Post Occupancy Evaluation in the Senate Room,
Faculty of Engineering, Hasanuddin University, Gowa

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Abstract. In higher education institutions, an effective and efficient communication is an important competitive advantage. Most of the communication is carried out in various meeting room environments. In terms of creating the right space for meetings, flexibility, easy use, and supporting university productivity, meeting rooms must be specially designed according to the architectural standard of space requirements. The Senate Room in the Faculty of Engineering, of Hasanuddin University, is one of the many rooms that are designed especially for meeting activities within the faculty. It is located on the 2nd floor of the Center of Technology (CoT) Building, with a capacity of 64 seats, and an area of 180 m². This room is arranged in a two-way theater or proscenium type, with lined tables and flat floors. This study aims to: 1) Identify the characteristics of the elements that shape and fill the room; 2) Analyze the effect of technical space planning on the functional aspects of users, and 3) Evaluate spatial design performance in terms of functional aspects. The research method used is the Post Occupancy Evaluation with qualitative data analysis. The population in this study is the users of the room as the subjects of space as the subject of research and the Senate Room of Engineering Faculty as the object of research. The results showed a discrepancy between the standards and needs of users both functional and technical aspects. The results of this study are expected to contribute practical insights to architectural design, specifically related to the creation of meeting room interiors.

1. Introduction
The meeting room is a place that generally functions as a gathering place to discuss a matter. It is a requirement for every institution to have a meeting room facility, as a place to gather and express opinions in making decisions for the common good. Basic implementation of restructuring for the meeting room is the Minister of Health regulation, Number 288 / Menkes / SK / III / 2003 on Guidelines for Health Services and General Building [1], as follows: meeting room as office facilities otherwise qualified environmental health if it meets the needs of physiological and psychological, and also user comfort that does not cause injury if used for long periods.

Engineering Faculty Senate Room as the meeting place for representatives of the lecturer who serves as one of the organs of the Faculty. The duties and authority of the senate is to give consideration and supervision related to academic norms, the academic community code of ethics, and other academic provisions. Discussion and meeting activities often require a long time to sit and discuss, so it takes space and furniture that can support the physical and psychological needs of users.
Post-Occupancy Evaluation (POE) is the process of understanding how well buildings meet the needs of clients and occupants. POE can also overcome complex cultural problems such as identity, atmosphere, and ownership [2]. In the field of architecture, POE has been widely used in design studies, building systems, and environmental behavior. This Post Occupation Evaluation is an evaluation of the effectiveness of the design after occupied. POE is intended to look for facts, not to find fault with the results of design. Research findings are used as input for higher quality design results, both in the planning, programming, design, construction, and occupancy building stages [3].

According to Hay R [2], the building has a good performance by determining what it looks like, in a series of quality targets. Ideally, the POE principle is SMART: specific, measurable, achievable, realistic and time-bound. Three factors are inseparable from POE, namely; 1) The effectiveness of the procurement process itself; 2) Performance of fabric detail and the built construction; 3) The effectiveness of building operations, in this case, the 'user' activity needs to be defined.

Post-Occupancy Evaluation in the Senate Room Faculty of Engineering is intended to systematically evaluate the performance of space, based on technical and functional aspects after space occupied this research discusses the technical aspects of space; including spatial elements (i.e, floor, ceilings, walls), space conditioning elements (lighting, air conditioning, acoustics, circulation, and spatial planning); and functional aspects include elements of furniture, as well as user comfort related to circulation and space planning. The purpose of this study is to provide information, understanding, and knowledge related to the design and application of meeting room that can support the activities in the Senate Room, Faculty of Engineering, Hasanuddin University This study is also intended to provide an overview of the room performance related to technical, and functional aspects.

2. Literature Review
2.1. Meeting Room Type

The meeting room layout in the Senate Room is a theater type. This type is used for large capacity meetings, similar to a classroom type, but in the middle is provided an open circulation that separates participants who sit on the left and right side. Usually a large room applied to accommodate each part. This room type provides desk facilities, so it can be used for material with many notes. Because this type can only be applied in large places, it is therefore necessary to have a sound system, lighting and additional screens to make it easy for participants who sit on the top or back seat to keep up with the material of the speaker. Theater design is usually limited and even minimal interaction of participants, therefore only focused on the speaker and the participants only become passive listeners.

| Type         | Features                                                                 |
|--------------|--------------------------------------------------------------------------|
| U-Shape      | Chair pattern shaped like the U letter                                   |
|              | Usually used for medium meetings with a capacity of up to 20 people that makes it easy for the speaker to interact and also communicate with each participant. |
|              | Seating around three sides of the room – good for presentations from front. Square layout conducive to discussion. Presentation space is the middle of the room. |
| Boardroom    | Usually uses a long table in the middle of the participants sitting face to face. |
|              | Can reach participants slightly to medium, allows participants to concentrate more fully to pay attention to the speaker. |
|              | Centrally located table. Classic layout ideal for debate and discussion. Popular for smaller meetings |

Table 1. Type of meeting room [4, 5]
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| Type          | Features                                                                                   | Picture |
|---------------|-------------------------------------------------------------------------------------------|---------|
| Classroom     | • Arranged with tables and chairs lined back with one main focus facing the speaker.       |         |
|               | • Accommodate more and maximum participants, but cannot cover every participant present.  |         |
|               | • Used to present to small to medium groups. Delegates (in ones or twos) have own workspace. Ideal for testing and individual training. |         |
| Theater       | • Usually applied in a large room to accommodate each part (left and right).               |         |
|               | • Used for large capacity meetings, but usually limited and even minimal interaction of participants. |         |
|               | • Used for product launches, presentations, displays. Used to present to large numbers of delegates. Allows for optimal room occupancy. |         |
| Banquet       | • Divide each division into one round table, divide the discussion team or separate by section or position. |         |
|               | • Functioned as a meeting and lunch, generally requires sufficient space and more space consuming. |         |
|               | • All delegates are facing front centre on round tables. Large space in the middle of the room. Ideal for small-group work |         |

2.2. Furniture Layout

An effective furniture layout must meet functional and visual criteria. Functional criteria evaluate how well the layout supports human activities that occur in space, such as conversation, rest, or movement. Visual criteria concern the perception of layout as a visual composition [6]. The study of statistical distribution of human physical characteristics, such as body size and shape, is known as anthropometrics. This study sets guidelines for the distance needed around the object and for the exact distance and angle between the objects [7].

Other functional criteria come from the study of environmental psychology, which examines how room layout influences human activities [8]. Activities that are affected by furniture layout are conversation and circulation. Conversation is greatly influenced by the placement of chairs, whose settings must support comfortable eye contact and normal volume. Circulation requires sufficient space to walk comfortably to all parts of the room. Each piece of furniture requires a range of space around it to be accessible and functional. An effective furniture layout must support circulation through the room and access to all furniture. Human physiology influences how objects should be positioned in pairs, such as chairs and tables of the same type.

Visual criteria concern the perception of the layout of furniture as a visual composition [9]. The main visual rules used by interior designers are visual balance, alignment, and dominant points of emphasis. According to Arnheim [9] “the best known principle of visual composition is visual balance. The principle is to place the average visual weight distribution at the center of the composition. The visual weight of an element is its perceptual salience. The general assumption is that larger objects carry more visual weight. Because of the arrangement of three-dimensional furniture, visual balance refers to the appearance of the arrangement from various points of view. In arranging furniture, the alignment mainly concerns the orientation of furniture items relative to each other and to the walls of the room.

Another principle of visual presentation that plays a role in interior design is emphasis / accent [10]. Generally the accent is desirable to have a dominant focal point in the interior, so that the eye can rest without competition for visual attention. In the interior of a meeting room, the focal point is often a protruding object such as a monitor screen.
2.3. Post-Occupancy Evaluation (POE)

According to Preiser [11], post-occupancy evaluation is the process of evaluating buildings in a systematic and meticulous manner, after they have been built and have been used for some time. The focus of the POE is on usage and usage requirements, thus providing in-depth knowledge of the consequences of decisions from the past and from the results of building performance. This knowledge becomes a good basis for creating better buildings in the future. Furthermore Preiser [11] divides three elements of building performance that can be identified and applied to POE, including:

- **Technical elements** consist of aspects of health, safety and security of buildings. These elements include; fire hazard, building structure, sanitation and ventilation, electricity, building walls, roofs, interior finishes, lighting, and acoustics.

- **Functional elements**, are the ability of residents to operate buildings effectively and efficiently. This element is related to human factors that affect physical dimensions, and configuration of space and furniture, as well as communication factors and user activity flow, ease of doing activities, and building specialization factors.

- **Behavioral Elements**, are social and psychological aspects of building occupant satisfaction levels. These aspects include the privacy and interaction of residents, environmental perceptions, sense of ownership, understanding and design of buildings, as well as the cognition and orientation of the residents' environment.

This research focus on functional elements (physical dimensions, room configurations, and furniture), as well as other functional standards specific to meeting rooms, and technical elements (lighting, audiovisual, acoustics, and space conditioning).

Based on the level of implementation, POE can be divided into three types [11], namely:

- **POE Indicative**, implemented in a short time (2-3 hours or 1-2 days). Aims to find indications of failure and the main success of a building's performance, so we need researchers who are familiar with the building to be evaluated. Data collection methods, through; evaluation of secondary data (archives and documents); performance issues (open questionnaire); walk-through evaluation (direct observation); interview people related to the object.

- **POE Investigative**, requires a longer time (160-240 hours), usually a continuation of indicative POE. Using the same data collection method as indicative POE, but with good and detailed data collection and analysis techniques.

- **POE Diagnostics**, is a thorough and in-depth investigation. The method used is the same as the POE indicative (questionnaire, survey, observation, and physical measurement), but then carried out a comparative evaluation with similar buildings using many variables. POE diagnostic seeks to find relationships between physical, environmental, and behavioral performance measures, so as to produce long-term recommendations for future improvements to the same type of buildings.

This study uses the POE Indicative type to find indications of failure and major successes in the performance of the Senate Room, Faculty of Engineering, Gowa Campus, based on the technical and functional aspects of space.

3. Research Methods

This paper draws on a qualitative study conducted in the Senate Room of Engineering Faculty, located on the 2nd floor of the CoT Building, Gowa Campus. The method used is Post-Occupancy Evaluation (POE) indicative with evaluation room-use by observing how occupants use the room to meet their needs, which can help the room to be run more efficiently. Collecting data based on measurement of room size, capacity, and dimensions of furniture, as well as anthropometric standards. In this study data analysis uses descriptive qualitative techniques that are used to analyze data by describing the data that has been collected, and data analysis using architectural graphics. Qualitative data include all theories or information and standard facilities, activities, and the needs of the function of the Senate Room.
The data collection is carried out in various ways, namely:

- **Literature study** is carried out by reading and recording information that contains theories and meeting room standards to obtain data that supports problem solving in research.
- **Data collection** is carried out with observation techniques that are based on direct experience that allows seeing and observing themselves, then notes according to what the user sees and feels.
- **Interviews**, observations and photo documentation are also techniques for accurate data collection, include an interview with room users.
- **Observation and photo documentation** conducted at the location of study.

![Figure 1](image1.png)

**Figure 1.** Site of the Faculty of Engineering Unhas, Gowa campus

![Figure 2](image2.png)

**Figure 2.** Location of the senate room on the 2nd floor of the CoT building of Faculty of Engineering of Unhas in Gowa
4. Results and Discussion

4.1. Characteristics of the Senate Room’s Interior Elements

The first stage of post-occupancy evaluation in the Senate Room is to identify the characteristics of the interior elements (floor, wall, ceiling), the technical elements of the room (lighting, air conditioning, acoustics), and the functional elements of the space including the space filling elements (furniture design) and space planning (furniture layout). Identification is carried out through observation with documentation, measurements, drawing, and interviews of space users.

4.1.1. Technical Aspects. Identification of the interior elements on the technical aspects, including the space-shaping components (floors, ceilings, walls), while the technical element includes a thermal, audial and visual component. Tables 2 and 3 show the characteristics of each element of the Senate Room.

| Components          | Attribute                                                                 | Pictures |
|---------------------|---------------------------------------------------------------------------|----------|
| Room shaping        | Floor                                                                      | ![](image1) |
|                     | Covered with a 6 mm thick carpet, milano style, red and blue. Has good sound absorption. | ![](image2) |
| Wall                | • Multiplex coated walls as high as 80 cm, wood motif and texture          | ![](image3) |
|                     | • Cream wall color                                                        | ![](image4) |
|                     | • The windows and vents 12 units (6 fixed glass windows, 6 awnings window) | ![](image5) |
|                     | • Vertical Blind, cream color                                              | ![](image6) |
| Ceiling             | • Gypsum board material, drop ceiling type, white color, with edge trim, 291 cm high. | ![](image7) |
### Table 3. Characteristics of technical elements

| Components | Attribute                                      | Pictures |
|------------|------------------------------------------------|----------|
| Thermal    | • Cassette type Air Conditioning, 2 PK (3 units) | ![](thermal.png) |
| Audial     | • Mic Sound (38 units)                          | ![Mic Sound](mic_sound.png) |
|            | • Speakers (4 units)                            | ![Speakers](speakers.png) |
|            | • Sound System (1 piece)                        | ![Sound System](sound_system.png) |
| Visual     | • TV monitor (1 piece)                          | ![TV Monitor](tv_monitor.png) |
|            | • LCD (2 pieces)                                | ![LCD](lcd.png) |
|            | • Lamp: downlight type (35 pieces), indirect type (4 pieces) | ![Lamp](lamp.png) |

#### 4.1.2. Functional Aspects. Table 4 shows the characteristics of functional elements in the Senate Room which include the space filler components, namely furniture: tables, chairs, and stage settings.

### Table 4. Characteristics of functional elements

| Components | Attribute                                      | Pictures |
|------------|------------------------------------------------|----------|
| Furniture  | • Chairman meeting table (3)                   | ![Chairman Meeting Table](chairman_meeting_table.png) |
|            | • Participants meeting table (32)              | ![Participants Meeting Table](participants_meeting_table.png) |
|            | • Signature table (1 piece)                    | ![Signature Table](signature_table.png) |
|            | • Podium table (1 piece)                        | ![Podium Table](podium_table.png) |
| Components | Attribute | Pictures |
|------------|-----------|---------|
| Chair      | • Chairman meeting chairs (5 units)  
             • Participant meeting chairs (64 pieces) | ![Chair Pictures] |
| Stage backdrop | • LCD screen (2 pieces)  
                • Background | ![Stage Backdrop Picture] |

**Table 5. Evaluation functional aspect**

| Criteria | Standard [4, 12] | Identified Problems |
|----------|------------------|---------------------|
| Furniture layout | 30" x 96" tables. Capacity: 160 people | • Support comfortable eye contact and normal volume  
• Requires a range of space around it to be accessible and functional  
• Support circulation through the room and access to all furniture  
• The alignment mainly concerns the orientation of furniture items relative to each other and to the walls of the room  
• Curved furniture layout affects the visual orientation of participants not focusing on the speaker  
• Location of furniture does not consider access to circulation from the entrance | |
| Furniture design | Table Size  
30" x 48"  
30" x 60"  
30" x 72"  
30" x 96" |
| | Capacity  
4-6 persons  
6 persons  
8 persons  
10 persons | • Consider are the finish edges of glass and wood conference tables  
• The conference table does not consider finishing table edges and user ergonomics, the design considers visual aesthetics more |
Criteria | Standard [4, 12] | Identified Problems
--- | --- | ---
Chair types should be associated with certain general activities. Ergonomic considerations are to be carefully reviewed in order to select the chair with appropriate attributes. Eye height consideration in the sitting position is affected by the flexibility of the upholstery, height, and seat arrangement.

• The static type of meeting chair for participants tends to limit the movement of participants, and the height of the seat that cannot be set tends to make it difficult for participants to view the speaker.

4.3. Spatial Design Performance in Terms of Functional Aspects

From the spatial aspect there are three factors considered in the evaluation, namely; circulation, space layout, room size, and space density. The problems of users with various room features are shown in Table 6. These findings illustrate the drawbacks of feature conditions, such as limited participant visual problems and obstructed views of the speaker, unclear audials, ergonomics and improper furniture layouts, non-compact table designs and no electrical sockets are available, seats are static for participants, contrasting carpet colors tend to cause distraction. On the other hand, theater-type room layouts generally require a large enough space while the area of the Senate Room is 180 m². The capacity and dimensions of furniture are dominant and do not match the area of the room, causing space density and circulation problems.

Table 6. Spatial design and technical system

| Features | Criteria [4, 12] | Suitability |
| --- | --- | --- |
| Circulation | • Sufficient space to walk comfortably to all parts of the room | √ |
| Room layout | • The design and layout should therefore allow for different presentation styles, flexible seating, circulation within the space and entry/exiting that does not disrupt presentation. | √ |
| Lighting | • Lighting should be zoned in such a way that front wall wash lighting fixtures can be dimmed to prevent light spill onto the screen during a presentation. | √ |
| | • Nominal min. 270 cm floor to ceiling height. | √ |
| Acoustic | • Acoustically treated walls, ceilings, floors, and window coverings provide absorptive qualities that minimize reverberation and improve voice communication in the space; should include carpeting with underlayment, acoustical ceiling tile (with an NRC of .7 to .9), and medium weight drapes or curtains. | √ |
| Features                                      | Criteria [4, 12]                                                                                                                                                                                                 | Suitability |
|----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
|                                             | • Typical meeting rooms should have a lay-in acoustic tile ceiling with the specified tile having a minimum Noise Reduction Coefficient (NRC) rating of 0.65.                                                    | √           |
|                                             | • Walls separating meeting rooms should be a minimum construction of two layers of 5/8 in. (1.6 cm) gypsum board on one side of a metal stud and one layer of 5/8 in. (1.6 cm) gypsum board on the other. | √           |
| Fixtures, furnishings and special mountings  | • Lecterns can either be stock items under the AV contract or custom-designed millwork.                                                                                                                        | √           |
|                                             | • AV equipment such as tape machines, video document camera, and computers can be built into walls, cabinets or credenzas for access by presenters.                                                        | √           |
|                                             | • Special mounting supports will be required for ceiling-mounted video projectors and any TV monitors suspended from the ceiling                                                                                 | √           |
| Natural Ventilation & Room Conditioning      | • Natural ventilation not desirable.                                                                                                                                                                           | √           |
|                                             | • Manually openable windows are permissible.                                                                                                                                                                   | √           |
|                                             | • Mechanical cooling, Air Conditioning, 20° – 22° C                                                                                                                                                           | √           |
| Audiovisual (AV) system                     | • Single image slides or dual side by side are most common.                                                                                                                                             | √           |
|                                             | • Slides can be front or rear-projected. The horizontal centerline of the lens is the horizontal centerline of the projected image.                                                                     | √           |
|                                             | • Video projectors can also project front or rear and can be suspended from the ceiling or mounted in a floor cradle in a portable configuration.                                                        | √           |
|                                             | • Large screen television and audiovisual systems are common features in the meeting rooms.                                                                                                               | √           |
|                                             | • The rear projection room should be 1/3 the size of the usable conference room space.                                                                                                                       | √           |
| Audiosystem                                 | • Audio systems required for audiovisual spaces may consist of two separate sound systems, one for speech reinforcement and one for amplification of program sound material.                                      | √           |
|                                             | • Speech reinforcement is accomplished through the use of microphones located at the lectern, head table, or even for the meeting participants in a larger space.                                         | √           |
|                                             | • Speech signals are mixed, processed, then amplified and delivered to flush-mounted ceiling loudspeakers.                                                                                               | √           |
|                                             | • Uniform sound level throughout the audience area is measured with a pink noise signal, where 80 dBA is the target sound pressure level (SPL); with a tolerance of + or - 1.5 dBA.                        | √           |
### Table 7. Evaluation functional aspect

| Criteria                     | Standard [4, 12]                                                                 | Suitability  |
|------------------------------|--------------------------------------------------------------------------------|--------------|
| Room and Spaces Planning     | • Room proportion to suit layout of furniture and desired occupancy | √            |
|     Requirements             | • Design occupancy minimum 20 persons. Preferred 50 persons plus.               | √            |
|                              | • Area to suit building occupants, allow approx.:                              | √            |
|                              |   - 0.8m² per staff member                                                    |              |
|                              |   - 40 m² for 20                                                              |              |
|                              |   - 100 m² for 50                                                             |              |
|                              | • One space a maximum of 80 m from any work-point.                            | √            |
| Crowding                     | • Larger objects carry more visual weight. The density of space is not         | √            |
|                              |   dominated by furniture, so that the room feels relieved.                    |              |
| Visual                       | • Perception of layout as a visual composition, visual balance,                | √            |
|                              |   alignment, and dominant points of emphasis.                                 |              |
|                              | • Place the average visual weight distribution at the center of the           | √            |
|                              |   composition.                                                                |              |
|                              | • Visual balance refers to the appearance of the arrangement from             | √            |
|                              |   various points of view.                                                    |              |
|                              | • The accent is desirable to have a dominant focal point in the interior,    | √            |
|                              |   so that the eye can rest without competition for visual attention.          |              |
|                              | • The focal point is often a protruding object such as a monitor screen.       | √            |
| Activities                   | • Furniture layout must supports human activities that occur in room.         | √            |
|                              | • Spaces are intended for comfortable human communication and ease of         | √            |
|                              |   accommodation.                                                             |              |
| Ergonomic                    | • Distance needed around the object and for the exact distance and angle      | √            |
|                              |   between the objects.                                                        |              |
|                              | • Objects should be positioned in pairs, such as chairs and tables of the     | √            |
|                              |   same type and size.                                                        |              |

Figure 3 shows the layout of furniture that tends not to consider the circulation of space, especially in the entrance area and the edge area of the room. Limited circulation space, causing the back table is not functioning.

The visual limitation towards the speaker, especially for participants who sit in the back, is due to the type of chair that is static-difficult to move and the suitability of the stage height to the eye height of the participant in a sitting position. Figures 4 and 5 show the visual area of the participants in the vertical and horizontal directions, where the podium and the screen becomes the main focus.
The participants' visual area is limited and the unobstructed view toward the speaker.

- Access to circulation from the entrance is blocked by furniture
- Without connecting circulation in space
- Edge circulation width < 80 cm

**Figure 3.** Circulation and room layout

**Figure 4.** Visual area in a vertical plane [13]

**Figure 5.** Visual area in a horizontal plane [13]
5. Conclusion

Characteristics of interior elements, both floors, walls, and ceilings can absorb sound well. Distraction due to color contrast tends to occur on the floor and sunlight glare from the window. Technical and functional aspects influencing the room so that the room becomes crowded, and less effectively accommodate the meeting activities. The results of this study are expected to contribute practical insights to architectural design, specifically related to the creation of meeting room interiors. Based on the results of the analysis and evaluation using POE, it is known that there are weaknesses of functional and technical aspects in the Senate Room, Faculty of Engineering, Unhas Gowa, namely:

- Functional aspects; furniture layout, proportion space, room circulation, furniture design, and visual space.
- Technical aspects; audials, acoustics, fixtures, furnishings and special mountings.

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