

THE STUDY OF FURNITURE DESIGN (LAY OUT AND ERGONOMIC) DURING THE COVID-19 PANDEMIC AT DKI JAKARTA PUBLIC SERVICE MALL

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ABSTRACT

The problem currently faced is that changes in interior design styles during the COVID-19 pandemic have greatly affected the furniture design trend. With the current epidemic, we live in isolation that limits social interactions. We need to adapt to carry out daily activities, both indoors and outdoors. We do this so that we avoid exposure to the coronavirus. In this regard, the trend of furniture design inevitably has to change according to health protocols. DKI Jakarta Public Service Mall is one of the things that must improve with this. Public facilities, which are elements in the form of seats, have an important role in public service activities. Public furniture such as seats is an important thing whose function is to support comfort. The purpose of this research is to examine the layout and ergonomics. The research method used in this research study is a qualitative descriptive method, with layout analysis in the waiting room and human dimension analysis as well as posture analysis using the REBA method. The expected benefits in this research are the publication of the results of research and development through a National Journal accredited by Sinta, can achieve the expected Technology Readiness Level and convey the results of research to the Research Center of Mercu Buana University.

Keywords: Evaluation, Layout, Design, Furniture, Public, Pandemic.

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INTRODUCTION

COVID-19 pandemic is able to change interior design trends into public furniture currently. A challenge for research lecturers or interior designer practitioners is related to the study of layout and ergonomics during the corona virus pandemic. One of the places is related to society service activity is special area of the capital Jakarta Public Service Mall. As a place that facilitates public services activities for society, then the need for a comfortable and healthy seat/sofa is indispensable. According to Moenir, knowledge about public services, office administration, motives, attitudes and behavior of public services, office administration, motives, attitudes and behavior of services and management of public services is absolutely understood by company leaders or anyone engaged in the public service business. Placement layout and anthropometry ergonomics, design of seats/sofas for services need to get more serious attention due to the current pandemic. The reason is because this place is often visited by the community, it is necessary to pay attention to the aspect of service.

This domestic cooperation research with title The Study of Public Furniture Design during Pandemic at the special area of the capital Jakarta Public Service Mall is our work that has never been written by other people or published by others. This research evaluated the layout of public furniture by an anthropometric ergonomic design approach. In this research, data obtained came from the results of measurements and observations through 3-dimensional images from the special area of the capital Jakarta Regional Government web data. The measurement data obtained, such as the shape, size, and materials used, will be compared through layout drawings and anthropometric ergonomics theory. This research is based on something that wants to be expressed from observations result on some public furniture that is in public spaces as an activity media for the society. Of course, this become a very important input related to prevent the spread of corona virus. Health protocols must be implemented in public facilities as an effort to prevent this outbreak. The development of public furniture will automatically follow the ongoing trend due to the COVID-19 pandemic. The relationship between prevention of the corona virus, public services, public furniture, and user comfort is really needs to get concern. In carrying out this research, it is necessary to have a good approach, to formulate aspects of shape, size, and public furniture material which are analyzed based on ergonomic anthropometry.

"Conceptual approaches can be built by understanding several things, including: Components of design understanding, analytical design schemes, mapping of design mindsets, design approach methods, and ending with the formulation of design concepts" (Santoso, 2020).

The definition of research in various literatures always leads to research objectives where contribution to knowledge is the main thing, it is certain that the benefits will be felt by the community, at least the people who are directly or indirectly related to our research objectives. As Dawson put it: *Research is a considered activity which aims to make an original contribution to knowledge* (Dawson, 2009). Contributions in research can lead to proposals improvements we propose, and we can prove that improvements will be even better. Hence, the contribution to science is the improvement or revision we make from our research.

The output of this research is expected to be continued and published in an accredited national scientific International journal. This domestic cooperation research activity must be able to make a scientific contribution to science and be able to bring out a change. This domestic cooperation research was carried out together with partners from Indonesia of Arts Institute Yogyakarta and students as a manifestation of the implementation of the College Tridharma. In line with the development of science, researchers are expected to be able to improve their abilities and skills through research. In addition, to increase the excitement of academic life, students also get attention in this domestic cooperation research activity. Researchers are also responsible for improving students' abilities in conducting research. Based on the explanation above, the formulation of the problem in this study is to examine the layout of waiting room furniture and ergonomic of the sofa/waiting chair.

METHODOLOGY

"The research method used is descriptive qualitative and quantitative, a scientific way to obtain valid data with the aim of finding, developing, and demonstrating certain knowledge so that it can be used to understand, solve, and anticipate problems."

With this method, the researcher intends to carefully observe certain aspects related to the problem being researched and evaluate the layout of furniture and the design of public furniture in the service waiting room and lobby, so that data will be obtained that can support the preparation of this research report. The data obtained will be further processed and analyzed with interior and ergonomic theory, so as to get a clear picture of the problem and conclusions can be drawn regarding the problem.

The research approach in this study is to use a design approach and researchers use a conceptual approach in the design process, especially public furniture seating/sofa. In this study, the data obtained came from measurements and direct observation of the object of research. Obtained measurement data such as shape, size, and materials used, will be compared with anthropometric ergonomic theory.

According to Sumartono (2017), qualitative method is a process of research and understanding based on a methodology that investigates a social phenomenon and human problems. Research using qualitative data (data in the form of data, sentences, schemes, and pictures). In this approach, researchers make a complex picture, examine and make detailed reports.

Data collection techniques that researchers do are through:

- Observations were made by researchers by observing what was the focus to obtain research data, namely, the layout of the room and the shape of the public furniture design in the service room and lobby. Observations made really help researchers in identifying research problems, by seeing, measuring and documenting through the camera. As well as trying to get a blueprint lay out of the service waiting room and lobby from the building manager.
- Literature study/literature review is carried out by tracing important documents that are considered related to the research focus. Data obtained from literature studies in the form of text or images. Documents that are the source of data are books and journals related to public furniture, ergonomics, public services, and health protocols.

General review

Interior design theory

In interior design illustration books, interior design is planning, arranging, and designing spaces in buildings. Interior design is the work of designer architects that specifically concerns the interior of a building, the forms of which are in line with the development of science and technology which in the design process are always influenced by local geographic elements and social habits that are manifested in certain styles. Interior design elements consisting of lines, shapes, fields, spaces, colors, patterns, textures, ventilation, lighting, and form a space that can separate the inner space from the outer space. Some of the principles that must be considered in interior planning include:

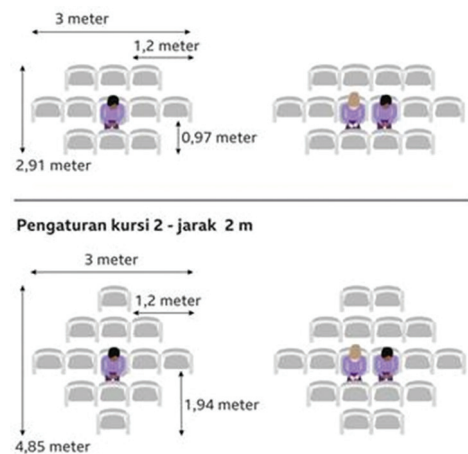
- Setting the plan (lay out) of a building and determining the size or dimensions measured by a certain scale, namely, metrics for the International scale (British, Indonesia) and inches (US)
- Determination of location and direction
- Adjustment of the interior with the basic elements that make up the interior layout According to Wicaksono and Tisnawati (2014) the purpose of interior design is to:
 - Fix function
 - Enriching aesthetic value
 - Enhances the psychological aspect of a room.

According to Anggita, Astuti the size of a product must adjust to the size of the human body or the target user of the product that is made to create comfort for the user's body, not make it tired, and according to the needs of the human body.

Lay out furniture

Definition of furniture is home furnishings that include all items such as chairs, tables, and cabinets. Mebel comes from the word movable, which means it can move. In ancient times, tables, chairs and cabinets

were relatively easy to move from big stones, walls, and roofs. Furniture comes from the French language, furniture which means household furniture. Furniture comes from the word *fournir* which means furniture or home or room furniture. Although *mebel* and furniture have different meanings, they are designated the same like tables, chairs, cabinets, and so on. In other words, *mebel* or furniture is all objects that are in the house and are used by residents to sit, lie down, or store small objects such as clothes or cups (Haryanto, 2004). Setting or seating arrangement are an effort made in providing services in the waiting room, to create comfort. The proper arrangement of the service waiting room can affect the participation of the community in carrying out their activities in the room. There are various types of seating arrangements. There is a U type, team style, conference table, circle, chevron arrangement, auditorium, and traditional.



Anthropometric ergonomic theory

Ergonomics is the study of human behavior in relation to their work. In short, it can be said that ergonomics is the adjustment of work tasks to the condition of the human body, which is to reduce the stress that will be faced. His efforts include adjusting the size of the workplace to the dimensions of the body so as not to be tiring, setting the temperature, light, and humidity to suit the needs of the human body.

Definition of ergonomics

The term ergonomics come from the Greek language which consists of two words, namely, *ergon* which means work and *nomos* which means rule or law. According to (Panero, 2003) Ergonomics is a work design technology based on the sciences of human biology, anatomy, physiology, and psychology. And according to Alfata MN, Hermawan Y, Widyahantari R. Ergonomics approach needs to be done in workspace planning and design human centered.

Definition of anthropometry is one of branches of ergonomics that connect to measuring the dimensions of the human body that can be used to design ergonomic facilities. According to (Wignjosobroto, 2000), the word anthropometry comes from the Greek, namely, the word *anthropos* (man) which means human and the word *metreinn* (to measure) which means size, so that anthropometry is a science related to measuring the dimensions of human body. A collection of numerical data relates to the characteristics of the human body in terms of size, shape, and strength and the application of these data to design problems. Anthropometry can be widely used as an ergonomic consideration in the process of designing or designing products or work systems that will be used by humans.

Posture analysis method rapid entire body assessment (REBA)

According to Hignett S This technical note details the preliminary stage in the development of a postural analysis tool, Rapid Entire Body Assessment (REBA). REBA has been developed to fill a perceived need



Fig. 1: MPP mall view
Source: Doc Pemda DKI



Fig. 4: The service room view third floor
Source: DKI regional government doc



Fig. 2: The service room view first floor
Source: DKI Regional Government Doc



Fig. 3: The service room view 2nd floor
Source: DKI Regional Government Doc

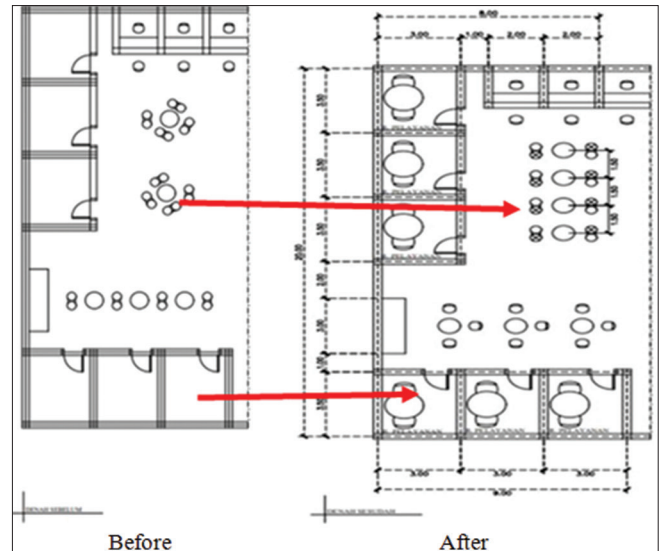


Fig. 5: First floor waiting room layout
Source: Private Doc

for a practitioner's field tool, specifically designed to be sensitive to the type of unpredictable working postures found in health care and other service industries. This is very important to note because production results are strongly influenced by what workers do. Work posture itself means that work is a human activity to change certain conditions of the natural environment which is intended to defend and keep its survival. Ergonomics which is related to human work in this case is shown to redesign work procedures that must be applied, to provide the enhancement of effectiveness and efficiency as well as comfort or safety for workers (Sutalaksana, 2006).

Health protocol in public space

Minister of Health Terawan Agus Putranto issued a circular letter regarding the prevention protocol on May 20, 2020, aimed to the Head of the Ministry of Business Sector Development, Governors and

Regents/Mayors all over Indonesia. The circular letter numbered HK.02.01/MENKES/335/2020 concerning the Protocol to Prevent the Transmission of COVID-19 in the Service Sector Workplace and Trade Sector (Public Area) in Supporting Business Continuity. The COVID-19 transmission prevention protocol applies to workplace managers, business actors, workers, customers/consumers, and communities involved in the service and trade sectors (public areas).

Do physical distance limit at least 1 meter:

- Provide special signs placed on the floor of labor-intensive areas such as changing rooms, elevators, and other areas as a barrier between workers.
- Regulating the number of workers entering to facilitate the implementation of social distancing.
- Arrangement of work desks, seats with a minimum distance of 1 m.

RESULTS

Public Service Malls according to the PANRB Ministerial Regulation no. 23 of 2017 is the place for the implementation of public service activities for goods, services, and administrative services which is a function expansion of integrated services both centrally and regionally, as well as BUMN, BUMD and private services in order to provide fast, easy, affordable, safe, and comfortable services. The Public Service Mall provides a variety of public services such as taking care of driving licenses, RI investment files, ID cards, STNK, credit loans, e-mail, and

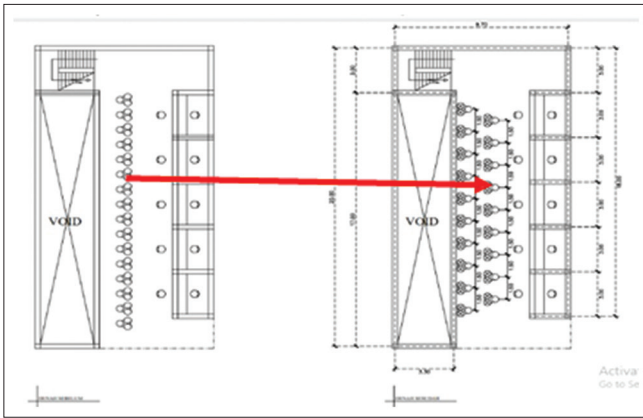


Fig. 6: Second floor waiting room layout
Source: Private Doc

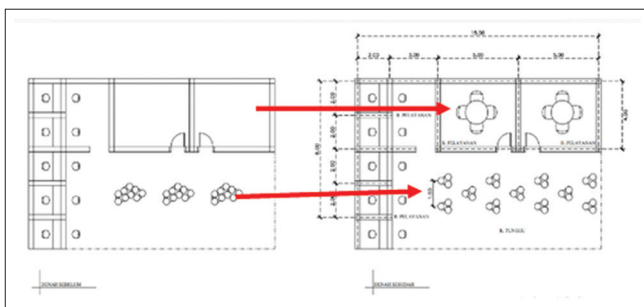


Fig. 7: Third floor waiting room layout
Source: Private Doc

taxes, immigration, PLN, passports, and so on. The data used in this study are primary data based on literature studies through various official journals, scientific research, and related studies. Because the location has not been opened to conduct a field survey, so the results obtained are based on the DKI Jakarta Regional Government web data as follows (Fig. 1):

Problem identification from the data obtained as follows:

Problem identification is obtained from online pictures as follows:

1. The layout of furniture in the waiting room, first floor (Fig. 2), service room second floor (Fig. 3) and third floor (Fig. 4) are still not in accordance with health protocols, there are still double and 3-seater furniture which are still in use (Fig. 5).
2. The room's chamber is made of wood with a white HPL coating and a wood texture. The chair used is a chair made of synthetic leather in black and yellow, accompanied by an iron leg adjuster (Fig. 6).
3. The sofa in the waiting room is a backrest sofa with a smooth upholstery material and a soft seat. The layout distance between adjacent sofas or waiting chairs is < 1 m. The guest table between the sofas is made of wood and iron legs (Fig. 7).
4. Related to social distancing, the layout of public furniture that looks untidy, so it is not comfortable in circulation because it causes contact or touching between visitors.
5. The design form of public furniture on second and third floor service room, especially sofas or waiting chairs, still does not look ergonomic, this can be seen from visitors who sit with their legs raised because of their height and look tired because there is no backrest.
6. The shape and size of the sofa/chair in the waiting room are as follows:
 - a. First floor, it is round oval face each other, Width: 45 cm, Depth: 40 cm, Length: 90 cm, Height: 50 cm, base material is plywood, foam, rubber, and synthetic leather upholstered in gray.
 - b. Second floor, it is round oval in a row, Width: 80 cm, Depth: 40 cm, Length: 120 cm, Height: 50 cm, the base material is wood,

plywood, foam, rubber, and synthetic leather coated with gray and orange fabric.

- c. Third floor, triangular shape (combination of three sofas with three square) facing and in a row, Width: 90 cm, Depth: 80 cm, Length: 180 cm, Height: 50 cm, base material is wood, plywood, foam, rubber, and synthetic leather upholstered fabric gray and orange.
 - d. All sofas/waiting chairs without backrest and arm with 5 cm height adjuster.
7. The lighting configuration as shown in the picture above uses overhead downlights, bright, and uniform types which give the impression that the space is large and public. Lighting on the upper floors generally still uses artificial lighting, because natural lighting from the windows is exists from one side only.
 8. Overall ventilation uses AC.
 9. Ceiling acoustic uses board gypsum and games ceiling as well as some ME, Audio, and Sringkler accessories.

Based on the data above, a discussion is carried out in accordance with the formulation of the problem regarding layout and ergonomics in waiting room on first floor and service rooms on the second and third floor.

DISCUSSION

Picture of the layout design created by author based on data from the web of Google DKI Regional Government (Author yet get a layout plan from Service Mall Building DKI Jakarta Public) Comparison the Layout

Here's the layout analysis:

1. Layout changes on the first, second, and 3rd floors maximize the function of the space, the activities of room users can be shown and then the needs for furniture facilities can be determined. The changes are adjusted based on circulation, view, and health protocols during the current pandemic.
2. Changes which are made in the waiting room and service room are reducing public furniture that is lined up or facing each other and redesigning 1-, 2- and 3-seater public furniture to become single, so that it can be easily shifted the sofa/lounge chair so as not to touch and maintain health, safety, and comfort of visitors.
3. One of important aspects in health protocol is *social distancing*. This one has big affects to the layout of furniture in the waiting room and service room, where space for movement is limited and humans must maintain a distance of approximately 1.5 to 2 meters between. For this reason, the layout of the furniture must be considered and this is very important because it relates to visitor behavior which has an impact to the comfort and circulation of visitors at this DKI Public Service Mall.

The following is the Human Dimension Ergonomics Analysis:

Public furniture designs that are applied at the DKI Jakarta Public Service Mall, namely:

- Sofa/Waiting Chair first floor, Dimensions: L: 45 cm, D: 40 cm, W: 90 cm, H: 50 cm
- Sofa/Waiting Chair second floor, Dimensions: L: 80 cm, D: 40 cm, W: 120 cm, H: 50 cm
- Sofa/Waiting Chair third floor, Dimensions: L: 90 cm, D: 80 cm, W: 200 cm, H: 50 cm

The calculation of height is not in accordance to standard, sofa height must represent 5 Th % (percentile) of women, so as not to hang the leg which can cause numb, swelling, or pain, height should be: 40–45 cm (16"-18"),

Size for Asians, the lowest seat height is 38 cm. Sitting comfortably can be done by removing the 5 cm adjuster on the sofa leg

Ergonomics standards are as follows:

- Width of waiting sofa according to standard 40–50 cm (16"-20"), Depth: 37.5–45 cm (15"-18")



- The surface of waiting chair sofa is flat, the rounded ends are standard, the seat depth and width are 45 cm
- The upholstery material for the synthetic leather sofa is not suitable because dirt can be easy to stick but easy to clean, it is recommended to use upholstery, which is a porous upholstery material, to maintain ventilation/air circulation.

REBA method of body posture analysis

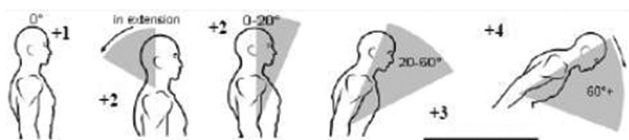
The steps for the assessment and suspension are as follows:

1. Assess Neck Posture (Locate Neck Posture).

In this neck posture, it will observe visitors who are sitting in the waiting room and assess how many angles are formed by the workers' necks.

NECK

Posture	Score	Total	Description
Flexion: 0-20°	1	2	If the neck is twisted
Flexion: >20°,	2	3	or tilted to the sideways
Extension >20°			the score is added +1



2. Assessing Back Posture

BACK

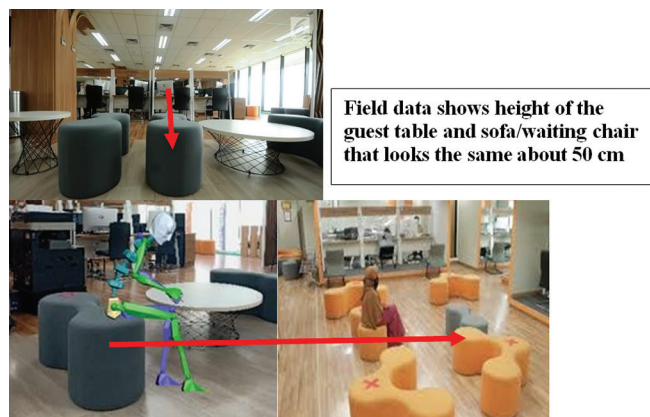
Posture	Score	Total	Description
straight (Natural)	1		
Flexion: 0-20°,	2		If the body twisted
Extension 0-20°			
Flexion: 20-60°,	3	4	or tilted sideways score plus+1
Extension>20°			
Flexion: >60°	4	5	

3. Assess Leg posture



LEG

Posture	Score	Total	Description
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Legs supported, weight evenly distributed, walk or sit	1	2	If knee Flexion 30-60°: skor ditambah+1
Unsupported leg, weight is evenly distributed/ unstable posture	2	4	If knee Flexion>60°: +2

The results of the posture analysis obtained a total score of 12, this shows a very high score and the source of the problem can be seen from the image analysis as follows:

The height of the guest table when viewed from the picture is almost equivalent to waiting sofa/chair which makes the user have to bend his back to write something on the table. Based on the REBA score obtained, this activity is not good if done for a long time, because it will cause pain on user's back. For this reason, the height of the guest sofa/ chair must be reduced so that it can be used comfortably and safely.

CONCLUSION

Based on the results of descriptive qualitative research on the study of furniture layout on physical distancing at the DKI Jakarta Public Service Mall, the following conclusions can be drawn:

1. The results of the research on the layout of the furniture layout in the waiting room and service room can be concluded that the effective layout to be applied by keeping the distance between single sofas and waiting chairs as well as humans is 1.5-2 m.
2. To be able to maximize physical distancing, apart from laying out furniture, you must also pay attention to the circulation flow in the room. Circulation currents should be unidirectional or linear to minimize close encounters between people.

SUGGESTION

1. Minimalist Round Single Sofa is a solution if you put it in a waiting room and service room, this is the right choice to create seating arrangements in the room so that it is easy to shift. Using quality materials that are comfortable to sit on.
2. A single sofa with a minimalist design and color and using a short back and armrest will be able to make visitors safe and comfortable.

REFERENCES

Alfata MN, Hermawan Y, Widyahantari R. Ergonomic study of the design of government office workspaces based on Indonesian anthropometry. *J Permukiman* 2012;7:126-137.

Anggita D, Astuti DA. Overview of materials and forms of various types of pillow products. *J Narada* 2018;5:291078.

Dawson. Dawson, C. *Introduction to Research Methods: A Practical Guide for Anyone Undertaking a Research Project*. 4th ed. United Kingdom: Oxford; 2009.

Haryanto E. *Ragam Hias Kursi Kayu Tunggal Jawa Tengah Abad ke 17-20*. Tesis Program Studi Desain. Indonesia: Institut Teknologi Bandung; 2004.

Hignett S. Rapid entire body assessment (REBA). *Appl Ergon* 2000;31:201-5.

- Kesehatan SK. HK.02.01/MENKES/335/2020 Concerning the Protocol to Prevent the Transmission of Covid-19 in the Service and Trade Sector Workplaces (Public Areas) in Supporting Business Continuity; 2020.
- Moenir HA. Manajemen Pelayanan Umum. Jakarta: PT. Bumi Aksara; 2006.
- Panero J, Zelnik M. The Human Dimension and Interior Space. Jakarta: Erlangga Group; 2003.
- Pradana H. The role of furniture as an interior component. J Design 2018;7.
- Santoso A. A conceptual approach to the interior design process. J Dimensi Interior 2020;3:111-22.
- Sholichul T, Sudiajeng L. Ergonomics for Safety. Occupational Health and Productivity. Uniba Press: Surakarta; 2004.
- Sugiyono. Quantitative Research Methods, Qualitative. Penerbit R&D: Bandung; 2013.
- Sumartono. Qualitative Research Methodology in Art and Design. Pusat Studi Reka Rancang Visual dan Lingkungan Fakultas Seni Rupa dan Desain University Trisakti; 2017.
- Sutalaksana IZ. Teknik Tata Cara Kerja. Laboratorium Tata Cara. Kerja and Ergonomi, Departemen Teknik Industri. Bandung: ITB; 2006.
- Wicaksono AA, Tisnawati E. Teori Interior. Jakarta: Penerbit Griya Kreasi; 2014.
- Wignjosoebroto S. Ergonomi, Studi Gerak dan Waktu. Jakarta: Guna Widya; 2008.