Effectiveness of Using Dormitory Rooms Based on The Capacity and Functional Performance of Users (Case Study: Male and Female Student Dormitory, Institut Teknologi Sumatra)

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Abstract. Dormitory facilities are essential accommodation facility that facilitated by universities that have a large number of students. The room's level of effectiveness in a dormitory can be measured by the number of rooms, especially those that are private, such as bedrooms. Institut Teknologi Sumatera (ITERA), with many new students enrolled every year, must accommodate hundreds of students, especially those who come from outside the city. Due to the large number of students, the university management provided a solution to accommodate three people in one room. It gives various perceptions amongst the users about the effectiveness of space and its effect on user functional performance. This study aims to determine the level of effectiveness in using room space and its effect on individual learning performance. This study compares male and female dormitories based on the assessment aspect of several user perception variables. The method used in this research is based on the results of questionnaires distributed to students with aspects of assessment including privacy, territory, crowdedness, and adaptability. This study's results are a parameter of space effectiveness based on space capacity and its effect on student learning performance. This finding is expected to become a reference for dormitory facilities to facilitate better.

Keywords: effectiveness, dormitory room, capacity, functional performance

1. Introduction
Educational sectors are sought to be one of the critical segments in society, an environment that has a massive impact on the growing generations' learning process [1]. The occupants’ satisfaction with building performance reflects the quality of the building facilities' design, construction, and management. Dormitory buildings as housing providers for students have a significant effect on learning performance. The quality of the dormitories is an essential factor influencing student decisions when choosing universities. Students consider the dormitory building as their second home, so students have high expectations for the dormitory building quality [2].

This research’s background is that accommodation is the first problem students face when they study outside the city where they live. In this case, it is a residence for students. Dormitory facilities are essential accommodation facilities facilitated by universities with a large number of students. Institut Teknologi Sumatera (ITERA), with a large number of new students every year, must accommodate hundreds of students, especially those who come from outside the city. Due to the large number of students, the university management provided a solution to accommodate three people in one room. That gives various suggestions on room users' perceptions about space effectiveness and its effect on user functional performance.
The purposes of this research are:
1. To determine the level of effectiveness in using room space and its effect on individual learning performance.
2. This study compares male and female dormitories based on several user perception variables' assessment aspects.

2. Literature Review
The dormitory is the space when students interact throughout their university lives. In this sense, these spaces' circumstances in which students are in the individual and social development process must be known and continually developed [3]. It is possible to improve the living environment's quality by providing ambient conditions suitable for human requirements. One of the premier troubles that students are moving away from their family and home face is accommodation. What students expect from dormitory rooms is to conduct their vital activities safely and tranquility. Students who have different cultures, values, and habits live an everyday life by keeping together should be designed to make them feel at home. In this regard, the rooms should be appropriately planned and decorated considering such activities as sleeping, studying, and resting [4].

A study of perceptions, adjustment, and adaptations of residential environment throws light on both universal and culturally specific definitions of housing [5]. For the majority, staying at the university is transient and negatively influences their perception of their current residence as 'home' (in a more permanent sense). The variety of approaches to perception reflects differing ideas of what is essential. Designers and users experience the process of perceptions to solve problems in the design [6].

The extent to which individuals feel in control concerning their spatial environment has much to do with their satisfaction. Still, studies of privacy have illustrated its complexity in interacting cultural, personal, and physical conditions. There are aspects of crowding which were often ignored in early research situational, affective, and behavioral, and knowledge of the response of others in similar situations can modify behavior [6].

As a private area, the bedroom is the only "place" that is formal and informal. Dimensional units support different ergonomic positions; occupants can sit in their unit comfortably; they can perform everyday activities such as working on a computer. They can be connected to a wired or wireless network because a plug is installed for each unit [7]. This affects the effectiveness of private space as an essential facility in the dormitory building.

3. Methods
The method used in this research is based on the results of questionnaires distributed to students with aspects of assessment including privacy, territory, crowdedness, and adaptability. The behavior variables are privacy, territory, crowdedness, and adaptability with a measurement model using a Likert scale questionnaire. This variable aims to measure occupant satisfaction with social relationships and interactions between fellow occupants—the primary data collected from the questionnaire targeting 200 respondents is the students. However, the questionnaire only reaches 182 respondents (91%) for female students and 116 respondents (58%) for male students.

The use of variables was intended to measure the occupants' level of satisfaction regarding what they feel and think about the facility. Furthermore, this project's results are expected to improve the dormitory design process as one of the recommendations for developing accommodation facilities and space effectiveness in dormitories.
Figure 1 shows that the first step was the initial observation of the buildings. The observation is meant to have a direct experience regarding the real condition of the research object. The observation was conducted with immediate visitation to the building and through the technical construction drawing to see the zoning and the dormitory facility since the early design process. Furthermore, the observation information becomes the reference to formulate the research variable related to occupant’s behavior.

4. Result and Discussion
This study compared two dormitory buildings, a male student dormitory and a female student dormitory. It is based on the questionnaire results by proposing several behavior variables (privacy, territoriality, crowdedness, adaptability). The final product obtained compares variables between the capacity survey data and functional performance users in the two buildings. The case study area is the user’s privacy area, the room space occupied by three people per room. That is one of the policies implemented by the university, given a large number of students.

4.1. Male student dormitory
The male student dormitory building is a five-story building, with 4-story function rooms having 96 rooms, with 24 rooms per floor. Each room consists of 3 students. The room area is about 5.4 meters by 4.5 meters, include furniture such as a bed, study table, and wardrobe. In 1 room, there is one shared bathroom. For cooking activities, a small pantry is provided for cooking, but there is a daily catering service so that students do not do the cooking too often. Washing clothes activities, a paid laundry service is provided, but some wash their clothes, and there is a drying room on the balcony.

Figure 2. (a) Plan of Student Room (Male Student Dormitory); (b) Layout Furniture of Student Room (Male Student Dormitory)
Table 1 is a diagram of the questionnaire results regarding the behavior variables (privacy, territoriality, crowdedness, adaptability), which are stated in the graphic, and the results of the author’s analysis.

**Table 1. Diagram of behavior variables (Male student dormitory)**

| No | Variable     | Graphic | Result                                                                                                                                 |
|----|--------------|---------|----------------------------------------------------------------------------------------------------------------------------------------|
| 1. | Privacy      | ![Privacy Diagram](image) | From the question about “Is your privacy area disturbed?” found that 39% answered “undisturbed” means that the occupants feel that their privacy were not disturbed. About 7% answered “strongly disturbed”. |
|    |              |         | From the question about “Do you often feel disturbed by the people next door?” 53% responded “strongly undisturbed” means that they don’t feel disturbed by the people next door. |
| 2. | Territory    | ![Territory Diagram](image) | From the question about “Is your territory limited by the other occupants? “46% responded “strongly unlimited” means that the territoriality does not limit. About 5% responded “strongly limited” they feel that they territoriality is limited. |
| 3  | Crowdedness  | ![Crowdedness Diagram](image) | From the question about “Do you feel that the room is narrow and cramped?” 59% answered “spacious” means that the occupants not really feel cramped and narrow. |
|    |              |         | From the question about “Does the room still enough to occupy by three persons?“47% answered “sufficient” means that the occupants feel that the room is enough to be occupied by three persons. |
| 4  | Adaptability | ![Adaptability Diagram](image) | From the question about “Do you feel that you are quickly adapting to this dormitory (especially for the room)?“50% responded “adaptable” means that they feel they quickly adapt with the roommate. |
4.2. Female student dormitory
Like the male student dormitory building, the room area in the female student dormitory is about 5.4 meters by 4.5 meters. The difference is the furniture layout. In the female student dormitory, the bed is arranged on two levels for two people and single beds. Other facilities, such as toilets, pantry, and drying rooms, are the same as the male student dormitory.

![Plan of Student Room (Female Student Dormitory)](image1)

![Layout Furniture of Student Room (Female Student Dormitory)](image2)

**Figure 3.** (a) Plan of Student Room (Female Student Dormitory); (b) Layout Furniture of Student Room (Female Student Dormitory)

Table 2 is a diagram of the questionnaire results regarding the behavior variables (privacy, territoriality, crowdedness, adaptability), which are stated in the graphic and the results of the author’s analysis.

| No | Variable          | Graphic | Result                                                                 |
|----|-------------------|---------|----------------------------------------------------------------------|
| 1  | Privacy           | ![Privacy](image3) | From the question about “Is your privacy area disturbed? “51 % Answered” strongly undisturbed” means that they don’t feel that their privacy is disturbed. 1% stated “strongly disturbed”. |
|    |                   |         | From the question about “Do you often feel disturbed by the people next door? “60% answered” strongly undisturbed” means that they don’t feel disturbed by the people next door. 2% “strongly disturbed”.

Table 2. Diagram of behavior variables (Female student dormitory)
2 Territory

From the question about “Is your territory limited by the other occupants?” 52% responded “unlimited”. 3% responded “strongly limited”.

3 Crowdedness

From the question about “Do you feel that the room is narrow and cramped?” 69% answered spacious means that the occupants don’t really feel cramped and narrow. 1% responded “strongly unspacious”.

From the question about “Does the room still enough to occupy by three persons?” 54% Answered “insufficient” means that the occupants feel that the room is not enough to be occupied by three persons.

4 Adaptability

From the question about “Do you feel that you are quickly adapting to this dormitory (especially for the room)?” 48% responded “unadaptable” means that they feel they don’t quickly adapt with the roommate. 2% “strongly adaptable means that they feel they quickly adapt with the roommate.

4.3. Comparison between variables

From the results of the questionnaire between users in the male student dormitory and the female student dormitory, the following method is to compare the percentages between both of them to get a conclusion about the effectiveness of using the room space so that it can be seen which quality is more effective and conducive between a male student and female student users.
Table 3. Diagram of comparison behavior variables

| No | Variable | Male Student dormitory | Female Student dormitory | Conclusion |
|----|----------|------------------------|--------------------------|------------|
| 1  | Privacy  | 39% answered “undisturbed” means that the occupants feel that their privacy were not disturbed | 51% Answered” strongly undisturbed” means that they don’t feel that their privacy is disturbed | Related to the question “Is your privacy area disturbed?” Occupant in male and female dormitories feels “undisturbed” by their privacy space. |
|    |          | About 7 % answered “strongly disturbed” | 1% stated “strongly disturbed” | |
|    |          | 53% responded” strongly undisturbed” means that they don’t feel disturbed by the people next door | 60% answered” strongly undisturbed” means that they don’t feel disturbed by the people next door | |
|    |          | 52% Responded “unlimited” | 2% “strongly disturbed” | |
| 2  | Territory | 46 % responded “strongly unlimited” means that the territoriality does not limit | 52% answered spacious means that the occupants don’t really feel cramped and narrow | Related to the question “Do you often feel disturbed by the people next door?” The occupant in the male and female student dormitory stated that they were “undisturbed” |
|    |          | 5% responded “strongly limited” they feel that they territoriality is limited | 1% responded “strongly limited” | |
|    |          | 47% answered” sufficient” means that the occupants feel that the room is enough to be occupied by three persons | 54% Answered “insufficient” means that the occupants feel that the room is not enough to be occupied by three persons | Related to the question “Do you feel that the room is narrow and cramped?” Occupant stated that the room they occupied was quite large. In the sense that their room is proportionally occupied by more than one occupant. |
| 3  | Crowdedness | 59% answered “spacious” means that the occupants not really feel cramped and narrow | 69% answered spacious means that the occupants don’t really feel cramped and narrow | Related to the question “Does the room still enough to occupy by three persons?” The occupant in the male student dormitory feels that it is enough to be occupied by three people, in contrast to the female student dormitory which states that the space capacity for 3 people is not large enough. |
|    |          | 47% answered” sufficient” means that the occupants feel that the room is enough to be occupied by three persons | 1% responded “strongly unspacious” | |
|    |          | 48% responded “unadaptable” means that they feel they don’t quickly adapt with the roommate | 2% “strongly adaptable means that they feel they quickly adapt with the roommate | Related to the question “Do you feel that you are quickly adapting to this dormitory (especially for the room)?” The occupant in the male student dormitory feels they can adapt quickly to the environment and roommates. In contrast to the female student dormitory, which takes longer to adapt to the environment and roommates. |

The discussion about two results from all variables between male and female student are we can see from table 3 that there are two variables which represent different and contradictory answers between a male student and female student, namely:
• From variable “crowdedness” Related to the question “Does the room still enough to occupy by three persons?” The occupant in the male student dormitory feels that it is enough to be occupied by three people, in contrast to the female student dormitory, which states that three people’s space capacity is not large enough.
• From variable “adaptability” Related to the question “Do you feel that you are quickly adapting to this dormitory (especially for the room)?” The occupant in the male student dormitory feels they can adapt quickly to the environment and roommates. Conversely, the female student takes longer to adjust with roommates.

5. Conclusion
From the results of these results, it can be concluded that:
1. For the crowdedness variable, the occupants of the male and female student dormitories stated the opposite, namely regarding the capacity of the room occupied by three people. The male dormitory’s occupant noted that it was sufficient, while the female dormitory’s occupant felt that it was not large enough to be occupied. It can be analyzed as follows:
   a. Women’s needs are more complex and closer than men, such as the need for a larger area of privacy for personal activities (sleeping, studying, makeup).
   b. Friendship of male student is more open than the female student so that they can share more areas of their privacy.
2. Because of the state above, it affects the adaptations experienced by male and female students. The questionnaire results on the adaptability variable, which states that male students adapt more quickly to their roommates than female residents who take longer to adjust. Several factors that affect the adaptation of older female students, namely:
   a. Personality factors (traits, character, social relationships (introvert/extrovert).
   b. Accommodation factor (store and market that far away from the dormitory).
   c. Cultural factors.
3. The results of this study are the parameter of space effectiveness based on space capacity and its effect on student learning performance. This finding is expected to become a reference for a better dormitory facility.

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