

Modern Minimalist Shelf Inspired by White Luxury

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Abstract: Bulky shelves are frequently heavy, especially when made of solid materials such as solid wood and thick tempered glass, needing the use of two or more people to transfer them from one location to another. Furthermore, if the furniture is an elegant, antique armoire, it will not only be enormous and weighty but also delicate and precious, necessitating extra care. Thus, the objective of this study is to design and develop a modern minimalist shelf inspired by the white luxury that is portable. To begin, the design criteria for this study were acquired using a questionnaire issued via Google Form. According to the survey, the majority of respondents favoured bookshelf with a modern design and segregated storage space. During the design process, 35 thumbnails, four ideations, and three concept developments were drawn. The final prototype for this study was made of plywood with white stickers and acrylic plastics. Although the newly designed bookshelf solves the aforementioned issue, there are a few design changes that may be made to increase its value and aesthetic.

Keywords: Modern Design, Minimalist Design, Shelf, White Luxury, Portable Furniture

1. Introduction

Nowadays, most people plan the living room as the primary site to place shelves, whether to be filled with books, as a television entertainment zone, or even as ornamental furniture. Aside from its function, shelves have become a need for living spaces, and the design concept of the shelf is now taken into consideration when determining where to position it in order to complement the space design concept (Hipcouch, 2018). The selection of proper materials for the shelf is critical to ensuring the shelf's durability and compatibility with the space (Huber, 2020). For example, if the shelf is intended to have a wood colour and grain, oak, maple, or cherry plywood are ideal materials for the aforementioned design. These choices will still be durable, but they will be less expensive than non-

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manufactured hardwoods of the same species. A clear topcoat finish protects the wood from dents and scratches while letting the colour and texture shine through.

Furniture is often heavy, needing two or more persons to relocate it from one location to another. With heavy furniture, success rates for carrying or moving it declined dramatically. This means that designed furniture should not be too heavy or too tall in order to be able to reposition it on a regular basis. Moreover, the design of the furniture legs, such as a shelf leg should be ideal for a clean and clutter-free environment if it has to be swept or rubbed (Avis-Riordan, 2017). Dust and dirt may readily accumulate beneath furniture, irritating allergy sufferers (Courtney, 2019). Furthermore, sharp edges of the furniture are only there to make it appear stylish and sophisticated, but they are harmful to users, particularly kids. When it comes to preventing harmful situations, curved/chamfer/fillet edges are the ideal approach to eliminate any accident involving children, and adults are no exception (Loh, 2014). Therefore, this study will develop a modern minimalist shelf inspired by white luxury to address the aforementioned issues.

White luxury refers to the colour of the shelf which mostly will influence the surface colour including the combination colour for the lining such as gold and black colour. The edges of the shelf may have curved while the sides surfaces may be straight. White is commonly accented with other colours to enhance or change perception (Bizongo, 2019). White luxury is an idea gained from some of the top furniture designs that exhibit the notion of luxury white and undoubtedly showcase the style of furniture whether put in the house or in a relatively large area. The use of white luxury as a finishing material allows the designed furniture to be effortlessly integrated into any design idea of the space.

2. Literature Review

A shelf is a flat horizontal surface that is used to contain objects that are exhibited, kept, or offered for sale in a house, company, store, or elsewhere. It is elevated from the ground and generally has brackets anchored/supporting it on its shorter length sides. A shelf may also be referred to as a counter, ledge, mantel, or rack. Console tables, which are comparable to individual shelves, are meant to be set against a wall and maybe mounted. Figure 1 presents a simple wooden wall shelf.



Figure 1: Example of simple wall shelf

The shelf has both functional and aesthetic importance. The shelf, like any other big piece of furniture, may be placed in any desirable spot, including the corner of the study room, dining room, bathroom, and even the kitchen (Hipcouch, 2018).

Shelves, like other furniture, are available in a variety of designs that may be described as fitting an angle that does not truly meet the shelf's state. Here are some examples of various types of shelves use in any space to transform your home from ordinary to remarkable. Fixed bracket shelves are made up of individual brackets and can be used as standalone shelves or in combination with other brackets to

create a multi-unit structure as depicted in Figure 2(a). Fixed brackets made of metal or wood can be connected or hinged directly to a wall or a case. It is protected by metal or plastic shelf pins of varying thicknesses and diameters.

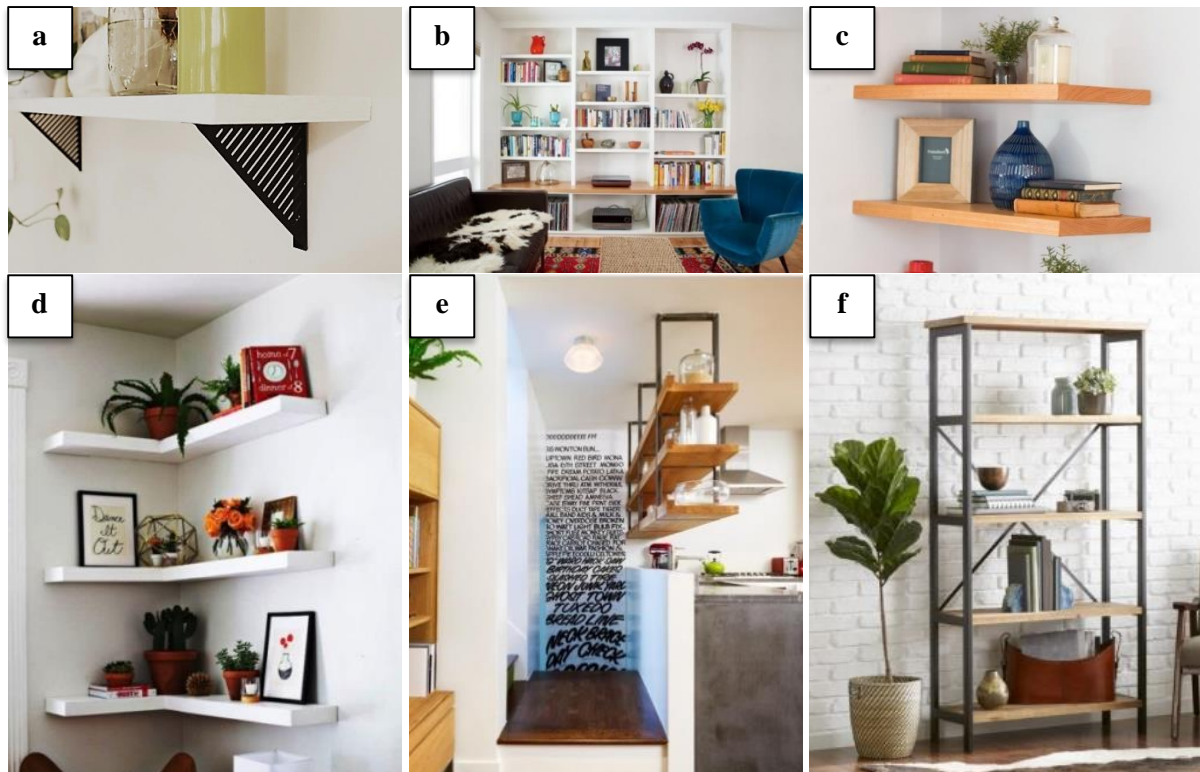


Figure 2: (a) Fixed bracket shelf, (b) built-in shelf, (c) floating shelf, (d) corner shelf, (e) top-hung shelf, and (f) freestanding/portable shelf

The next choice is built-in shelves, which is the most basic of all shelf alternatives (Figure 2(b)). Built-in shelves fit into nooks, alcoves, and other niches and may be installed anywhere there is an indent, making them excellent for houses with limited space. Meanwhile, floating shelves are not only functional but also visually appealing as presented in Figure 2(c). In contrast to fixed bracket shelves, which are bound by clear nails and pins, they appear to float over walls apparently unattached to screws and hinges. They're an attractive method to show off luxury goods and artwork. Also known as torsion box shelves, which are built of engineered wood with internal bracket support, providing a shallow closed box with load-bearing capabilities.

The corner shelf is shown in Figure 2(d), despite their name, aren't exclusively for corners. Rather, they are tailored to fit into smaller areas and locales, with the choice of open or closed units and the ability to be floor-based or wall-hung. These are creative methods to add storage without taking up too much room. In a variety of fancy designs, they make effective use of inaccessible and difficult-to-reach areas. There are solid wood, acrylic, and engineered/laminated wood shelving systems available, and they can all be customised to fit any area.

The next type of shelf is the top-hung shelf, which is used in schools and storerooms to store and display objects such as books, periodicals, pens, and other items as illustrated in Figure 2(e). They incorporate metal segments that are wall-mounted and from which shelves and droppers may be suspended. Top-hung storage shelf solutions do not work well with lightweight walls. Finally, there's the freestanding/portable shelf. They're ideal for both exhibiting and keeping goods. They are lightweight and small, allowing them to be relocated to any position while still offering adequate room. Freestanding shelf systems are available in a variety of sizes, materials, colours, and styles. Figure 2(f) shows an example of a freestanding shelf.

3. Research Methodology

The method in this study can be separated into three phases, namely design criteria identification, design process, and prototype, as in prior works (Ramli *et al.*, 2018; Selimin *et al.*, 2019; Husuno & Selimin, 2020). It starts with identifying design criteria. At this stage, a questionnaire survey with three sections was employed to collect data (demographic information, design criteria and recommendation). This questionnaire was issued to participants using Google Form, and the data collected was analysed and translated into design criteria prior to the design process.

The second step is known as the design process. During this stage, more than ten thumbnail sketches were done with a pen and A3 drawing paper. To create as many thumbnails as possible, a quick, no-judgment, and no-correction strategy was used (divergence process). Subsequently, the ideation was developed based on the selected thumbnails that act as the base of sketches. The ideations were made by combining several ideas of thumbnail sketches, with a minimum of four ideations made to represent the shelf's design concept. Prior to the idea development stage, a few ideations were chosen, which will be detailed further in the next section. The details of the shelves, particularly the modification and safety of selected ideations, were further refined during the idea development stage to meet the intended design concept. In this study, two idea development sketches were created, and both ideas were used as candidates in the final design selection stage via a simple final design survey.

Then, the prototype process begins with the creation of a mock-up based on the final design chosen. This mock-up was intended to illustrate and evaluate the design's stability as well as its aesthetic appeal. The mock-up in this study was made at a ratio of 1:6 utilising materials such as wood sticks, plastic sheets, mounting boards, corks, and many more. When no further changes were required to the design, the technical drawings of the final design were created using AutoCAD software. For 2D drawings, the drawings were created in orthographic view, and for 3D drawings, they were rendered to replicate the proposed final design.

4. Results and Discussion

4.1 Design criteria identification phase

Table 1 shows the summary of the significant results of the questionnaire with a total number of 100 respondents. According to the demographic data of the survey, most of the respondents are female (67.0%) and the rest are male respondents. Most of the respondents are between 18-35 years old (60.0%), followed by 36-45 years old respondents and over 46 years old respondents with 32.0% and 8.0% respectively. In addition, most of the respondents are married and Malays. As for the household income group, 71.0% of them fall in the B40 group, 24.0% in the M40 group, and 5.0% in the T20 group.

As for the shelf design criteria, 93.0% of them, almost all respondents own a shelf to support their daily routine. However, 67.0% of them are not satisfied with the function of their shelf and the rest are satisfied with their current shelf. Furthermore, 58.0% think that their shelf is difficult to transport because it is bulky and heavy. Next, 46.0% of the respondents prefer a bookshelf and indicated that everyone should own a bookshelf over other types of shelves. As for design concept, modern minimalist concept is the most popular bookshelf with 34.0%, followed by modular concept (26.0%), conventional design (23.0%), industrial concept (11.0%) and others (6.0%). In addition, 64.0% of respondents prefer separate storage spaces as a feature to consider when buying a shelf, followed by a shelf with drawers (32.0%), and 3.0% want hanging storage spaces. Most of them also prefer multifunctional shelf based on their current shelf design to support their daily routine activities.

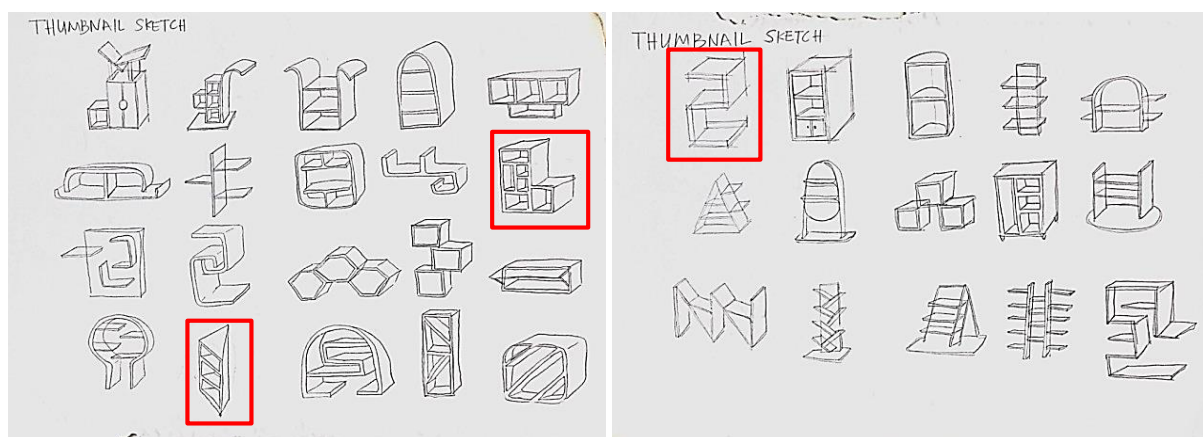
Table 1: Summary of significance questionnaire data

Section	Percentage (%)	Description
Demographic information	67.0	Female respondents
	60.0	Ages between 18 and 35
	57.0	Marital status is married
	80.0	Malay respondents
	71.0	Household income group – B40
Design criteria	93.0	Own shelf
	67.0	Not satisfied with their shelf function
	58.0	Find difficult to move or relocate their shelf
	46.0	Think everyone should have bookshelf
	34.0	Prefer modern minimalist shelf
	64.0	Prefer shelf with segregated storage spaces
	32.0	Prefer shelf with drawer
	90.0	Prefer multifunctional shelf
Opinion	51.0	Strongly agreed with portable or movable shelf
	35.0	Picked shelf with split storage will led to heavy shelf
	57.0	Prefer horizontal shelf over vertical (tall) shelf
	75.0	Recommended shelf in white colour

In the opinion section, 51.0% respondents strongly agreed with this study's proposal to design a portable or movable shelf, 30.0% agreed, 17.0% were neutral, and 1.0% neither agreed nor strongly agreed. Moreover, 35% of the respondents said that the reason for the heavy shelves is due to the many divided storages, 21% disagreed, 20.0% agreed and disagreed, and 4.0% disagreed at all. So based on the survey, it can be summarised that the design criteria for this study are modern, minimalist bookshelf with some separate storage and drawers.

4.2 Design process

Figure 3 shows the thumbnail sketches of shelves with different shapes and designs. More than 10 thumbnails were sketched in this study. Three of the sketches marked with a red box in Figure 3 were selected for the next design process, ideation. The selection was based on the sketches that met the design criteria obtained, which included keeping them separate.

**Figure 3: Thumbnails**

In the ideation phase, the design was specified in more detail, especially looking at every possible angle, including two-dimensional (2D) and three-dimensional (3D). By combining several designs from the thumbnail sketches, the ideation was developed. In this study, 4 ideation designs were created as

presented in Figure 4, of which only 2 were used for further development of the ideas. The selection was based on the shape of the divided space for storage.

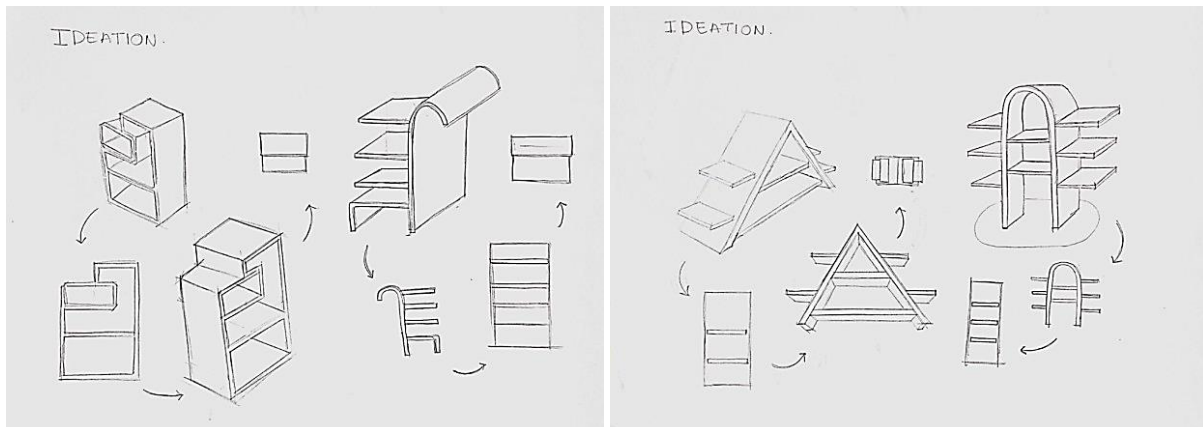


Figure 4: Ideations

In idea development stage, two ideas were further developed in this phase. A square or rectangular shape was incorporated into the design. The first idea development sketch has the features of caster and plenty of partition for storage, while the second idea development sketch also has the features of caster with large storage area for keeping things. As illustrated in Figure 5, both idea developments focus on rectangle design features and divided storage area.

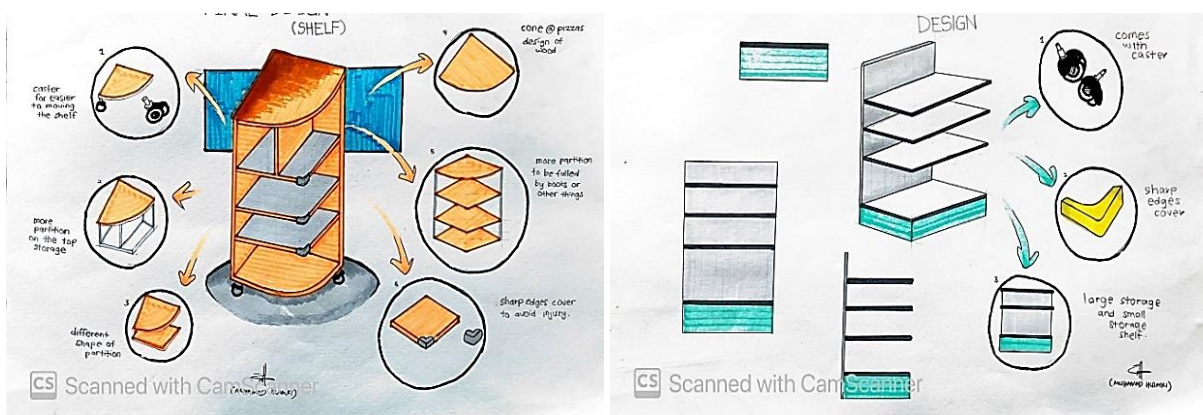


Figure 5: Idea development sketches

Next, a simple final design survey was conducted to choose the final design of the modern minimalist shelf inspired by white luxury. The final design was changed based on the participants' recommendations to improve the design. The majority of participants suggested adding more partitioned storage from different angles and incorporating the desk function into the design. Figure 6 shows the final design for this study.

4.3 Prototyping

This phase began with the development of a mock-up. The mock-up was developed using various materials such as corrugated cardboard, tape, hot glue gun, 3-second glue, and tools such as knives and scissor. The mock-up is used to show and evaluate the appearance of the prototype to be made based on the final design, but smaller than the actual size of the prototype. The mock-up for this study is shown in Figure 7.

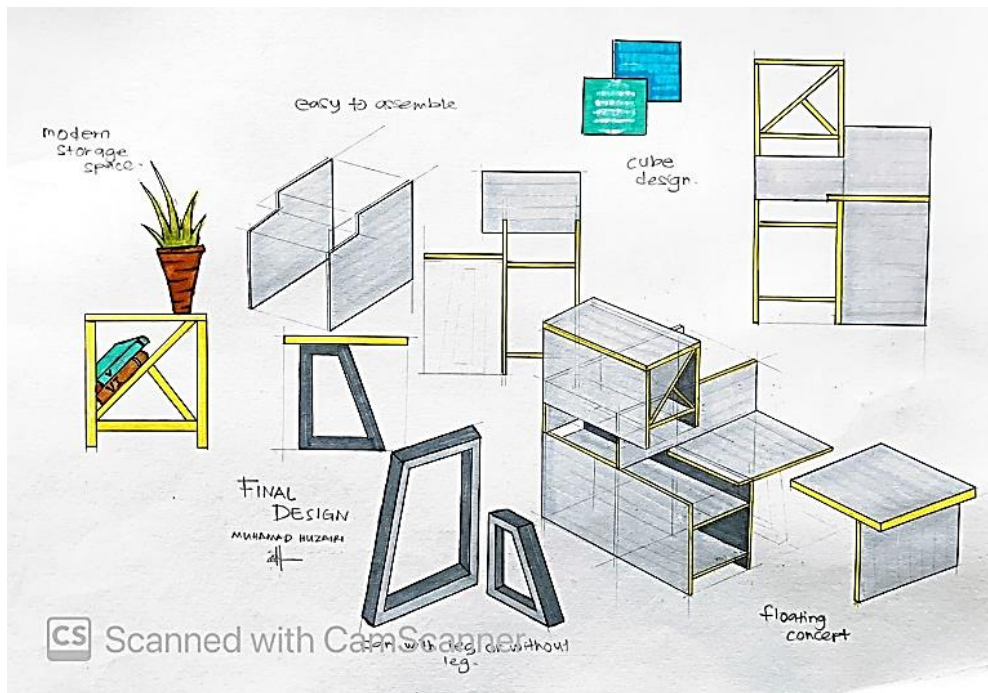


Figure 6: Final design of modern minimalist shelf inspired by white luxury

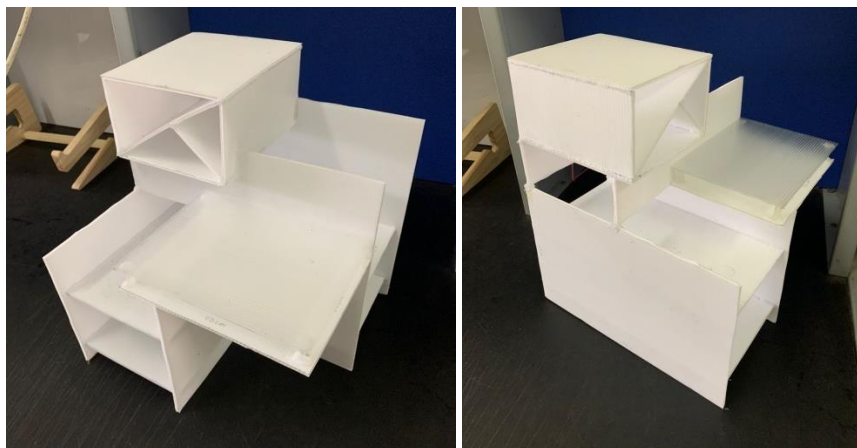


Figure 7: Mock-up of modern minimalist shelf inspired by white luxury

The process of preparing technical drawings was completed once there was no need for amendments to the final design. AutoCAD software was used to generate the technical drawing, which was plotted in 2-dimensional and 3-dimensional viewpoints, including an isometric view. These technical drawings include real prototype measurements and will be used as a reference during the prototyping process. Figure 8 depicts the isometric and orthographic views of the final product, which has dimensions of 100 (width) x 100 (length) x 111.8 (height) cm³. Meanwhile, Figure 9 depicts the rendering drawing of the final design.

The actual prototype was manufactured in this study by following the final design that was chosen by a simple final design survey of a modern minimalist shelf inspired by white luxury. The prototyping process consists of five steps: material selection, measuring, cutting, assembling, and finishing. Fabrication begins with the selection of materials, with plywood serving as the main material. Before beginning the cutting process, all pieces were measured and marked on the plywood. Following that, the assembly of the prototype's main body component was completed.

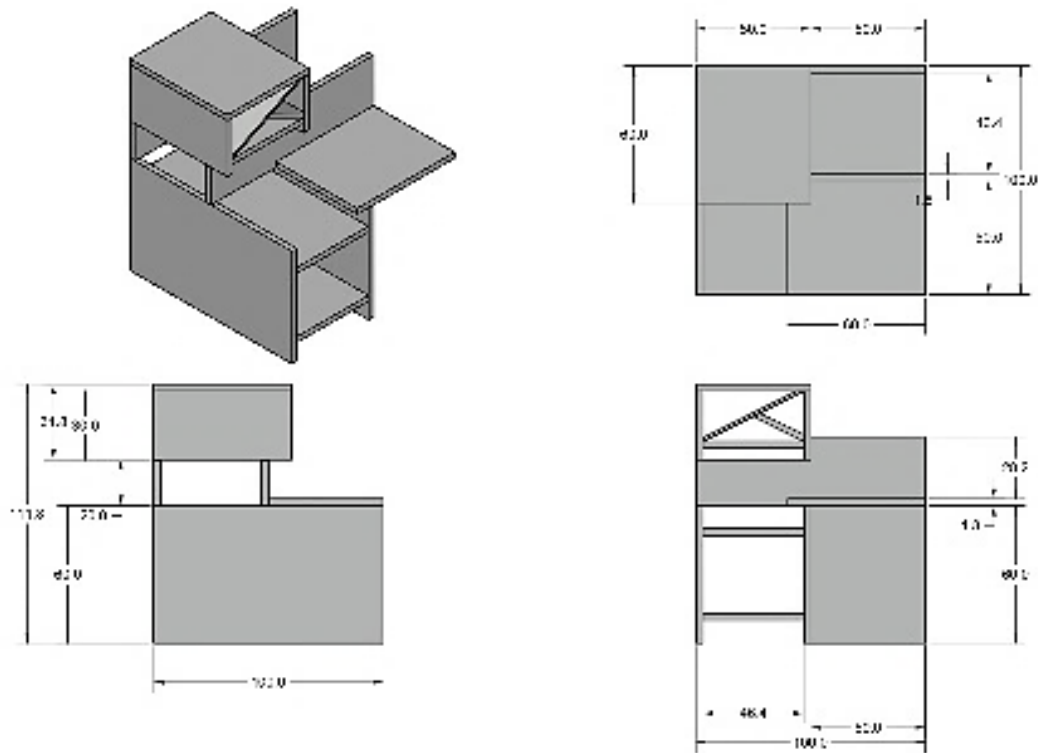


Figure 8: Orthographic and isometric views of the prototype

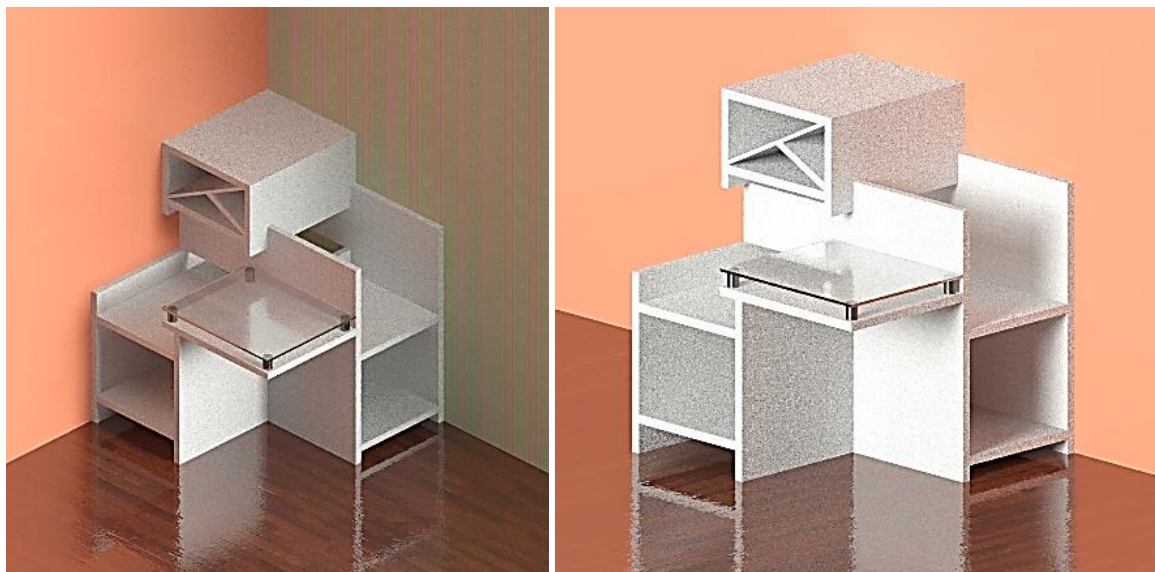


Figure 9: Rendered 3D view of the prototype

After that, flat head screws were utilised to join all of the sections and give the prototype stability and fixed jointing. Following that, the edging procedure was completed by utilising a plywood edge bending tool to cover all exposed plywood surfaces with a white sticker. Wood glue was used to keep the white sticker from peeling off the plywood. Subsequently, the acrylic was cut and mounted in the desired location using an acrylic glass spacer and screws. Figure 10 displays the final prototype of a modern minimalist shelf inspired by white luxury.

5. Conclusion

Finally, from the design survey, the modern minimalist bookshelf design criteria are modern, minimalist bookshelf with some separate storage and drawers. A total of 35 thumbnails, 4 ideations, and 2 idea developments were drawn as a result of the study. The final design of this study was chosen by a final design survey approach chosen by potential consumers. The prototype was made out of plywood, white stickers, and clear acrylics. The final prototype was designed in the shape of a rectangle and had a display divider made of acrylics as a table top aspect. This study's prototype can give a solution for respondents who desired a moveable shelf that allows them to easily shift the location of their furniture whenever they wish.

Future study is advised to build a shelf that appears indestructible yet is useful and easier to use. Especially on the storage portions for the design of a bookshelf, the storage size may suit the book size to lower its size and offer more room for other functions. Furthermore, the design must have neither too little nor too many compartments on the top parts of the shelf. Excessive storage capacity is not only inconvenient for the user but also wastes space and causes instability.

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