

REST AREA MOSQUE CIRCULATION SYSTEM DESIGN MODEL WITH DESIGN THINKING APPROACH

Desthyo Putra Pangestu¹ & Didit Widiatmoko Soewardikoen^{1*}

¹Jl. Telekomunikasi Jl. Terusan Buah Batu, Dayeuhkolot, Bandung, Jawa Barat, Indonesia

ARTICLE INFO

Keywords:

rest area,
mosque,
circulation system,
design thinking,
empathize.

ABSTRACT

Along with the times in various aspects, developments also occur in buildings where Muslims worship, namely mosques, especially in the rest area. Developments in factors of value and meaning that affect parts of the function are no longer a place of worship but also a place of temporary rest and commerce by residents around the mosque area. The impact of this phenomenon raises the assumption that there will be an increase in visitors at a particular time and space so that the mosque's capacity is not sufficient. One of the affected space elements is space circulation so that space users will have limited space. That raises the question of whether the circulation aspect will be affected by this phenomenon. As a response to this phenomenon, a design thinking approach is used at the empathize stage as an initial effort to find out the needs and desires of space users from problems that occur using participatory observation and structured interviews. The research results at this stage can obtain accurate and valid information through the analysis process to be defined at the next stage of design thinking.

1. INTRODUCTION

This research was conducted based on the development of values and meanings that continue to occur in buildings where Muslims worship, to adjust the primary function of worship needs in the context of space and time, and secondary functions such as social and economic values. Functional factors in the mosque can affect the identity of the mosque and become the identity of a particular place; identity is obtained from the background of the mosque, the mosque construction process, the style used, and the geographical factor of the location of the mosque (Harahap et al., 2020). So that mosques built in specific locations are flexible, marked by many of these facilities in public space buildings with the term *Mushalla* (buildings or worship spaces with a smaller scale compared to mosques).

This phenomenon also occurs in mosques located on toll road rest areas in Indonesia; these mosques have specific values and meanings that are no longer only as places of worship (religious values) but also develop as temporary shelters to rest (social value) and the welfare of the community around the mosque by doing business (economic value). It is known that operating hours are full service 24 hours a week, and the high intensity of mosque visitor mobility will lead to

the assumption of space problems, especially the circulation system so that it will affect the limited space and capacity of the mosque.

Several studies discuss circulation in mosques, such as "Designing the *Manasik Haji* Mosque and Rest Area Based on Community Aspirations in Triharjo Kulon Progo Village" (Risfanda, 2020). This study, alluding to the problem of the mosque's circulation system from the *manasik haji* (a demonstration of the implementation of the pilgrimage according to its pillars and carried out before going to the holy land) and applying a participatory design approach by involving the local community by emphasizing the circulation of men and women who are separated from the beginning of entering the mosque area to the end of leaving the mosque area and paying attention to *taharah wudhu* (the process of purification when you want to pray) in the form of reinforcing the boundaries of the sacred area and its circulation path. As a result, the zoning system is divided to strengthen the relationship between space functions to facilitate space integration and form a circulation pattern. Another study, "Review of Visitor Behavior on Circulation Patterns of the Great Mosque of Central Java," (Nabilah et al., 2018). In this

*Corresponding author: diditwidiatmoko@telkomuniversity.ac.id

study, the results of the hypothesis were identified, stating that visitors to a mosque with a large number of facilities would find it challenging to achieve the circulation goal. From the collection of questionnaire data, the results obtained are that visitors have no difficulty determining circulation. However, there are obstacles brought based on the analysis result, such as the use of information signs that are needed and placed strategically and informatively. Based on the exposure of assumptions and previous research, this research is needed to respond to the problems and evaluate previous research problems—paying attention to circulation paths for male and female room users, designing circulation paths with sacred boundary properties, and applying strategic planning and informative information signs.

From several studies that have been described, there are problems similar to this study. Namely, the circulation path between men and women is still the same, causing problems with circulation obstruction and causing cross circulation. It is necessary to design a separate circulation path between men and women from the beginning to enter the mosque area, as well as the appropriateness of the application of strategic and informative information signs so that they can be easily seen, read, understood, and trusted, making it easier for room users to understand circulation patterns and achieve ease and comfort—mosque space users.

The Decree of the Director-General of Highways No. 76/KPTS/1999 explains that the rest area is a place devoted to toll road users with various supporting facilities for the needs of rest area visitors and fulfills the requirements not to interfere with the smoothness and safety of other toll road users. Another definition, according to the Decree of the Minister of Transportation Number 65 of 1993, states that a rest area is a place to rest and park vehicles with various facilities provided for rest area visitors, and its primary function is to restore the driver's prime condition, to reduce the possibility of accidents (Firhandy, 2018).

As explained in the rest area's definition, visitors can find various supporting facilities in the rest area, one of which is a mosque. (Munawir, 1984) in (Suryanto & Saepulloh, 2016) explains that a mosque is a place for Muslims to carry out worship activities prioritized in a jama'ah (together) manner but are also allowed individually. In the continuous process, it can increase solidarity and also as a means to stay in touch. The mosque is *sajada-yasjudu-sujudan*, which means prostration, namely *wada'a jabhathahu bil ardi muta'abbidin*, which puts the forehead to the earth to worship. In addition, there are also definitions by several scholars, such as by *Al-Nasafi in Tafsir al-Nasafi* Volume 4, Then by *Al-Qadhi Iyadh in Tafsir al-Jami Lil Ahkam Al-Qur'an* and Az-Zarkasyi That in *I'lam al-Sajid bi Ahkam al Masajid* that the mosque is a place to carry out all kinds of ritual worship activities with the value of obedience and obedience to *Allah Subhanahu Wa Ta'ala*. In the end, the mosque is a place of worship and has many functions such as a mosque rest area, namely as a place to support social activities, such as a place to socialize, and a place for economic activities. Certain mosques function

as education places, community information centers, places for marriage contracts, and health activities (Suryanto & Saepulloh, 2016).

Circulation is a traffic pattern or movement contained in an area or building, to achieve optimal circulation, it is necessary to consider aspects of flexibility, economy, and functionality (Harris, 1975). So it can be concluded that from several definitions of circulation, it can be an understanding to achieve ideal circulation, circulation must be able to become a liaison between spaces within the building and between spaces inside and outside the building, and can increase the optimal effectiveness of space user activities related to goods or vehicles by considering the value of flexibility, ergonomics which includes the value of ergonomics (covering aspects of security, comfort, health and efficiency), then consideration of economic and functional values (Tofani, 2011). In an ongoing process related to the problems in this research regarding the ergonomics of the flexibility of the circulation user's space in mosque facilities, then the need for optimal information signs and recommendations for additional facilities specifically for mosque visitor activities that can potentially cause circulation problems.

In the process of this research, it also examines other research that discusses circulation problems in mosques, including "Mosque Space Circulation Patterns in Makassar Case Study: Babul Khaer Mosque" (Usman & Oktawati, 2019). What is a research discipline of architecture, with a qualitative approach related to the layout and circulation of the mosque, which discusses the comfort of space users when worshipping? It was identified that the circulation at the Babul Khaer Mosque is currently uncomfortable for space users during worship. Solving the problem in this study was carried out by rearranging the space, namely maximizing the area of the mosque's space and providing additional functions in spaces that rarely occur so that the space can function optimally. In addition, a re-circulation system is also carried out, namely separating the circulation of men and women to avoid cross circulation from the beginning of entering the mosque, then heading to the wudhu area, to the prayer area, and leaving the mosque area. Finally, designing a particular wudhu area for children and the elderly and reconditioning the parking area.

Several studies have explained that there are problems similar to this research, such as the circulation path between men and women is still in the same circulation path, so from this phenomenon, the circulation between spaces becomes biased and sometimes constrained by the area and number of the area, and will cause problems with circulation obstruction such as the occurrence of cross circulation. So, it is necessary to consider separate circulation paths between men and women from the beginning of entering the mosque area to leaving the mosque area, as well as optimizing the space and supporting facilities of the mosque area on the factor of area, number, and users of facilities such as children and the elderly in certain areas. Finally, consider applying strategic and informative information signs to make it easier for space users to understand circulation patterns and achieve convenience and comfort when worshipping.

Knowing that intensive activity in the rest area will affect the circulation in each facility in the main rest area of the mosque. (Karso, 2010) circulation is a path or space for a movement designed to connect certain areas to facilitate activities with adjusted sizes and needs. (Ching, 2012) In the book *Architecture, Form, Space, and Order*, Third Edition, several circulation patterns can be applied to the mosque rest area by adjusting the needs. Linear circulation, circulation that can be the primary regulator for several spaces. Radial Circulation, a combination of several linear circulations starting or ending at a particular central point. Spiral Circulation, single circulation tends to be attracted and increasingly away from the starting point. Grid Circulation, circulation that forms a square or rectangle caused by two parallel paths that intersect. Network Circulation occurs due to the configuration of paths that connect specific points that are interconnected in space—lastly, Composite circulation is a combination of other circulations adapted to space requirements (Karso, 2010).

A mosque rest area is a place with intensive mobility activities, so it is assumed that at every prayer time, there will be a buildup of visitors in several areas of the mosque that affect the circulation path so that it will produce circulation that is not ergonomic. The mosque area where circulation problems occur can be sorted according to the flow of space users' needs for prayer activities. First, in the mosque entrance area, this area depends on the area and number of circulation paths, knowing that rest area visitors will come simultaneously at the time of prayer, thus requiring a reasonably wide circulation path with the number adjusted to the category of mosque visitors, can be categorized into two categories, namely men and women who are separated. Furthermore, the footwear storage area is also an area for removing footwear, sufficient area is needed for the two separate categories, because in the process of removing footwear it takes a long time, so that if the area is by activity needs, it can reduce the potential for obstructed circulation. After removing footwear, the next area is the wudhu area which is separated. A unique path is needed with sacred boundaries for both categories to avoid cross circulation, which can invalidate wudhu and potentially obstruct the circulation path. The size and number and the placement of the entrance and exit of the mosque need to be considered so that the circulation path remains conducive for users of the mosque space when they come to enter the central area of the mosque to worship, to leave the central area of the mosque and leave the mosque area.

2. METHOD

This study uses a qualitative paradigm with observation and interview instruments; sample selection was carried out purposively based on criteria (Soewardikoen, 2019). The object of research is the al-Mi'raj Mosque KM 97 Cipularang Toll Road. In this study, the initial stage or the empathize stage, the data collection process was carried out by making direct observations of the object of research on each mosque visitor activity, then conducting in-depth interviews with visitors and also to mosque managers.

The process is human-centered or involves humans as the center in every stage of the design process. Design thinking originates and is intended for humans, Design thinking originates and is intended for humans not technological, or business centered (Camacho, 2016). Starting with empathy, discovering user needs by understanding beliefs, values, motivations, behaviors, constraints, advantages, and challenges. The stages in the next research are the Define, Ideate, Prototype, Test, and continued with evaluation and iteration at certain adjustment stages, which have not been carried out in this study. The process for analysis is to summarize all the data obtained from the results of participatory observations and in-depth interviews to then draw conclusions according to the interactive analysis model, namely data collection, data reduction, data presentation and conclusion.

3. RESULT AND DISCUSSION

The process of collecting data through participatory observation and structured interviews was carried out on June 20, 2021, at the al-Mi'raj Mosque KM 97 Cipularang, from 12.00 WIB to 19.00 WIB. During this period, data were collected by making direct observations regarding the activities and behavior of mosque visitors when they were prospective users of the mosque space when they were users of the mosque space and after as users of the mosque space, which had an impact on the mosque's circulation facilities. Observations began at the stage of prospective mosque room users entering the mosque area, it is known that there is one circulation path to enter and exit the mosque area, but there are also prospective mosque room users who use the parking area in the south of the mosque, for circulation paths if there are no cars who parked. However, when it rains, or the mosque parking area is filled with cars, a buildup of circulation hinders circulation, which is not ergonomic, as shown in the following picture.



Figure 1: Circulation conditions in line when it rains, and the car park is filled.

Furthermore, after the circulation path enters and exits the mosque area, circulation problems occur in the mosque entrance area, namely in the area of the removal of footwear and the development of footwear, from the limited size and number of areas and not designed with adjustments to the duration of the user when carrying out activities in that area, then there is a user of the area space. There are also other facilities such as free mineral drinking water provided

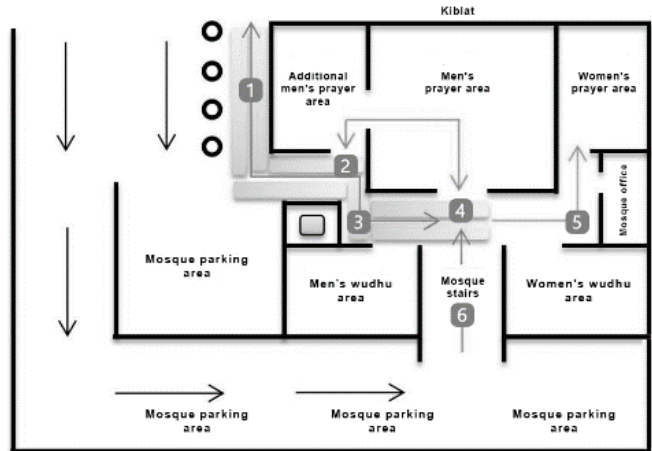
in the refrigerator and a display case to collect items left behind by mosque visitors. Some of the available facilities cause space circulation to be increasingly hampered because many facilities are offered in a minimal area, so various patterns of space user behavior hinder the circulation path.

The next problem arises from the problems mentioned in the research “Designing the Manasik Haji Mosque and Rest Area Based on Community Aspirations in Triharjo Kulon Progo Village” (Risfanda, 2020) namely the problem of the circulation path between men and women being one and the circulation path of the sacred boundary for space users who have wudhu. These problems occur in the al-Mi’raj Mosque, as shown in the following picture.



Figure 2: Circulation conditions in the mosque entrance area.

The DKM (Mosque Prosperity Council) Mosque al-Mi’raj has renovated some of the mosque’s rooms, including the mosque entrance area in the form of a staircase with sufficient circulation in and out of the mosque. However, observations identified that the design product was not effective. It is known that the stairs have fewer users compared to the previous circulation described. To access the entrance stairs, visitors have to rotate the mosque to feel it is inefficient and choose a straight-line circulation.



- 1: The main circulation route to the mosque
- 2: Loose areas and use footwear and circulation routes out of the prayer area
- 3: Circulation path to ablution area and toilet
- 4: The main entrance to the prayer area of the mosque
- 5: The circulation path to the women’s prayer area
- 6: The circulation path to the mosque area is through the mosque parking area

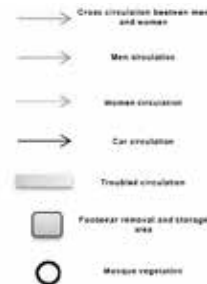


Figure 3: Circulation in the al-Mi’raj mosque area. (Marking on the plan according to the number on the figures).

The following circulation flow is in the wudhu area. There are no significant problems with the process of using space to carry out wudhu activities. However, in circulation after the wudhu activity, there are problems, namely the impact of circulation after the area takes off footwear between men and women crossed the circulation in front of the entrance to the central area of the mosque, causing cross-circulation. Of course, this circulation hurts room users who have already performed wudhu, especially for men, as shown in the following picture.



Figure 4: Circulation of the central circulation of the mosque entrance.

The successive stage is in the participatory observation process; it was found that some users of the space for women had difficulty finding the wudhu area for women and the women's prayer area; sometimes, women entered the men's wudhu area and entered the men's prayer area. This phenomenon happened in the research "Review of Visitor Behavior on Circulation Patterns of the Great Mosque of Central Java" (Nabilah et al., 2018); the al-Mi'raj Mosque requires strategic and informative information signs to prevent space users from getting to the predetermined circulation.

Circulation in the mosque room is not a significant problem; due to the current COVID-19 pandemic condition, prayer activities are conditioned by a distance of about 1 meter for each room user. Then the circulation problem arises when space users finish praying, there is a south door of the mosque, which is used as the mosque's exit, but the area is also used as a mosque prayer area for space users who do not get a place in the mosque's main room. Problems that arise from the circulation door can interfere with space users during prayer, and the impact of the end of the circulation will again result in a buildup of circulation in the area of off footwear and then continue in the area along the circulation path in and out of the mosque, as in the following image.



Figure 5: Circulation of the mosque's side door and the mosque's footwear area.

After conducting participatory observations, a structured interview process was carried out to obtain more detailed information about the circulation in the mosque. Interviews were conducted with (Riki, 2021) as an imam (a person who leads congregational prayers) and the manager of DKM Masjid al-Mi'raj, and (Yuli, 2021) as treasurer of DKM Masjid al-Mi'raj. Data obtained from the interview process with Mrs. Yuni shows that circulation conditions on weekdays tend to be crowded and remain conducive. Conditions are not conducive during Friday prayer times. Space users exceed the mosque's capacity, so that circulation is not conducive until the weekend. On weekends, visitors are always crowded even though outside prayer times and the circulation flow is not conducive when entering prayer time. In addition to this phenomenon, there is also the condition of the mosque's circulation becoming very unfavorable, namely during the mudik tradition (an once a year routine for Indonesian people to return to their hometown) and when they returned from their hometown, with various needs of visitors who came to worship, to rest for a while, to take advantage of the toilet facilities.

However, during the current COVID-19 pandemic with the Indonesian government's call for a ban on holiday home for idil fitr, the circulation conditions at the al-Mi'raj mosque are more conducive.

The following process is carried out to Mr. Riki; the data obtained from the current circulation condition is an effort to solve circulation problems. It was explained that the al-Mi'raj mosque had renovated the widening of the mosque area to increase the mosque's capacity and relocate the toilet area and wudhu area. It was known that initially, men and women were in the same area for the toilet area and the wudhu area. Moreover, the problem of circulation paths that are not ergonomic because access to circulation from the area to the mosque entrance is very far, making it difficult for space users. Efforts to renovate the widening of the mosque area and relocating the toilet area and wudhu area do not entirely solve the problem of space, especially the circulation system. Instead, it gives rise to other circulation problems as described.

Interviews were also conducted with several mosque visitors; from the results of the interviews, it was found that most of the mosque visitors had the primary purpose of worship, then followed by a short break in the mosque area or the mosque car parking area, as well as utilizing the mosque's toilet facilities. The impression of visitors to the al-Mi'raj mosque that each facility is superior to cleanliness and coolness makes mosque visitors comfortable.



Figure 6: Circulation of the central circulation of the mosque entrance.

Then information was obtained regarding the facilities and circulation of the mosque; mosque visitors thought that it was necessary to renovate the circulation path aspect because the size of the central circulation was too narrow, so that there was still a buildup of visitors in certain areas, especially in the mosque's footwear storage area, which felt the facilities lacked optimal function because most mosque visitors do not leave their footwear, there is still cross circulation between men and women after wudhu. Continuous circulation after the room users finish praying, there are room users who are confused about determining access to circulation out of the main room of the mosque, there are two alternative circulations, namely through the entrance of the mosque and the side door of the mosque, but both accesses are expected to have circulation problems still when accessed on specific time. For access to the entrance, it is suspected that a room user who wants to leave will run into a room user who wants to enter, resulting in an inhibition of circulation. Access to the side door will also hamper circulation because access to the side door is directly connected to the footwear storage area, which often occurs when mosque visitors accumulate.

Further information revealed that mosque visitors find it difficult and confused to reach the toilet facilities because the place is hidden and difficult to reach, and the information signs are less informative regarding the placement, size, and content of the information signs, which are dominated by written descriptions and minimal symbols related to the function of the facility



Figure 7: Circulation of information signs and locations of toilet facilities that are difficult to reach.

Analysis of the results of observations, in-depth interviews, there is a correlation between the two, namely there is a discrepancy between the activity needs of mosque visitors and the circulation conditions of the existing mosque facilities, so it is necessary to consider the ergonomics factor of the circulation area and information signs to facilitate the circulation process so that there is no accumulation of mosque visitors and causes obstruction of circulation. mosque rest area which is supported by ergonomic provisions of circulation area and provision of information signs. The design thinking approach is applied at the empathize stage, as an initial effort to understand the needs, thoughts, emotions and motivations of space users to define the problems of the rest area mosque circulation system.

4. CONCLUSION

Research carried out using a design thinking approach at the empathize stage resulted in the circulation of the al-Mi'raj mosque rest area KM 97 Cipularang is affected by the phenomenon of space user activities in certain aspects of space and time. It is proven from the data collection process using participatory observation methods, and structured interviews, resulting in circulation problems in the mosque area regarding circulation flows based on the hierarchy of space user needs that are not optimally facilitated by the DKM al-Mi'raj mosque, resulting in problems with the circulation of space in the mosque area. In the ongoing process, further research is needed to identify problems more critically so that research can be continued to the next stage of design thinking, namely the define stage.

ACKNOWLEDGEMENT

Acknowledgments to the honorable speakers, Mr. Ustad Riki as chairman of the DKM Masjid al-Mi'raj.

Mrs. Yuni as treasurer of the Masjid al-Mi'raj.

The visitors of the al-Mi'raj mosque.

REFERENCE

- Camacho, M. (2016). David Kelley: From Design to Design Thinking at Stanford and IDEO. *She Ji*, 2(1), 88–101. <https://doi.org/10.1016/j.sheji.2016.01.009>
- Ching, F. D. K. (2012). *Architecture Form, Space, and Order* (Third Edit). Wiley. <https://www.google.co.id/books/edition/Architecture/GryqqV58cXcC?hl=en&gbpv=0>
- Firhandy, A. R. (2018). Rest Area Kabupaten Mempawah. *Jurnal Online Mahasiswa S1 Arsitektur UNTAN*, 6(2), 298–308.
- Harahap, A. P., Thahir, A. R., & Handjajanti, S. (2020). Peran Masjid Sebagai Pembentuk Identitas Tempat the Role of Mosque As Place Identity Formation. *Agora*, 17(1), 53–63. <http://dx.doi.org/1025105/agora.v17i1.7521>

- Harris. (1975). *Dictionary of Architecture and Construction* (C. M. Harris (ed.); Fourth Edi). McGraw-Hill Education. https://www.google.co.id/books/edition/_/fM5aRKFSQvYC?hl=en&sa=X&ved=2ahUKEwjS9pbyvPj3AhWjS2wGHewCAwMQ7_IDegQIERAC
- Karso, O. S. (2010). Dasar-Dasar Desain Interior Pelayanan Umum III. *ISI Denpasar*, 8, 1–3.
- Nabilah, A., Pribadi, S. B., & Alfia riza, M. A. (2018). Tinjauan Perilaku Pengunjung Terhadap Pola Sirkulasi Masjid Agung Jawa Tengah. *Modul*, 18(2), 54. <https://doi.org/10.14710/mdl.18.2.2018.54-59>
- Riki, (2021). Interview of “Sistem Sirkulasi Masjid Al-Mi’raj KM 97 Cipularang” on Masjid Al- Mi’raj, Tol KM 97 Cipularang.
- Risfanda, M. (2020). *Perancangan Masjid Manasik Haji dan Rest Area Berbasis Aspirasi Masyarakat di Desa Triharjo Kulon Progo* [Universitas Islam Indonesia]. <https://dspace.uui.ac.id/handle/123456789/28466>
- Soewardikoen, D. W. (2019). *Metodologi Penelitian Desain Komunikasi Visual* (B. A. F. Maharani (ed.)). PT Kanisius Yogyakarta. https://www.google.co.id/books/edition/Metodologi_Penelitian/-uQWEAAAQBAJ?hl=en&gbpv=0
- Suryanto, A., & Saepulloh, A. (2016). Optimalisasi Fungsi dan Potensi Masjid; Model Pemberdayaan Ekonomi Masyarakat Berbasis Masjid di Kota Tasikmalaya. *Iqtishoduna*, 8(2), 1–27. [file:///C:/Users/ADMIN/Downloads/143-1-293-2-10-20161222 \(1\).pdf](file:///C:/Users/ADMIN/Downloads/143-1-293-2-10-20161222%20(1).pdf)
- Tofani, L. (2011). *Terminal Imbanagara Kabupaten Ciamis Clarity* [Universitas Komputer Indonesia]. <https://repository.unikom.ac.id/18465/>
- Usman, R., & Oktawati, A. E. (2019). *Pola Sirkulasi Ruang Masjid di Makassar. 1.*
- Yuli, (2021). Interview of “Sistem Sirkulasi Masjid AlMi’raj KM 97 Cipularang” on Masjid Al- Mi’raj, Tol KM 97 Cipularang.