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ARTIFICIAL LIGHTING IN THE EXHIBITION ROOM OF THE PRESIDENTIAL MUSEUM, BALAI KIRTI, BOGOR CITY, WEST JAVA

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PREFACE

The Presidential Museum of the Republic of Indonesia Balai Kirti is an Echelon IIa Level UPT that functions as both a recreational and educational facility, providing information through the presentation of memorabilia and visuals displays related to the Presidents of Indonesia. The name Balai Kirti means “Bangsal Kemuliaan” (Hall of Glory). The word “Kirti” is derived from Old Javanese and Sanskrit, meaning deeds that bring fame, thus, when combined, “Balai Kirti” can be interpreted as a building that houses various historical objects and legacies of the Presidents of the Republic of Indonesia (Darmansyah, Ramlan, & Suroto, 2017). Epistemologically, Balai means "room," and Kirti means "fame.", therefore, Balai Kirti can be understood as "a room that stores fame" (Hamidah, 2019). As a Presidential Museum, the exhibition space could be better planned to serve as an ideal facility that represent the nation’s identity through the attributes associated with the Presidents of the Republic of Indonesia over time. The ideas and works of the presidents reflect the civilization of the nation and should be shared—particularly to the younger generation, and society in general.

PREFACE

The building of the Republic of Indonesia Presidential Museum, Balai Kirti, consists of three floors with the following functions:

- The first floor (The National Gallery)

Displays the Garuda Pancasila relief, the Proclamation Text, the Pancasila Text, the Opening Text of the 1945 Constitution, the Youth Pledge Text, the Indonesia Raya Song Text, and the Digital Map Panel that reiterates the history of Indonesia's territory development from 1945 to 2014. The use of the digital map is to optimize technology and reduce paper usage (Jihan & Gae, 2019). At the back, stand six statues of the retired Presidents of the Republic of Indonesia.

- The Second Floor (The Presidential Gallery)

This gallery showcases various collections and important information related to the works and achievements of past presidents, organized into six thematic clusters. The second floor also houses the Presidential Library, which contains the presidents' personal collections along with literature on the presidency.

- The third floor

The third floor consists of a meeting room and an open garden that serves as a public space, featuring various tropical plants and offering views of the Bogor Presidential Palace area.

PREFACE

In designing the permanent exhibition space, attention must be paid to the materials on display, lighting, acoustics, ergonomic and functional aspects of display systems, and clear signage for visitor comprehension. According to O'Neill, a well-designed exhibition must consider the relationship between the collection, the space, and the audience to ensure a meaningful experience.

Visual communication and interpretation are vital in delivering historical messages. The museum uses photographs, graphics, illustrations, and texts to contextualize exhibits. Continuous innovation and evaluation are necessary for the museum to maintain its role in education, cultural preservation, and historical recreation. By enhancing the display system, *Balai Kirti* can create an engaging and informative experience that aligns with the significance of its collections.

RESEARCH METHOD

This study employs a qualitative approach, focusing primarily on the Permanent Exhibition Room of President Soesilo Bambang Yudhoyono Cluster. Data were collected through interviews, participant observation, and documentation. The collected data were then analyzed through data reduction, presentation, and conclusion drawing or verification and the results are presented in narrative form.

RESULT AND DISCUSSION

The Presidential Museum of the Republic of Indonesia is a place full of historical and educational value. Each exhibition space offers a distinct experience and provides a unique perspective on the nation's journey through the leadership of its Presidents. From Soekarno to Soesilo Bambang Yudhoyono.

The Exhibition Room of President SBY showcases a variety of personal collections rich in meaning, including:

- Ceremonial Uniform and Doctoral Gown (Ph.D.), symbolizing the weight of responsibility and commitment to education.
- A self-portrait and inspirational quotes, reflecting President Yudhoyono’s character and guiding philosophy.
- CDs of original songs, used as a medium for expressing national unity and patriotic messages.
- Communication devices, highlighting the significance of effective communication in leadership.
- A United Nations peacekeeping helmet, representing Indonesia’s contribution to global peace missions.
- Photographs of presidential activities and a collection of books, offering insight into the president’s personal and intellectual life.

RESULT AND DISCUSSION

Selecting an appropriate lighting system for museum exhibits—especially those involving sensitive materials like textiles and paper—requires careful attention to light intensity, spectrum, and exposure duration. LED lighting is favored for its energy efficiency, long lifespan, and minimal ultraviolet (UV) and infrared (IR) emissions. The flexibility of LED color temperatures enables curators to enhance visual presentation without compromising conservation. Additional protective measures, such as UV and IR filters, are essential to mitigate harmful radiation.

Exhibition design plays a vital role in lighting control. The use of UV-resistant glass in vitrines helps block external radiation, while proper ventilation reduces heat accumulation from light sources. Strategic lamp placement—positioning lights at a distance from sensitive objects—minimizes thermal damage. Continuous monitoring of environmental conditions, including light intensity, temperature, and humidity, is crucial for preventive conservation.

RESULT AND DISCUSSION

Light is a double-edged sword in textile conservation: while essential for visibility and aesthetics, improper management can degrade artifacts. Therefore, integrating advanced lighting technologies with sustainable conservation strategies ensures both the visual impact and longevity of collections. Natural lighting may also improve visitor comfort and reduce energy consumption, thereby influencing visitor behavior.

According to SNI 6197:2011, the recommended standard light intensity for museum exhibition areas is 350 Lux.

RESULT AND DISCUSSION

Table 1. Lighting Fixtures in the President Soesilo Bambang Yudhoyono Cluster

No	Position	Armature	Type of lamp	Power	Temprature	Illumination	Luminous Flux
1	Display case	DownLight	LED GU10	3 Watts	4500 Kelvin	293 – 961	270 Lumens
2	Ceiling	Spotlight	LED E27	15 Watts	3000 Kelvin	187 – 730	1300 Lumens
3	Display case	Downlight	LED G14	1 Watts	4500 Kelvin	164 – 533	115 Lumens
4	Above the artwork	Spotlight	LED E27	18 Watts	3000 Kelvin	569 - 961	1500 lumens

The GU10 3 watt 4500 kelvin 500 lux 270 lumen LED lamp has the following characteristics:

1**. GU10 3 Watt LED**

An energy-efficient LED lamp consuming only 3 watts of power. Despite its low energy consumption, it provides bright lighting.

2. **4500 Kelvin**

This color temperature provides neutral white light. It strikes a balance between warm (2700K) and cool (5000K or higher) light.

3. **500 Lux**

Lux measures the intensity of light received on a surface. With 500 lux, the lamp provides enough brightness for small spaces or objects.

4. **270 Lumens**

Lumens measure the total light emitted by the lamp. At 270 lumens, this 3-watt LED provides sufficient brightness for small areas or displays.

This GU10 3-watt, 4500 Kelvin, 500 Lux, 270 Lumen LED lamp offers efficient and bright lighting with a comfortable neutral white light. It is an excellent choice for illuminating small areas or highlighting objects in display cases, shelves, or other compact spaces, where moderate light intensity (500 Lux) and brightness level (270 Lumens) are optimal.

RESULT AND DISCUSSION

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The E27 15 Watt 3000 Kelvin 700 Lux 1300 Lumen LED lamp has the following characteristics:

1. **E27 15 Watt LED**

With 15 watts of power, this lamp is more powerful than lower-wattage alternatives.

2. **3000 Kelvin**

The 3000 Kelvin color temperature emits warm white light, creating a comfortable, soft, and intimate atmosphere.

3. **700 Lux**

This lux rating indicates the light intensity that reaches a surface. At 700 lux, this lamp provides sufficient illumination for larger areas or tasks that require clear, focused lighting. It offers stronger lighting than lower-lux lamps (such as 500 lux).

4. **1300 Lumens**

Lumens measure the total amount of light emitted by the lamp. With 1300 lumens, this lamp is bright enough for larger spaces or general lighting needs. For comparison, a standard 100-watt incandescent bulb emits around 1600 lumens, meaning this lamp provides ample brightness while being energy-efficient enough to replace a higher-wattage incandescent bulb.

This LED bulb emits warm white light, consumes 18 watts, and delivers a total of 1500 lumens, providing brightness comparable to higher-wattage incandescent bulbs while consuming significantly less energy.

RESULT AND DISCUSSION

Table 2 Results of Lighting Measurements

No	Area	Area Code	Light Source	Distance from the light source to the Object	Light Source Temperature	Object Temprature	Data 1 (Lux) (Left)	Data 2 (Lux) (Middle)	Data 3 (Lux) (Right)	Avr (Lux)
1	Bilingual Area	A1	18 Watts Small LED Spotlight	2.853 M	28.5 C	27.7 C	80	118	218	138.67
2	SBY wall portrait	A2	18 Watts Small LED Spotlight	3.577 M	28.5 C	28 C	189	280	224	231.00
3	TV Panel	H	18 Watts Small LED Spotlight	3.584 M	40 C	28.1 C	114	97	747 4	95.00
4	Green Shirt	B1	3 Watts LED Downlight (recessed) 15 Watts Surface - mounted LED Spotlight	3.080 M	32 C	28.3 C	651	530	610	597.00
5	Graduation Gown	B2	3 Watts LED Downlight (recessed) 15 Watts Surface - mounted LED Spotlight	3.080 M	32 C	28.3 C	441	512	481	478.00
6	President's attire	B	3 Watts LED Downlight (recessed) 15 Watts Surface - mounted LED Spotlight	3.757 M	36.8 C	27.8 C	78	90	95	87.67
7	Quotes	C1	18 Watts Small LED Spotlight	3.598 M	31.7 C	33.5 C	73	76	84	77.67
8	Quotes	C2	18 Watts Small LED	3.598 M	32.6 C	33.5 C	85	96	100	93.67
			Spotlight							
9	Quotes	C3	18 Watts Small LED Spotlight	3.598 M	33 C	33.5 C	90	80	70	80.00
10	Quotes	C	18 Watts Small LED Spotlight	3.598 M	31.6 C	32 C	105	102	78	95.00
11	Portrait of SBY	D1	18 Watts LED Spotlight	3.594 M	31.1 C	29.2 C	63	70	75	69.33
12	Portrait of SBY	D2	18 Watts LED Spotlight	3.594 M	31.1 C	29.2 C	80	73	52	68.33
13	HP SBY	E	18 Watts LED Spotlight	0.583 M	28.1 C	27.8 C	46	70	110	75.33
14	Tiga Tv	F1	18 Watts Small LED Spotlight	3.602 M	28.8 C	28 C	149	142	140	143.67
15	Tiga Tv	F2	18 Watts Small LED Spotlight	3.602 M	28.8 C	28 C	125	172	179	158.67
16	Tiga Tv	F3	18 Watts Small LED Spotlight	3.602 M	28.8 C	28 C	150	127	126	134.33
17	Helm	G	1 Watt 4-LED light module	0.853 M	28.1 C	27.8 C	80	48	70	66.00
18			15 Watts Big Spotlight							
19			18 Watts Small Spotlight							

RESULT AND DISCUSSION

A comprehensive lighting analysis within the President Soesilo Bambang Yudhoyono Cluster showed:

- Minimum illumination: 68.33 Lux (used for dramatic, artistic emphasis).
- Maximum illumination: 597 Lux (used for important objects like ceremonial uniforms and academic regalia).
- Average illumination: 158.20 Lux, lower than the ideal 300–500 Lux for exhibitions, indicating a generally dim environment.

Effective artificial lighting provides visual comfort without causing disruption or light pollution, benefiting both people and the surrounding environment. Light pollution typically occurs when artificial light extends into areas where it is not needed.
Some principles of effective artificial lighting and reducing light pollution include:

1. **Directional Lighting**: Use lighting that can be directed to specific areas, such as spotlights or downlights.
2. **Appropriate Light Intensity**: Select lights with a brightness level that meets your requirements.
3. **Correct Light Color**: Opt for lights with a warmer color temperature, typically between 2700 Kelvin and 3000 Kelvin.
4. **Motion Sensors or Timers**: Utilize motion sensors or timers to ensure lighting is only active when needed.
5. **Protective Light Covers**: Employ light covers or protectors to minimize upward light spill and focus illumination only on desired areas.
6. **Avoid Over-lighting**: Choose lighting that is neither too bright nor excessive.
7. **Energy-Efficient LED Lighting**: LED lights are more efficient, focus light better, and consume less energy than traditional lights, contributing to environmental sustainability and reducing light pollution.

CONCLUSIONS AND RECOMMENDATIONS

Overall, the exhibition layout at the Balai Kirti Presidential Museum has successfully reflected the history of Indonesian leadership in an informative and engaging manner. However, several aspects still need to be improved to optimize the visitor experience and enhance the museum's effectiveness as a center for historical education and recreation.

1. **Exhibition Flow**: The flow of the exhibition should be rearranged to create a more cohesive and easily comprehensible narrative
2. **Interactive Media**: The use of interactive media needs to be enhanced and maintained regularly
3. **Visual Communication**: The effectiveness of visual communication and interpretation needs to be improved.
4. **Educational Programs**: Educational programs should be expanded and improved.

CONCLUSIONS AND RECOMMENDATIONS

5. **Lighting Enhancement**: When designing exhibition spaces to display artworks or valuable objects, the lighting levels should be set around 300 – 500 Lux for general areas, with lighting on key objects reaching around 500 – 1000 Lux.
6. **LED Spotlights implementation**: For areas that require brighter lighting, installation of LED spotlights should be considered and directed toward specific exhibits.
7. **Visual interpretation**: Visual communication and interpretation play a vital role in conveying historical messages to visitors.
8. **Technology Integration**: It is time for the Balai Kirti Presidential Museum to adopt a wider range of media and technologies to enhance the appeal and interactivity of its exhibitions.

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