



Analysis of the Effect of Ergonomics and Circulation on The Comfort of Dormitory Occupants: Around Maranatha Christian University

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ABSTRACT

The dormitory is a temporary accommodation used by people who work or study. A place is needed for small activities and rest that can increase the spirit of the dormitory residents. Based on the available data, many dormitory rooms still have ergonomic and circulation problems, with the majority of the problems found being narrow circulation, to furniture that is too small such as tables. The purpose of this study is to examine the comfort of the rooms based on furniture ergonomics and layout. The data collection of this qualitative research was done by interviewing dormitory room residents around Maranatha Christian University. The results of this study are to determine the ergonomics, circulation of the dormitory room, and good perspectives so that it can increase the comfort of the residents to carry out activities in it, as well as find solutions and suggestions that can be taken to respond to problems found in the dormitory rooms studied around the Maranatha Christian University.

1. Introduction

Dormitory is a temporary dormitory that is very often associated with students, most students who study at a university live in a dormitory. Around a university, almost every house around it provides a room to be used as a dormitory for students on campus, or a building that is intentionally built just to become a boarding house. The owner of a dormitory will make the room as comfortable as possible. However, the dormitory many differences in every dormitory that exists, starting from the price difference to get the difference in facilities and quality obtained by the residents of the dormitory (Wardhani, et. al, 2017). If a dormitory is in the range of a fairly cheap price, the room obtained is quite small so the residents of the dormitory room can't bring many personal items into the dormitory. Likewise, if a boarding house is in the range of a fairly high price, the residents get a fairly good room in terms of circulation and quality obtained. Therefore, it is very important for someone who will choose a dormitory to pay attention to the ergonomic aspects of the dormitory. Ergonomics is a principle and reference to the human body dimensions or anthropometry in the selection of furniture to the design of spatial layout. Anthropometry is a field of science that deals with human body dimensions. These dimensions are divided into statistical groups and percentile sizes (Liliana, et. al, 2007). If a room has good ergonomic aspects, then the aspect has a very big impact on the effectiveness of its occupants, because the purpose of good ergonomics is to improve work performance by paying attention to the abilities and weaknesses of the user, which also means it has an impact on the psychology of the occupants. The most common mistake is found in the ergonomic aspect of a dormitory.

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Research that is common and often done is about ergonomics and room circulation, both discussions about room circulation in houses, and ergonomic furniture in cafes or offices that are generally located in public places. The creation of a furniture product must certainly fulfill the comfort element for its users on ergonomic factors (Laksitarini, et. al, 2021). If the furniture does not pay attention to ergonomic aspects properly and makes its users uncomfortable, it can have a bad impact on its users, even causing health problems (Fakhreza, et. al, 2023). In a building, there must also be a good standard for arranging furniture and good circulation paths (parwata, et. al, 2019). Of course, for users or residents in a dwelling or building, from the beginning before it is built, it still maintains good comfort and circulation factors, because from that it can form the atmosphere of a room (Nasywa N, et. al, 2022). And also if good ergonomics are applied, it will certainly have a good impact on carrying out activities in it, both in terms of health and psychology, becoming more increased and productive (Jassmine, et. al, 2022). With the discussion of the existing problems, a boarding house currently has few considerations for ergonomic elements. Therefore, this study discusses a boarding house to be studied and found circulation and ergonomics that are problematic in it.



Figure. 1 Maranatha Christian University (Source: personal documentation.)

Around Maranatha Christian University, many boarding houses are rented out to students on campus. There are many variations in quality and facilities offered by existing boarding houses, ranging from the best to the lowest. However, it is a choice for prospective boarding house residents to get the desired facilities. Various factors determine residents' choice of dormitory, ranging from financial factors to social factors. Some students deliberately choose dormitories that are less good in terms of ergonomic aspects, just to be close to their peers without thinking about the risks that will be obtained. In the area, many boarding house buildings are residential houses but are currently used as a dormitory for

Maranatha Christian University students. Generally, a dormitory has problems with poor spatial layout due to limitations in designing the layout using existing ones. Therefore, the ergonomic aspect that can be applied is not optimal. Boarding houses that were previously not residential have good designs because it is easier to arrange the space by applying ergonomic aspects compared to former residential dormitories. During activities, lighting can also help provide an aesthetic effect in a room. Therefore, it is very important to pay attention to what type of lighting can be produced and applied to the room to create an atmosphere in the room (Maggie T, et. al, 2023).

The dormitory selected for this study is Blessing Home and Sukakarya no.10 dormitory. Both of these dormitories are buildings that are designed from scratch for dormitories, not from a house that has been renovated to become a dormitory. There are advantages and disadvantages in the rooms of both boarding houses. In Blessing Home, all the designs in the room are well arranged and use custom furniture, so the room looks neat. Meanwhile, in Sukakarya no.10 dormitory, the room is not designed for furniture, so the impression of the room is less tidy.

Ergonomics has a significant impact on students, especially in terms of health and effectiveness due to stress during lectures, so students need a place to rest that can provide comfort for them. If the place is uncomfortable, it will cause anxiety and create deeper stress, so psychologically it reduces the thinking ability of the person. In addition to being used as a place to rest, dormitories are also used as a place for students' daily activities, such as doing assignments. If it does not have sufficient circulation, students will feel bored with their thoughts, which is caused by inadequate ergonomics. This research is conducted so that prospective residents of a dormitory can understand how important it is to understand the importance of applying ergonomic aspects and the good and bad impacts that will be obtained it. It is not uncommon for students in the Maranatha University environment to choose a dormitory without paying attention to these aspects, due to a lack of knowledge about ergonomics.

Based on the problems found in the ergonomic aspect, the problem is narrow circulation in the area near the entrance and poor spatial arrangement such as many items that are only scattered in the dormitory room, besides being uncomfortable to look at, it is also disturbing to carry out activities in it. Based on the research objectives, there is a question contained in it, How to apply good ergonomic aspects to dormitory rooms?

2. Method

To achieve the research, this study uses a qualitative method. The qualitative method is a method that generally uses measuring tools, methods, and statistical documents in its research, but it is qualitative to help more (Subadi, 2006). This research was conducted by direct survey of the dormitory and by interviewing the dormitory residents. Qualitative research is research that prioritizes deep understanding and interpretation of meaning, comfort, and relevant facts (Suwandi, 2008). The discussion focuses on the layout of the dormitory room by examining the distance and magnitude of circulation and the arrangement of furniture layouts that have a big impact on circulation inside. This research compares two different dormitories around Maranatha Christian University, the first is a dormitory from JO's resident, Sukakarya no.10 dormitory, and the second is JI's dormitory, Blessing Home. The survey in this research was conducted on October 12, 2023, and interviews were conducted at night with dormitory residents to obtain information that supports this research. Both dormitory residents decided not to include their real names in this research and made a decision to use only name initials. This is because they do not want their data to be known by many.

The anthropometric theory approach is used to find out where the location that does not yet match the standard size, shape, and strength of a product and good circulation based on predetermined data, all adjusted based on the results of measuring human body dimensions (Wignjosobroto, 2000). There are lessons in ergonomic circulation and anthropometric ergonomics in the theory to be discussed.

3. Results and Discussion

Ergonomics aims to create comfort and safety so that users can be productive (Hutabarat, 2017). The design of dormitory rooms often does not meet ergonomic standards for users of the room. Generally, dormitory rooms have a small enough space, but the layout inside is too forced so that the circulation inside is not by the standard. In dormitory rooms, it must be made as comfortable as possible for its residents, so that it can be used comfortably for rest and light work in it so that it can make the psychology of its residents not feel depressed due to the small circulation factor. This is also influenced by poor furniture arrangement.

3.1. The meaning of ergonomics in general Understanding ergonomics in a bedroom:

1. Ergonomic of the bed

The bed is the main facility for resting in the bedroom. The most important ergonomics of the bed is the size of the mattress, with the length of the mattress being greater than the height of the human, and the width of the mattress being by the width of the human body. The circulation of space around the bed, and adequate clear distance between the bed and other furniture should also be considered in good spatial arrangement (Christany, et. al, 2018). Standard mattress sizes have also been established according to the number of people lying on them. Here are some mattress sizes according to international standards:

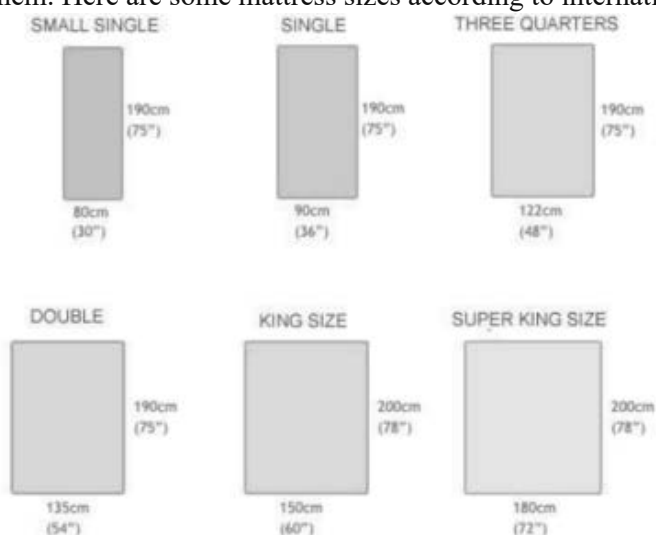


Figure. 2 Maranatha Christian University (Source: <http://www.thebedroomcentre.com>)

The relationship between the line of sight to the window is also a consideration for human activity efficiency (Christany, 2018). This is related to the height of the mattress from the floor. The ideal height of the mattress from the floor is around 40-45cm.

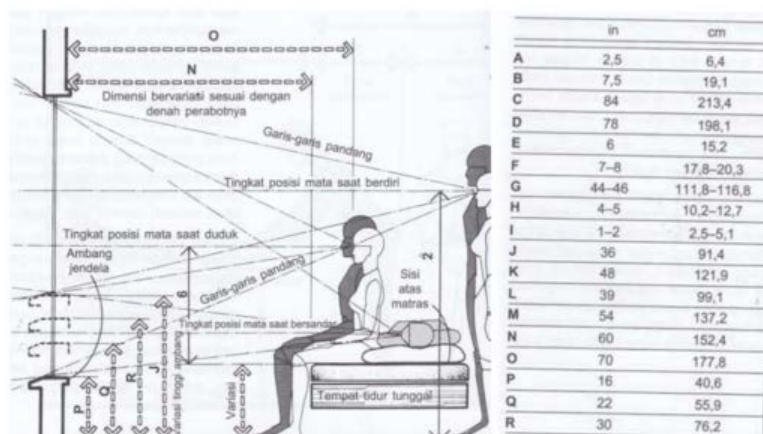
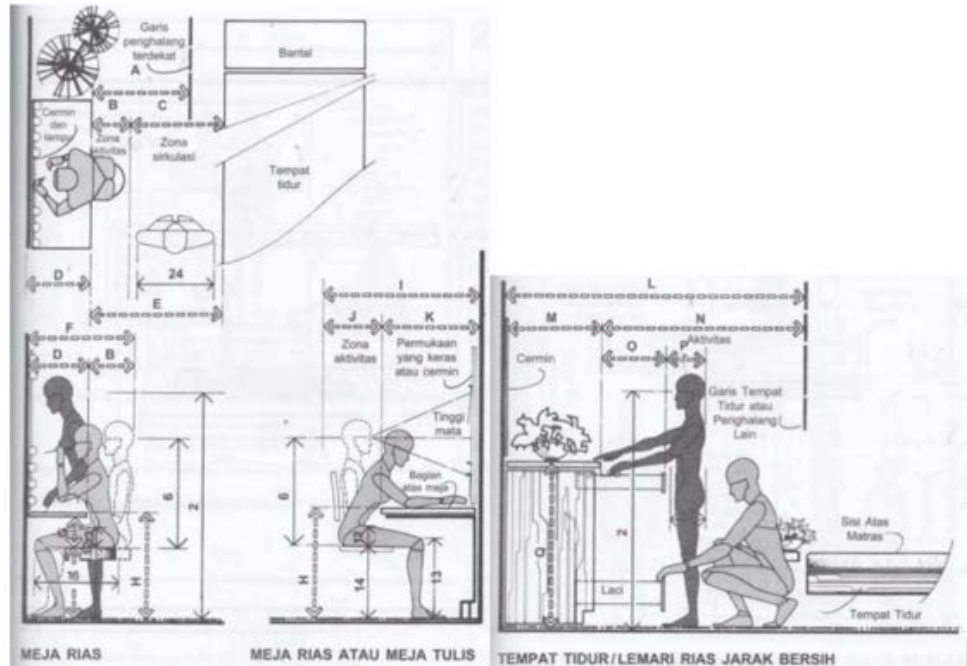


Figure. 3 Bedroom Sight Line (Source: Dimensi Manusia dan Ruang Interior, page.150)

2. Ergonomic of the table and circulation

In the bedroom, there is usually at least a table for placing luggage, which can be a work table or a writing table. The most important ergonomics in the design of a work desk or writing desk are the size of the desk and clean circulation to achieve ideal movement (Mulyadi, 2015). The ideal circulation area along with the user's activity area is around 100 cm. Here is an illustration of the circulation area and activity area on a desk in a bedroom:



	in	cm
A	24–28	61,0–71,1
B	12–16	30,5–40,6
C	30	76,2
D	16–24	40,6–61,0
E	42–46	106,7–116,8
F	28–40	71,1–101,6
G	7 min.	17,8 min.
H	28–30	71,1–76,2
I	42–54	106,7–137,2
J	18–24	45,7–61,0
K	24–30	61,0–76,2
L	62–72	157,5–182,9
M	20–24	50,8–61,0
N	42–48	106,7–121,9
O	16–20	40,6–50,8
P	18	45,7
Q	42	106,7

Figure. 4 Ergonomic of the table (Source: Dimensi Manusia dan Ruang Interior, page.153)

3.2 Application of theory to JO and JI dormitory

1. JO dormitory anthropometric ergonomics

In the first study to be discussed, the boarding room of JO's tenant has a height of 162cm and a weight of 70kg. This dormitory room has adequate circulation space. The habit that the tenant often does is the chair which according to JO on October 12, 2023, is usually used for the study table and is used to put a gallon. The experience directly experienced by JI on October 12, 2023, when surveyed, is the same as that felt by the tenant, basically when entering the room it feels like the space is still quite spacious, it's just that the layout is quite messy. It was also conveyed by JO on October 12, 2023, that if he had enough

personal belongings, it would look quite scattered, so the impact that occurs when looking at the situation is laziness and boredom. Sometimes it has an impact on the level of severe stress if the tenant is in the room (Musabiq, et. al, 2018)

a. Bedroom Sight Line

For the beds in the dormitory, according to the residents, the distance from the floor is too low with a height of 10cm from the floor with a thickness of 25cm on the mattress. According to JO on October 12, 2023, the bed is too low with a height of 10cm from the floor and a thickness of 25cm on the mattress. The impact that is often experienced is difficulty in getting up from the bed because it requires a considerable amount of energy to stand up (Figure 5). So it is still not by the standard line of sight theory, where the minimum height of the bed should be 40-55 cm (Panero, 1979).

b. Circulation between table and bed

The distance of circulation from the desk to the bed is also quite close, making residents with a fairly large body posture feel cramped when doing an activity at the desk (Figures 5 and 6). The distance between the desk and the bed is only 53 cm. If a chair is placed, the resident feels cramped to sit in that area. The minimum standard for that distance is 100cm (Panero, 1979).



Figure. 5 JO bed dimension (Source: personal documentation)



Figure. 6 JO dormitory (Source: personal documentation)

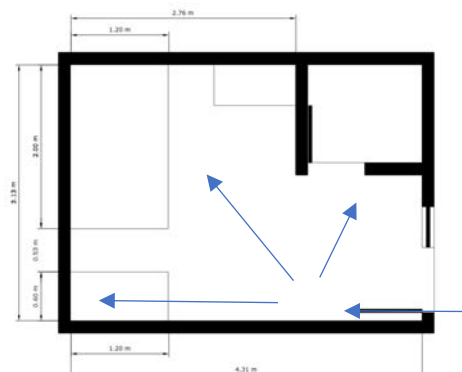


Figure. 7 Layout dimensions JO dormitory (Source: personal documentation)

The bed in Kos JO is still suitable for the body posture of its occupants. However, the height of the bed for the line of sight is still inadequate. It is advisable to add the height to reach the standard based on human dimensions and interior space (Panero, 1979). Then, for the distance between the table and the bed, it is better to move the position of the bed facing the wall or bathroom and the position of the wardrobe can be shifted towards the bed to achieve good circulation and comply with ergonomic standards.

2. JI dormitory Anthropometric ergonomics

The second study to be discussed is the JI boarding house room with a height of 183cm and a weight of 80kg. This boarding house room is different from the previous study. The space in this dormitory room is slightly smaller than the previous one. According to JI on October 12, 2023, as a resident of the dormitory room, it felt quite calm when inside, because what was seen was quite neat and nothing looked cramped. So, the effect on the residents is that they feel comfortable staying there for a long time, and doing light work is also quite pleasant (Musabiq, et. al, 2018). The direct experience of JI's friend when entering the dormitory room is that when opening the door, the circulation looks narrow, but when already inside, it looks wider. He felt comfortable and at home when inside, because the items looked neat and not scattered, and the distance between the furniture and also between the table and the resident's bed was quite wide. The resident often works out in that area (Figures 8 and 9).

a. Bedroom Sight Line

The height of the bed from the floor in the dormitory is already good because the distance is by the standard with a height of 30cm on the base and a thickness of 25cm for the mattress. So the total height of 55cm is by the standard line of sight on the bed, where the standard height of the bed is 40 - 55 cm (Figure 8) (Panero, 1979).

b. Circulation between table and bed

According to JO on October 12, 2023, the distance between the bed and the table is very good because it is not too close, so the circulation is very good (Figures 8 and 9). The distance is 145cm, which already exceeds the minimum standard that has been determined. This distance is very good because it can be used freely for the area (Panero, 1979).



Figure. 8 JI bed dimension (Source: personal documentation)



Figure. 9 JI dormitory (Source: personal documentation)

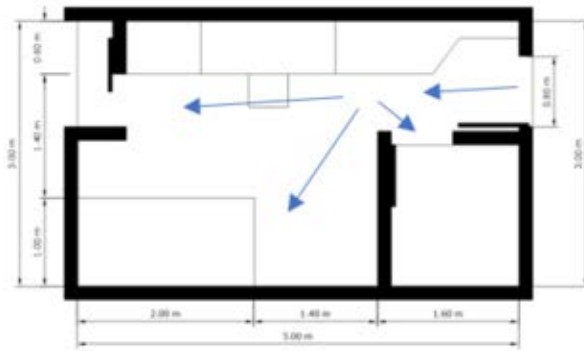


Figure. 10 Layout dimension JI dormitory
(Source: personal documentation)

The bed in Kos JI is still suitable for the body posture of its occupants. Most of the points discussed in the room are already by ergonomic standards. However, one thing was found that still does not meet the standard for room access. This can be overcome by changing the direction of the door opening, which was previously opened to the left, and changed to the right. This can minimize the impression of narrowness when entering the room, the suggestion is addressed to the owner of the dormitory.

4. Conclusions

Anthropometry for furniture is very important because it is a general standard for a product. In a dormitory room, this factor needs to be considered because someone who is in it wants a comfortable place to rest.

Comfort factor can be determined by what can be done inside, and the circulation of the room. The basis for fulfilling this is by paying attention to anthropometry starting from the perspective of the bed, and good room circulation. For the line of sight of the bed, it must have a height between 40-55cm with the aim that the user does not need to exert too much energy to get out of bed. For circulation, it must be by the specified standards because of course the residents will carry out certain activities in the room. Good circulation will support the activities to be carried out by the residents.

In JO dormitory, the problem found is that the furniture position is not good enough, so the circulation at the distance between the table and the bed is too close, only 53cm, whereas this distance makes it difficult for users to move in that area. Then, for the height of the bed which h is too low, only 25cm from the floor. The circulation between the table and the bed should have a distance of around 100cm, and the height of the bed should be between 40-55cm. So, the solution that can be applied to the JO dormitory is to change the furniture layout as shown in Figure 11. In the JI dormitory, the problem found is the narrow entrance circulation when the room door is opened. This is influenced by the shape of the cabinet furniture and the direction of the door opening. So, the solution that can be applied to the JI dormitory is to change the direction of the door opening which was previously opened to the left, to the right as shown in figure 11.

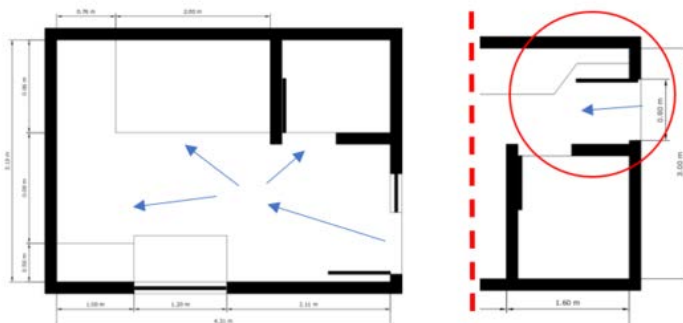


Figure. 11 Suggestion for JO and JI dormitory (Source: personal documentation)

The results of this study show that there are still ergonomic and circulation problems in both different dormitory room locations. There are complaints about the position of the table with the bed being too close and the circulation being narrow, but there is also good circulation. The lesson that can be learned is that space arrangement and circulation are very important to consider in dormitory rooms, because the condition of a room can affect the psychology of its occupants. For boarding house owners, it is important to manage furniture layout and pay attention to ergonomic circulation aspects before building a boarding house. For prospective boarding house residents, choose a dormitory room that has implemented good ergonomic circulation so that you can feel comfortable while in your room.

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