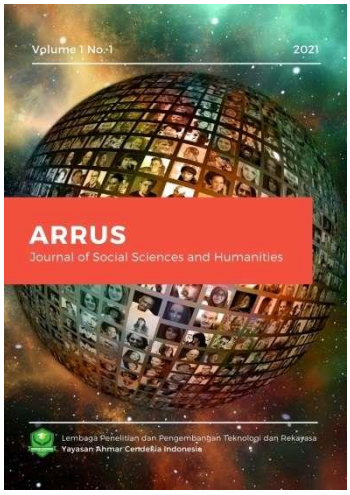
Ardhan, et.al., *ARRUS Journal of Social Sciences and Humanities*, Vol. 3, No. 5 (2023)
https://doi.org/10.35877/soshum2039

OPEN ACCESS

ISSN: 2776-7930 (Print) / 2807-3010 (Online)



*Corresponding author: Afid Novendra Ardhan, Politeknik Negeri Batam, Indonesia

E-mail: afidardhan8@gmail.com

RESEARCH ARTICLE

Interior Design of Dual-Function Buildings of PT. Daffa Ekspressindo Logistik Using Sketchup 3D

Afid Novendra Ardhan* & Gendhy Dwi Harlyan

Multimedia and Network Engineering Study Program, Department of Information Engineering, Politeknik Negeri Batam, Batam, Kepulauan Riau, Indonesia

Abstract: The time development has made interior design a special need for many people in visualizing the wants and needs of the spaces to be occupied, especially for companies that own buildings to carry out various business activities. A company in Batam, namely PT. Daffa Expressindo Logistik requires a good and appropriate interior design for a company building, which is used to run two business fields, including automotive repair and logistics. Therefore, an interior design was designed for the company through qualitative research methods to obtain interior design concepts and workmanship using the MDLC method. This design concept is based on the need for interior design for buildings that are used for more than one function and for the convenience of users and visitors. The benefits that users and visitors will experience with the existence of PT. Daffa Expressindo Logistics is able to fulfill all activities to work safely, comfortably, and optimally.

Keywords: Interior Design, Mixed-Use Building, MDLC, Sketchup 3D

1. Introduction

Interior design has currently become a special and crucial focus in visualizing the expectations and needs of the spaces to be occupied (Susanti et al., 2020; Wijaya, 2022). Consequently, interior design has become something highly necessary nowadays (Atmadi, 2018). Interior design itself means planning, arranging, and designing interior spaces in buildings. However, interior design has different meanings when viewed from an expert's point of view. According to Alexander, as a researcher, mentioned that interior design is the precise physical component of a physical structure. On the other hand, according to DK Ching, interior design is the layout planning and design of the interior space in a building (Faisal et al., 2022). Interior design does not only plan the facilities in the room, but also provides the atmosphere of the room so that it positively impacts its users (Atmadi, 2018; Rainna et al., 2021).

Companies are ones that need interior design to develop and run a company, and the use of interior design is an important need (Prataama et al., 2016; Tika Pratiwi et al., 2021). One of the company that needs interior design is PT. Daffa Ekspressindo Logistik is located in the Sei Panas area of Batam City. This company operates in two business fields: logistics and automotive repair. The operational activities of these two business fields use a building in the form of a shophouse, which has been converted into an office and also an automotive repair shop.

However, there have been obstacles faced in running the business, that it is difficult to distinguish the workshop and the office. Therefore, to overcome these obstacles, the use of appropriate and good interior design is required to facilitate the operational activities of the company's two business sectors. In addition, it can also make customers who come to the

https://doi.org/10.35877/soshum2039

ISSN: 2776-7930 (Print) / 2807-3010 (Online)

company feel comfortable. Buildings used for several activities can also be called mixed-use buildings, which means buildings with several functions consisting of one or more buildings connected to each other with different functions. This type is suitable for minimal space but requires many functions. Apart from commercial functions, there are also residential, recreational, and worship functions (Lovita A, 2020).

The interior design for the use and arrangement of rooms is very required. The device's implementation was sekected to help companies display attractive 3D models (Google SketchUp, 2019). Technology is needed in interior design planning, where the software used is Sketchup because in this design process, the features available in this software are complete and sufficient for creating a 3D interior design (Google SketchUp, 2019).

Other research results show that the feasibility of 3- dimensional Sketchup media is obtained with very feasible result on material perspective visible on the simple building house (Endru et al., 2020). Other studies mention that using SketchUp 3D produces high-quality imafes because it utilizes Enscape (real-time rendering and virtual reality), leadin to significant changes in the existing condition (Adly et al., 2021). SketchUp is a premier 3D design software that truly makes 3D modeling accessible to everyone, with easy-to-learn and powerful tools that empower creators to bring their vision to life. The difference between previous research and this study lies in the fact that this research was conducted with the aim of designing the interior of the dual-functions building of PT. Daffa Ekspressindo Logistik using Sketchup 3D. Unlike previous research, this study involved the interior design of a single building with two functions. By utilizing the SketchUp 3D method, it is expected to generate vidual images with satisfactort results.

2. Research Methods and Materials

The method used to collect data in this final thesis is a type of qualitative research. The method used in this research consists of a sequence of methods starting with data collection, then continuing with design. The method was started by collecting data, which consists of (1) Observation Stage in the company to obtain data about the company building, after that conducting (2) Interview Stage with the owner. Then, the survey (3) results were analyzed to obtain the final results of the design concept so that it was in accordance with the objectives and expected benefits. After obtaining the concept to be implemented, the work continues with the MDLC (Multimedia Development Life Cycle) design method, or the Luther-Sutopo Model, which consists of 6 stages: Concept, Design, Material Collecting, Assembly, Testing, and Distribution. The author selected this method as it is suitable for implementing the steps that must be carried out when designing a 3D interior visualization design.

1) Observation Stage

This stage was carried out by making direct observations at the company, recording the necessary information and carrying out existing interior documentation to determine the actual conditions at PT. Daffa Ekspressindo Logistik. The results of the observations and data obtained are as follows:

a. Building Data

Table 1. Building Data

No	Description	Results
1.	Building area	112 m2 (L 16 m x W 7 m)
2.	Number of Floors	2 (two)
3.	Number of Rooms	3 Rooms
4.	Facility	Toilet, balcony
5.	Door	Rolling doors

https://doi.org/10.35877/soshum2039

ISSN: 2776-7930 (Print) / 2807-3010 (Online)

b. Discussion of Existing Interior

Figure 2. Workshop section

Figure 3. Workshop section

The figure 2 and 3 are the existing interior of the workshop which is on the 1st floor at the front of the building, where the area is enough to place one car and there is also a toilet, but the arrangement is not good so the existing equipment is not placed in the proper place. Additionally, there is no space for customers to sit comfortably.

Figure 4. Workshop Door

Figure 5. Workshop Section

The figure 4 and 5 is the existing interior of the workshop which is at the back of the building. The area is large enough to place a car and several shelves to store workshop equipment. There is also a dividing door between the front and rear workshops so that when the car is being painted, it does not interfere with the activities of the front workshop.

Figure 6. Empty Room

Figure 7. Second Floor area

On the second floor of the building, there is an empty area near the stairs and two rooms. These two rooms are located next to each other and there is a window which can provide good air circulation in one of the rooms. However, its use is inappropriate because the room is currently used to store company equipment and goods, and storage is lacking in organization. Apart from that, the ceiling on the 2nd floor is also damaged and something has fallen, so it needs to be replaced.

Figure 8. Workspace

The figure 8 shows the existing interior of the work space on the second floor, the room arrangement and air circulation are quite good. The room is currently used as a workspace for the owner and employees, as well as a room for guests. In this room, there are document storage shelves and a toilet.

https://doi.org/10.35877/soshum2039

ISSN: 2776-7930 (Print) / 2807-3010 (Online)

2) Interview Stage

Interview was conducted with the owner of PT. Daffa Ekspressindo Logistik to find out the company's wants and needs. Then, the results of the interview were used as a reference in solving the problems found in the design object. The questions posed to the respondents were about: (1) the concept and (2) the colors they would like to apply, (3) whether they had any plans to add space or not, (4) whether there had been any obstacles in the employee's work. The data obtained from respondents are as follows:

- Respondents want workshop and office interiors to look more modern than before.
- The colors that want to apply match the workshop and don't look dirty, while the colors for the office are comfortable or eye-catching. Not far from the impression of the company's brand colors.
- Respondents wanted to make empty and unorganized rooms functional again.
- The obstacle faced by employees who work indoors is the lack of freedom to carry out their work because the owner's room, living room, and employee work space are in one room.

3) Data Analysis Results

Based on the previous analysis, several concepts that support the company's desires and needs were obtained, but also conform to interior design theory. These results indicate that there is a lack of arrangement and utilization of interior space design in buildings. From this analysis, a design concept was then created to answer the problems with the design object. Design concepts are divided into two, namely, macro and micro concepts (Anggra Ayu Rucitra, 2020).

a. Macro Concept

The Macro Concept is an outline of the concept that will be implemented to the methodology and analysis of the concept. The form of solution to the concept taken was from the side of customer comfort. The 1st floor is a workshop that deals directly with customers and there is no place for customers to wait comfortably.

Another concern in using interior design is that this company is not only engaged in one business field, but two. Buildings are a form of identity for a company, meaning that logistics businesses also need to be visible to the public and provide easy access to visitors. Therefore, the 1st floor will also be used and designed as a room (Reception) to welcome logistics guests who simply want to ask or send small sized or mass items. In addition, the room is also equipped to be used as a comfortable waiting area for the workshop customers. One of the unused rooms on the second floor will also be utilized and arranged as an employee work space. Given small room size, the use of interior design must be able to create efficiency for the room. This spatial division is based on the Mixed-use Building theory that underlies this research.

b. Micro Concept

The Micro Concept is a detail and elaboration of the macro concept, where this concept refers to more detailed interior elements, such as shape, color and material on walls, floors, lighting and others.

- Space Zoning

PT. Daffa Ekspressindo Logistik area is divided into two areas according to the activities carried out, namely public and private areas. The majority of public activities are on the 1st floor, namely workshops, logistics and toilets. Then, the 2nd floor includes all the divisions of private areas, such as work space for employees, owner's work space, special living room, and storage warehouse.

https://doi.org/10.35877/soshum2039

ISSN: 2776-7930 (Print) / 2807-3010 (Online)

- Room Position

On the 1st floor, the division of positions is adjusted based on the interests of the users. The workshop and waiting room, which have the largest number of visitors, are on the 1st floor to make it easier for visitors to come and of course the workshop must be on the 1st floor. Likewise, the logistics reception room, located on the first floor, is more strategic for visitors who only want to ask for services or send small items.

Meanwhile, on the 2nd floor, the position of the room is based on user activity and circulation because the 2nd floor is only accessed by certain people. There are stairs facilities to access the second floor.

- Floor Concept

The application of a floor concept that is in accordance with the shape of the movement is more concerned with solving security and comfort issues. There is not much leveling so it does not endanger employees or customers. Floor work must be appropriate for the workshop because certain terrain and conditions require heavy traffic and large loads. Thus, the selected material must be appropriate for safety, aesthetics, durability, and maintained hygienic factors. Using the right ceramics and applying epoxy to the floor, workshops can be a solution in this case (Wahyuni Trisna, 2023).

- Wall Concept

Based on the results of interviews with company owners, the concept is modern and the colors that are suitable for the workshop and do not easily look dirty. Meanwhile, for the office, the colors are comfortable to the eye or eye-catching. Apart from that, the color that want to be implemented is also not far from the impression of the company image contained in the logo. The following is a wall concept for workshops and offices based on research results based on various sources (Zainudin, 2021):

The suitable colors for workshops are colors that do not easily look dirty. White keeps to be the basic color of the workshop walls, then overlaid with another color at the bottom so it doesn't look dirty easily. Gray is a color that can give a modern and elegant impression, but can also reduce the dirty impression on the walls and be combined with orange, giving an energetic and attractive impression. Besides, a logo wall sticker from the workshop will be added.

Colors that are suitable for the office are the comfortable colors to the eye or eye-catching so that workers/employees feel at home and can focus on their work. White is a color that gives an elegant impression, making the room feel more spacious and comfortable. So that it is not monotonous. White will be combined with brown, giving a warm, elegant and modern impression.

The Waiting Room and Reception are new rooms that will be added on the 1st floor. The color choice for this room is white and a touch of red. Then, the walls consist of brick and are combined with glass so that part of the workshop can be seen through the glass.

- Lighting Concept

In interior design, PT. Daffa Ekspressindo Logistik uses the concept of direct and indirect lighting, combining the use of natural light with artificial lighting. The lighting concept focuses on the use of natural light, where most activities are carried out from morning to evening to be able to use natural light. The lighting that will be used is natural lighting, then artificial lighting consisting of general light and spot light (Regina et al., 2022).

https://doi.org/10.35877/soshum2039

ISSN: 2776-7930 (Print) / 2807-3010 (Online)

4) Planning

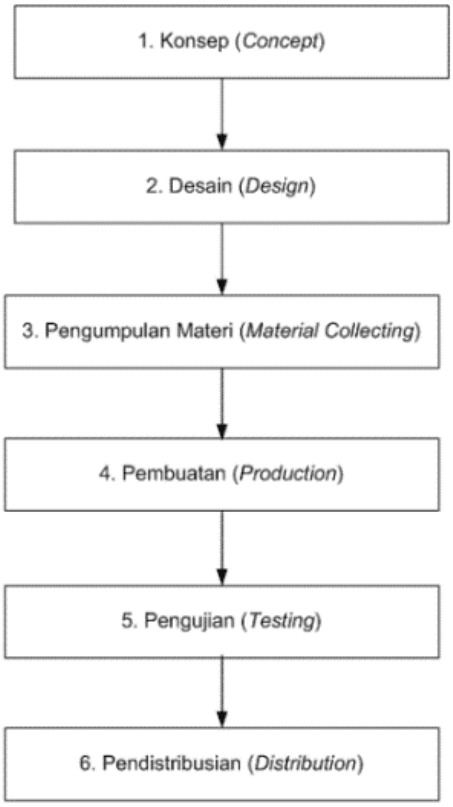


Figure 9. MDLC method

The following is an explanation of the Multimedia Development Live Cycle stages:

a. Concept

The Concept stage is the objective stage for determining the interior design. Besides, it aims to collect design ideas that will create an interior design model.

b. Design

Design is the stage of designing and creating an interior design model in SketchUp. This stage creates a layout/plan in the software.

c. Material Collection

This stage is the stage of determining the materials that will be used in the interior design process.

d. Assembly

The interior design stages are divided into two stages, namely the 3D model creation stage and the room's interior design.

e. Testing

After all stages have been passed, the next process is to carry out the testing stage by adjusting to the initial concept and the client's expectations.

f. Distribution

At this final stage, the results of the rendering process will be saved in JPG format in image form, then submitted to the client.

https://doi.org/10.35877/soshum2039

ISSN: 2776-7930 (Print) / 2807-3010 (Online)

3. Results and Discussion

The stages of the work process according to the MDLC approach method.

1) Concept

The first stage that must be carried out is the concept. This stage is determining the basic concept for designing a 3D interior design, for example by making a rough sketch and exploring ideas from other sources:

a. Ideas/References

The following is an image that can be used as a reference in creating interior designs with a modern theme:

Figure 10: Reference 1

Figure 11. Reference 2

Figure 12. Reference 3

Figure 13 . Reference 4

b. Design Sketch

According to Nurcahyo (2022), a sketch is a rough drawing that is used to concretize (implement) ideas that are still abstract and only fixed in the mind. There is an interior design for the PT Daffa Ekspressindo Logistik building made interior sketches of several rooms as below:

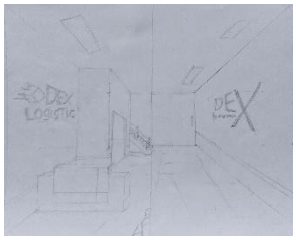


Figure 14. Front 1st Floor

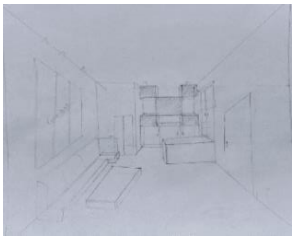


Figure 15 . Owner Room

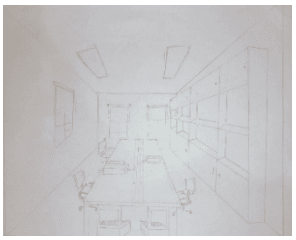


Figure 16. Employee Workspace

2) Design

The second stage that needs to be carried out is design stage. It is the process of working on objects that have been designed at the concept stage by making a floor plan or layout of the interior of the shophouse in the workshop and office that will be designed.

https://doi.org/10.35877/soshum2039

ISSN: 2776-7930 (Print) / 2807-3010 (Online)

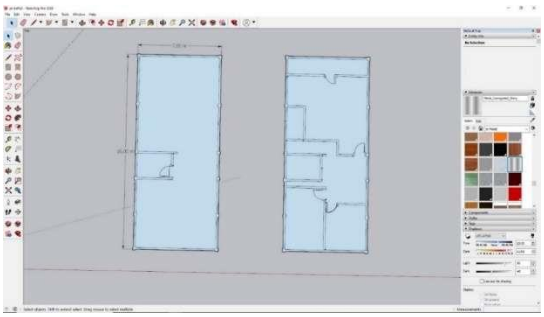


Figure 17. Interior design layout work of 1st and 2nd floors

3) Material Collection

The third stage is material collection, which is the process of collecting materials, such as textures and other equipment that will be used in the process of designing the 3D interior of the building.

4) Production

The fourth stage was started to design the interior objects that were planned in the previous design stage, such as modeling, texturing, lighting and camera processes. Below are several pictures showing the progress of the company's interior design work:

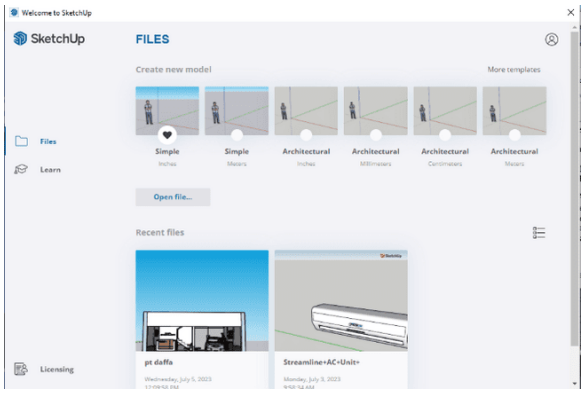


Figure 18. Sketchup Menu Window Display

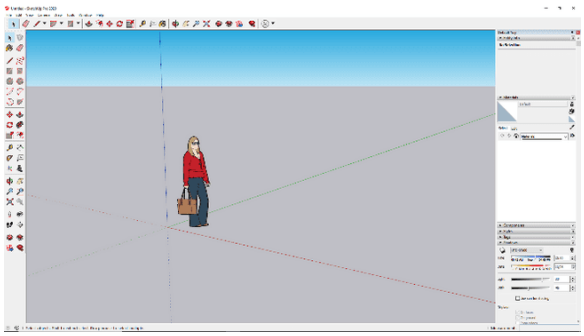


Figure 19. Initial Display When Conducting Modelling Object

https://doi.org/10.35877/soshum2039

ISSN: 2776-7930 (Print) / 2807-3010 (Online)

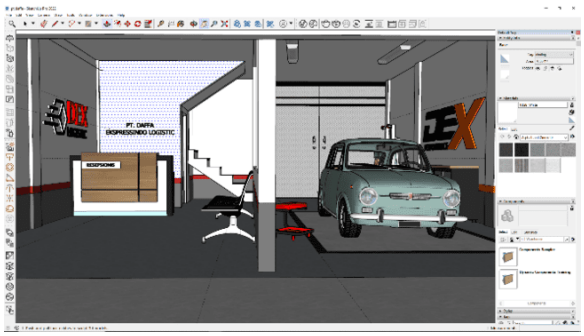


Figure 20. Display of Work on 1st Floor (1)

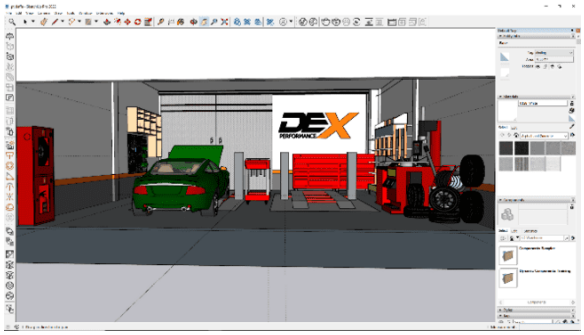


Figure 21. Display of Work on 1st Floor 2)

Figure 22. Displau of Work on 2nd Floor (1)

Figure 23. Display of Work on 1st Floor (2)

https://doi.org/10.35877/soshum2039

ISSN: 2776-7930 (Print) / 2807-3010 (Online)

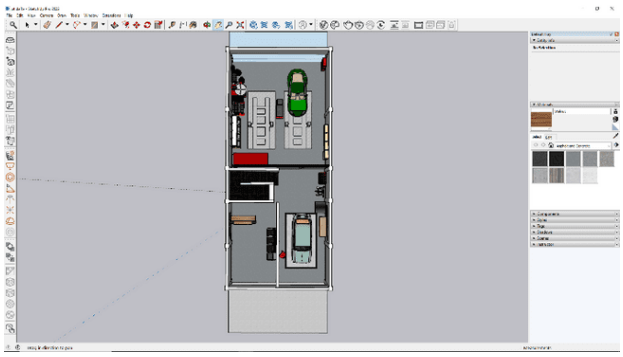


Figure 24. Overall Display of 1st Floor

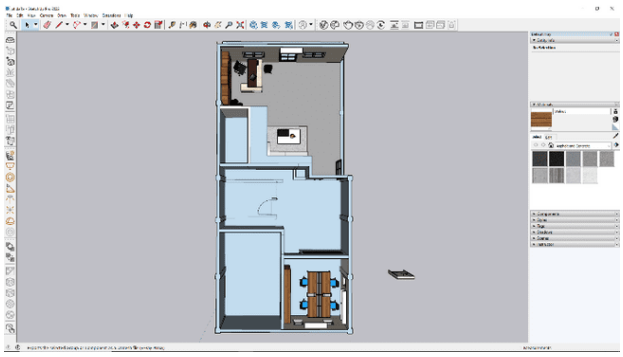


Figure 25. Overall Display of 2nd Floor

5) Testing

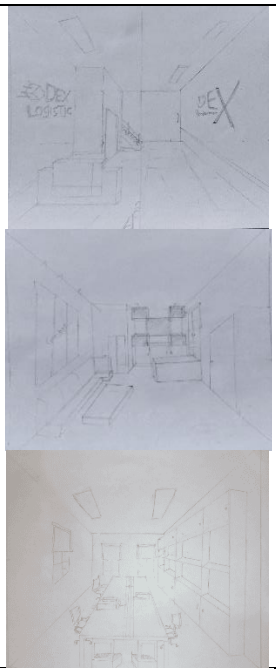
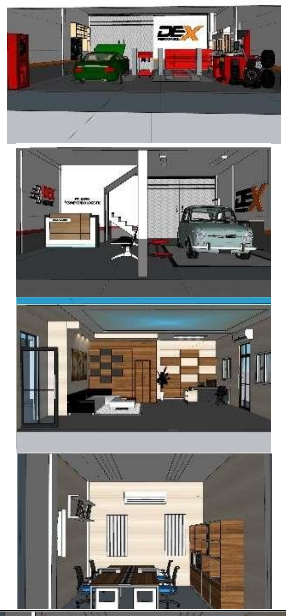
The fifth stage is the building interior design work that has been previously created will be rendered and then presented to the client. This stage aims to ensure whether there are any errors or discrepancies according to the client regarding the building's interior design or not. If it is found the error, repairs process will be carried out first. If it is confirmed that there are no errors, then it will proceed to the distribution stage. First testing is an evaluation with the company owner regarding the alignment of the design results with the agreement made during the pre-design interviews, which include determination of concept, color, and utilization room with results as presented in the table 1.

The testing on the interior design results of PT. Daffa Expressindo Logistik was conducted using MOS (Mean Opinion Score) testing to obtain direct employee feedback regarding the newly created interior design. The research results indicate that in terms of the concept, it reflects a modern and appropriate results. This is in line with the research findings which state that the 3D image concept, people can see image clearly and realistically (Sultan et al., 2022). As for the colors applied, these designs are appropriate and create a comfortable visual impression. This aligns with research indicating that 3D animation visualization using SketchUp is effective (Rachman et al., 2021). The utiliziation concept for the empty room is suitable as an employee workspace, and the new interior design for the owner's space is in line with their preferences and the allocation of rooms is well done. The results of this research align with the theory that SketchUp is an application consisting of an intuitive 3D mode that allows users to create and edit 2D and 3D models using the patented "push and pull" technique. Through these features, designer can transform any flat surface into a 3D shape (Asanbekova, 2020; Kim et al., 2017). This is further supported by research indicating that SketchUp is known for its simplicity and accessibility (Brightman, 2018; Wang et al., 2012).

https://doi.org/10.35877/soshum2039

ISSN: 2776-7930 (Print) / 2807-3010 (Online)

Table 1. Pre-design interviews

No	Scenario Testing	Design Results	Information	Conclusion
1.	Concept		Approved	Resulting concept in interior design can be stated to be modern and appropriate with results interview
2.	Color		Approved	The colors applied to the design are already appropriate and have impression comfortable view.
3.	Utilization room		Approved	The room allocation was not discussed during the interview with the owner, but it was based on the approved design result.

https://doi.org/10.35877/soshum2039

ISSN: 2776-7930 (Print) / 2807-3010 (Online)

No	Scenario Testing	Design Results	Information	Conclusion
4.	Distribution Room		Accepted	Distribution room No discussed in interview with owner However results design Approved

6) Distribution

The final stage is distribution, and the results of the rendering process will be saved in JPG format of image form and given to the company. The following are the results of the 3D interior design of the PT. Daffa Ekspressindo Logistik building:

a. Front of 1st Floor

Figure 26. Results of the Front of 1st Floor

The figure 26 is the result of the interior design of the workshop and space on the 1st floor of the building. In accordance with the concept to be implemented, this section is provided a room for seating for guests and a reception room for logistics services, located on the left side. This room has direct access to the toilet and stairs leading to the 2nd floor. Meanwhile, a room for a workshop intended for light repairs is on the right side. These two rooms are separated by walls equipped with glass. The results of this research are in accordance with other research, which shows that the role of digital information media through 3D media provides contribution convenience for the community to get information about layout buildings and spaces (Syahputra et al., 2021).

b. Back of 1st Floor

This section is a workshop for medium to heavy repairs, such as replacing tires and so on. This room is also a place to store workshop tools. The front and back are separated by doors.

Figure 27. Results of the back of the 1st floor

https://doi.org/10.35877/soshum2039

ISSN: 2776-7930 (Print) / 2807-3010 (Online)

c. Owner's Workspace

Figure 28. Owner's Workspace Results

The figure 28 is the result of the design for the owner's workspace and special living room. The image describes a sofa placed near the entrance next to the toilet, which is covered with a plywood cabinet so that the toilet does not look conspicuous, while the owner's work desk is placed near the window. This room has many windows for air circulation and light to enter, but is still equipped with lighting, such as spot lights above the sofa and work desk to add to the room's aesthetics, as well as a general light in the middle of the room.

d. Employee Workspace

Figure 29. Employee Workspace Results

The figure 29 shows a new employee's work space, previously an empty and unused room. This room has two windows, which are sufficient for air circulation and light to enter. This room is equipped with a work desk facing each other so that the room doesn't feel cramped. Moreover, furniture is provided with a cupboard to store documents. The type of artificial lighting used in this room is general light.

4. Conclusion

The use of interior design can introduce the interior of representation of a company's building to the company itself or other companies, serving as a reference for interior renovation plans. With 3D image results, users can see images clearly and realistically. Designing 3D interior using SketchUp 3D software can assist the company in utilizing the building more attractively, comfortably, and optimally. In this regard, the author has adapted to the owner's wishes and preferences, from the initial concept creation, layout, and all the designs created.

References

Adly, E., Widodo, W., Rahmawati, A., & Harsoyo, YA (2021). Design of Tourist Park in Mrisi Village Using the 3D SketchUp Application. *JAST : Journal of Science and Technology Applications* , *5* (2).

Anggra Ayu Rucitra. (2020). Formulating Interior Design Concepts. *Interior Design Journal*, *Vol. 5 No.*

https://doi.org/10.35877/soshum2039

ISSN: 2776-7930 (Print) / 2807-3010 (Online)

Asanbekova, G. K. (2020). Lessons on creating 3d models in SketchUp. *Informatics in Schools*, *1* (9). https://doi.org/10.32517/2221-1993-2020-19-9-31-50

Atmadi, T. (2018). PT Office Interior Design Study. Pupuk Sriwidjaja with a Modern Minimalist Concept. *Narada : Journal of Design and Art* , *4* (3), 303–313.

Brightman, M. (2018). SketchUp Basics. In *The SketchUp Workflow for Architecture*. https://doi.org/10.1002/9781119410171.ch5

Endru, RP, & Feriza, N. (2020). Literature Review : Study on the development of 3D Sketchup media on perspective projection material by drawing the appearance of a simple house, Endru Rakha Putra Feriza Nadiar. *Journal of Building Engineering Education Studies* , *6* (01).

Faisal, M., & Utami, WS (2022). Interior Design Design as a Media for Visualizing Coffee Outlets from the Heart. *MAVIB Journal*, *3* (2), 205–216. https://doi.org/10.33050/mavib.v3i2.2211

Google SketchUp. (2019). 3D Design Software 3D Modeling on the Web SketchUp. In *SketchUp* .

Kim, MG, & Um, DY (2017). 3D Architectural Modeling and Quantity Estimation using SketchUp. *Asia-Pacific Journal of Multimedia Services Convergent with Arts, Humanities, and Sociology* , *7* (6). https://doi.org/10.14257/ajmahs.2017.06.90

Lovita A, H. (2020). Evaluation of the Mixed-Use Building Concept as an Alternative for Building Spatial Planning at the Rsi Cileungsi Bogor Mosque. *SAKAPARI* .

NMS Wahyuni Trisna, N.E.P. (2023). Interior Design of Motorcycle Modification Workshop in Denpasar Bali. *Ispectrum JOURNAL*, *22* (1).

Nurcahyo, M. (2022). Study of the Role of Sketching in the Creative Process and Design Education. *Across Space*, 89.

Prataama, A., & Indriyani, R. (2016). Succession Planning in an Interior Design Furniture Family Company. *Agora* , *4* (2).

Rachman, SRD, & Alam, S. (2021). 3D Animation Visualization of Minimalist Btn Housing Based on Android Using Sketchup and Unity. *Proceedings of the Scientific Seminar on Information Systems and Information Technology*, *X* (1).

Rainna Dwiariani Manikam, IKDN (2021). An overview of the psychology of retail interior design. *Vastukara Journal*, *1* (1).

Regina, V.M., Marizar, E.S., Florencia, M., & Correspondence, P. (2022). The Role of Lighting in the Interior of the Korean Cultural Center in Jakarta. *Mezzanine*, *5* (1), 151–157.

Sultan, S., Samsudin, S., Yunita, F., & Ilyas, I. (2022). DESIGN OF ROOM INTERIOR DESIGN USING SKETCHUP SOFTWARE AND 3D BLENDER. *Selodang Mayang: Scientific Journal of the Regional Development Planning Agency of Indragiri Hilir Regency* , *8* (3). https://doi.org/10.47521/selodangmayang.v8i3.271

Susanti, A., Mustafa, MYE, Wulandari, IGAJ, & Putri, PS (2020). Understanding Adaptive Reuse in Architecture and Interior Design as an Effort to Maintain Environmental Sustainability: Literature Review Analysis. *SENADA (National Seminar on Management, Design and Business Applications of Technology)*, *3* .

Syahputra, R.B., & Deslianti, D. (2021). Making 3D Animation Videos for the Governor's Office of Bengkulu Province. *Recursive: Journal of Informatics*, *9* (2). https://doi.org/10.33369/rekursif.v9i2.17353

Tika Pratiwi, & Maryam. (2021). EFATA TRANSACTION SERVICE INFORMATION SYSTEM INTERIOR DESIGN. *Anti virus : Scientific Journal of Informatics Engineering*, *15* (1). https://doi.org/10.35457/antivirus.v15i1.1506

Wang, Y., Zheng, M., & Li, X. (2012). 3D modeling of buildings based on CSG and SketchUp. *Advanced Materials Research*, *594 – 597*. https://doi.org/10.4028/www.scientific.net/AMR.594-597.2333

Wijaya, IBA (2022). STUDY ON THE APPLICATION OF INTERACTIVE PRINCIPLES IN INTERIOR DESIGN. *Mintakat: Architectural Journal*, *23* (2). https://doi.org/10.26905/jam.v23i2.7841

https://doi.org/10.35877/soshum2039

ISSN: 2776-7930 (Print) / 2807-3010 (Online)

Zainudin, A. (2021). Color Theory in Design. *STEKOM University*.