc.
- The infrastructure context—local energy supply sources, types, and costs, local water supply/availability and water quality, local manufacturing industry for building materials, local infrastructure for salvage, reuse and recycling etc.
- The cultural context—definitions and understandings of terms, political-administrative and legal considerations, economic implications of various measures, historical experience. (252-253)

These issues should be considered in detail before planning and conducting the evaluation since they provide diagnostics for the criteria to be utilized. Following are the criteria—some of which derived from GBC—proposed for the alternative POE model regarding sustainability aspects.

- Use of new technology as a route to sustainability
  - The building's achievements along the development in technological products
  - Building's capability in self-improvement and self-cure
  - Rate in use of technology
- Contextual factors
  - Public services—transportation
    - Proximity to public transport and services
    - Vehicular access to site
    - Public bicycle paths in the area
  - Interference with the surroundings—location
    - Site climate—daylight, glare, winter sun, wind, noise, heat etc.
    - Value and scarcity of the land to be used for development
    - Adequacy of infrastructure
  - Affect of loadings on immediate surroundings
    - Environmental loadings—acidification, solid waste, effluent, site impacts
- Longevity
  - Capability to adapt or response new demands on the building.  
Adaptability is the possibility to host new functions without major changes in the building structure.
  - Quality of service—controllability of systems, and maintenance of performance
- Indoor environmental quality—in the sense of thermal comfort, illumination, and acoustics

- Level of the architectural expression—the expression of common features for the purpose of making all of the sustainability effort visible for the development of social conscious
  - Visibility of the ecocycles of water, sewage, and solid waste
  - The use of passive techniques for the benefit of heavy thermal mass, such as large windows, and outdoor shadings
  - Use of materials in that sense
- Levels of resource consumption—the amount of resource consumed during construction and use phases of a building.
  - Energy use
    - Operating energy—life cycle energy use of a building, including heating, cooling, and ventilation, lighting of interior spaces, powering of equipment and other services
    - Initial embodied energy
  - Water—sanitary appliances, services
  - Land—preservation and maintenance of the integrity of biological productive land, the average proportion of building to site, including building footprint, on-site surface parking, and access roads
  - Materials—constructional materials, finishes and coatings, any type of material used for renovation purposes
- Economics
  - Costing data—construction and life-cycle phase
  - Replacement times of building systems
- The choice of the built form
  - The degree to which it requires mechanical ventilation

- The degree to which it requires cooling
- The degree to which it requires humidification
- Health of occupants
  - Indoor environment—allergy, cancer, noise, lighting, joint problems, discomfort, poisoning
  - Outdoor environment—microclimate, noise, dust and bio-diversity of ground, water, vegetation

The criteria suggested here can be used easily when the architectural program is sensitive to environmental issues and where the design decisions have been given in that way. Also these criteria can be concerned in any type of building, no matter of its level in achieving that. In order to attain an understanding of responsibility for the protection of natural resources, this alternative POE model including sustainability issues can be applied to just about any building type and size, as the purpose is sustainable design for the community.

#### **4.7. Additional Criteria With Focus on Adaptively Re-used Buildings**

The public has recently focused on the important resources that older buildings contain. Following this, it has become very common to see an old building satisfying contemporary needs, and responding to current functions of society. Thus, evaluation of adaptively re-used, preserved, restored, or renovated buildings needs to be taken into consideration. The difference between these four rehabilitations in buildings are defined by Kurtich and Eakin, as follows:

*Preservation* is the act of maintaining all or any part of a building in order to ensure its historic significance. *Restoration* is the act of returning the building in some manner to a condition deemed appropriate after it has been set aside to be

“preserved.” *Renovation* is the act of renewing and updating older buildings’ original uses to satisfy contemporary needs. *Adaptive reuse* refers to the recycling of an older building by giving it a new use through renovation. (16)

Besides preservation, restoration, and renovation, adaptive reuse is one of the most applicable and widespread ways to re-cycle an old building and give it a new use. It is “... the interjection of an entirely new function into the shell of an older building. ... Many older buildings have important historical or architectural significance in addition to functional or commercial use” (Kurtich and Eakin 362-363).

#### **4.7.1. Purpose**

The primary aspect to be considered is the historical or architectural significance of the building to be evaluated. In addition to that, “[h]istorically significant buildings and their related landscape setting should be retained and restored, or put to adaptive reuse with respect to their cultural value, and their connection with city’s heritage” (Gammage 88). In this additional part of the POE survey, the design decisions and interpretations of the building should be evaluated because of the importance given to social consciousness honoring this heritage, and protection of the built environment. A building should respect the architectural heritage and preserve the cultural history. Also mentioned by Kurtich and Eakin, “[t]he older building has a history of its existence in space. In addition, it might also represent an interesting historical style or composite of styles. Considering the building’s rehabilitation, the designer must have a keen, intelligent understanding of all histories associated with the building” (362-363). Thus, focusing also on adaptively re-used buildings would provide reliable data in the sense of its contribution to heritage, history and vitality.

#### **4.7.2. Criteria Suggested for Adaptively Re-used Buildings**

In the case of adaptively re-used buildings, the analysis of existing conditions is beneficial for a proper POE to be conducted. Following are the basic criteria to be considered:

- The historical or architectural significance of the building
- The size of the building and its room disposition
- The condition of the building's structure and mechanical systems
- The location of the building—in the city scale and urban scale
- The building's economic potential (Kurtich and Eakin 363)

Measurement of the values existing in re-used buildings is quite complicated and shelters "... factors that may be deeply felt but are more difficult to measure" (Davis 160). Therefore this model should be usable by professional evaluators in architectural practice. Criteria to be considered after the occupancy of a building adapted for re-use—when all the alteration is complete—are as follows:

- Provision of historical continuity
- Reflection of the historical value (of a historical place)
- Provision of cultural continuity
- Durability of original material, style, and meaning
- Continuity of the building in the sense of
  - Form
  - Materials
  - Techniques

- Culture of production
- Craftsmen's and artisans' contribution
- Variety in execution—e.g. carpentry or masonry—and detail
- Lastingness of traditional applications
- Preservation of
  - Authenticity of fabric—e.g. “... including even plaster, paint, and other surface treatments that used to be considered expendable and renewable” (Cantacuzino 165).
  - Artistic authenticity
  - Historical authenticity
- Representation of the original significance of the history and culture once it existed in
- Appropriateness of the contemporary use—facility type—assigned
- Effectiveness of the new usage in
  - Economic
  - Social
  - Environmental means
- Level of maintenance of the original features—e.g. sculptures, relief, built-in fixtures, construction details
- Selection of the new and additional material to be used in the existing building
  - Harmony of the new and old material
- “Reversibility of interventions” (Warren 39)
- Integrity in the quality of finished work
  - Quality of craftsmanship
  - Use of new material

- Sympathy in interpretation
- “Integrity in understanding the qualities of both old and new” (Warren 41)

Besides all the criteria proposed above, it is advisable to consider two more issues:

- How is the building bearing the modern function assigned to it?
- What kind of a modern function can be assigned to it? (Altinluk 12)

#### **4.8. Proposal for POE Building Survey**

The six groups of criteria discussed above have been integrated into a ‘Post Occupancy Evaluation Building Survey’ in the form of different questions (see Appendix A).

Following a section on building information, the survey is composed of seven parts as discussed below:

1. **Background Information:** This part inquires some necessary information about the evaluator, such as his/her age, sex, occupation, and relation with the building. If the evaluator is an inhabitant of the building, some detailed information, such as location of the work area, and time spent in building and workspace are requested. If the evaluator is not inhabitant, but a passer-by or visitor, the frequency of facing the building is requested. This background information is necessary to be acquainted with the user’s profile, to follow up any issues that arise, and to designate individual’s needs in building.
2. **Visual Aesthetics:** This part contains questions focusing on identity, scale, balance, order, integrity, massing of building elements, style-façade design, meaning, and visual quality of the building evaluated.

3. Contextual Compatibility: This part considers the general outline of the building in relation to urban setting it exists in, by focusing on space organization, site organization, and fit between building and proximate environment. Here, proximate environment refers to urban context and the streetscape for a building, or the land and natural environment for a sub-urban building.
4. Participation and Communication With Inhabitants: This part focuses on two way relationship between the building and inhabitants: participation of inhabitants in planning, design and evaluation phases of a building, and building's potential of communication with inhabitants.
5. Design Review: This part makes a general overview to the building, asking for the relationship of building with the setting, the design features aiding human comfort, the level of visual interest provided etc.
6. Sustainability: This part focuses on building's attribution on sustainability issues, in other words, the continuity of the facility and the level of 'greenness' that the building performs during different phases of its life cycle. In this sense, the building's contribution in use of new technology, contextual factors, longevity, and health of occupants are examined. As in the other parts of the survey, necessary information about sustainability and longevity is given to enhance the knowledge of evaluator. In this part, some questions look for the occupants' conception of technical values in building, such as the resource consumption during construction and renovation.
7. Supplement for Adaptively Re-used Buildings: This part of the survey has been designed for adaptively re-used buildings only. If the building being evaluated has been constructed recently for the current purpose and function it holds, the evaluator would omit this part. Questions in this part focus on continuity in

different senses, such as original material, and style, preservation of authenticity, and appropriateness of the new function assigned.

The overall form of the proposed ‘Post Occupancy Evaluation Building Survey’ derived from the criteria discussed in this thesis can be seen in Appendix A. It is suggested that this alternative model should be integrated into current POE studies, which are effective in evaluation of technical aspects.

#### **4.9. Evaluation of the Model and Discussion**

A preliminary evaluation of applicability of the alternative model developed in this thesis has been done by the use of a pilot study. The aim of the pilot study is to test the effectiveness, and to find out whether there is any problem arising through the process of the application and measurement of the alternative model.

##### **4.9.1. The Pilot Study**

A building, located on Bilkent University’s main campus in Ankara, Turkey, namely the new building of the Faculty of Art, Design and Architecture has been used in the pilot study. The building has been occupied since 1996. It houses approximately 100 occupants in offices, and around 400 additional occupants as students during weekdays. The building has been planned and constructed for an educational purpose, and holds a great deal of problems, which are usually criticized and complained about by the inhabitants. The building is constituted of two identical wings connected to each other with several corridors on basement, second, third, fourth, and fifth floors. Each wing is formed of two main parts—offices in five floors in one, and studios in three floors in the other—along with a common ground floor.

Twenty evaluators participated in the study. They show a diversity in the time spent in the building—thus experience with the building, as well as occupation, background knowledge, and occupancy type—inhabitant or routine visitor. There is no time limitation for evaluators as they were free to use their time in order to comprehend questions and give the most suitable answers for reliable outputs. The average time used out for a survey varied between twenty minutes to half an hour.

#### **4.9.2. Evaluation and Discussion**

The results of the test study shows that the model proposed in this thesis is quite effective in evaluating buildings according to socio-cultural, perceptual, and other criteria mentioned in third chapter. Most of the answers give indications of major problems existing in building. Discussion with participants of the survey indicates that they found the survey rich and extensive in context, asking for detailed questions to reveal potential problems.

Some weak points requiring proofreading were pointed out, otherwise the survey designed for alternative POE model was found to have a sound basis in the sense of aspects it evaluates in buildings. (See Appendix B for a compilation of the data obtained in the pilot study.)

The findings regarding weak and strong points of the alternative POE model can be pointed out as follows:

1. Clearness of questions: The questions were understood by any type of evaluator, as there are explanations for related terminology. Some of the evaluators were instructors in the Department of Interior Architecture and Environmental Design, whose background knowledge can be considered as expert level, and they gave more reliable answers. Some evaluators were students from the Department of Communication and Design and daily passersby, whose background knowledge can be considered as non-expert level (they are out of the context of architecture and design education). Five undergraduate, and nine graduate students participated in the survey, whose level of background knowledge is different from each other. Three questions turned out to hold ambiguity, whose tasks would be changed for a better comprehension. In order to obtain more reliable answers, it is suggested that the survey ought to be done and evaluated by experts.
2. User groups in the building: Most of the building types are occupied by a variety of user groups. Specific for this case, the faculty building is occupied by instructors, students, security guards, administrative staff, maintenance and cleaning personnel, and service personnel. POE is an evaluation tool conducted by the favor of occupants, and there is diversity in users in this building. Thus, all users should have been participated in the study in order to get useful results. To do that, the survey should be converted into some different formats and become useable by different user groups. For example, a survey with fewer questions and simple terminology can be most useful for the evaluators who do not have any architectural education and experience. Also, the original survey can be translated into different languages for the ones who do not know English.

3. Expert and non-expert evaluators: The answers are analyzed and it is found that the experts evaluators are capable of giving more reliable answers as they have background knowledge about the issues mentioned in the survey. As the survey is suggested to be done by experts, the opinions of non-expert evaluators are as important as experts'. Besides, the new model can be used in other building types, such as office buildings, hospitals, residential etc. Therefore, the survey can be simplified and some terms can be converted into simple ones. The model developed in this study is open for changes to be done when different user groups are of concern.
  
4. Concept of 'proximate environment': In several questions, the term proximate environment tended to be a problem as its definition changes from person to person. Most of the participants consider the main campus as the proximate environment, which is right in this case, however the borders of the term proximate may not be clear when the model is conducted in some other contexts. Since the survey is designed for any building type, the limits have to be designated for questions concerning relation of the evaluated building to the setting it exists. There should be alterations in surveys to define what is meant by such concepts: borders, site, proximate environment, and surrounding.
  
5. Comments on questions: The question asking for the presence or absence of a visual focus (part 2.1.) brought two alternate answers: visual focus in interior space, and visual focus provided by exterior site. Therefore, this question should be asked for both. The question asking for the thermal comfort (part 6.3.) may

have two different ratings according to summer and winter. For example, a building may have high performance in the summer, but low performance in the winter. Therefore, this question should be asked for both.

6. Process of measurement: There are approximately 100 questions, which are quite a lot. Thus, questions should be numbered for easiness in measurement.
7. Expression of results: The outcomes of the evaluation can be separated and analyzed according to two different groups, which are experts and laymen. Therefore the outliers' effect on statistical calculations would be minimized, and differences between two distinct groups can be seen. In addition to that, the results can be given both in numerical form, and in verbal form. The numerical scores of the pilot study are given in the table of findings in Appendix B.
8. The evaluation of findings: Some questions require a yes or no answer; therefore their measurement can be transformed into percentiles. As an example, only 3 of twenty evaluators think that the organization's identity is visible from all directions, which makes 15%. It is understood that the building has a problem that the identity of organization it housed is not visible from all directions. This may be interpreted as meaning that the architect did not succeed in designing this building to hold an identity for the Faculty of Arts, Design and Architecture. Similarly, 6 of twenty evaluators perceive an effort in the building regarding the use of new technology for sustainability, which makes 30%. Thus, the building appears not giving sufficient emphasis and sensitivity on sustainability issues.

Most of the questions have five level scale as answers: very much, somewhat, neutral, rather not, and definitely not. These are transferred to a five to one scale, and a mean average is calculated (very much referring to 5, and definitely not to 1) for each question. For example, the scale of the building suiting the site was rated as 3,2 over 5. There are also striking results. The building's provision of visual means of communication was rated as 2,15 over 5, and building's provision of auditory means of communication was rated as 1,44 over 5. Thus, the building may be thought to be poor in provision of communication with inhabitants. The building's potential in the sense of naturalness it offers was rated as 1,8 over 5, it's provision of natural and soft elements was rated 1,6 over 5, and sensitivity to nature as 1,33 over 5. The building may thus be thought as not being designed effectively to provide sensitivity to natural elements.

These findings are by-products of the pilot study whose main aim was to test the applicability at the survey, and not to evaluate the building. Therefore, they should not be used for this evaluative purpose.

As a conclusion, the preliminary evaluation of the alternative POE model indicated that the model is effective in use, and has a potential in dealing with building values discussed in this thesis, and finding out usable results. Weak points of the survey should be reviewed, and necessary corrections and additions should be made. Most of the questions find decisive answers from evaluators, especially on the issues of identity, massing, visual quality, participation, and sensitivity to nature. As long as the questions are clear and easy to understand, and occupants pay the necessary attention while

answering questions, this comprehensive survey would be an efficient tool for building evaluation.

## **5. CONCLUSION**

This thesis is related with an assessment of most commonly used building evaluation technique, namely post occupancy evaluation. POE studies are done to evaluate the effectiveness of designs of buildings and their environments. They are efficient tools in order to provide information on what works and what does not work in architecture and the allied professions.

A brief analysis of current studies shows that most of the POEs are focused mainly on technical performance of buildings. The criteria of evaluation in twenty-six selected case examples show that these studies assess the building performance in terms of general user satisfaction. However, there remain many more issues to be considered for an effective and comprehensive building evaluation.

Current POEs are highly effective to provide feedbacks and establish design guidelines for problems related with physical performance issues. But, there are also problems related with socio-cultural issues, sustainability of environments, perceptual issues, and alike. Therefore this thesis has attempted to make an assessment of POE from the point of view of building values. The assessment of POE identifies deficient aspects of the system, in other words, its extent and limits. What has been evaluated with POEs, and what has not been evaluated with them have been identified and a detailed comparison

has been made. Thus, the lacking points of this systematic technique of building evaluation have been identified.

Studies of value of the built environment and building involve complexities regarding such diversity in the conception of building. Building values involve a wide spectrum of issues to be considered in the process of building, which makes them the most appropriate source for the assessment of POE. Also, we need building values in order to be able to evaluate relevant aspects in buildings.

In the light of building values, the criteria to cover deficient parts of POE have been suggested under six main groups. These are aesthetics, contextual compatibility, participation and communication issues in buildings, design review, sustainability, and lastly criteria for adaptively re-used buildings. An alternative POE model has been derived from these criteria in order to provide a comprehensive building evaluation regarding diversity of aspects considering buildings and their environments. The alternative model developed in this thesis has some common points with current POEs, such as the phases of planning, conducting field research, and applying results. What it differs in is its focus on buildings.

In order to test the effectiveness of the alternative model developed through integration of some new criteria into POE, a test study has been conducted on a selected building. The aim of this test has been to find out whether it is applicable to evaluate a building according to the criteria suggested in this thesis. The results show that the inhabitants of the building answered questions with attention, and found the 'POE Building Survey' comprehensive and meaningful. A few questions were found to be problematic. Some concepts, such as proximity and neighborhood, were vague in meaning. Thus, detailed

explanations according to the context of the building evaluated should be mentioned before such questions.

The ratings of approximately hundred questions are given in a tabular listing of answers. Some aspects were rated as average, which means neither poor nor strong in quality, but on medium level. However, there are quite effective results indicating problems of building, such as the organization's identity, provision of green and nature, contribution to tradition and culture, and unbalanced relationship—in size—with proximate buildings. In these senses, the design of the building was found not to be successful in its intention on such issues. On the contrary, it was found to provide a good visual focus, to have a successful use of color and textured patterns on façade design, to provide a somewhat clear geometry, to maintain easy access to service and transportation utilities, and to have a manageable consumption of water and energy. Such conclusions indicate that the model developed in this study turned out to be an efficient tool that is holding a potential to give useful outputs.

It is concluded that every kind of occupant should participate in a comprehensive evaluation of the facility, regardless of their knowledge, function in the building, and native language. Thus, the survey can be in different forms for different user groups according to their background knowledge in architectural discipline, their culture and language, and their acquaintance with the building. For example, the survey can be in two forms for experts, and laymen, in which both would focus on the same subject, but one with a simplistic approach.

In order to benefit from these kinds of building evaluations, such results should be compared with architect's intention in order to understand how the architect

accomplished in his project. Specific for this case, the building is located in a university campus, and the same architect designs most of the buildings. Some useful design guidelines can be derived from the results of this study, since the campus would need similar buildings in future. Besides defining useful guidelines for future projects, changes can be made on existing building where applicable.

The current study pointed out that post occupancy evaluations of buildings can be more comprehensive by integrating new criteria into this system, without changing its nature. This study provides new aspects to be considered. However, the building industry is in a highly accelerating development process with the involvement of new technology. Intelligent buildings, green buildings, and open buildings are on the way. Therefore, there will always be new criteria to be considered in building evaluations. The model developed here opens a way to a wider perspective of POEs, and can be seen as limited with the current situation. A further step may be to work on such kinds of buildings in order to discuss various approaches.

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# **APPENDIX A**

## **POST OCCUPANCY EVALUATION BUILDING SURVEY**

## Building Information

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*This part is to be filled out by the person or organization, carrying out the evaluation.*

---

Name of building or facility

Location

City  Country

Owner of building

Architect(s)

Facilities management

Type of the facility

government  military  educational

business  organizational  residential

other please indicate

Age of the facility years

Approximate number of occupants

Type of environment in which facility exists city  sub-urban

town  campus

historical site  non-urban site

other please indicate

Additional notes

## Post Occupancy Evaluation Building Survey

This survey is being conducted for the purpose of assessing the users' comfort in the building's interiors and exteriors, focusing on aesthetical, compatibility, participation, sustainability, and longevity factors. Outcomes from the survey will guide the future designs of same type. The identities of individuals will not be revealed in any case. The background information is needed to follow up any issues that arise, and to designate individual's needs in building.

### Part 1. Background Information

Age Please tick below 20  20-40  over 40

Sex Please tick female  male

Name and Lastname

Occupation

Relation With Building Please tick inhabitant of building  other   
Please continue with Part 1.1. Please continue with Part 1.2.

#### Part 1.1. Inhabitant of the building

Location in the Building

Your Work Area in the Building occupied by you alone  shared with others

Time Spent in the Building years below 1  between 1-3  over 3

Time Spent in the Work Area years below 1  between 1-3  over 3

Days Spent per Week Please write in the building  in work area

Hours Spent per Day Please write in the building  in work area

With what frequency do you go outside this building during the day for work reasons?

daily  several  once a  never or   
times a week week or less almost never

Where do you normally eat lunch and take your coffee breaks? Please write each of them shortly in the place provided

Is there any other space that you go or work, and spend considerable time besides your own or shared working area? Please write shortly in the place provided

#### Part 1.2. Passers-by, Visitors, or Potential Occupants *Not to be completed by inhabitants*

Frequency of facing the building times per day  times per week   
Please write in the suitable box

times per month  times per year

How frequently you have a business in this building? a day  a month   
Please indicate by days in the suitable box

a week  a year

## Part 2. Visual Aesthetics

---

### Part 2.1. Identity

---

*Identity refers to the sense of familiarity and recognition evoked by a scene of an organization occupying the building. Identity may aid making sense by allowing observer to place the scene into a known category, and lead to sense of interest.*

---

Does the building hold a special quality? Yes  No

If yes, please tick the appropriate box or boxes.

historical quality  symbolism  view  singularity

Does the building provide a visual focus If yes, please write what the building focuses on

Yes  No

Can you think of this building as a piece of sculpture? Yes  No

Can you think this building as a landmark? Yes  No

Would you go out of your way to go by this building for no specific reason? Yes  No

Is the organization's identity well organized? Yes  No

*Organization refers to the institution or establishment occupying the building.*

Is the organization's identity clearly recognizable? Yes  No

Is the organization's identity visible from all directions? Yes  No

Does the building suit the pattern of the proximate environment?

very much  somewhat  neutral  rather not  definitely not

Do you think that the building enhances the public image of architecture and built environment?

very much  somewhat  neutral  rather not  definitely not

### Part 2.2. Scale

---

*Scale is how we perceive the size relationship of one thing to another. Here, it refers to urban scale, which encompasses buildings, streets, bridges, plazas, parks, monuments, etc. At the urban scale we see buildings in relation to one another.*

---

Does the scale of the building suit the site?

very much  somewhat  neutral  rather not  definitely not

Does the scale of the building suit the surrounding buildings?

very much  somewhat  neutral  rather not  definitely not

Does the scale of the building suit the character of the neighborhood?

very much  somewhat  neutral  rather not  definitely not

### Part 2.3. Balance

*Balance refers to the state of steadiness in which all parts of the building or the built environment are of equal or proper weight.*

*Does the size of the building have a balanced relationship with proximate buildings in the neighborhood?*

very much  somewhat  neutral  rather not  definitely not

*Do the exterior features of the building have a balanced proportion within themselves?*

*Exterior features include window openings, doors and doorways, stairs, pathways etc.*

very much  somewhat  neutral  rather not  definitely not

*Is there a balanced use of color?*

very much  somewhat  neutral  rather not  definitely not

*Is there a balanced use of textured pattern?*

*Pattern can be used to create balance in architecture, especially when patterned surfaces are complimented with unpatterned surfaces. A "pattern" in architecture can be made with color or texture. It can be created with one material and various textures, or various colors and one texture.*

very much  somewhat  neutral  rather not  definitely not

*Is there a balanced use of light and shadow at different times of the day?*

*A balance of light and shadow can be created by the placement of parts of the building in relationship to the whole, where some parts are pushed to the outer limit and catch the sunlight, and other areas are recessed and in shadow.*

very much  somewhat  neutral  rather not  definitely not

### Part 2.4. Order

*Order refers the special way in which interior and exterior features of a building are arranged in connection with each other, depending on the purpose, such as visual coherence, or fitness for use and operation.*

*Do the exterior features of the building create a hierarchy within themselves?*

*Exterior features include fenestration on façade, entrance and doorways, circulation patterns, pathways, water and landscape elements, shading devices, colonnades, and such elements that related to building.*

very much  somewhat  neutral  rather not  definitely not

*If you think that there is some hierarchy, it is (Please tick the relevant box or boxes)*

by shape  by size  by location

*Does the building hold a clarity in the sense of its geometry? Regarding its closure and definition with the skyline*

very much  somewhat  neutral  rather not  definitely not

### Part 2.5. Integrity

*Integrity refers the state of wholeness and completeness of several features in the building, such as the use of materials, forms, functional sequences, natural and artificial elements, etc.*

*Is there appropriate use of material, in the sense of maintenance and duration of interior and exterior features, such as finishing, fixtures, utilities etc.*

very much  somewhat  neutral  rather not  definitely not

If you think that there are specific places inside or outside of the building with inappropriate use of materials, please write these in the space provided.

Do the land uses adjacent to the building seem to fit harmoniously with the building?

very much       somewhat       neutral       rather not       definitely not

Do the parts integrate well with each other and form an effective appearance? Such parts include interior and exterior features such as ramps, stairs, any type of shelters, green elements, sub-structures of the building etc.

very much       somewhat       neutral       rather not       definitely not

Does the building and its environment provide natural or soft elements, such as foliage and water?

very much       somewhat       neutral       rather not       definitely not

Is there a disturbing amount of prominence of built elements and visual nuisances? Such as billboards, poles and wires, intense land uses, and traffic

very much       somewhat       neutral       rather not       definitely not

### **Part 2.6. Massing of Building Elements**

*Massing refers to the volumetric composition of a building, defined in terms of design attributes such as height, shape, and complexity of overall form.*

Do the subdivided parts of the building appear to have a specific function?

very much       somewhat       neutral       rather not       definitely not

Is the function of each part in the building easy to identify?

very much       somewhat       neutral       rather not       definitely not

Would a visitor know where to go on entering the building?

very much       somewhat       neutral       rather not       definitely not

Is there relationship between the parts of the building for it to appear as one unified structure?

very much       somewhat       neutral       rather not       definitely not

Is there a variation in the structural parts and massing of the building providing interest and variety?

very much       somewhat       neutral       rather not       definitely not

Please rate the overall form of the building, in the sense of complexity it provides.

Please put a tick mark on the scale, in which 1 refers to simple, and 6 refers to most complex.

simple 1      2      3      4      5      6 complex

Is there a balanced articulation of base, body, and top of building?

Articulation refers to clear and effective expression of different parts, their proportions, union etc.

very much  somewhat  neutral  rather not  definitely not

### Part 2.7. Style - Façade Design

Façade design is used to mean the surface treatment of the planes, that define the shell of the building. Manipulation of the façade is rendered not only through stylistic tactics, such as Georgian motifs, but also through more abstract features, such as the proportioning of window openings or the use of color and materials.

Is there a rhythm and proportion of fenestration (windows, openings etc.) ?

very much  somewhat  neutral  rather not  definitely not

Please rate the overall degree of ornament, detail, and relief on the façade design.

Please put a tick mark on the scale, in which 1 refers to poor, and 6 refers to rich.

poor 1                      2                      3                      4                      5                      6 rich

### Part 2.8. Meaning

Meaning refers to the interaction between persons and the environment through a channel of nonverbal communication. It involves the subjective experience of observers in relation to physical form.

Do you think that the building is holding any symbolic meaning?

very much  somewhat  neutral  rather not  definitely not

Do you think that the building has a specific style of its own? Please consider the use of familiar, popular, historic styles and elements

very much  somewhat  neutral  rather not  definitely not

Regarding the four seasons, does the building provide a special sensitivity to nature? Please consider its treatment or of materials and provision to green, and natural environment

always  usually  no opinion  seldom  never

### Part 2.9. Visual Quality

This part of the survey may request information along some terms, whose meanings may not be known precisely. Explanations are therefore provided before the questions. Please read the short definitions and rate according to the given percentage scales.

Does the building have potential in the sense of the diversity it holds?

Diversity (visual richness) refers to the number of noticeably different elements in a scene.

very much  somewhat  neutral  rather not  definitely not

Does the building have potential in the sense of order it provides?

Order refers to the degree to which a building looks organized and the degree to which it and its parts are compatible.

very much  somewhat  neutral  rather not  definitely not

Does the building have potential in the sense of openness it provides?

Openness refers to the clarity and definition of the vista.

very much  somewhat  neutral  rather not  definitely not

*Does the building have potential in the sense of naturalness that it offers?*

*Naturalness refers to the perceived prominence of vegetation and water.*

very much       somewhat       neutral       rather not       definitely not

*Does the building have potential in the sense of historical significance that it holds?*

*Historical significance refers to the perception that a place has historical significance or traditional style.*

very much       somewhat       neutral       rather not       definitely not

*Does the building have potential in the sense of provision of livable space ?*

*Livable space refers to the presence and satisfaction of people.*

very much       somewhat       neutral       rather not       definitely not

### **Part 3. Contextual Compatibility**

---

*For the questions regarding contextual compatibility, please consider the general outline of building, such as its style and massing, in relation to urban setting that it exists in.*

---

#### **Part 3.1. Space - Exterior Site Organization**

---

*Is there sufficient emphasis on site organization for appropriate use of circulation pathways?*

*Site organization has to do with basic spatial pattern that a building imposes on the site.*

very much       somewhat       neutral       rather not       definitely not

*Is there sufficient emphasis on site organization for perception of landscape patterns?*

very much       somewhat       neutral       rather not       definitely not

*Is there sufficient emphasis on site organization for efficient vehicular access?*

*Please consider driveways and parking*

very much       somewhat       neutral       rather not       definitely not

#### **Part 3.2. Fit Between Building and Proximate Environment**

---

*Does the building suit to the site it sits upon, in the sense of massing and style?*

very much       somewhat       neutral       rather not       definitely not

*Does the building suit to the character of the neighborhood?*

very much       somewhat       neutral       rather not       definitely not

*Is there a fit between building and the land used adjacent to the building?*

very much       somewhat       neutral       rather not       definitely not

*Is there a fit between the type of building and its use?*

very much       somewhat       neutral       rather not       definitely not

*Do you perceive relation between public and private areas, in the sense of space and massing?*

very much       somewhat       neutral       rather not       definitely not

*Is the exterior massing of the building compatible with surrounding buildings, in the sense of its shape?*

very much       somewhat       neutral       rather not       definitely not

*Are the overall stylistic attributes of the building façade compatible to the surrounding buildings and the neighborhood?*

very much       somewhat       neutral       rather not       definitely not

*Are the ornament, detail, or relief in the façade design compatible with surrounding buildings?*

very much       somewhat       neutral       rather not       definitely not

## **Part 4. Participation and Communication with Inhabitants**

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### **Part 4.1. Participation in Design and Evaluation**

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*For your satisfaction of needs, were you involved in any part of decision making process regarding building's design? This can be any kind of your contribution in the building, such as a change in design of your occupied space, your environment etc.*

yes       no opinion       no

*Have you ever been involved in any kind of its evaluation, since your presence in this building?  
If yes, please write what kind of an evaluation it was, and by whom it was conducted.*

yes       no

*Does the building provide an opportunity to its users to participate in the process of space designs?*

very much       somewhat       neutral       rather not       definitely not

*Does the building provide participation to its users in the sense of invitation of access?*

*Please consider the entrances, doorways, and stairs, as important features of invitation of access.*

very much       somewhat       neutral       rather not       definitely not

*Does the building provide participation to its users in the sense of relation to the human scale?*

*Please consider the control of human scale and detail scale in the building, which brings a building of large size down to the scale of the human body. The detail scale encompasses the elements that are related to the hand in size, such as bricks, tiles, mosaics, paintings and sculpture.*

very much       somewhat       neutral       rather not       definitely not

*Does the building provide any kind of evocativeness of interest?*

*Please consider the features in the building that evokes you and attracts your interest.*

very much       somewhat       neutral       rather not       definitely not

## Part 4.2. Building's Communication with Inhabitants

---

*Does the building provide visual means of communication?*

*Visual means of communication may include printed signs, dedicatory inscriptions, iconographic symbols etc.*

very much       somewhat       neutral       rather not       definitely not

*Does the building provide auditory means of communication?*

*Auditory means of communication may include ringing bells, spoken announcements, acoustical responses to the sounds etc.*

very much       somewhat       neutral       rather not       definitely not

## Part 5. Design Review

---

*Do you think that the building has a positive relationship with the setting?*

*Please consider the contextuality of the building; its relation with the size, character, and setting of adjacent streets, and pedestrian networks.*

very much       somewhat       neutral       rather not       definitely not

*Do design features of the building aid human comfort, in the sense of protection from weather conditions?*

*Please give your answers regarding two seasons: summer and winter*

*Summer (Protection from sun and heat is a priority. Provision of shaded areas, courtyards, colonnades etc.)*

very much       somewhat       neutral       rather not       definitely not

*Winter (Access to sun is a priority. Protection from rain, snow and safety issues regarding those factors)*

very much       somewhat       neutral       rather not       definitely not

*Does the building and its proximate environment provide visual interest?*

*Visual interest refers to harmonious balance of various forms and materials.*

very much       somewhat       neutral       rather not       definitely not

*Does the building provide opportunities for appreciating the beauty of the environment?*

*Please consider the use of vistas, and panoramas that give emphasis to open space, mountains, special manmade or natural landmarks etc.*

very much       somewhat       neutral       rather not       definitely not

*Does the building make a contribution to cultural history, heritage, or tradition?*

very much       somewhat       neutral       rather not       definitely not

## Part 6. Sustainability

---

*Sustainability refers to continuity of facilities for future use, and attainment of socially compatible environments for this purpose. In general, sustainability issues in buildings cover building's life cycle. A building's life cycle refers to the planning, programming, construction, occupancy-use, and evaluation phases of a building, which is cyclic in nature.*

---

### Part 6.1. Use of New Technology

---

*Along with the development in technological products, do you perceive any effort in the building regarding the use of new technology?*

*Please consider building's capability in re-cycling energy and water disposal, efficient use of energy in heating and lighting etc.*

yes       no

If yes, please rate the use of new technology.

low 1 2 3 4 5 6 high

### Part 6.2. Contextual Factors

---

Are the public transportation and service utilities close to the building?

very much  somewhat  neutral  rather not  definitely not

Is there easy vehicular access to building along the site it stands upon?

very much  somewhat  neutral  rather not  definitely not

Please rate the overall level of your conception of resource consumption in the building, in the sense of energy

low 1 2 3 4 5 6 high

water

low 1 2 3 4 5 6 high

land use

low 1 2 3 4 5 6 high

materials (used during construction and renovation phases)

low 1 2 3 4 5 6 high

According to your perception, please rate the areal proportion of the building to its site.

Building includes building footprint, on-site surface parking, and access roads. The rest refer to site, including green areas, land etc. In the fractions given below, the nominator refers to the building, while denominator refers to the site it sits upon.

1/5  2/5  3/5  4/5  5/5

### Part 6.3. Longevity

---

Longevity refers to the possibility to host new functions in the building without major changes in the structure, adaptability, and quality of service that building provides.

---

Does the building hold a capability and flexibility in order to adapt or respond to new demands?

New demands can be in the form of change of use, function, or area requirements, change of user type and attitudes etc.

very much  somewhat  neutral  rather not  definitely not

Please rate the potential of performance, in the sense of thermal comfort.

low 1 2 3 4 5 6 high

Please rate the potential of performance, in the sense of illumination.

low 1 2 3 4 5 6 high

Please rate the potential of performance, in the sense of acoustics.

low 1 2 3 4 5 6 high

## Part 6.4. Health of Occupants

---

Considering the health of occupants, please rate the performance of indoor environment.

Consider any kind of allergy, noise, joint problems, physical discomfort, poisoning etc.

low 1 2 3 4 5 6 high

Considering the health of occupants, please rate the performance of outdoor environment.

Consider effects of microclimate, noise, dust and bio-diversity of ground, water, vegetation etc.

low 1 2 3 4 5 6 high

## Part 7. Supplement for Adaptively Re-used Buildings

---

*Important Note: This part of the survey is for adaptively re-used buildings, including preserved, restored, and renovated types. Please consider following questions if the facility evaluated is an old building adapted to satisfy contemporary needs, and respond to current functions of society. Please do not consider this part of the survey, if the building is newly constructed for the current purpose.*

---

Is it possible to perceive the provision of historical continuity via the newly introduced features?

very much  somewhat  neutral  rather not  definitely not

Is it possible to perceive the provision of cultural continuity via the newly introduced features?

very much  somewhat  neutral  rather not  definitely not

Does the building provide special emphasis on the historical value of the place?

very much  somewhat  neutral  rather not  definitely not

### Part 7.1. Continuity

---

Please rate the continuity of original material.

low 1 2 3 4 5 6 high

Please rate the continuity of original style.

low 1 2 3 4 5 6 high

Please rate the continuity of the building in the sense of form.

low 1 2 3 4 5 6 high

Please rate the continuity of the building in the sense of techniques and culture of production.

low 1 2 3 4 5 6 high

Please rate the continuity of the building in the sense of craftsmen's and artisans' contribution, in variety, in execution and detail.

low 1 2 3 4 5 6 high

Is it still possible to perceive the provision of traditional applications?

very much  somewhat  neutral  rather not  definitely not

**Part 7.2. Preservation of Authenticity**

---

*Please rate the preservation of authenticity with the building, in means of authenticity of fabric*

low 1                      2                      3                      4                      5                      6 high

*artistic authenticity*

low 1                      2                      3                      4                      5                      6 high

*historical authenticity*

low 1                      2                      3                      4                      5                      6 high

*Is there a harmonious use of new and old materials in the existing building?*

very much                       somewhat                       neutral                       rather not                       definitely not

*Please rate the level of maintenance of the original features, such as sculptures, relief, built-in fixtures, construction details etc.*

low 1                      2                      3                      4                      5                      6 high

**Part 7.3. Appropriateness of the New Function Assigned**

---

*Please consider these questions if there is an interjection of an entirely new function into the shell of the older building.*

---

*Is the new usage environmentally effective?*

*Please consider the nature of the environment, the possible effects of the new building to that environment and existing facilities.*

very much                       somewhat                       neutral                       rather not                       definitely not

*Is the new usage economically effective?*

very much                       somewhat                       neutral                       rather not                       definitely not

*Does the building bear the new (contemporary) function assigned to it?*

very much                       somewhat                       neutral                       rather not                       definitely not

---

*Thank you for your participation in this survey.*

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## **APPENDIX B**

### TABLE OF FINDINGS

## Building Information

*This part is to be filled out by the person or organization, carrying out the evaluation.*

Name of building or facility

Location

City  Country

Owner of building

Architect(s)

Facilities management

Type of the facility

government  military  educational

business  organizational  residential

other please indicate

Age of the facility years

Approximate number of occupants

Type of environment in which facility exists city  sub-urban

town  campus

historical site  non-urban site

other please indicate

Additional notes

*The building is planned and constructed for the purpose of education; for Faculty of Art Design and Architecture. Therefore, seventh part of the survey is not required to be filled out by the evaluators.*

## Table of Results

*If not indicated in percentiles, or as being "over 6", the results are ratings over 5.*

Number of participants in "POE Building Survey": 20      female       male

Relation with building:      inhabitant of building       other

<b>Visual Aesthetics</b>		
1	The building holds a special quality.	Yes <input type="text" value="65%"/> No <input type="text" value="35%"/>
	The special quality is by      view <input type="text" value="62,50%"/> singularity <input type="text" value="37,50%"/>	
2	The building provides a visual focus.	Yes <input type="text" value="70%"/> No <input type="text" value="30%"/>
	<i>The visual focus provided by building is because of the monumental entrance and the passage way between two wings. In the interior, the atrium space provides a visual focus.</i>	
3	The building can be thought as a piece of sculpture.	Yes <input type="text" value="25%"/> No <input type="text" value="75%"/>
4	The building can be thought as a landmark.	Yes <input type="text" value="60%"/> No <input type="text" value="40%"/>
5	Change your way to go by this building	Yes <input type="text" value="30%"/> No <input type="text" value="70%"/>
6	The organization's identity is well organized.	Yes <input type="text" value="20%"/> No <input type="text" value="80%"/>
7	The organization's identity is clearly recognizable.	Yes <input type="text" value="25%"/> No <input type="text" value="75%"/>
8	The organization's identity is visible from all directions.	Yes <input type="text" value="15%"/> No <input type="text" value="85%"/>
9	The building suits the pattern of proximate environment.	<input type="text" value="2,4"/>
10	The building enhances the public image of architecture and built environment.	<input type="text" value="3"/>
11	Scale of the building-the site	<input type="text" value="3,2"/>
12	Scale of the building-surrounding buildings	<input type="text" value="2,5"/>
13	Scale of the building-character of the neighborhood	<input type="text" value="2,55"/>
14	Balanced relationship of size of the building-proximate buildings	<input type="text" value="1,9"/>
15	Balanced proportion of exterior features	<input type="text" value="3,7"/>
16	Balanced use of color	<input type="text" value="3,45"/>
17	Balanced use of textured pattern	<input type="text" value="3,5"/>
18	Balanced use of light and shadow	<input type="text" value="2,9"/>
19	Hierarchy of exterior features	<input type="text" value="2,95"/>
	Hierarchy within exterior features of the building is      by location <input type="text" value="66.6%"/> by size <input type="text" value="33,40%"/>	
20	Clarity in the sense of geometry	<input type="text" value="3,2"/>

21	<i>Appropriate use of material</i>	2,75
	<i>There is inappropriate use of material on exterior floor finishes (especially entrance and stairs), roof, interior floor finishes-acoustics.</i>	
22	<i>Fit between adjacent land uses and building</i>	2,44
23	<i>Integration of parts-effective appearance</i>	2,85
24	<i>Provision of natural or soft elements</i>	1,6
25	<i>Prominence of built elements and visual nuisance</i>	2,6
26	<i>Appearance of sub-divided parts</i>	3,45
27	<i>Identification of functions of sub-divided parts</i>	2,25
28	<i>Way finding for visitors</i>	1,9
29	<i>Relationship between parts-unification of structure</i>	2,68
30	<i>Variation in the structural parts and massing of building</i>	3
31	<i>Overall form of the building-complexity</i>	4,75 over 6
32	<i>Balanced articulation of base, body, and top</i>	2,94
33	<i>Rhythm and proportion of fenestration</i>	3,83
34	<i>Overall degree of ornament, detail, and relief on façade design</i>	3,36 over 6
35	<i>Symbolic meaning</i>	2,65
36	<i>Particular style</i>	3,2
37	<i>Sensitivity to nature</i>	1,33
38	<i>Building's potential in diversity</i>	2,44
39	<i>Building's potential in provision of order</i>	2,75
40	<i>Building's potential in provision of openness</i>	2,45
41	<i>Building's potential in provision of naturalness</i>	1,8
42	<i>Building's potential in historical significance</i>	1,9
43	<i>Building's potential in provision of livable space</i>	2,3
<b>Contextual Compatibility</b>		
44	<i>Appropriate use of circulation pathways-site organization</i>	3,05
45	<i>Perception of landscape elements</i>	2,55

46	Efficiency in vehicular access			2,65
47	Suitability of site and building-massing and style			2,7
48	Suitability of character of neighborhood and building			2,6
49	Fit between building and land use			2,45
50	Fit between type of building and its use			2,6
51	Relation between public and private areas			2,85
52	Compatibility of exterior massing with the surrounding-shape			2,9
53	Compatibility of façade with the surrounding-overall stylistic attributes			2,6
54	Compatibility of façade design with the surrounding-ornamentation			2,8
<b>Participation and Communication with Inhabitants</b>				
55	Involvement in any decision making process	Yes	20%	No 80%
56	Involvement in any evaluation	Yes	10%	No 90%
Two of the participants involved in way-finding evaluation of building, conducted by graduate students.				
57	Participation in the process of space designs			2,4
58	Invitation of access			2,4
59	Possession of human scale			2,4
60	Evocativeness of interest			3
61	Provision of visual means of communication			2,15
62	Provision of audial means of communication			1,44
<b>Design Review</b>				
63	Positive relationship with the setting			2,45
64	Aid of design features in human comfort		summer	3,2
			winter	1,8
65	Provision of visual interest			2,8
66	Provision of opportunities for appreciation of the beauty			2,55
67	Contribution to cultural history, heritage, or tradition			1,78

<b>Sustainability</b>		
68	<i>Use of new technology</i>	Yes <input type="text" value="30%"/> No <input type="text" value="70%"/>
69	<i>Proximity of public transportation and service utilities</i>	<input type="text" value="3,8"/>
70	<i>Vehicular access</i>	<input type="text" value="3,5"/>
71	<i>Overall level of resource consumption-energy</i>	<input type="text" value="3,8 over 6"/>
72	<i>Overall level of resource consumption-water</i>	<input type="text" value="2,9 over 6"/>
73	<i>Overall level of resource consumption-land use</i>	<input type="text" value="3,65 over 6"/>
74	<i>Overall level of resource consumption-materials</i>	<input type="text" value="3,45 over 6"/>
75	<i>Areal proportion of the building to site</i>	<input type="text" value="3/5"/>
76	<i>Capability to adapt or respond to new demands</i>	<input type="text" value="2,5"/>
77	<i>Potential of performance-thermal comfort</i>	<input type="text" value="3 over 6"/>
78	<i>Potential of performance-illuminance</i>	<input type="text" value="3,1 over 6"/>
79	<i>Potential of performance-acoustics</i>	<input type="text" value="3 over 6"/>
80	<i>Health of occupants-indoor</i>	<input type="text" value="3,1 over 6"/>
81	<i>Health of occupants-outdoor</i>	<input type="text" value="3,3 over 6"/>