

Crowding and Territoriality within Urban Safety (Case Study: Ketabang, Surabaya, Indonesia)

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Abstract—The city of Surabaya is one of the largest metropolitan cities in Indonesia with positive city growth and development. Along with this, the wave of urbanization and the increase in safety threats also increased. The increased threats triggered the procurement of facilities related to high safety. However, Ketabang, as one of the regions that have the availability of complete safety facilities, still has a great record of safety threats, especially in public space. Thus, an evaluation of the effectiveness of the facility needs to be carried out, especially on the topic of controlling the crowd and clear territorial boundaries. The control itself is related to the limitation of public activities, which can be one of the factors that cause reduced awareness and surveillance of the perpetrators of safety threats. Because of it, this region needs further research on each level of territorial crowds and territorial boundaries that can affect safety in public spaces. This study uses qualitative data analysis, character appraisal of related facilities, and cognitive mapping as a research method. The results of the analysis process outline the influence of crowds and territorial boundary on the safety of users of public spaces in the study area. These results are the main handle in providing an evaluation of the design and provision of facilities that can improve the safety of public space users.

Keywords— Crowding, Territorial, Urban Design, Public Space, Safety

I. INTRODUCTION

URBAN safety is an individual problem that can develop into a community problem when it is associated with the urban environment. As it stated by several previous studies, where personal safety is an essential factor in lifestyle choices, and safety threats is a problem that threatens the quality of urban life [1][2][3]. This lack of guaranteed safety results in a level of threat that reinforces feelings of fear of the threat of safety in cities [4]. However, with the help of physical environmental design to influence non-physical factors that can reduce the addition of safety threats, this fear can be reduced. So, it will directly improve the quality of safety guarantees in urban areas [5]. Lack of attention in a design that includes safety factors often leads to a lack of attention to public facilities that are the points of occurrence of safety threats. The lack of attention in design is better known as the "broken window effect."

Public space as a place where safety threats occur, often related to clarity on individual identity. Places that can hide someone's identity whether it has caused by the lack of effectiveness of safety facilities or the level of crowds are often a hot spot for threats of safety in urban spaces [6]. Also, physical features that prevent flight in a public space in a city

often take a limited form [7]. The prevention itself has shown a relationship between the certainty of the existence of other people and the boundary of the area towards feeling safe in the public space.

Alone is a factor that can arouse personal fear in some cases. The presence of other people while doing activities in the city increases the sense of safety that will reduce doubts to move within the city. This based on the possibility of getting help and guarantee of surveillance of the perpetrators and events that threaten safety [8]. On the other hand, the feeling of being alone in public space is not the only one that causes deficiencies in safety. Sometimes some groups can cause feelings of insecurity instead of increasing security. It all depends on the number of individuals, characteristics, and habits that can affect fear in others [9]. These characteristics often linked to antisocial behavior that comes from several potential groups such as gangs, drug users, and homeless people who can cause an increase in feelings of insecurity in others [8]. Hence, control of crowds is needed to limit public areas prone to safety threats and semi-public and private areas that have limited access. The control is needed to be able to focus more effective supervision of public space without the opportunity to overflow the crowd to a wider radius.

Safety guarantees in public space are not entirely in the process of planning and designing cities in Indonesia. Safety factors in design and planning in the spatial planning law only explain the design of safety in select zones in the city, such as airports or buildings. However, public safety factors are not a significant consideration. The lack of consideration about safety factor reflected in the safety factors described in the planning guidelines, where the design factors in the city not fully elaborated. Thus, the safety of public space users when carrying out activities on the results of existing designs can decrease. Therefore, studies to find out ways to improve public safety in urban areas need to be done further.

Crowd control, in this case, is related to limiting access to the movement of users of public spaces, which can increase the likelihood of the presence of actors among them. Boundaries on access to improve safety were first triggered by Newman [10] and inspired by Jacobs [11], where territories have a vital role to play in reducing the number of safety threats. In this case. Control of space in the form of giving clear boundaries to residential spaces can affect residents in increasing their sense of ownership and control of space while giving outsiders a sense that "you are entering space under the control of others" [10]. However, in this case, Newman stated that boundaries on access to improve the

sense of safety in restricted urban spaces such as the gated community. Despite this, territories are one of the essential factors in preventing the threat of safety in urban areas. Physical design can create an environment that influences its users. Users are then trained to develop sensitivity to zones in their region in the presence of territorial assertions [12].

The territorial boundary can be done by providing facilities that can limit access as well as access control. This territorial boundary consists of, physical boundaries which include fences, gates, groups of buildings that form a detour, and high walls. Also, this barrier must be seen as one component of the hierarchy that defines space and must allow visibility [10] [12]. Also, there are territorial boundaries in the form of symbolic barriers which include open gates, street lights, road markers, short paths, planting, and changes in the surface texture of walking. Symbolic barriers without sharp changes such as high gates or walls are also identified as boundaries because they have an effect on human behavior and hope to realize differences between public and private areas [10]. In any form, this territorial barrier serves to emphasize the delivery of messages to public space users that they have entered other areas. The barrier allows the perpetrators to be more alert and resist their desire to do something that can threaten the safety of others.

Conducting an evaluation process to control crowds through territorial boundaries requires a deeper understanding of non-physical and physical conditions in an area within the city. The evaluation took process by looking at residents' perceptions of the level of crowds that are around their environment. Furthermore, this is useful for viewing areas that need to be restricted and require higher access control. The purpose of this direction is also useful to be able to evaluate existing territorial boundary facilities.

This research concerns the field of urban design research, where the aspects discussed include physical and non-physical aspects. The discussion specifically focused on existing territorial boundary facilities and community perceptions in addressing these boundaries and the level of crowds in their neighborhood. In this case, the study location is in Ketabang, a village in the city of Surabaya, Indonesia. This location has a variety of public spaces and activity centers that can affect the emergence of crowds (Figure 1).



Figure 1. Location and Boundary of Study Site

II. METHOD

This study uses field observations and the walkthrough method to collect the required data. This process collects data on people's perceptions of the level of crowds and territorial boundaries regarding their safety in public spaces. The

process of data collecting also looks at the boundaries of each region and the openness of the area of each road in the study area. The observation process also produces a map showing each facility capable of suppressing territorial boundaries. Based on these data, the analysis process was carried out using qualitative data analysis to see trends in public perception, and with character appraisal and cognitive mapping, the effectiveness of each boundary in the region evaluated against its ability to control crowds. Hence, this is done to be able to see the region's ability to improve the safety of users of public spaces.

III. RESULTS AND DISCUSSION

This study focuses on the influence of crowds and territorial boundaries to improve the safety of public spaces users in the city of Surabaya. The availability of public space facilities as well as the existence of public space users originating from the center of activity is one of the criteria for location selection. So, this study chose Ketabang Village, Genteng District, Surabaya City, as the study location. The choice of study location based on the security aspects mentioned by Whitzman and Mayes [13]. These aspects itself based on social aspects, namely the number of threats to a region, as well as environmental aspects, namely the presence of facilities that serve the community.

Ketabang is one part of Genteng sub-district in Surabaya City. This area is one of the administrative centers of Surabaya City with the mayor's office. In addition to that, Ketabang also has several activity centers that can be a center of crowds on a small scale. The types of activities include educational facilities, trade areas, office facilities, and city parks. The total area of the Ketabang area is 115 Ha. As for this study, the location of the study was divided into 7 zones to be able to reinforce each activity center, and the scale of the crowd affected by the activity (see Figure 2).

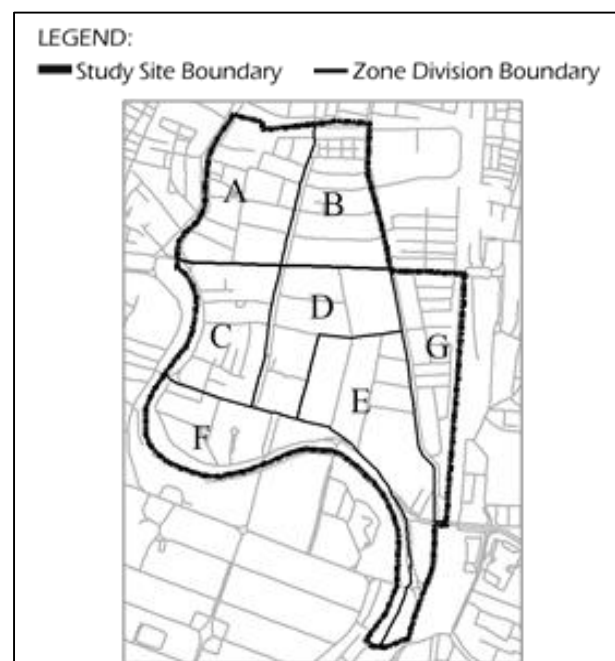


Figure 2. Site Ketabang Map by Zone Divisions

Based on the security aspects, the researchers refer to the Surabaya Polrestabes Case Dynamics Map from May 2017 to May 2018 (see Figure 3). Based on the map, it has found that

the Ketabang Village has a large amount of criminality in outer space, namely four incidents of violent theft and 12 incidents for motor vehicle theft. Ketabang Village has varied public spaces. Variations in public space in this area include parks, malls, green open spaces, fields, and several activity generators that should be a factor that guarantees the safety of users of public space. However, Ketabang Village has a large number of violations in the city, and this is the basis for site selection.

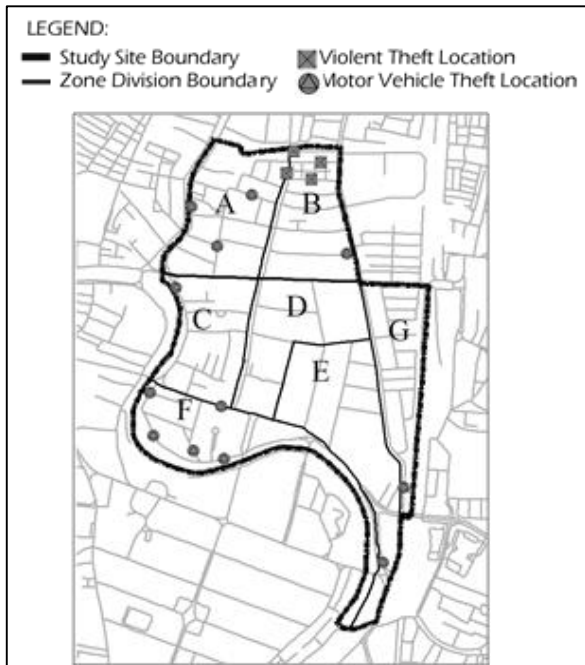


Figure 3. Dynamic Map of Safety Threats Case in Ketabang

The process of perception data collection is carried out in each zone, with a total number of respondents totaling 65 people. Data collecting aims to see whether there are differences in perceptions of the level of crowds and also territorial boundaries that influence territorial openness. The community, in this case, is given questions about the influence of the level of crowds in each zone and their fear of an event that might occur if the level of a crowd is at the level they are worried into (see Table 1).

Table 1. Basic Questions about People's Perceptions

Factors	Items
Crowd Influence	Level of crowds affect the sense of safety The level of the crowd caused to be uncomfortable
Events that might occur	Safety threats can occur in this area Know of the safety threats that have occurred in this area
Influential center of activity	The center of activity affects the level of crowd The center of activity blurs the boundaries of public and semi-public spaces

Crowding in the study area was assessed by the level of crowd average of the research area and dividing it where if less than ten people, the crowd considered as low crowds, 10 to 20 people considered as medium crowds, and more than 20 people considered as large crowd. Related to this, the crowd at several activity centers is one of the causes of public anxiety about the existence of safety threats (see Figure 4). However, there are some differences in people's perceptions

regarding the level of crowds at the center of activities that affect their safety. In the vicinity of trade facilities and educational facilities, a high level of the crowd is a trigger for fear of safety threats. Contrary to this, people tend to feel that their safety is not guaranteed if the level of crowds is low in the area around the city park, city cemetery area, and some residential areas.

Crowding aspects in the study area show that people tend to see low crowds more threatening to safety than large crowds. It also concludes that the majority of respondents in the study area are more referring to the theory of encounter model safety. Where public space users believe that foreigners can become "police" in public spaces and provide first aid in the event of a safety threat. That thought shows that facilities with the possibility of foreign visitors are easier to cause a reduction in feelings of safety. While around educational facilities, the level of the crowd at a facility that has a location in the middle of a settlement creates a feeling of fear of a threat to safety. The crowds show that public facilities can influence the feeling of guaranteed safety in semi-public areas. The feeling of the emergence of safety threats around the residence is the main reason for the community to feel that the high level of a crowd becomes the basis of fear of threats. The results of collecting community perceptions (see Table 2) also explain that the level of crowds influenced by time. Where the center of activity that has a high level of crowds and does not make people feel threatened during the daytime, can be an area that avoided at night. Avoided location shows the lack of generator activities that have a range of activities throughout the day and can help oversee public space.

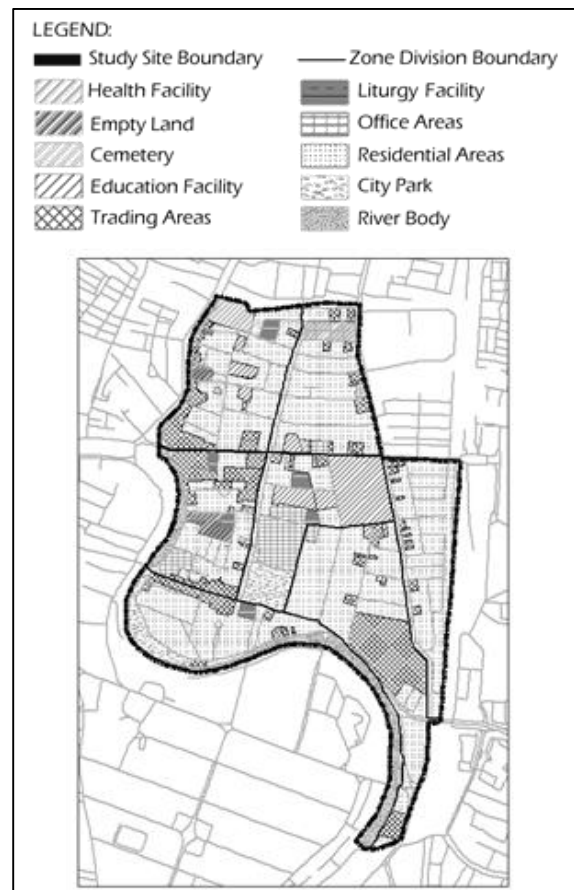


Figure 4. Landuse Map of Ketabang

Table 2.
The Results of Data Collecting on People's Perceptions

Zone	Community Perceptions
Zone A	The crowd in the Zone A education area caused a lack of supervision by the authorities. Low levels of crowds in residential areas make this zone a possible safety threat.
Zone B	The lack of generator activity around the cemetery area makes the level of crowds in this area lower than in other areas.
Zone D	The level of crowds in the education area can increase natural surveillance. However, this can be the cause of many safety threats in this zone.
Zone E	The level of crowds caused by generator activity in zone E is an increasing factor as well as reducing the level of safety in this region according to respondents.
Zone F	High level of the crowd can cause public neglect of the safety threat in zone F. City parks that are only opened during the daytime cause crowds to be very low at night due to the absence of other activity generators.
Zone G	Low levels of the crowd in residential areas can be one of the conditions that attract violators.

The process of collecting data on community perceptions shows that the level of crowds simultaneously affects the threat of safety and feelings of safety, and can be a problem if there is no control. As stated by Newman [10], that control of access can increase the feeling of guaranteed safety while conveying a clear message to foreigners that the area is limited to access. Moreover, territorial boundaries can also be an aid for supervision in public spaces where a door to access can be provided by a checkpoint that can help screen and monitor anyone entering the semi-public area. In this regard, the territorial boundaries of each zone in the study area mapped, and their effectiveness is seen to be able to filter crowds into semi-public spaces.

A. Territorial Boundary in Zone A

The physical barrier has a vital role in zone A because it becomes a real marker of the territory. This territorial boundary can affect interests that can be at risk for the safety of users of public spaces. By using a design that limits territory, actors can directly indicate that someone has entered a different area so that they can suppress the desire to do something that is at risk for the safety of others. Physical barriers in zone A include the existence of portals and road gates, which spread over several roads. The existence of portals and road gates in zone A (see Figure 5) in addition to showing clear territorial boundaries can also be a point where the authorities have to guard the security of residential areas.



Figure 5. Physical Barrier at Zone A

Aside from the physical barrier, there are also symbolic barriers in zone A (see Figure 6). Symbolic barriers have functions to create the impression that there are changes from

every public area to another public area and from the public area to the private area. In zone A, symbolic barriers marked by changes in road cover on several roads in zone A.



Figure 6. Symbolic Barriers at Zone A

B. Territorial Boundary in Zone B

Physical barriers also have a significant influence on the territorial zone B (see Figure 7). The strong influence is due to the physical limiting facilities in the form of portals located on all road sections that connect residential areas. The physical barriers cause the territories in zone B to seem very close, where on each portal road section, there is only one portal. As for this, it often causes visitors to have difficulty if they want to enter this area and do not know the portal schedule is open or closed. The portal in this zone is also often equipped with security post facilities; this indicates that the residential area in this zone is very safe. However, on roads that do not have portals, this zone provides enough safety threats. The threats caused by the relationship between the road segments in this zone, which directly connected to the main road section of the city of Surabaya. The road relation can cause a safety threat that has a street robbery pattern, where the threat perpetrator commits an offense and immediately flees from the scene [14].

Zone B also has symbolic barriers in the form of differences in road cover and changes in vegetation patterns when entering the residential area. Symbolic boundaries in zone B do not directly influence the awareness of territorial differences. However, this is enough to influence the differences in the milieu in the settlement area.



Figure 7. Physical Barrier at Zone B

C. Territorial Boundary in Zone C

Physical barriers that exist in zone C are more diverse, namely gates, high walls, and fences. Physical boundaries in zone C though vary but are only in several roads in this zone. The gate, which is one of the most apparent physical barriers is only in the settlement area in zone C (see Figure 8). Apart from the settlement area, the residential area in this zone does not have a gate or portal; this is related to the road section in

zone C which is dominated by the road that connects the one-way road segment. In addition to gates, other physical barriers, namely high walls and fences are also located in the settlement area, namely as a physical barrier to limit the vacant land in zone C to the built area. With the limitation between vacant land and public space, safety will increase due to visible maintenance on unused land, further discussed in sub-chapter C maintenance zones.

Symbolic barriers in zone C shown by road markers and differences in maintenance and shape of the sidewalk, thus strengthening perceptions of territorial differences. Zone C and Zone D have sidewalks that look better than other zones; the difference in the quality of maintenance causes this difference to be a significant symbolic barrier. In addition to this, the difference in the quality of the sidewalk also affects the territorial boundaries within zone C itself, where the quality of sidewalks shows the difference between areas that have strict quality control and areas that have more tenuous supervision.



Figure 8. Physical Barrier at Zone C

D. Territorial Boundary in Zone D

Public spaces in zone D do not have physical boundaries, unlike other zones in the research area. The limited physical boundary is because zone D is an area that has formal activities such as offices and education and settlements that are between these two activities. So, there is no reason to give physical limitations because visitors to this region can be anyone and come from various walks of life. The absence of physical barriers in zone D can interpret as an area that is open to anyone, but this can be a gap. The gap for safety in zone D is related to its function as a formal area that is more crowded during the day, and this can increase the safety risk in zone D at night if excellent supervision facilities do not support it.

Symbolic boundaries in zone D are different from physical boundaries; symbolic boundaries in zone D are very diverse. Symbolic barriers in zone D are often road markers that limit each road segment (see Figure 9). Other symbolic barriers that can be used as territorial boundaries between regions are road signs in the form of boundaries of parking areas in office areas. This sign can be a barrier to notify visitors that they have entered the formal activity area, the Surabaya City government office.

E. Territorial Boundary in Zone E

Physical constraints in zone E are in the form of road portals and fences. The physical barrier in the form of a portal founded in the southern residential area, but settlements in zone E on the southern side of the education zone D do not have a portal. The lack of portals shows the difference between the level of openness of the two areas, even though

it is still in one type of land use. In addition to portals, another physical barrier in zone E is a fence. The fence can be found in the trading area, Grand City Mall (see Figure 10). The use of this fence is not only to limit the territory but also to allow road users to be aware of the existence of trade in services [14], namely Grand City Mall Surabaya in this zone.

In the discussion of symbolic barriers, in contrast to other zones that have several types of symbolic barriers, zone E only has symbolic boundaries on how many street signs. The number of these sign is also related to the high level of openness of zone E so that territorial boundaries are not too much attention in areas that have a level of openness that expects others to visit [10].



Figure 9. Symbolic Barrier at Zone D



Figure 10. Physical Barrier at Zone E

F. Territorial Boundary in Zone F

The territorial aspects of zone F include discussion of physical constraints and symbolic barriers. In zone F, the physical barrier in this zone is a portal, gate, fence, and high wall. Limits in the form of portals and gates are located in residential areas (see Figure 11), while fences and high walls are in the tourist park area. The existing physical boundaries indicate that the difference between the level of openness of the two areas is different. Hence, this can also be a distinction between territories that visitors can enter from other zones with limited territorial access [10]. In the discussion of symbolic constraints, zone F is the same as zone E, which has only symbolic constraints in the form of street signs on each road segment

G. Territorial Boundary in Zone G

The physical barrier on the G zone is a road portal on

several road segments. The existence of portals is often found in residential areas in the research area, as well as in zone G, the existence of this portal is also an action that reflects that residential area residents want a limited number of visitors (Newman, 1972). In the discussion of symbolic barriers, zone G has symbolic constraints in the form of road markers and changes in land cover. Related to this, the difference in road cover occurs between residential roads and settlements, wherein the residential area the road has road cover while in the settlement area the road is in the form of paving blocks.

The results of observations made on facilities that can limit territoriality in the research area are then used to evaluate the ability of these boundaries (see Table 3).



Figure 11. Physical Barrier at Zone F

Table 3.

The Result of a Character Appraisal on a Territorial Boundary Facility	
Zone	Community Perceptions
Zone A	The existence of gates and portals in an area can improve safety. However, in the A zone, the physical barrier is not very influential because of public facilities located inside of the zone itself.
Zone B	Boundaries on the use of portals in zone B show part of the utilization of the Heroes Cemetery as a center of activity. However, this can increase the risk of safety at night.
Zone C	High openness in zone C makes territorial delimiting facilities less necessary, but clear symbolic barriers can reinforce territorial differences without reducing territorial openness.
Zone D	Territory in zone D shows that this region is open to anyone but still pays attention to signs that explain territorial differences.
Zone E	Territorial boundaries on zone E are sufficient to mark public and private areas. The clear of the mark itself is due to the different levels of openness in the area of settlement and trade in services.
Zone F	Clear territory boundaries between two land use make residential areas look like semi-public areas. The openness makes the tourist park area a hotspot for violators when the crowd level becomes lower.
Zone G	The residential area in the zone becomes a semi-public area that has limited access and territorial clearness due to limited types of land use.

The results of this evaluation show that barriers in each zone tend to influence the safety of users of public spaces. In this case, the effect on safety has centered on the ability of the barrier to limit access. Several gates and portals in several zones appear not equipped by security posts. The lack of equipped gates can obscure the function of the barrier itself as an access controller. More in-depth, the availability of barriers in the study area is still lacking (see Figure 12). The lack of barrier applies to residential areas that attached to a particular activity center. An example of this is a residential area that is very close to educational facilities in zone A and residential areas that seem to be part of the trading area in zone E. These two zones obscure the boundaries of public and semi-public spaces due to the absence of boundaries provided.

The problem with territorial aspects is related to the site aspect, namely in the milieu discussion, which addresses the openness of the region. Territorial issues in the research area are related to territorial boundaries between public and semi-public spaces. Furthermore, this is still related to the limitation between public facilities which act as the center of activity and settlement areas in zone A, zone B, and zone F.



Figure 12. Portal and Gate Distribution of Ketabang

Furthermore, exclusive territorial boundaries cause other areas to experience increased safety risks. Moreover, this is related to the existence of security portals and posts in each settlement. To sum up, it is undoubtedly positive to keep the residential area in a safe condition. However, conditions related to the safety of public spaces outside the settlement area do not appear to be a priority, especially in the area of non-formal activities.

The availability of gates and portals causes this territorial boundary. Both of these physical constraints have the same function, namely to provide territorial boundaries but with different properties. Gates as territorial boundaries only provide a marker function for public space users that they enter different territories. The function itself is related to the definition of the gate in the Large Indonesian Language Dictionary (KBBI) which states that the gate or by another name is a large gate to enter the yard of the house (roads, parks, and public space.). On the other hand, the portal has a definition as an equation of gates and stakes or bars that are installed at the end of an alley (road) to block the entry of specific vehicles. The definitions explain that the portal has the same function as the gate, but the portal can close access to the territory. Thus, this indicates that regions that use portals have limited and more closed access when compared to areas that only have gates. The limit of access also directly

affects the openness of each zone.

Related to the problem of the ability for territorial openness, zone A, zone B, and zone F each have public facilities which also act as centers of territorial activity. Public facilities in these three zones have similarities, namely proximity to settlement facilities and do not have the same type of land use series or form the same land use complex such as offices and educational facilities in zone D, service trade in zone C, zone E, and zone G. This causes a difference in openness in each zone (see Figure 13). Therefore, regions with public facilities have a significant degree of openness, so that public facilities in the middle of settlements have a risk of having a higher safety risk due to high openness with a center of activity that can attract many foreigners to come to the area.

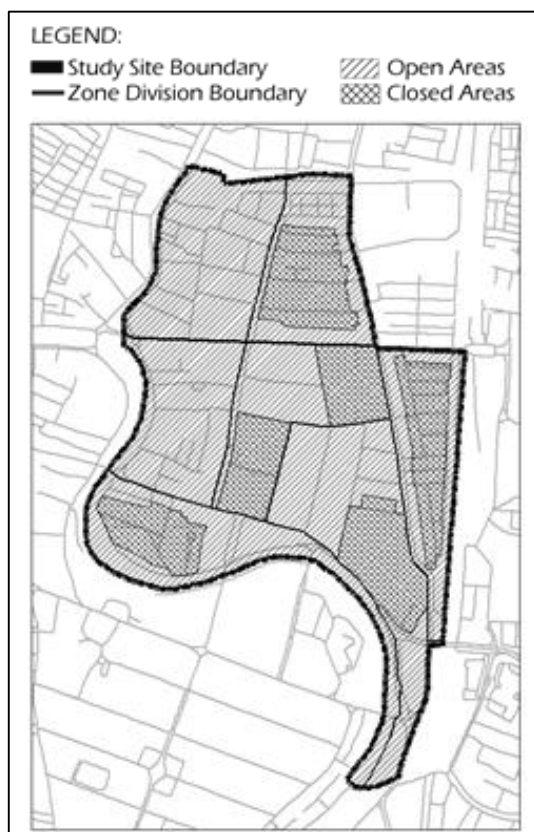


Figure 13. Territorial Openness of Ketabang

The above findings explain how the concept of urban safety can be used in the research area as a reference for improving the safety of users of public spaces in the city of Surabaya. Based on this reference, it can be seen that the application of urban security factors to improve the safety of users of public space can be applied. In this regard, the application adapted by adding territorial boundaries to public and semi-public spaces. The application is following the theory of increasing urban safety by Newman [10], which emphasizes the development of the concept of urban security, which focuses on natural supervision and territorial definition.

Based on the result, the addition of road portals is done to limit the access of users of public space to semi-public areas, and the addition of open space is needed to be able to control access and supervision of crowds (see Figure 14). Given this limitation, the level of safety in the study area will be higher because supervision can more focus on public space without

worrying about additional safety threats in semi-public areas.



Figure 14. Ketabang Visualization of Addition of Territorial Boundaries

The design factor applied to solve this research problem is focused on the application of territorial restrictions and crowd control by providing new activity centers. These elements, besides being able to help ensure the existence of supervision, also provide a guarantee of safety for users of public spaces to be able to carry out activities that are focused on spontaneous activities. Therefore, the application of this design factor becomes the basic principle of resolving the problem of crowding and territoriality. The application of road portals, in this case, is an alternative design option that implies territorial restrictions according to regional characteristics. Other options can be a gate or fence with a door. The road portal is also chosen based on the character of the area dominated by gated-communities who often have limited access so that the road portal can be equipped with guard posts that serve as a filter for access to semi-public space. In addition to this, open spaces that have a radius of service with a smaller scope are also needed to overcome research problems in addition to the application of territorial restrictions. Open spaces such as small parks besides functioning to bring crowds to one place can also function as a factor that increases natural supervision. Also, open spaces can be furnished with furniture that is useful to provide opportunities for public space users to perform spontaneous activities.

IV. CONCLUSION

The results of this study about urban safety show that the level of crowds in public spaces can affect the sense of safety of users of the public space and the residents of the area. It is not excessive if the crowd can be one of the main factors that determine the level of safety of public space. The perception of safety based on how crowds in public spaces can affect the physical environment and non-physical factors. In the study area, the level of crowds based on community assessments that often come from a gated community. The assessments made the perception of the need for territorial boundaries increase. The desire to make an area more exclusive on one side is emphasized based on the results of this study.

Moreover, territorial boundaries, although they can be a controller of access to an area, not all areas want to complete territorial boundaries. Therefore, the application of territorial boundaries must be considered based on regional characteristics. These characteristics are needed to support the design of the old and the new, but still, consider the main principles of improving the safety of users of public space. The design itself, it would be better to consider the level of openness of the desired area. Differentiation between public and semi-public spaces is needed but does not necessarily cover the whole area. This consideration is intended to continue to open access to visitors by adding screening factors to who can enter the area and who is not allowed. Again, this based on people's perceptions of being the standard for the safety guarantees they expect. Thus, further research in other regions by including factors of people's perceptions that have different social views can be done in order to be a comparison of the importance of territorial boundaries and crowd control at the level of safety of users of public spaces.

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