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Green Environment Modern Café Interior Design Using 3D Rendering Technique

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Abstract

The design of modern café interiors today not only emphasizes aesthetics but also considers environmental sustainability. This study aims to develop a café interior design using a green environment approach, which prioritizes energy efficiency, natural elements, and a comfortable atmosphere. The design process involved several stages, including observation, floor plan development, 3D modeling using SketchUp, and visual rendering with Lumion 6.0. A storyboard was created to guide camera movement during visualization, allowing each area to be presented systematically. The final result is an animation video that realistically showcases the interior, from the entrance to the outdoor area. Rendering was done offline to produce high-quality visuals, including natural lighting, realistic textures, and soft shadows. The final video was edited using Adobe Premiere Pro to add narration and background music. The findings indicate that 3D rendering technology is highly effective in conveying both aesthetic and environmentally friendly design concepts. This approach is expected to serve as a reference for developing sustainable interior designs, especially in public spaces such as cafés.

Keywords: *Interior Design, Green Environment, 3D Rendering, Café, Sustainability*

1. Introduction

In recent years, the presence of modern cafés has grown rapidly in response to the public's need for comfortable and creative social spaces [1]. Cafés have evolved into multifunctional gathering places—serving not only as spots for relaxation and social interaction but also as venues that support professional activities [2]. As a result, interior design has become a crucial aspect in attracting visitors, particularly those seeking a unique and distinctive atmosphere [3]. Alongside the growing awareness of environmental issues, the Green Environment concept has been increasingly adopted in café interior design. This includes the selection of sustainable materials, energy efficiency, and responsible waste management [4]. Environmentally friendly design not only enhances aesthetics but also contributes to long-term sustainability. Digital technologies such as three-dimensional modeling and 3D rendering techniques are now widely used to design interior spaces more realistically and efficiently [5][6]. These visualizations help convey detailed layouts, color schemes, and lighting plans before implementation. Through this approach, the present study aims to produce a modern café interior design that is both aesthetically pleasing and environmentally conscious, with 3D rendering technology serving as the primary tool in the design process.

2. Research Method

2.1. Data Collection Methods

To support the design process, the author employed the following data collection methods:

1. Observation: The author conducted direct visits to several local modern cafés to gain inspiration regarding design, spatial layout, and ambiance.

2. Literature Study: Information was gathered through written references such as journals, articles, and scholarly sources relevant to the design topic.

2.2. Planning Stages

1. Observation and Site Study
The initial stage involved visiting a reference site—one of the cafés located in Medan City. This observation aimed to directly examine the implementation of green environment elements in interior design, such as the use of large windows and plant-based decorations.

2. Interior Floor Plan Development
Based on the observations, the author developed floor plans for the first and second floors to serve as a reference for spatial modeling. These plans reflect a systematic and efficient functional layout of the interior.

3. 3D Modeling
The design process continued by constructing a three-dimensional interior model using SketchUp. This stage included detailing the spatial forms, design elements, and selection of visual materials.

4. Visual Rendering
Once modeling was completed, the design was rendered using Lumion 6.0 to produce realistic visualizations. The purpose of this rendering is to present the café's interior atmosphere in a vivid and aesthetic manner.

5. Storyboard Creation
A storyboard was created to determine the camera movement flow during the animation rendering. This stage helps organize the sequence of shots, starting from the entrance and covering all interior areas, including the upper floor and the outdoor space.

3. Results and discussion

3.1. Storyboard results

The storyboard plays a crucial role in designing the flow of camera movement, ensuring that every corner of the space is systematically presented. There are six main scenes that illustrate the camera transitions, starting from the entrance area, main room, barista counter, second floor, and ending at the backyard area.

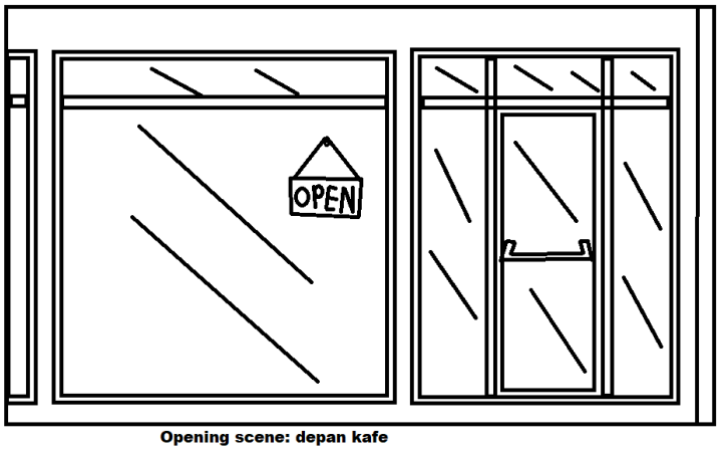

Fig. 1: Storyboard – Camera Facing the Café Entrance

This storyboard illustrates the planned scene in which the camera is directed toward the main entrance of the café.

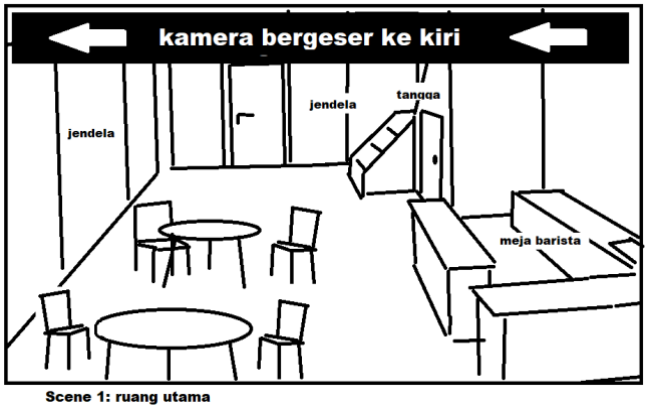

Fig. 2: Storyboard – Camera Showing the Main Room View

This storyboard illustrates the planned scene in which the camera displays the view of the café's main room.

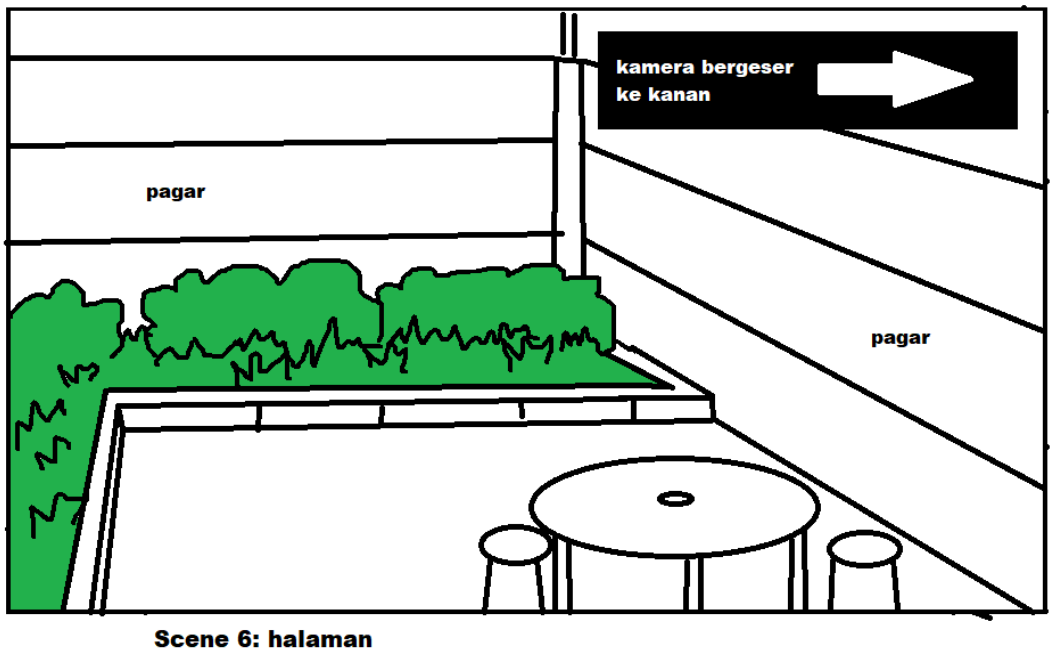

Fig 3: Storyboard – Camera Showing the Backyard View

This storyboard illustrates the planned scene in which the camera displays the view of the café's backyard area.

3.2. 3D Rendering results

After the modeling process was completed, the design was rendered using offline rendering, a method in which the entire rendering is performed by the system without user interaction. This method was chosen to achieve high visual quality, including natural lighting, shadows, material textures, and a realistic spatial atmosphere.

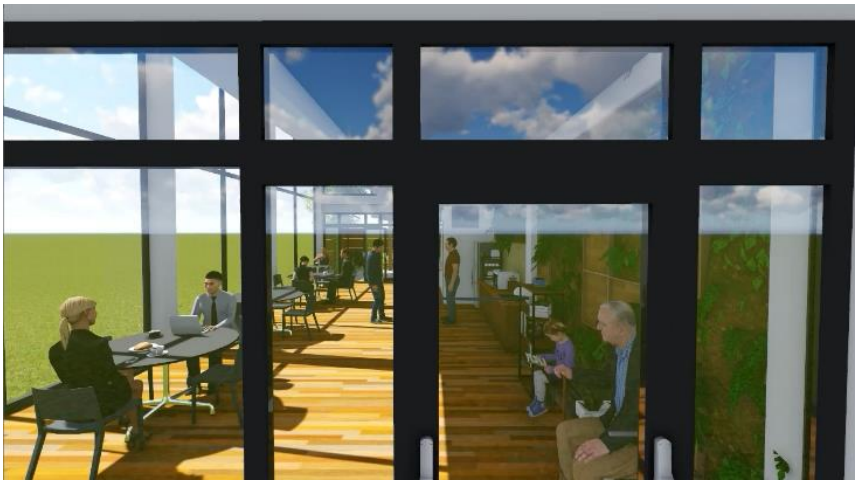

Fig 4: 3D Render Result – Opening Scene

This 3D rendering presents the scene in which the camera is facing the main entrance of the café.

Fig 5: 3D Render Result – Main Room

This 3D rendering presents the scene in which the camera displays the view of the café's main room.

Fig 6: 3D Render Result – Backyard Area

This 3D rendering presents the scene in which the camera displays the view of the café's backyard area.

The rendered video was later edited using Adobe Premiere Pro to add explanatory text and background music. This visualization is expected to convey the design comprehensively—both aesthetically and functionally—while also highlighting the sustainable values promoted by the green environment approach.

4. Conclusion

This study produced a modern café interior design that adopts the green environment concept, supported by 3D rendering technology. Through stages of observation, modeling, and visualization, the resulting design successfully presents a space that is aesthetic, comfortable, and environmentally friendly. The incorporation of natural elements such as sunlight, ventilation, and greenery has proven effective in

creating a healthy and appealing atmosphere. Additionally, the use of a storyboard proved valuable in planning a structured visual flow throughout the rendering process.

5. Suggestion

Future research is recommended to explore a broader approach to sustainable design, such as by integrating recycled materials or smart technology systems into interior spaces. Furthermore, evaluating user responses through simulations or interactive visual testing could provide more in-depth feedback on the effectiveness of the implemented design.

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