

## DESIGNING OFFICES WORKSTATION USING SUSTAINABLE MATERIALS IN THE COVID-19 PANDEMIC ERA

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Submitted: July 2022, Revised: December 2022, Accepted: February 2023

### ABSTRACT

The world was shocked by the Covid-19 pandemic at the end of 2019. Indirectly, global warming played a role in the outbreak problem, especially Covid-19. Indonesia Climate Change Trust Fund also said that climate change (including global warming) did not cause the COVID-19 outbreak, but it could help spread it. One of the solutions that humans do to reduce the impact of global warming is to apply the concept of Sustainable Design. The concept of sustainable design, which is applied to reduce the negative impact on the environment and reduce the spread of the corona virus, can be overcome by using eco-friendly materials. Eco-friendly materials also have several basic criteria, namely efficiency in the use of energy, durability, easy maintenance, and non-toxic. Therefore, researchers want to analyze what materials can be used as materials for designing workstation furniture for the Tiket.com office. This is done with the aim of designing workstations using sustainable materials and minimizing the spread of the Covid-19 virus. This study uses a qualitative method with field data collection and literature study related to the design of workstation furniture. For the design of the workstation furniture using the Rosemary Kilmer method which consists of the analysis stage (commit, state, collect, and analyze) and the synthesis stage (ideate, choose, implement, and evaluate). These eco-friendly materials are applied to the design of workstation furniture for employees at the Tiket.com office. The application of these materials is also based on the needs and functions required. In conclusion, furniture that is designed based on the concept of sustainable design with the use of eco-friendly materials can prevent the spread of the epidemic, especially Covid-19.

**Keywords:** Covid-19, eco-friendly, global warming, material, sustainable design.

### 1. PREFACE

Late 2019 to early 2020, the world was shocked by the presence of a new virus, which is called Corona. The virus that causes Covid-19 [1]. David Wallace-Well in his book writes about his concerns about the epidemic problem. "What worries epidemiologists more than ancient diseases is that existing diseases can move, change, or even undergo further evolution due to global warming." [2].

From Wallace-Well's statement, indirectly, global warming plays a role in the problem of the outbreak, especially Covid-19. The Indonesia Climate Change Trust Fund also said that climate change (including global warming) did not cause the Covid-19 outbreak, but could help spread it [2].

"Global warming will disrupt those ecosystems, which will help disease to break through," Wallace-Well writes in his book. Global warming that occurs due to the climate crisis, makes the temperature rise, the polar ice caps melt, making various changes on earth. Therefore, every living creature must adapt. So are viruses and bacteria [2]. One of the solutions that humans do to reduce the impact of global warming is to apply the concept of Sustainable Design [3].

Sustainable Design is the overall concept of sustainable design, seen from energy efficiency such as space and furniture forming materials, lighting, air conditioning. Sustainable can be applied in several ways, such as by selecting the materials to be used in the interior of the room, setting up quality air circulation, and so on. Therefore, the application of the sustainable concept needs to be disseminated, so people can start implementing it so that the effects of global warming do not expand and a better life can be created [3].

The topic that will be discussed is about sustainable design, which will focus more on the use of eco-friendly materials in the designing workstation furniture of Tiket.com office. The application of environmentally friendly materials is one of the actions towards sustainable design. The principle of maintaining environmental balance must be the basis of any development or change efforts to achieve human welfare and the sustainability of the function of the universe [4].

## 2. RESEARCH METHOD

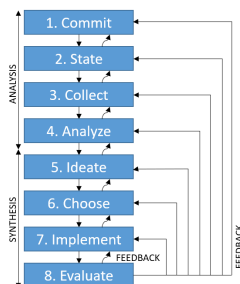
The method used is a qualitative method that is analytical so it is not stated in statistical form and numbers. Data were collected through field surveys and literature studies related to the design of tiket.com office workstation furniture. Qualitative analysis uses furniture design theories, including ergonomics to determine space requirements.

The design of the workstation furniture uses the Rosemary Kilmer method which uses 8 stages starting from: (a) Commit, realize and accept design problems that exist in the field. by making schedules, contacting clients, and managing permits; (b) State, determine the problems that exist in the field by making a problem formulation, problem boundaries, and design objectives; (c) Collect, collect information. designers must conduct research from similar projects that have been done by collecting literature data and field data; (d) Analyze, see all the information that has been collected about the existing problem and then analyze it; (e) Ideate, think creatively to find ideas in solving problems to achieve design goals; (f) Choose, choose the ideas that fit the concept, client needs, budget, needs, goals, and desires; (g) Evaluate, is a review to see what the designer has done whether it has solved the problem; (h) Implement, is the stage of work after the idea is selected. By creating final design drawings, working drawings, and presentation drawings.

Feedback, for systematic evaluation at each step of the design process, using the previous or previous steps [5].

**Figure 1**

*Design process by Rosemary Kilmer*



## 3. RESULTS AND DISCUSSIONS

Sustainable furniture by defined is type of furniture with certain characteristics. In manufacturing practices it is engineered material. Durability in terms of lifespan will end up

by not adding tree cut to the landfills. It will be additional matters if it is being manufactured locally. The costs might be a bit higher but the quality is guaranteed for years. Types of sustainable furniture; Recycled or Recyclable: The furniture should be made of recycled or repurposed materials, or be recyclable itself. It could easily be both. Barn wood furniture is an example of furniture that reuses materials from old barns. Metal can also be repurposed along with wood. Next, Renewable: It should make use of materials that are organic and can be easily re-grown or replaced. For instance, bamboo is increasingly gaining in popularity because it grows back very quickly. Other than that, Safer Materials: The piece of furniture has been made using materials that are safer for the environment by being less toxic and that has no, or lower off-gassing. Stewardship Sourcing: The furniture is made of raw materials that come from fairly-traded sources or cellified low impact sources such as FSC-approved forests

Sustainable Design is a relationship or a method from planting. The sustainable life cycle is from taking original materials in nature and then processing them in factories and then distributing them to consumers, used by consumers and then recycled, repaired or reprocessed in factories. or use of resources, so that these resources are not permanently damaged [3].

The principles of sustainable design are divided into 3 primary areas, namely: operational, philosophy, and practice [6].

Operational principle: long-term decision-making process, in collaboration with parties involved with sustainable design or sustainable design, minimizing direct and indirect impacts on the environment.

Philosophical principles: respecting the needs of society in current and future generations, energy efficiency such as natural resource management, and sustainable solutions that are cost-effective, easy to maintain.

Principle of practice: reduce and eliminate pollutants in the environment and a product, material, finishing and building system, a durable product.

Sustainable material specifications: To reduce the environmental impact associated with materials, the priority of interior designers is that finishing materials such as paint and varnish can have an impact on the environment. The location of the project determines the materials, products and capabilities available whether it uses a lot or less energy, long lasting, easy maintenance is important. For projects that are used for a long period of time, the material must be durable, have technological capabilities and also pay attention to appearance. In addition to the maintenance techniques on each product, the impact on health needs to be considered by designers [3].

Larasati (2007) suggests that the selection of sustainable materials is self-produced material with natural finishing or reducing negative impacts on the environment and according to Mrs. Tita Larasati, a bamboo expert and lecturer at the Bandung Institute of Technology, the life span or age of bamboo in buildings can last a long time. or sustainable, depending on the cultivation, processing, application, preservation, and maintenance of bamboo [3].

Eco-friendly materials have the following criteria [7]: (a) Non-toxic, before and after use; (b) In the manufacturing process does not produce substances harmful to the environment; (c)

Can connect us with nature, in the sense that we are getting closer to nature because of the natural impression of the material; (d) Materials that can decompose easily naturally.

The following are eco-friendly materials that are applied to the designing workstation furniture of tiket.com office:

(a) Plywood

This type of plywood material is made of bark which is arranged and glued in layers. After that, the composition of this basic material will be pressed with a high-pressure machine to produce multiplex. The texture is quite tight and the durability is also high, as well as waterproof. Often used in furniture, multiplex generally durable [8].

There are several types of plywood that we can find on the market, namely plywood from pine wood, plywood from sengon wood and plywood from sungkai wood. The price of standard size plywood per sheet is 120x240cm according to the plywood thickness variants, 6mm, 9mm, 12mm, 15mm, 18mm and 24mm.

Plywood is suitable for various building needs as well as the manufacture of household furniture. For the use of building materials, it can be used for beams, floors, panels, and formwork.

In addition, external plywood can also be used for a variety of home exterior purposes, such as door surface coatings or wall cladding. Then, plywood is also used as a material for furniture, ceilings, and wall panels.

**Figure 2**

*Multiplex material*



**Source:** <https://www.dekoruma.com/artikel/75716/jenis-triplek>

**Figure 3**

*Multiplex material*



**Source:** <https://padiumkm.id/product/produsen-kayu/368781-plywood>

#### (b) Tempered Glass

Tempered glass is a glass that is made by going through a heating process to make the glass stronger and safer than ordinary glass [9].

There are many types of glass that can be made into tempered glass. For example, extra clear glass can be made into extra clear tempered glass, acid glass can be made into acid tempered glass, or glasstone glass can be made into tempered glass stone glass. As long as the glass can be processed in temperature or chemical processes, then the glass can turn into tempered glass. In general, if you are engaged in the building materials industry, architecture, or interior, tempered glass will be served using the tempering furnace machine method. As for other industries, such as screen protectors, the electronics industry, there is a possibility that the glass is produced by chemical methods. The most common misunderstanding is where tempered glass is mistaken for a different type of glass material or material than ordinary glass. It should be underlined once again, tempered glass is glass that has been additionally processed in a tempering furnace or chemical process, so before determining specifications, it is necessary to clarify in more detail what type of glass you want to make tempered glass.

Types of Tempered Glass:

##### (a) Clear Tempered Glass

In appearance, this glass looks like ordinary glass in general. This glass is also deliberately made clear to make it easier to apply to various objects or different architectural needs.

##### (b) Laminated Tempered Glass

This glass is slightly different from other reinforced glass in that it already has a laminate layer attached to one or both parts of the glass. The function of the laminate layer is to make the glass safer when hit by a blunt object.

##### (c) Reflective Tempered Glass

Reflective tempered glass that has been pasted a layer that has a surface like a mirror that can reflect reflections well. This type of glass is very safe to use as a mirror, because if the mirror falls, the shards will not harm others.

##### (d) Tinted Tempered Glass

This glass has been coated with a layer of thin film and already has a color. The function of the color is to reduce the heat of the sun that enters the room so that it can make the room cooler.

##### (e) Frosted Tempered Glass

This type of glass has a slightly rough surface and is deliberately made so that it cannot be fully see through like ordinary glass. You can still see a few shadows behind it but won't be able to recognize it clearly at all.

#### Figure 4

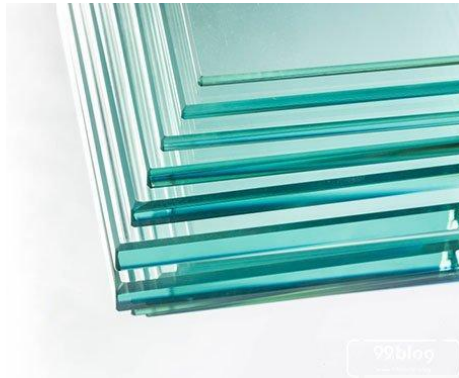
*Tempered glass*



Source: <https://www.rumah.com/panduan-properti/kaca-tempered>

**Figure 5**

*Tempered glass*



**Source:** <https://www.99.co/blog/indonesia/kelebihan-kaca-tempered/>

(c) HPL (High Pressure Laminate)

HPL is a coating material that is used as the top layer or finishing on wooden furniture, so that it displays a smooth but textured appearance [10].

This product consists of several layers, including a kraft layer impregnated with phenolic resin (kraft paper), a decorative layer (decor paper), and a clear laminate layer (overlay paper).

These layers are produced under high pressure and temperature of about 1000 kg per square meter and a temperature of 140 degrees Celsius. These laminated sheets produce a material that is strong, durable, hygienic, and offers a relatively wide range of designs and applications. HPL can be applied to both vertical and horizontal surfaces and can be heated to form certain contours or curves depending on the thickness of the sheet. The thickness itself is available from 0.8mm to 1.5mm with dimensions of length and width of about 244cm and 122cm.

HPL itself has several types of finishing for various surface shapes, such as semigloss, solid, wood texture motifs or embossed motifs, doff (matte), and glossy which can be chosen according to design needs.

HPL material is also widely applied to custom made furniture products such as wardrobes, bookshelves, nightstands, dressing tables, work tables, countertops, or cabinets. For some people, they prefer uniformity or suitability of color themes or motifs in interior decoration.

Advantages of HPL: (a) HPL has a wide selection of colors and patterns; (b) The resistance to scratches and water owned by HPL is fairly good; (c) The process of making products using HPL does not cause a lot of dirt; (d) The use of HPL makes the resulting product has a smooth appearance; (e) The time required to complete the product as a whole is also shorter; (f) The process of making products faster coupled with the use of simpler materials makes production costs can be saved; (g) Products that are finished using HPL have better resistance to scratches and water than plywood; (h) The use of HPL will give a modern impression to the products we make.

Disadvantages of HPL: (a) HPL is quite difficult to make curved; (b) The process of cutting HPL must be done very carefully; (c) HPL has a low level of flexibility and is easily damaged; (d) The HPL board is attached to the product through a gluing process using a

special glue; (e) The impression produced by the duco paint finish will look more luxurious; (f) There are still many plywood replacement materials that are cheaper than HPL; (g) You have to give finishing to the edging so that the HPL layer really looks neat.

**Figure 6**

*High pressure laminates*



**Source:** <https://www.dekoruma.com/artikel/72488/serba-serbi-hpl-high-pressure-laminate>

**Figure 7**

*High pressure laminates*



**Source:** <https://bildeco.com/blog/kelebihan-dan-kekurangan-hpl/>

### **Final design**

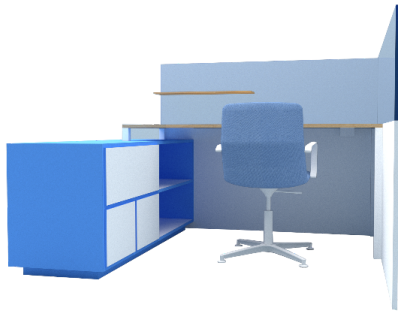
Because the design of this workstation furniture was made for the Tiket.com office, the theme used was adjusted to the tiket.com image, namely carrying the Modern and Playful theme. The use of modern themes is because the workers or employees of tiket.com are the millennial generation who need everything modern, both in terms of technology and the shape and image of the tiket.com office which is designed in a modern way for young people. While the use of the playful theme is due to the dominant blue color in the tiket.com logo which symbolizes a form of freedom like the sky that has no limits. The big yellow circle symbol in the new logo is called the happiness dot or a point of joy that draws dynamic consumers.

The form of furniture that will be made uses a modern playful concept. Inspired by geometric shapes with everything simple, functional, and well-organized. The design used is minimal in decoration but emphasizes functionality and needs.

The color used for the finishing material for the design of the tiket.com office workstation furniture applies the color identity of the tiket.com company itself, which is dominantly using blue.

**Figure 5**

*Perspective 1 of furniture design*



**Figure 6**

*Perspective 2 of furniture design*



Explanation:

(a) Storage

- Material plywood 12 mm FIN. HPL
- Consist of: (a) 2 Open Storage (70 x 50 x 30), (b) 1 drawer (75 x 50 x 30), (c) 2 Cupboard (37 x 50 x 30)

(b) Top Table (155 x 70)

- Material plywood 12 mm FIN. HPL
- Charging port

(c) Sneeze Guard (155 x 45)

- Material Tempered Glass
- Screen divider provides privacy for users
- Clear glass prevents the transmission of covid-19 while allowing users to still be able to socialize with co-workers

(d) Table Legs

- Material plywood 12 mm FIN. HPL

#### **4. CONCLUSIONS AND RECOMMENDATIONS**

The concept of sustainable design, which is applied to reduce the negative impact on the environment and reduce the spread of the corona virus, can be overcome by using eco-friendly materials. Eco-friendly materials also have several basic criteria, namely efficiency in energy use, durability, easy maintenance, and non-toxic. These eco-friendly materials are applied to the design of workstation furniture for employees at the Tiket.com office. The application of these materials is also based on the needs and functions required.

Workstations must be designed with employee productivity in mind, therefore the materials applied are not only eco-friendly and concerned with aesthetics, but also health and comfort.

### Acknowledgement

The author would like to thank profusely to all parties who have helped and supported in the process of writing this article.

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