The Masjid Pedestrian Network of Madani City: Exploring Religious Facilities Exterior Space for Pedestrian Friendly Street Network in Banda Aceh

Sylvia Agustina[1,*], Chyntia and Aryani[2] and Saiful Mahdi[3]

[1]Architecture and Planning Department, Engineering Faculty Syiah Kuala University, Darussalam Banda Aceh 23111, Indonesia
[2]Architect, National Slum Upgrading Program (KOTAKU), Banda Aceh, Indonesia
[3] Research Center for Social Science and Culture (PPISB) Syiah Kuala University Darussalam Banda Aceh 23111, Indonesia
*Corresponding Author: sylvia_agustina@unsyiah.ac.id

Abstract

The urban landscape of Banda Aceh is characterized among other by one significant building type; the masjid and its smaller varian; mushalla, which are present not only in all neighborhood but also attached to major public facilities. This work explores the potential of religious facilities exterior space for linking pedestrian friendly street network in Banda Aceh. The paper argues that within the framework of *Madani* City advocated by the municipality of Banda Aceh, the number and distribution of masjid and mushalla could serve as nodes for generating and prioritizing more pedestrian friendly environment. The strenght of this argument is explored through spatial analysis of masjid number, distribution and service area. The spatial analysis at urban scale is followed by neighborhood observation around five samples of masjid service area, connection to the street network and proximity to public facilities. School is selected as the main reference for public facilities based on availability of city wide school data. School is also a very important public facility that could make most benefits from good pedestrian network. The result suggests that adding to the multiple roles of a masjid, it has great potential to shape pedestrian friendly street network that is developed accordingly with the *Madani* concept advocated by the local government and with the socio–cultural context of masjid centered community in Banda Aceh.

Keyword : Masjid, pedestrian network, madani city, spatial analysis.

Introduction

Masjid as building type

"Masjid" is the arabic word for a mosque. It simply means a space for prayer, a place of worship or prostration in prayer. The origin of the word ispossibly from Aramaic (https://en.oxforddictionaries.com). The Arabic term*masjid* has been absorbed into Indonesian, written either as *masjid* or *mesjid*. The term *masjid* is also preffered by many moslem compared to the term mosque. The use of the word "mosque" in English is discouraged partly based on a mistaken belief that it is derived from the word "mosquito" and is considered as a derogatory term. For many, the use of Arabic term is simply preferred as it more accurately describes the purpose and activities of a mosque, and because it is also the language of the Quran (http://islam.about.com).

Masjid is the most important architectural representation of Muslim identity (Khan, 1990). Along with the spread of Islam, masjids are build all over the world. The building often reflects the local culture, heritage, and resources of its community. Although masjid designs vary, there are some common physical features. These features or elements characterize a masjid as building type (https://www.khanacademy.org). The main features are prayer hall and *minaret* (tower). The elements in the main prayer hall may include a *mihrab* (a niche in the wall indicating the direction of Mecca and where the *Imam* or prayer leader stands to lead the prayer) and mimbar (a pulpit or steps from where the *Imam* delivers the *khutbah* or shermon). Then there is ablution area which is separated for male and female. Dome roof is often associated with masjid even tough there are many masjids both old and contemporary that do not have domes. Beyond these basic features, masjid may be large or small in size, simple or elegant in style. They are also constructed with a large variety of materials.

Modern masjid especially in the area where muslim is minority is often completed with contemporary features such as school (tough education is always an integral part of a masjid but usually conducted in the main hall), community organization offices, halal shop, parking area and other amenities located within the masjid's compound.

The importance of Masjid as building type in Banda Aceh

The majority of Banda Aceh resident is muslim. The city adopts Islamic Law (*Sharia*) and in 2012 set and branded its development goal towards a "*Madani* City". The word *madani,* derived from Arabic means related to civil rights, urban, to emphasize on Islamic values, norms and laws supported by *iman* (beliefs), science and technology (http://kbbi.web.id/madani). The municipality of Banda Aceh translated *madani* spirit into seven strategic missions to improve the practice of Islam towards *kaffah* (comprehensive) implementation. The seven missions are to improve the good urban governance, to improve the people's economics, to foster an intellectually healthy and welfare society, to develop Islamic tourism infrastructure, to improve women participation in the public domain, to improve child protection and to improve youth's role as the city's development strenght (http://syariatislam.bandaacehkota.go.id). This paper focus on how the islamic values could be translated into more meaningful urban planning principles, beyond what are currently seen as a somewhat supervicial applications through for examples, the over emphasis on incidental segregation of male and female in public spaces and the ecletic use of Islamic ornamentation or architecture style. In the socio–cultural context of Banda Aceh, a masjid is not only used as prayer space but also community space such as for community meetings, Islamic classes for all ages, funerals, weddings and other celebrations. Masjid is of a high importance since it is the core of religious and social life of majority of the people in Banda Aceh.

Masjid and the city

Islamic civilization is not merely a set of religious beliefs and laws but also a functioning society that organizes the life of Muslim into a community. The decision to establish a masjid signifies a commitment to build a community either before or after a physical neighborhood is established as the building block of Islamic city. Therefore as a the most important architectural representation of muslim community, masjid is the key element in the Islamic communities, neighborhood and cities (Abu Lughod, 1987; Khan, 1990).

For a simplification purpose the discourse on masjid can be classified into pair classification of the content–container, hard–soft or physical–social aspect. The physical aspect often centered around the building itself such as on its architecture style (i.e. Mustafa and Hassan, 2013), the interior decoration, thermal or the construction. The social aspects is the one that is possibly most often talked about by the general public. This is related to the ritual and social activities in the masjid. It is often termed as *kemakmuran mesjid* (the welfare of the masjid) which is basically the dynamic of religious and social use of the mesjid.

The exterior space of a masjid is usually discussed in the context of Islamic garden. However the Islamic garden concept is not necessarily attached to a masjid and very often is not applied to community masjids. It is usually limited to major historic or grand large scale masjid. Despite the fact that masjid is a very important element of islamic city, the discussion of how masjid compound connects to the surrounding urban fabric and the city is still limited.

Walking to a Masjid

Male muslim is encouraged to perform 5 daily compulsary prayers with *Jamaah* (in a conggregation) at a masjid (Quran, Al Baqarah 43; *Hadith* Al–Bukhari No 131 and Muslim No 649, narrated by Abu Hurairah). Walking toward a masjid for prayer is considered an act of worship as well, then it will be compensated as such for everyone (Hadith Muslim No 1553, narrated by Abu Hurairah). The longer you have to walk the more reward you will get. In this sense, a pedestrian friendly environment should be an integrated concept surrounding a masjid. However this is not always the case. The consideration for masjid design or construction is often limited within the boundary of the masjid compound. In Banda aceh for example, even the city's Grand Masjid Baiturrahman has a very poor pedestrian system beyond its compound's boundary.

Masjid and pedestrian friendly environment

Walkability level is a way to state how friendly and easy it is for pedestrian to walk. Several methods have been proposed by researcher and planner to assess the walkability of a space or a neighborhood. The methods known include simple measure by the presence of standard width sidewalk (at least for 1 person to walk safely along the street to more complex assessment tools as such walkscore (https://www.walkscore.com) and the walkability index (Frank *et al*, 2016; Leslie *et al*, 2005). The

walkability index uses a range of indicators including net residential density (ratio of residential unit to the land allocated to residential area), retail floor area ratio (retail building floor area divided by retail land floor area), intersection density (connectivity of street network, represented by ratio of number of true intersection; three or more legs to the total land area) and land use mix or entropy score which is the degree of land use diversity based on 5 main land uses of residential, retail, entertainment, office, institutional. The walkability index is not immediately applicable to a situation such as in Banda Aceh where city wide primary data of urban fabric is limited and where mixed land use are hardly recorded and continuously change without proper reporting and permitting. Some appropriation is needed to enable quick evalution of the walkability in a certain area e.g surrounding a masjid.

Methods

Data Collection

The neighborhood, city boundary and initial educational facilities data are acquired from the Remote Sensing and GIS Center–Syiah Kuala University (RSGIS–SKU). The georeferenced religious facilities data is traced using ArcGIS through on–screen digitation over Banda Aceh satellite image (0.5m resolution acquired from GeoEye in 2013). Data for masjid is sorted and updated. Crosschecking is done through Google Earth, Google Map and secondary information of masjid list (http://www.dream.co.id). In several cases verification is done by direct site visit. From aerial view the masjid and its compound can be identified and distinguished from other building type by its orientation towards Mecca, the footprint and sometimes by the larger land size compared to typical housing site.

The educational facilities information is also updated through the same process and crosschecked using secondary information such as school database from publicly available government data (http://data.bandaacehkota.go.id). Data of actual situation around the site and neighborhood level are collected through site observation.

The service area of masjid.

In this research the service areas of all religious facilities particularly of masjids are delineated by drawing a circular buffer area around the center of the site with radius of 300m. This distance is based on appropriated easy or conveniently walking distance. The range of walking distance vary across places. It is often set between 400 m as the lower boundary and 1000 m as the upper boundary (http://humantransit.org). In this sense the 300 m is a very moderate distance which correlates to approximately less than 5 minutes of normal walking time. The 300 m radius moderation is also taking into consideration the indirect path range and unfavorable climate for walking.

In unattractive environment such as under unfavorable climate, parking lot or congested street, people are most likely to walk for as long as 2 minutes or approximately 200 m while the mean easy walking distance in minutes is reported to be around 15 minutes (Colabianchi *et al*., 2007). Based on this information the research set 300 m as the walking distance range for Banda Aceh or approximately less than 5 minutes walking time.

The actual service area of a mesjid and particularly of a mushalla is often set by social and political association rather than actual distance. Although there is no limitation, a mushalla that belong to a *gampong* (neighborhood or village) serve mainly the resident of that particular *gampong*. This type of service coverage could be considered at the site level but is not included in the calculation at the citywide level.

Spatial Analysis

The spatial analysis step is as follows
1. Plotting and digitazing the location of all religious facilities in Banda Aceh to see the overall distribution.
2. Delineating service coverage for all religious facilities using buffer of 300 m radius. This will result in understanding area that is within walking distance from religious facilities including the masjids. It suggests that with regard to masjids, people who are within this area when a prayer call is heard could easily walk less than 5 minutes to a masjid.
3. The religious facilities buffer map is overlaid with map of educational facilities. The number of educational facilities within 300 radius of each religious facility is calculated within ArcGIS. Ten religious facilities with the highest number of school consist of 9 masjids and 1 church. Some masjids have up to 6 schools within walking distance.
4. We then focused on selecting masjid for case study. The selection is ideally done using complete data of city wide destination facilities (not only schools), land use, and pedestrian amenities. However since the our citywide data is limited to religious and educational facilities only, we used the two type of data at

this stage of the research and proceed with qualitative judgement when selecting site case studies. We identified 5 samples based on proximity to schools, land use diversity and neighborhood complexity that may represent interesting case study. The 5 masjids are Masjid Al Anshar, Masjid Al Huda, Masjid Al Muttaqin, Masjid Al Fitrah and Masjid Al Mukarramah (See Table 1 for location).

5. Calculating number of intersection (as indication of intersection density) by marking and calculating intersection with more than three legs (three street branching) within the walking distance buffer. Intersection is identified by on–screen digitation in InDesign.
6. Delineating block area using InDesign and presented as figure ground image.

Neighborhood Observation

Neighborhood observation is conducted toward 5 masjids to better understand the urban structure related to pedestrian system and to compare it with the information derived from satellite image and the result of spatial analysis.

Results and Discussion

Prayer space distribution across the city.

Banda Aceh has 90 neighborhoods grouped into 9 districts or *kecamatan*. Every neighborhood has at least one mushalla or masjid. In many areas especially in neighborhood with higher population density there are several masjids. The location of masjid is not necessarily in the middle of neighborhood since the selection of the land is not based on centrality or service coverage but more on the availability of land. Many of the masjid parcels are *waqaf* (endowment) land.
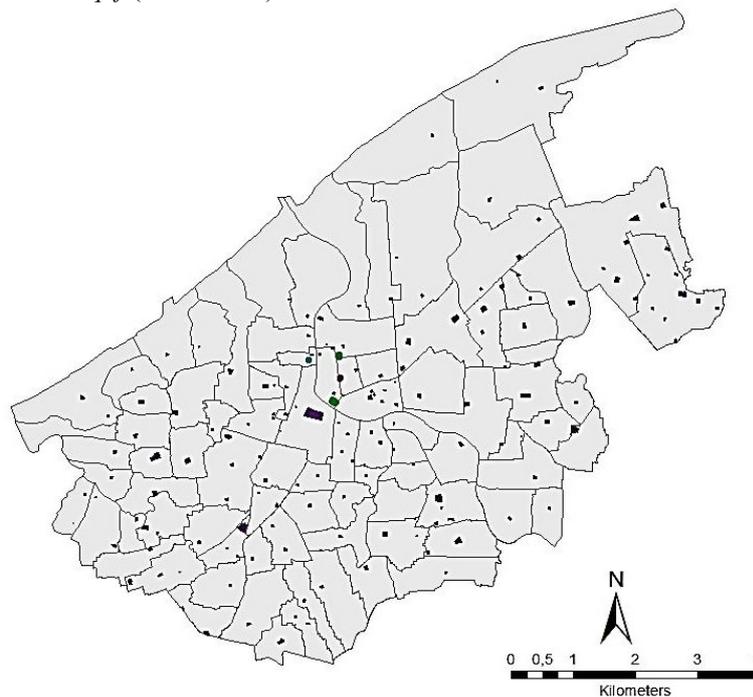

Figure 1. Distribution of all religious facility parcels in Banda Aceh (masjid, mushalla, church, temple) overlaid on neighborhood boundary map of Banda Aceh

The research has so far located 165 religious facilities consist of 161 masjids or stand alone mushalla, 2 churches, 1 Budhist temple and 1 Hindu temple. The masjids comprise of 98 % of the total religious facilities in Banda Aceh. The size of the facilities ranges and the parcel/lot area also varies. Some masjids have large yards, others have very narrow yards with almost 100% building coverage. The churches and temples are concentrated in downtown area while masjids are spread in every neighborhood. The number and distribution of masjid are valuable for setting up city wide spatial planning and policy including pedestrian planning system. The current pedestrian improvement is usually attached to region base e.g. in downtown or in conservation zone or more often it is partially developed for a street segment, not connecting destination points or pedestrian generating activities. The location and distribution of all religious facilities is presented in Figure 1 while Figure 2 shows the location of 161 masjids with walking distance buffering.
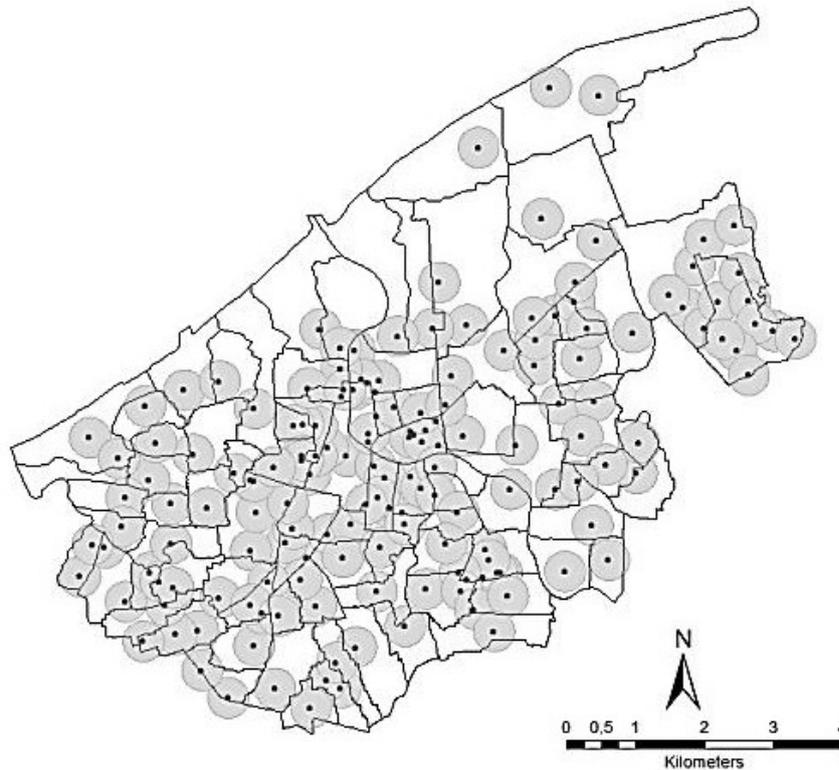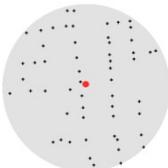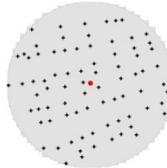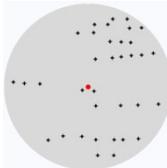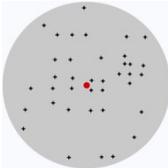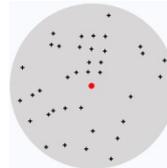
Figure 2. Location of Masjid and Mushalla (161 sites) with 300 m buffer indicating walking distance coverage.

The buffering shows that almost all inhabited area of Banda Aceh is within walking distance of a masjid or a mushalla. This is happening naturally or organically due to population demand and availability of land. It is without pre–design. The walking distance buffer used is very moderate. More area will be covered if we used 400 m or 800 m buffer.

We appropriated some indicators to enable assessment of walkability within the walking distance buffer of five masjids. The indicators are 300 m buffer for service coverage, block size and composition, intersection number and density, land use diversity and population density.The observation indicates that there is a gap between what the urban fabric and structure already provided for good pedestrian system with the final physical service at the neighborhood level. The assessment at buffer and neighborhood level is presented in Table 1. We then proceed to the observation at the site level which include pedestrian amenities on site and at street level, traffic condition and vegetation along the street. The full report on the observation on site and at street level are beyond the scope of this paper.

The five samples comprise of community masjids and institutional masjid. The neighborhoods also varies, ranging from residential dominated neighborhood, military compound to a busy market. In terms of natural features, mesjid Al Muttaqin present an interesting setting as it is located by the working waterfrontt, and next to a central market. The sample masjid each has 5 or 6 schools within the buffer areas. The area observation shows that all have very good actual land use diversity. They are also located in medium to high population density for Banda Aceh. The block size and structure seems to be ideal for a pedestrian friendly environment. Long size blocks only exist around Masjid Al Fitrah which is a military compound and can be considered less public than the other four. The compact block size and structure correlate with the high number of intersection ranging from 37 to 83 around Masjid Al Huda.

Table 1. Walkability assessment at neighborhood and buffer level for five Masjids

No	Attributes	Masjid Samples				
	Name	Al Anshar	Al Huda	Al Muttaqin	Al Fitrah	Al Mukaromah
1	Location within the city and name of Gampong/ Neighborhood	Mulia	Laksana	Peunayong	Neusu Jaya	Punge Jurong
2	Image within buffer (r=300m) Area = 28.3 ha					
3	Neighborhood within buffer (r=300m)	Mulia, Laksana, Peunayong	Laksana, Keuramat, Mulia	Peunayong, Keudah, Mulia	Neusu Jaya, Kampung Baru, Sukaramai	Punge Jurong, Kampung Baru, Merduati
4	Neighborhood Population Density (per ha in 2013) Min =2, max=188	Mulia = 93 Laksana = 153 Peunayong = 83	Laksana = 188 Keurama t= 153	Peunayong = 83 Keudah = 76 Mulia = 93	Neusu Jaya = 92 Kampung Baru = 39 Sukaramai = 77	Punge Jurong = 55 Kampung Baru = 39 Merduati = 69
5	Block Figure Ground within buffer (r=300m) White=Block Black=Street					
6	Intersection number and density within buffer (r=300m)	57 Intersection Density 2.01/ha	83 Intersection Density 2.9/ha	35 Intersection Density 1.2/ha	37 Intersection Density 1.3/ha	37 Intersection Density 1.3/ha
7	Land Use Diversity within buffer (r=300m)	Diverse	Diverse	Diverse	Diverse	Diverse

Conclusion

- At citywide level, religious facilities number and distribution could be used as nodes to generate pedestrian friendly system and prioritize pedestrian improvement program. The approach is in line with Islamic values that promote walking to a masjid, interpreted into practical spatial planning principles.
- The observation at neigborhood and 300 radius buffer show that the urban fabric of the neighborhood are suitable for pedestrian friendly environment.
- The walkability level assessment should include detail observation on site and at the street level to evaluate whether the urban fabric and physical structure at the city and neighborhood level are met with physical design and actual use on site and at the street level. Further research at that refined detail should be conducted to more masjids in the city.

Acknowledgements

References

Abu–Lughod, J. L. (1987). The Islamic city–historic myth, Islamic essence, and contemporary relevance. *International Journal of Middle East Studies* 19 (2): 155–76.

Colabianchi, N., Dowda, M., Pfeiffer, K. A., Porter, D. E., Almeida, M. J. C. and Pate, R. R. (2007). Towards an understanding of salient neighborhood boundaries: Adolescent reports of an easy walking distance and convenient driving distance. *The International Journal of Behavioral Nutrition and Physical Activity* 4 (1): 66.

Frank, L. D., Sallis, J. F., Saelens, B. E., Leary, L. . Cain, K., Conway, T. L. and Hess, P. M. (2010). "The development of a walk ability index: application to the Neighborhood Quality of Life Study." British journal of sports medicine 44(13): 924–933.

Khan, H. U. (1990). "The architecture of the mosque, an overview and design directions." Expressions of Islam in Buildings: 109–127.

Leslie, E., B. Saelens, L. Frank, N. Owen, A. Bauman, N. Coffee and Hugo, G. (2005). "Residents' perceptions of walk ability attributes in objectively different neighborhoods: a pilot study." Health & place11(3): 227–236.

Mustafa, F. A. and Hassan, A. S. (2013). Mosque layout design: An analytical study of mosque layouts in the early ottoman period. *Frontiers of Architectural Research* 2 (4): 445–56.

Walkscore Professional, https://www.walkscore.com, accessed September 30, 2016