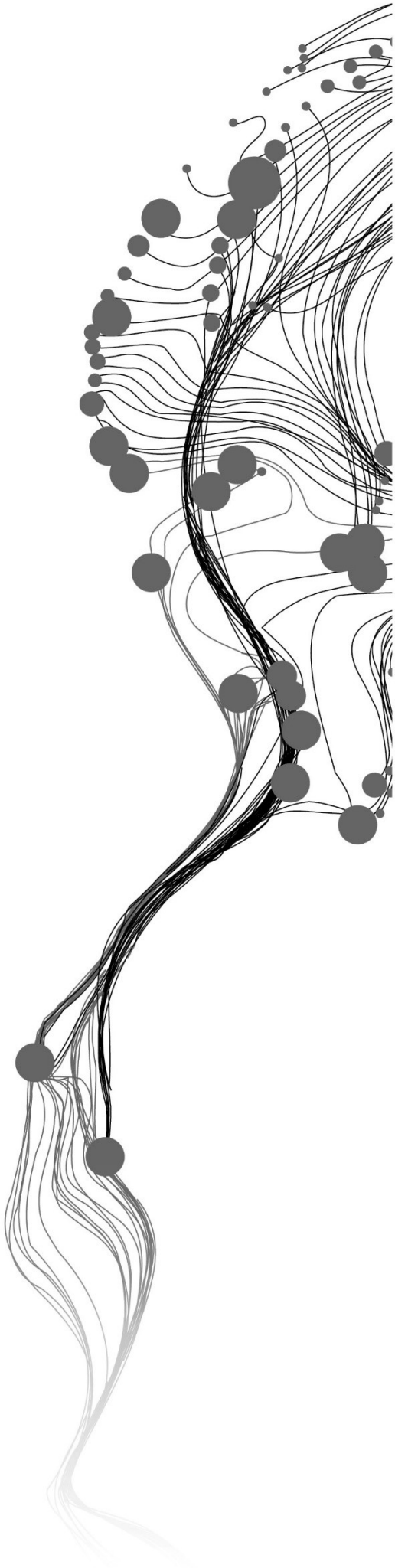
Exploring the Sense of Place of an Urban Kampung.

Through The Daily Activities, Configuration of Space and Dweller's Perception: Case Study of Kampung Code, Yogyakarta

IRSYAD ADHI WASKITA HUTAMA

May, 2016

SUPERVISORS:
Ms. M.Kuffer, Msc
Ing. F.H.M. van den Bosch



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IRSYAD ADHI WASKITA HUTAMA

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SUPERVISORS:
Ms. M.Kuffer, Msc
Ing. F.H.M. van den Bosch

THESIS ASSESSMENT BOARD:
Prof.dr.ir, M.F.A.M., van Maarseveen (Chair)
Dr, K, Pfeffer (External Examiner, Universiteit van Amsterdam)

ABSTRACT

As every place including human habitat has its sense of place, this research is set out to investigate the attributes that are forming the sense of place of an urban kampung (informal settlement). The sense of place is formed when individuals perceive their surrounding environment counting on their cognition towards space and the social atmosphere in a place. When it comes to the human habitat, the sense of place plays an important role in creating an emotional attachment of people to their habitat.

Informal settlements in many cities in the Global South are facing deprivation in terms of basic infrastructure provision and segregation of its social relationship with the city structure. This applies also to informal settlements in Indonesia (urban kampungs). Urban kampungs in Indonesia nowadays, experience gradual deterioration in terms of infrastructure and physical maintenance wherein the Government of Indonesia tries to cope with this issue through a Kampung Improvement Program (KIP). However, KIP is not regarded as a sustainable program because some physically-upgraded kampungs deteriorated gradually due to poor maintenance and lack of awareness from its inhabitant.

Given the above understanding, there is an urgency to look into the unique spatial and social characteristics of an urban kampung, and importantly, how the dwellers perceive their kampung in order to create a sense of place. Therefore, this study aims to explore the sense of place of an urban kampung through in-depth spatial, behavioural, and dwellers' perception investigation. The author selected Kampung Code, Yogyakarta as a case study. More than 160 respondents were interviewed to inquire the sentiment toward their kampung. Activity mapping with snapshot method was conducted to record the use of space and types of activity occurring in the kampung throughout the day. In addition, to understand the impact of space-activity in creating a sense of place, the author employed space syntax and spatial metric analysis, then analysing their correlation with behavioural activities of the dwellers.

The study found that the sense of place in Kampung Code is created by the interplays of daily activities of dwellers in the outdoor space, the configuration of space, and dweller's perception of the place and the social value of the community. The eight favourite places give the identity and attachment towards place by promoting continuous social interaction among dwellers. The dweller's outdoor activities mostly took place in the high locally integrated and in the less densely built-up spaces. Dwellers also triggered to participate in outdoor activities where the local people appeared in place. Therefore, there is a co-benefit between the configuration of space and the motivation of people doing outdoor activities, especially for social interaction. The dwellers are motivated to participate in outdoor activities where they see others in outdoor spaces (co-presence), at the same time, the co-presence is the positive product of good configuration of space.

In conclusion, it can be said that the sense of place of the urban kampung is created by the harmony of the community that manifest in activity-space practices. Dwellers perceived that of the layout of the kampung are less important than the value of social cohesion. The presence of the dwellers in favourite places has a higher impact in stimulating interaction rather than the visual and physical quality of the kampung.

Keywords: informal settlement, urban kampung, sense of place, space syntax, spatial metric, dweller's outdoor activity and perception.

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATION

CBD	: Central Business District
ComBasDev	: Community Based Development
FGD	: Focus Group Discussion
HBE	: Home Based Enterprise
KPI	: Kampung Improvement Program
PD	: Patch Density
RA	: Relative Asymmetry
RRA	: Real Relative Asymmetry
RT	: Rukun Tetangga
RW	: Rukun Warga/ Neighbourhood
SHDI	: Shannon's Diversity Index
UNA	: Urban Network Analysis
USI	: Unplanned Settlement Index

1. INTRODUCTION

This chapter starts with the preface of research background and justification. Research problem, case study background and significance of the research are presented in the following section. It further continues with defining research objectives and research question. The final section explains the conceptual framework that is structuring the fundamental knowledge of the research.

1.1. Background and Justification

In 2003, UN-Habitat (2003) stated that that the developing countries suffer from inescapable massive urbanisation which led 924 million people or 31.6% of world's population living in slum or squatter settlements. This trend has continued until now. Simple but complex reason behind this rapid urbanization is people in rural village come to the cities in hope for the opportunity of a better job and well-being. However, it often turns out that the carrying capacity of cities, land values, and labourer markets does not match with the expectation of newcomers. Therefore, as mention by UN-Habitat (2006), people tend to live in low price districts or slum and squatter areas.

UN-Habitat (2006) has established the definition slum using five (5) criteria such as access to clean water supply, sanitation, durable housing, secure tenure, and overcrowding. However, According to Karimi & Parham, (2012), is it rather difficult to define and categorize an area as either a slum or informal area only by analysing the five attributes of slums. Using the same benchmark from UN-Habitat to test the slums in different region, the result would be different as every country has different unique characteristic of slums (Karimi & Parham, 2012). Further, Doherty & Lino e Silva (2011) studying Brazilian favela states that the dominant activity of inhabitants in the slums can perceivably indicates the status of slum area itself, inferring that slum criteria is not always referred to the obvious visible assessment like over density built-up area and the quality of the housing construction Due to the complexity of the slums, Karimi & Parham (2012) prefer to use a slum-like condition to define either informal or quarter settlement where the deterioration and deprivation is much likely to occur in not so distant future.

A major concern is how to minimalize and address the complex issues so that it does not burden the capacity of the city in providing services to its citizens. However, informal settlement in urban areas that to create segregation of spatial and social relationship within the city (Parham, 2012). The Post-2015 development agenda have pointed out that the problem of informal settlement in urban areas is wicked and complex but it needs to be addressed through participation, social, inclusion, building capacity and partnership (United Nations Development Group, 2014). It means that informal settlements should not be seen as a problem, but as an opportunity to live and strive together in urban areas with a proper upgrading and regenerating agenda to eradicate segregation. Informal settlements as signified by Setiawan (1998) is an integral part of the cities where economic and social interaction built the identity and character of the city.

In the Indonesian context, informal settlements and slums are common in the major cities. The unique feature of urban informal settlements in Indonesia is embodied in what is called an urban kampung or only kampung. In Bahasa Indonesia, kampung means village (kampong in Malaysia) and it used to refer to the term "*desa*" as a unit of administrative of rural village (Funo, Yamamoto, & Silas, 2002). In addition,

Kampung is an elusive term, which is difficult to define as a unit an administrative unit. Urban kampung can be a neighborhood unit / unit of settlement or unit of sub-district or "*kelurahan*" (Sastrosasmito, 2009). A kampung in an urban area has often homogenous characteristics where the dwellers usually come from rural village and stay in urban area for seeking job opportunity. This process continues to preserve the characteristics of a village in an urban area as well as transforms the economic activity of its dweller from primary (agriculture and livestock) to formal-informal occupation (Funo et al., 2002).

Urban kampungs in Indonesia covers multifaceted aspect of life. On one hand it functions are able in providing affordable housing for the majority of city's resident wherein most of them are low to middle-income people. On the other hand, in fact of poor physical quality and lack of adequate basic service, urban kampungs are believed to convey more vibrant and creative informal activity (Sastrosasmito, 2009). Moreover, local communities have their own social systems, social values, and kinship[1]. This social capital is often more important than the quality of the surrounding environment since it gives dweller the power to sustain themselves (which are called according to Funo et al. (2002) autonomous communities).

Apparently, every neighbourhood, residential area, and district has its particular sense of place which results from its physical and sociological structure and experiential characteristics (Billig, 2006). It is also the same for an urban kampung, which contains many kind of activities and creativity of its inhabitant (Rahmi, Wibisono, & Setiawan, 2001). Sense of place is crucial for every place since it gives identity and a distinctive character to the area. According to Altman & Low (1992, p.165), sense of place is a symbolic relationship with the place which is formed by giving emotional or affective meaning to a particular place. This provides the basis of individual's and group's understanding to place. The concept of sense place is composed of three components, namely activities, setting of place, and human experience (Punter, 1991 cited in Montgomery, 1998). These interplays is signified by Cross, (2001) as the mutual relationship and harmony between inhabitant activity in a place that gives them the opportunity to experience the community. Hence, gradually, it constructs the attachment to the place and to the community belong to them.

1.2. Research Problem

In the context of urban kampungs in Indonesia, socio cultural factors are a determinant motivation in shaping the physical setting of space (Raharjo, 2010). The term "*rukun*" which means social harmony, concordance, or communality) and gotong royong (cooperation or sharing burden) has enabled the dwellers to sustain amid the pressure of urbanization and difficulties of un-equality of urban areas (Rahmi, Wibisono, & Setiawan, 2001, p.119). Dwellers also rely upon the social and physical assets of an urban kampung for satisfying inhabitant's daily needs. Hence, space is a critical manifestation of their daily habit and it will determine whether a kampungs will grow into a slum or triumph with its distinctive identity.

The first kampung improvement program (KIP) has been introduced and implemented in 1936 by the Dutch Colonial Government in Surabaya (Kampung Verbetering). Later, since 1968 this program became popular in addressing the needs of dwellers for liveable settlement by elaborating community aspire which subsequently recognized as Community Based Development (CBD). KIP combined with CBD has been

[1] Kinship in the urban kampung refer to the neighbor's kinship. This concept is similar with the term social cohesion which means the willingness of members of a society to cooperate with each other in order to survive and prosper (Stanley, 2003). The term neighbor' kinship is using occasionally by Sastrosasmito to depict the quality as well as the cohesion among dwellers in Kampung (Sastrosasmito, 2009). Unlike Prof. Sastrosasmito, Prof. Setiawan, who made a lot of research about urban kampung in Yogyakarta, frequently use the term communality, social harmony, and concordance which means *rukun* in local term (See. Rahmi et al., 2001; Setiawan et al., 2010; Setiawan, 1998). Thus, in this research, the author use neighbor's kinship and communality as a term that similar with the meaning of social cohesion.

introduced and implemented to alleviate poverty while upgrading physical conditions. However, KIP only concerned on infrastructural facilities upgrading such as drainage, water supply, electricity, and pavement of footpaths (Funo et al., 2002). Moreover, according to Sastrosasmito (2009), the 36 years of KIP program in Indonesia was not a sustainable program because some physically-upgraded kampung tend to be deteriorated gradually due to poor of maintenance and lack of awareness from its inhabitant.

In this regards, it is important to explore the unique characteristic of the urban kampung by means of understanding the sense of place of the kampung. Sense of place is important for both, the well-being of inhabitants and the environmental quality of the settlement. A study of the sense of place conducted by Karami, Ghafary, & Fakhrayee (2014) in residential complexes pointed out the significant role of physical details of building blocks, which give an resident's perception of aesthetic and public spaces in fulling residents need of social interaction. Moreover, appropriate design attributes of neighbourhood open space promotes frequent social interaction, hence signifies the sense of belonging (Karami et al., 2014). Billig (2006) did a research with ethnographic analysis of interview data on neighbourhood in urban revitalization areas. She describes the character of sense of place in a new housing development that produces less attachment compared to an old housing complex. A lack of sense of place in neighbourhoods can lead to the formation of identity crisis which could deteriorate the quality of human-built environment (Yandanfar, Heidari, Behdadfar, & Eskandari, 2013).

The role of space syntax approach for analysing the physical and social quality of informal settlement has been investigate by some researchers (Karimi & Parham, 2012; Parham, 2012). Karimi & Parham (2012) used space syntax to model and evaluate the adaptive regeneration scenarios of an informal settlement focusing on improving the internal function and external interaction to the city main structure. The researcher also focused on planed densification, distribution of public spaces, and building uses with various alternatives. It believed that those scenarios result on virtuous cycle of improvement which can be controlled by government and residents itself. Similarly, Vasku (2013) used parametric modelling of space syntax in Rhinoceros 3-D modelling software to model generative improvement of a network in an informal settlement in Jeddah. He focused on the improvement of network connections to repair the inner structure and give better connection to adjacency areas. A recent study in a formal residential areas has been conducted by Can & Heath, (2015). They used space syntax analysing the correlation of outdoor activities (including movement and stationary) and the morphology of spaces. The result high frequency of social interaction in the most integrated spaces.

Even though space syntax approach shows its superiority in understanding interplays between configuration of spaces and diversity of activities in an urban kampung, they lack intuitive explanations from the perspective of individual experience as an actor in space. In the context of sense of place, the personal orientation towards place should be interpreted subjectively (Billig, 2006). Hence, in this research, to fill the gap between what Cross (2001) has mentioned the relation between place and community attachment, subjective perception of dweller will be considered to explain the importance of sense of place in urban kampung.

Finally, this study focus on the concept of sense of place based on the interplays between uses and activities, spatial configuration of space and dweller's perception. Moreover, this study will adopt the modifiable framework of original concept of sense of place from Punter and Montgomery (1998) and concept of place making(PPS, 2015). This study of sense of place of urban kampung choose Kampung Code in Yogyakarta as study area.

1.3. Significance of the Study

The product of this study will contribute to the theoretical and practical knowledge of the concept of sense of place of informal settlement like urban kampung. This research is expected to contribute for developing an alternative guide for urban planner, architects, NGO's to take consideration of the significance role of sense of place in preserving the local character of kampung. In addition, the result clarifies to the most important aspect of sense of place that should be retained to make urban kampung alive.

1.4. Research Objectives and Question

1.4.1. Main Objective

The main objective of this research is to explore the "sense of place" of an urban kampung in Yogyakarta, Indonesia based upon the interplays of uses and activities, configuration of space, and dweller's perceptions.

Specific objectives that need to be achieved are:

1. To investigate and map the activity patterns of an urban kampung.
2. To analyze and map the configuration of space / spatial morphology in an urban kampung.
3. To describe dwellers perceptions toward the physical quality and neighbor kinship in an urban kampung.
4. To discuss the sense of place of an urban kampung based upon the interplays of configuration of spaces, uses and activities, and dweller's perception.

1.4.2. Research Question

The research questions are related to the three main sub-objectives as follow:

1. To investigate and map the activity patterns of dwellers in an urban kampung.
    a. Which spaces are used for specific activities?
    b. What are the types of activity of dwellers in an urban kampung?
    c. What is the dynamic of activities that take place at different times a day?
2. To analyze and map the configuration of space/ spatial morphology in an urban kampung.
    a. How can spatial patterns be measured and quantified?
    b. What are the configurations of spaces/spatial morphologies of an urban kampung?
    c. How diverse is the urban kampung in term of building use?
3. To describe dwellers perceptions toward the physical quality and neighbor kinship of urban kampung.
    a. How do dwellers perceive an urban kampung regarding social cohesion and kinship?
    b. How do dwellers perceive an urban kampung regarding place?
4. To discuss the sense of place of an urban kampung based upon the exploration of spaces, activity, and the dwellers perception.
    a. What are the interplays between spatial configuration and activity patterns of dwellers in an urban kampung?
    b. What attributes of spaces are important to shape the sense of place in an urban kampungs?
    c. How are spaces, activities, and perception intertwined towards the construction of a sense of place in an urban kampung?

1.5. Conceptual Framework

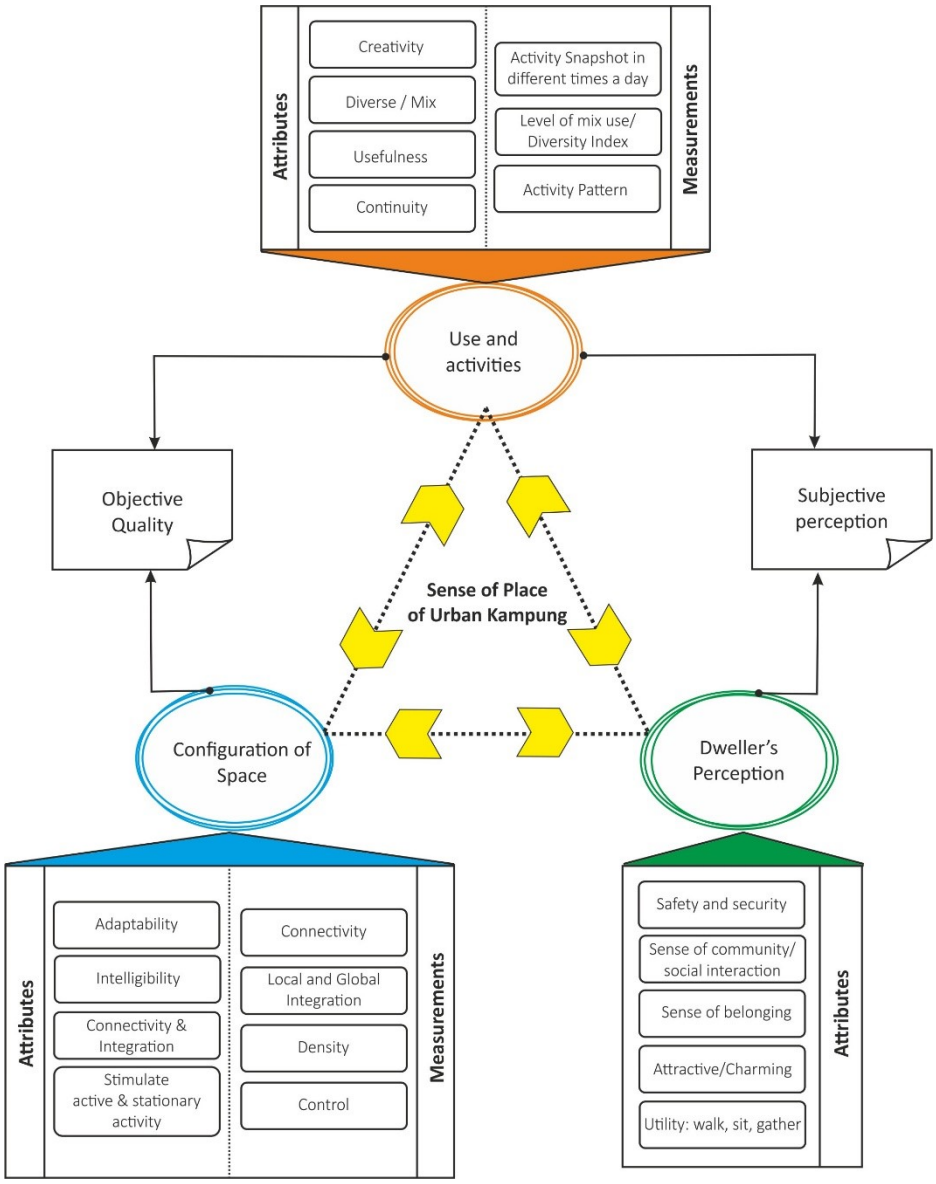


Figure 1-1. Conceptual Framework Modified diagram from Making a City by Punter and Montgomery (Montgomery, 1998) and Concept of place-making from Project for Public Space (PPS, 2015)

The domain of this research is confined to the concept of "sense of place" and its related attributes, which frame the case study of an urban kampung. The three key attributes (See Figure 1-1) that shape the sense of place are configuration of space, use and activity, and dweller's perception. Configuration of space describes the space as containment of activities. It acts in a topological relationship between space (e.g. connection and integration), uses and activity (referring to diversity of building use and activity occurring in space) and the dweller's perception (defined as the human experiences and feelings of individual as product of interaction of activity and surrounding environment). The three attributes are interrelated with each other to construct the sense of place

This conceptual framework is built upon the modification of sense of place concept in the field of urban design from "Making a City" by Punter and Montgomery (Montgomery, 1998) and the concept of place-

making (PPS, 2015). The framework also includes the definition of attributes and parameters which are mainly derived from the research of Gehl & Svarre (2013) on "how to study public life". The operationalization of this concept will be detailed further in methods.

1.6. Thesis Structure

The thesis consists of seven chapters as follows:

- **Chapter 1: Introduction**, this chapter contains the introduction of the research topic and issues to be deliberated, the background information on the context of the study, to justify the research problem, objectives, and questions. This chapter concludes with an outline of the conceptual framework.
- **Chapter 2: Literature Review**, the chapter reviews relevant literature through the discussion of concepts on streets as public space and urban fragmentation that will illuminate the subsequent chapter of the research.
- **Chapter 3: Case Study Selection and Methodology,** the chapter introduces the study area, with a brief description of selected streets within the study area. Methodology and Data Collection the chapter provides information on fieldwork and methods used for data collection and data analysis.
- **Chapter 4: Uses and Activities in Urban Kampung**, this chapter focus on research findings on types of activities, activity pattern, and uses in urban kampung
- **Chapter 5: Spatial Pattern / Configuration of Space in Urban Kampung**, this chapter describes the configuration of space such as connectivity, control, local, global integration measurement, density, and diversity. In addition, the impact of space configuration toward outdoor activity is described with regression analysis.
- **Chapter 6: Dweller's Perception Towards Physical Place and Neighbour's Kinship in Urban Kampung**, the chapter explores the perceived physical quality and the sociological sentiment of community in the urban kampung.
- **Chapter 7: Discussion toward Sense of Place of Urban Kampung**, the chapter analyses and discusses the results that lead to the articulation of sense of place based upon the interplays of uses and activities, configuration of spaces, and dweller's perception
- **Chapter 8: Conclusion and Recommendation**, this chapter is intended to conclude and summarize the whole study, limitation of research and suggest for policy development and further research direction.

2. LITERATURE REVIEW

This chapter starts with the review of the character and development of urban kampungs in Yogyakarta, followed by the definition and key concepts of sense of place of urban kampungs as well as the factors forming a sense of place. Next, activity, space and social interaction are reviewed. The final section presents specific methods like space syntax and spatial metric.

2.1. Kampung in Urbanized Areas: Development Process and Typology

The depiction of informal settlement varies from one to another country and depends on the context and factors taken into consideration. The features that characterize informal settlements are, for instance unplanned spatial layout, informal and insecure property tenure, and vulnerability to discrimination, and lack of basis service (UN-Habitat, 2003). In Indonesia, degrees of "informality" of urban kampungs are perceived differently. According to Raharjo (2010), informality of urban kampungs is relates to unsecure tenure. The majority of informal housing in urban kampungs was constructed first then the tenure negotiation follows. This cause the ambiguity in defining the informal kampung. For example, some kampungs have decent physical quality of housing but are registered as informal since they do not have tenure or are in the process of negotiating legalization of secure tenure.

In general, kampungs are common urban settlements in Indonesia and they have unique characteristics (Funo et al., 2002). People who live in a kampung bring their identity from an urban village to the kampung. As a result, kampungs growth as multi-dimensional neighbourhoods with physical, social and economic entities. It is stressed by Funo et al. (2002) that kampung have heterogeneous communities of complex inhabitants often with traditional values. In addition, Raharjo (2010) stated that kampungs show a strong relationship and urban history that can be traced since pre-colonial times. However, in the context of urban development, kampungs have a negative image being high density settlements that lack basic infrastructure and are dominated by urban poor (Funo et al., 2002).

The development of urban kampungs in Indonesia can be classified into pre-colonialism, colonialism, and post-colonialism period (Raharjo, 2010). However, it was during the Japanese colonialism era, that urban kampungs have been restructured into a neighbourhood system (RW[2] /RT[3]) and now its adopted by the government of Indonesia. An initial research of Indonesia's urban kampungs from Ford 1993 (cited in Tunas, 2008, p.87) classified them into four types: inner-city kampung, mid-city kampung, rural kampung, and temporary squatter kampung. Each of these typologies has its own characteristics (see Table 2-1).

[2] RW or "*Rukun Warga"* is an organization of the settlement where one RW normally contains 30-50 heads of households. It is a formal administrative unit given by the government to manage units of settlements.

[3] RT or "Tukun Tetangga" borrow the same concept as RW but RT is the smallest unit of a formal administrative unit containing maximum 15 heads of households.

Table 2-1. The Characteristics of The Urban Kampung in Indonesia

Typology	Location	Density	Settlement Characteristics
Inner-city Kampung	Between the original colonial city and the new inland cores	High density (100.000 per square kilometre)	Share space in traditional rooming house (*pondok*)
Mid-city Kampung	Located in the middle of city	Between 20.000 and 40.000 people per square kilometre	Two story concrete structure
Rural Kampung	Far from city	Low density	Traditional building
Temporary Squatter Kampung	Scattered in Metropolitan area		Temporary building

Adapted from Ford 1993, Model of Indonesian City Structure (cited in Tunas, 2008. p.87)

In the particular case of urban kampungs in Yogyakarta, according to Setiawan et al. (2010) and Setiawan (1998), there are four different types of urban kampung in terms of the morphology, status, and location. The first type is the traditional kampung (which is intentionally developed and planned closed to sultanate district/*Kraton*). Second, the old kampung (it has its legitimization as a normal settlement due to the inhabitants gained right of property). The third type is the kampung situated close to the Yogyakarta mayor riverbank (slum and unplanned). The fourth type is the kampung built in the outskirt of Yogyakarta city and still physically possess the characteristic of a rural village.

2.2. Public Spaces as Social Identity of Urban Kampung

Space in urban areas contributes the image and character of a place, wherein the interaction between space and activities determine the function and image of a places (Montgomery, 1998). The ownership of places can be classified into public, semi-public, and private (Alexander, Ishikawa, & Silverstein, 1977; Gehl, 2006; White, 1980). The ownership status, therefore, result to the intensity and variety of occupation (activities) wherein people decide to use places for different purposes. Private spaces such as a house, office, and yard possess a limited access and authority to stranger/foreigner to do their activity, meanwhile, public space gives the opportunity for all individuals to occupy the place. The last, semi-public spaces are usually developed by rules and understanding of people (Hickman, 2013; Karami et al., 2014). Such place can be for example taverns/shops, terrace, yard, and commercial or shopping mall.

In most urban kampungs in Indonesia, the feature of space is unique since the property of a place is shared within the community (Rahmi et al., 2001; Setiawan et al., 2010). The high built-up density (more than 85% of built-up) and high population density (about 250 persons per hectare compare to average population in the city which is about 150 persons per hectare (Rahmi et al., 2001, p.122-123)) result in serious shortage of open space, this plays a critical role to accommodate social interaction among inhabitants. However, the pressure of the high densities and lack of open space has stimulated the community to transform and adapt particular places in urban kampungs to be socially acceptable public spaces. Rahmi et al. (2001) found that although the open spaces in urban kampungs are limited, social public spaces are abundant. Those place are pathways/alleys, local shops and taverns (*warung* / *kios*), public baths and wells, fields, and other public facilities (e.g. community buildings, guard posts, mosques,

and meeting halls). Similar to the study conducted by Hickman (2013) regarding the significance of social public spaces in six deprived neighbourhoods in Great Britain, local public spaces or what he called "third places" such as café, local shops, tavern, pubs and community centre perform as medium for the interaction of residents. Thus, social public spaces strengthen and confirm the existence of community ties in neighbourhood areas. Some particular spaces mentioned by Rahmi et al. (2001) that relate to the sense of place of urban kampungs are listed below:

Table 2-2. Common Social Spaces in The Urban Kampung

Social space in the kampung	Character	Remark/description
Pathways/alleys	Organic and spontaneous, street width are varies from wide to narrow	In a typical urban kampung, pathways are directly connected with the house terrace[4] wherein the private zone is shifted to semi-public and even public space. This space is common for dwellers conducting spontaneous social interaction
Local shops and tavern (*kios/warung*)	HBE, semi-permanent construction	In urban kampung, shop and tavern not only supply the basic need of dwellers but also serve as social hub (to chat and discuss). this particular places are recognized to convey longer social interaction and building symbolic identity to the neighbourhood. (Hickman, 2013).
Public bath, toilet, well	Communal use, mostly spotted in un-exposed space	Sanitary facilities such public bath and toilets are unique properties of high-density urban kampungs, as such they stimulate social relation at particular times of the day. Such a place is shared by 10 to 15 household where e.g. woman use this place for washing clothes
Social facilities (community building, hall, guard post, and mosque)	Communal use, symbolic representation of the community	Social facilities in urban kampungs plays obviously an important role to accommodate social interaction as well as preserve the social system that binds the community (Rahmi et al., 2001; Setiawan et al., 2010; Yatmo & Atmodiwirjo, 2013). Community building and hall is used for meeting among community and its multifunction for other purposes. Meanwhile, guard post is used for keeping the kampung safe.
Field and open space	Limited in size, part of residual space, and heterogeneous form	The atmosphere in open spaces varies in time, resulting in different intensity of activities. Open spaces are used by dwellers for divers activities such as cooking, selling food/breakfast, drying clothes, and especially social interaction.

Source: compiled from Rahmi et al. (2001); Setiawan et al. (2010) and Yatmo & Atmodiwirjo (2013)

[4] In most of urban kampung in Indonesia, houses normally doesn't have an outer wall as gate that restrict stranger/visitor to enter private space of house like terrace or front yard. This condition caused by the fact that over built-up density that left no space to separate one house to the house next to it.

2.3. Sense of Place: Determination of Local Character

The discourse about the sense of place among researchers has emerge into various terminology. Cross (2001) strived to analysis similar definitions of sense of place from various researchers to provide a background for the use of each term. The terms are such as place attachment (Altman & Low, 1992; Low, 1992), *Topophilia* (Tuan, 1974), sense of place (Cross, 2001; Stedman, 2002), community attachment (Hummon, 1992). These terminologies have peculiar similarity in a way to perceive the relation between the individual and their surrounding environment. For example, this can be noticed from the various definition of sense of place. Low (1992, p.165), describes that *"place attachment* is the symbolic relationship formed by people giving culturally shared emotional/affective meanings to a particular space of piece of land that provides the basis for the individual's and group's understanding of and relation to the environment". Thus, place attachment is more than an emotional and cognitive experience, and includes cultural beliefs and practices that link people to place. Hummon (1992, p.262), expressed that community attachment as "personal orientation toward place, in which one's understanding of place and one's feeling about place become fused in the context of environmental meaning. Stedman (2002, p.563) stated that "sense of place can be conceived as a collection of symbolic meaning, attachment, and satisfaction with spatial settings held by an individual or group. In the more lucid description, Punter 1991 (cited in Montgomery, 1998, p.97) defined the concept of sense of place as the interplays of activity, physical setting, and meaning. Based on the aforementioned definitions, it is obvious that sense of place is created at least based on the three key factors namely activity/behaviour, space, and perception (meaning). Therefore, in this research, the term of "sense of place" is used consistently to describe the relation of activity, space, and people perception (cognitive and emotional) on space and activity.

The term of sense of place is used in several fields, e.g. human geography, environment, psychological. From environment field, Rogers & Bragg, (2012) used "sense of place" to analyse people's bonding to the environment for sustainable life in the city district. For their research, sense of place means valuable and meaningful place where people are physically and socially engaged to that place. The important point to build the sense of place is physical and emotional connection, sense of belonging that will encourage people's behaviours to protect their place (Halpenny, 2010 cited in Rogers & Bragg, 2012). The concept sense of place is also closely related to psychological and physical concepts (Hashem, Abbas, Akbar, & Nazgol, 2013). According to Altman & Low (1992), the sentiment toward place were created based on three types of relationship: cognitive, behavioral, and emotional dimension. Cognitive aspect are attributed to the spatial perception (geometry and form) of the space. Behavioral aspect refers to the functional relationship between space and activities. This relationship defines the utility of space that able to accommodate the people needs. Emotional aspect are attribute to the meaning of place to a person and this can be different from one person to others, it depends on experiences, motivations, intelectual background and physical characteristics itself (Hashem et al., 2013). The emotional aspect render the attachement and satisfaction of people towards place (Altman & Low, 1992).

Table 2-3. The Type of Interaction Between Humans and Places

	Type of Relationship	Details of Relationship	Place Component
Interaction between humans and places	Cognitive	General perception in order to understand the geometry of space and orientation	Form
	Behavioural	Perception of space capabilities to obviate the needs	Function
	Emotional	Perception of satisfaction and attachment to place	Meaning

Sources: adapted from Altman & Low (1992) cited in (Hashem et al., 2013, p.109)

Since there are a lot of subjective elements that effect the sense of place, some researches classified them into different scales (Hashem et al., 2013). Sense of place classification into scales are based on the understanding that the place has multiple meaning and inspires at varying degrees (see Stedman, 2002). A similar statement from Lynch (1960) that place identity could be different between places and could vary between people. Research findings from Hummon, (1992) in a study on community sentiments has revealed different types of sense of place, these are rootedness, alienation, relativity and placelessness. These different sense of place types are determined from an understanding that people's sense of place is influenced by satisfaction, identification and attachment to communities.

2.4. Factors in Forming Sense of Place

It is obvious that the sense of place is created from at least three different entities, setting of space, activity and interaction, and experience or emotion of individuals as a result of interacting with the surrounding environment. Thus, in short, sense of place is a subjective perception of people about their environment and a conscious feeling about places (Hashem, Abbas, Akbar, & Nazgol, 2013, p.110). Literature about factors that influence the creation and promotion of sense of place come from different perspectives and backgrounds. According to Hashem et al. (2013), developing and selecting factors in sense of place studies is based upon the purpose and objective of the research. For instance, architects and urban designers focus on detailed observations of geometry, form, and style of buildings and houses then seeing those elements as factor that determining the sense of place (Sattarzadeh & Asl, 2015). There are no normative factors, which are always used by researcher to define the sense of place. Instead, most researcher attempted to explore which factors are significant for the creation of the sense of place. In this regards, common factors are explained below. These were mostly extracted from the study of sense of place by Yandanfar et al. (2013) since it gives a comprehensive review.

Table 2-4. Factors in Forming a Sense of Place

Factors	Remark/description
Physical factors	▪ Physical factors refer to the quality of the place as a container of activity where interactions occur, they create the individual's or group's perception towards a place (Yandanfar et al., 2013). ▪ Place setting, availability of facilities and services, place status in urban settings, and space organization affect the attachment to space (Sattarzadeh & Asl, 2015).
Cultural and social factors	▪ Social dimension in space is a generic prescription towards a positive place (Gehl, 2006).

	▪ Sense of place relies upon people engagement, community network, and environmental connection (Raymond, Brown, & Weber, 2010). These interdependent elements, if they are occurring in a particular setting of place, will create a vibrant and liveable place, which can be easily noticed and perceived by others. ▪ Cultural values (norm, ethnic group, families, society member) are common in inducing the sense of place by giving a distinctive character towards a place (Hernndez, Carmen Hidalgo, Salazar-Laplace, & Hess, 2007).
Personal factors	▪ Personal factors are related to the individuals tendencies in social interaction and preference of a place to do daily activities (Yandanfar et al., 2013). ▪ People attachment to place is influenced by mixing of emotion, memory, imagination and current situation of environment which impact individual's feeling, either positive (exuberant, attached) or negative (e.g. depressed, grief, and placeless) (Jivén & Larkham, 2003).
Place satisfaction	▪ "individual's satisfaction toward place relies on factors such as existence of facilities, adaptability of place, visual characteristic and management, place economic value, place social setting, architecture and urban planning features, social communication, and history or background features" Yandanfar et al., (2013, p.858)
Interaction and activity features	▪ The diverse activity features like festival, celebration, cultural event, and gathering is a collective component of the society which have a substantial impact in attracting people, creating emotional feelings to a place and helping the construction of a sense of place (Yandanfar et al., 2013)

Course: compiled from various author (citation include in the description column)

2.5. Activity Pattern, Social Interaction, and Diversity

Gehl (2010, p.103) mentions that "the soft edge/transition zone between private and public space supports long-duration activities and social interactions". In-between spaces between the street and the building create the possibility for the residents to spend time together and to socialise spontaneously. Additionally, the specific characteristics of that space are also very important for encouraging interaction.

Gehl (2006, p.118) stated that "if the outdoors physical quality are poor, only strictly necessary occur". When the outdoor quality is well defined, necessary activity will take place with the same frequency and at the same time it will motivated people to do outdoor activity. Outdoor place will invite people to stop a while and inspired then them to have conversation/ interaction. Activities can be grouped into necessary and optional activities. *Necessary activities are* those that are considered compulsory / necessity in order to sustain, these activities are such as going to school, work, shopping, running errands (post). Those activities tend to involve more or less participation of others. While *optional activities* happen if there is a wish, time allocated, and place to make it possible. Normally this occurs under favourable exterior condition and unexceptionally time slot. Examples of activities are walking around city/plaza, sitting, sightseeing, enjoying life, read a newspaper. Thus when the quality of the outdoor environment is good, optional activities will automatically increase in frequency, as a result, the number of social activities usually increase substantially. Gehl & Svarre, (2013) and Gehl (2006) added to this typology (besides necessary and optional activities) also social activities. Social activities will occur depending on the presence of others in the public realm. These activities can be triggered spontaneously when people

inevitably pass, encounter or see others. They can yell and or just passively establish contact via a smile or just seeing each other.

The pattern of activity is not only determined by the single entity of space like the availability of amenities, shading/vegetation, or good physical setting[5]. Instead, the spatial configuration of space and diversity of use/function affect the pattern of activity. As signified by Montgomery (1998, p.97), "the activity itself is the product of two separate but related concept which are vitality and diversity". The first concept is referring to the number of people (movement and flow) in and around the street/space. In this regards, Gehl (2006) and Jacobs (1961) echoed that the integration of spaces (well connected) is being a key component in attracting people and encouraging lengthy use of space. Thus, a well-connected and integrated space/street was observed to have more social interaction (Can & Heath, 2015). The second concept, diversity is a combination of a mixture of activities and the variation of function (Montgomery, 1998). Similarly, Gehl (2006, p.108) describes that the diversity is the integration of various functions such as residence, services, and commercials function in close proximity. This promotes people who live and works in different buildings to use the same public space and connect together in daily activities. Hence, it can be said that pattern of activity in urban space is centred in the mixture of use such as café, pubs, cinema, grocery stores, and any other community services (Hickman, 2013; Montgomery, 1998).

Open space is varying not only from regular squares but also very familiar to linear types. Mehta (2013) pointed out that a street, road, and alley have a certain degree of social space. The richness of social activities in a street/alley can be found in low-traffic areas and where amenities are available. Neighbourhood and high-density settlements, which do not have adequate public spaces usually leave inhabitant to occupy street spaces as a medium of interaction. For the specific case of the urban kampungs in Indonesia, Rahmi, Wibisono, & Setiawan, (2001) has critically emphasized that the streets and footpaths play an important role for dweller to built-up social bonds thus create a distinctive identity of the urban kampung.

2.6. Co-presence and Encounter in Outdoor Space: The Signification of Socio-Spatial Identity

All of the discourse about the relation between configuration of space and activity argues that a place, which has higher degree of integration (multiple access) tends to attract more visitor, passer-by, and subsequently triggering interaction in space (Can & Heath, 2015; Gehl, 2006; Hillier & Hanson, 1984; Jacobs, 1961). Co-presence can be described as the awareness of an individual toward the presence of others in space as the natural outcome of spatial configuration (B Hillier & Vaughan, 2007). Besides, Karami et al. (2014) stated that the sense of co-presence in a place is also generated by the spatial attachment of place, the character, and the function of space. In this regards, the gradual and continuous presence of people in an outdoor space stimulates the process of understanding and recognizing the community in a neighbourhood.

The co-presence of others in public space is triggered by people-space practices. As stated by Gehl (2006, p.75) "People prefer to be where other people are - something happens because something happens because something happens". This describes a positive process through encounter that invites more people and more activity. A research by Gilroy, (2010) showed that high possibility of encounter of people

[5] Gehl (2006) and White, (1980) have studied in detail how urban space is appropriate for its user. Preferred use of space was related with the need and satisfaction of users. In their finding, for example, people tend to sit most where the amenities like bench presence in space. In addition, factors such as sun angle, shape, attractiveness of space will retain people in public space longer.

in places might induce conviviality among them. This is generated by the experience every time inhabitants encounter each other and enables the exploration of different attitudes, share information, and opportunities. In short, this process leads to the development of a sense of community (Hummon, 1992).

2.7. Spatial Configuration Through Space Syntax

Space syntax is a theory, method, tool of analysis, and interpretation, which enables to analyse the configuration of space and social variable. Two fundamental aspect of space syntax are the configuration of the system related each other and human activities and movement (Bill Hillier & Hanson, 1984; Bill Hillier, 2007). The aim of Space Syntax is to understand how buildings are grouped to define a continuous open system (Can & Heath, 2015).

Space syntax adopts a graph-theoretic method to model how urban spaces are integrated or segregated using axial maps. Open spaces are represented by individual axial lines – the longest visibility lines cutting across open spaces between buildings or street blocks (Jiang & Liu, 2010; Wang, 2012). Syntactic measurement can be powerful to analysis spatial configuration of space, which later if embed with social attribute data such as movement, pedestrian flow, crime (Bill Hillier, 2007) will reveal the social spatial phenomena in the study area. Respective to this study, some syntactic operation will be employed. They are, 1) Connectivity; 2) Mean Depth; 3) Local and Global Integration; 4) Intelligibility. This syntax operation is most commonly use to analyse the basic configuration of space at neighbourhood scale level (Can & Heath, 2015; Bill Hillier, 2007; Vaughan, 2007).

Space syntax refers to a set of theories and tools employed for spatial morphological analysis in an urban system. It provides a language of space for urban structural analysis through which urban planners can know better the process of urban development. Meanwhile, space syntax can also help analysing human displacement patterns in the city, such as pedestrian modelling, criminal mapping, and route-finding in complex spaces (Jiang, Claramunt, & Klarqvist, 2000) Space syntax has been regarded as a new computational language for the study of the urban structure during the past two decades (Hillier & Hanson, 1984; Jiang, Claramunt, & Klarqvist, 2000).

2.7.1. Limitation and Criticism of Space Syntax in Urban Studies

Space syntax is a central discourse in theory and application since the development of the essential work of "Social Logic of Space" (Bill Hillier & Hanson, 1984), Space is the Machine (Bill Hillier, 2007), and various of publication from the early beginning to the current space syntax symposium (Ostwald, 2011). Some scholars noticed an inconsistency of space syntax when computing the property of space based on relational and topological reasoning.

The first critique is regarding the mathematical operations of space syntax, which lays in the practical analytic method of syntactic analysis. According to Ostwald (2011), the concept of relative asymmetry (RA) and real relative asymmetry (RRA), which is used by Hillier & Hanson (1984) to analyse inner and outdoor spaces of settlements, seems too simple to determine the integration or segregation of space as it is only relying on the graph theory and not considering other factors. In this judgment, space is considered to be integrated when it can be accessed from more than one space option. The RA values itself is difficult to grasp (to imagine the integration of space) as it has normalized values ranges from 0 to 1. According to Hillier & Hanson (1984), a perfect shallow and symmetrical structure possess a RA value close to 0. Thus, the lower the value is the shallower and more integrated the space is.

The other debate focused on technical aspects, namely drawing axial lines as representations of spaces. As mentioned by Ratti, (2005, p.547), "the shortcoming of space syntax seem mostly to be traceable to its reliance on the axial map, a least longest-line-of sight mapping derived from a city's planimetric representation and analysed on the basis of its topology". In this regards, drawing the longest visibility lines cutting across open space (urban void) is subjective to individual spatial cognition which can be perceived from a single vantage point of view (Jiang & Claramunt, 2002). Hence, different people may have different perception of spatial cognition, when judging where to put starting and ending points of a line of sight (axial line) for an urban open space. This has been tested by Ratti (2004) by comparing perfectly grid pattern and deformation of meshed street patterns. The second case, representing the chaotic structure of space, shows that the implementation of axial lines results in multiple outcomes for similar configurations of spaces. Obviously, the ambiguity of syntax values relates to the derivation of axial lines.

The selection of different scales and boundaries of areas influence the varying results of syntax analysis. Ratti (2004) argued that the extent of the adjacency of study areas has consequences in changing for example the integration value in whole system and in the periphery of urban areas. In this respect, Gil (2015) stressed that the sensitivity of boundary effects influence the reliability of network topology analysis of urban areas particularly when determining centrality (urban centre).

2.8. Spatial Metric Measures for Analysing Spatial Charactersitic: Density and Diversity of Informal Settlements

Spatial metrics are algorithms that quantify specific spatial characteristics of patches, classes of patches, or entire landscape mosaics (UMass Landscape Ecology Lab, 2016). According to Herold, Goldstein, & Clarke (2003, p.288), "spatial metrics is a quantitative and aggregate measurements derived from digital analysis of thematic-categorical maps showing spatial heterogeneity at a specific scale and resolution".

Metric analysis is advantageous to analysis the change of urban form and land-use over time using spatiotemporal raster data (Herold et al., 2003). Thus metrics analysis such as class area (CA), number of patch (NP), edge density (ED), and contagion (CONTAG) are used to effectively measure the change in urban areas. Moreover, Lowry & Lowry (2014) uses 18 types of metrics to compare three different types of neighbourhoods starting from pre-suburban, sub-urban, and late-suburban in term of density, centrality, accessibility and neighbourhood mix.

The spatial metrics are also able to analysis informal settlement characteristics. For example, Kuffer, Barros, & Sliuzas (2014) used the various spatial metrics to decipher size, density, and layout structure of informal settlements in order to develop an unplanned settlement index (USI). A detailed comparison analysis of two informal settlements was conducted by Sirueri (2015), results showed the relevance of metrics in landscape, settlement, and object (building) level analysis. In her study, building characteristics were analysed using patch density (PD), mean shape index (MSI), Shannon Diversity Index (SHDI), and Shannon Evenness Index (SEI). Based on her research, the diversity index in two informal settlements showed relatively high values (8.99 and 9.44) indicating a high mix of building use in the settlements. Thus the application of spatial metrics is beneficial in understanding the characteristics and especially the ontology of slums by which the general indicators such as building characteristic, access network, density, settlement shape, location, and neighbourhood characteristic can be quantified and compared (Kohli, Sliuzas, Kerle, & Stein, 2012).

3. CASE STUDY DESIGN AND RESEARCH METHODOLOGY

This chapter contains the case study design and the methodology to process and analysis the data. First, the selection of case study area including fieldwork, primary data collection, and sampling strategy is presented. Next, the methodological framework is described, followed by an overview of the data analysis.

3.1. Selection of Case Study Area: Yogyakarta urban kampung

An urban kampung in Yogyakarta was selected as case study area for this research. The criteria used for the selection related to the history, physical and social characteristics, and typology of the urban kampung. The selected kampung had to allow the researcher to explore the sense of place of an urban kampung. As it has been elaborated in the previous chapter, the first reason related to the history of urban kampungs in Yogyakarta, which is quite unique compared to other informal areas in the Global South. The early development of urban kampungs in Yogyakarta is related with the beginning of the Yogyakarta Sultanate wherein some neighbourhoods were governed by the authority of sultanate right-hand man (*pangeran*). Other kampungs spontaneously developed during Dutch colonialization (Setiawan, 1998). Second, urban kampungs in Yogyakarta, although being considered as poor and demographic homogenous areas, they contain diverse activities and the dwellers still uphold social values. This makes kampungs more liveable and vibrant places than typical formal settlements.

Kampung Code was selected as case study because it fulfilled the aforementioned criteria. In addition, the researcher had a consultation with the local expert, asserting that the kampung is potential for sense of place studies. It also worth to note that several project (e.g. upgrading, disaster mitigation, and cultural event) has been carried out in Kampung Code.

Kampung Code is situated along the riverbank of the Code river (see Figure 3-1). This kampung, administratively consists of four neighbourhoods, namely Tukangan, Gemblakan, Juminahan, and Cokrodirjan. In terms of spatial relation with Yogyakarta city, Kampung Code is located in a strategic area close to the Yogyakarta Central Business District (CBD), sultanate district (*Kraton*), two regional services traditional markets, and train stations. Regarding the settlement status, according to the Mayor of Yogyakarta decree No: 393 (years 2014) about slum settlement in City of Yogyakarta, Kampung Code is a registered slum and potential to become deteriorate in terms of physical and infrastructure quality.

Kampung Code is a settlement where about 10.059 inhabitants (2596 Household)[6] reside within 25.69 Hectares. People living in the kampung are well-known for their creative professions like craft maker (e.g. engraver/*grafir* and paper recycled craft) and food catering. The foundation of kampung Code was not really clear but it was estimated in around 1915 when Dutch established new economic activities including a train factory/workshop in Lempuyangan[7] district. However, it was in 1946-1947 when Yogyakarta became the capital city of Indonesia, more people from Jakarta moved to kampungs in Yogyakarta. Lately,

[6] The figure was derived from the record/note owned by head of the kampung (*Lurah*).
[7] Dutch started to cooperate and established their power including economic, business, and political in 1830 or about 87 years after the establishment of the kingdom of Yogyakarta. In 1840 and 1870, due to the rise of population, the boundaries of the city expanded. By 1916, more Dutch resided in the city (mostly in Dutch quarter like Niewe Wijk/*Kota Baru*) and since then more economic activities were established (Setiawan, 1998).

in 1971-1980, particularly poor people spontaneously built scatter housing along Code River (Setiawan, 2010). This causes further densification of urban kampung until it saturated in present days.

Based on the fieldwork survey (see Figure 3-2), Kampung Code possess a quite diverse building function which can be classified into dominantly residential, commercial and services, local shop/tavern, community building, guard post, education (pre-school), mosque, and craft workshops. These functions can be reached within walking distance.

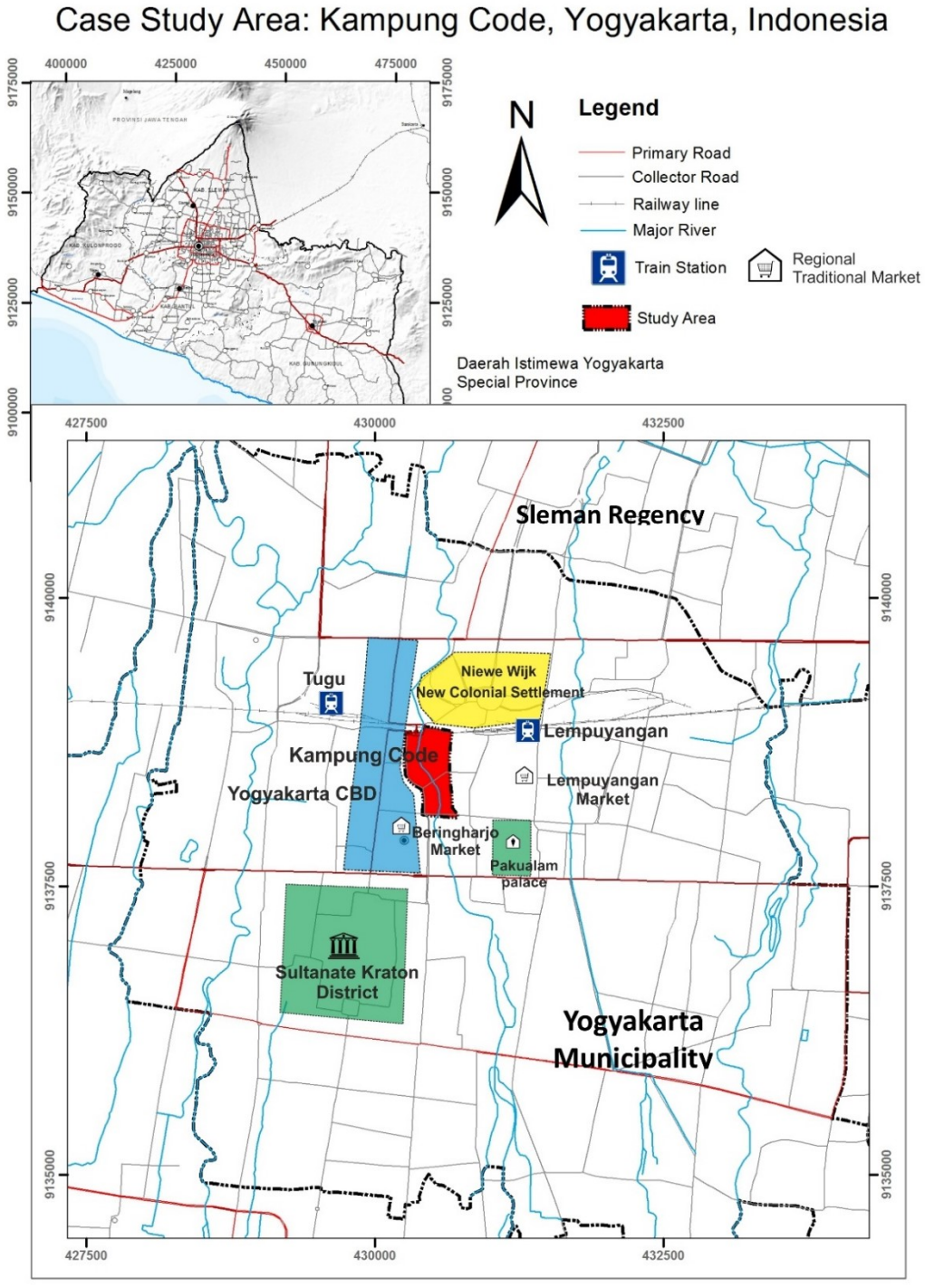


Figure 3-1. Case Study Area: Kampung Code, Yogyakarta.

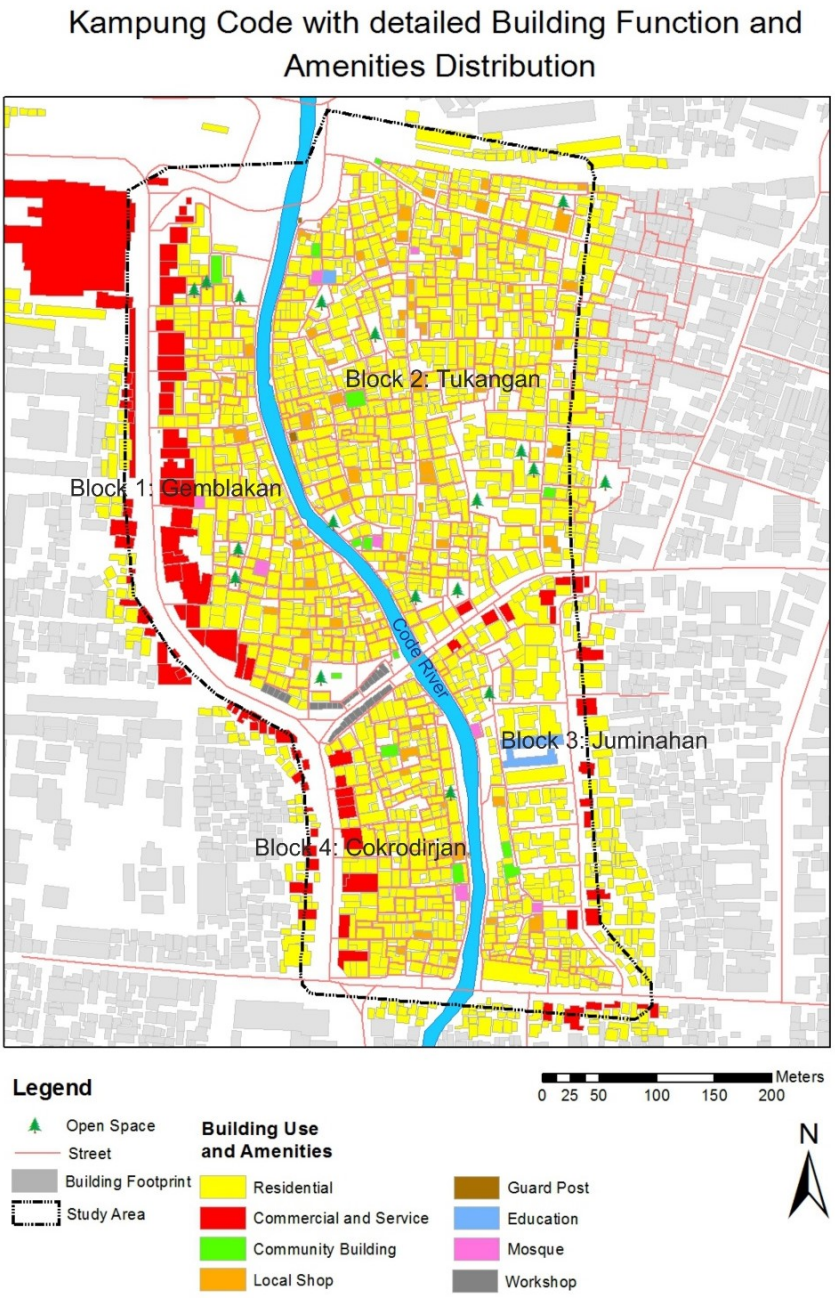


Figure 3-2. Case Study Area of Kampung Code and Its Perspective View

Figure 3-3. Perspective View of Kampung Code from Above

3.2. Case Study Research Design

This research employed a case study approach for exploring and describing the concept of sense of place. A case study was selected because this approach is useful to understand a theory/concept based on the phenomena occurring in the real word/ empirical observation (e.g. urban kampung in this research). According to Yin (2003), particular research questions like "how" and "what" may require varies data analysis since this type of research is considered an explanatory study. Therefore, this study also applied mixed method approach (Bryman, 2012) to synthesis multiple attributes of sense of place as described earlier in the conceptual framework (see Figure 1-1) .

3.3. Data Acquisition and Methods

The research design constitutes the plan of data collection in a consistent manner. The understanding of the concept of sense of place in the urban kampung needs empirical information of space (configuration of space), activity (uses and daily activity) and dwellers perception (perception of physical and social quality of neighbours). Thus, the required data and data collection strategy were organized into the sub-objectives in which all of the results connect to the discussion on the sense of place of the urban kampung. Table 3-1 gives an overview of data requirement, type of data, and data collection strategy to answer the research questions. The details of each data collection strategy were explained in the following chapter.

Table 3-1. Data Acquisition and Methods.

Demand of the data based on sub-objectives	Data required	Source / type of data	Data collection strategy
Investigate and map the activity pattern of dwellers	Building function and amenities	Secondary and Primary data (Updated)	Updating secondary data (GIS) with field survey
	Location of activities	Primary data (GIS)	Field survey
	Observed of daily activity at three different times of the day	Primary data (GIS)	Activity snapshot
	Pattern of activity	Primary data (GIS)	Questionnaire (Household member)
Analyze and map configuration of space in an urban kampung	Building foot print (represented by roof area)	Secondary and Primary data (Updated)	Updating secondary data (GIS) with field survey
	Road networks (streets, alleys)	Secondary and Primary data (Updated)	Updating secondary data (GIS) with field survey
	Axial Map	Primary data (GIS)	Draw axial line manually
	Raster Map of building function	Secondary data	Convert from vector to raster (building function)
	High-resolution images of study area	Secondary data	Images obtained from Google earth pro
Describe dwellers perception toward physical and neighbor's kinship	Perception of dwellers on physical quality	Primary data (narrative responses and quantitative Likert scale data)	Walking interview, FGD, Questionnaire
	Perception of dwellers on neighbor's kinship	Primary data (narrative responses and quantitative Likert scale data)	Walking interview, FGD, Questionnaire

Sense of place of an urban kampung	Pattern of perception on physical quality and neighbor's kinship	Results of perception data analysis	
	Use and daily activity	Results of activity map analysis	
	Configuration of space	Result on space syntax analysis (connectivity, global integration, local integration, control), density (PD) and diversity (SHDI)	
	Literature	Secondary data (literature)	Literature review

3.4. Fieldwork and Primary Data Collection

In this research, predominantly primary data were collected during a one-month fieldwork in Kampung Code, Yogyakarta, Indonesia in October 2015. The fieldwork process and types of data are described in the following sub-section.

3.4.1. Field Survey

Field survey and observations have been carried out before conducting other primary data collections to ensure availability and preparedness of base spatial data. During the observations possible locations for outdoor activities were monitored. This allowed the researcher to decide on the number of surveyors needed for activity snapshotting as well as designing a strategy for activity mapping. Furthermore, a survey was conducted to explore and trace all network (e.g. street, pathways, and alleys) within and to the study area. Building function and amenities available in the study area were surveyed as well.

Researcher used the following methods to locate the 'street' network:

- GPS tracking,
- manual tracing, and
- asking local people with the help of printed high-resolution images to assist in tracking all networks within the urban kampung including streets, pathways, alleys, and deadlocks.

It was important to be guided by local people to locate alleys and deadlocks, which were unknown. However, in this case, GPS showed some drawback as it created fuzzy lines so the manual tracing was used to compensate the error. The same principle was also implemented for record building functions and amenities. Subsequently, all those data were fixed and visualized in ArcGIS platform to create a based map of the urban kampung. The base map of the urban kampung shows all networks and building functions. This base information was used for the following observation/survey (e.g. maps were printed in A3 paper to assist surveyor in adding peculiar spatial information).

3.4.2. Activity Mapping

According to Gehl & Svarre (2013) activity mapping is an effective approach to study the behaviour of people in various settings of space. In this research, all outdoor activities had been observed thoroughly with the snapshot method. Referring to a recent study by Can & Heath (2015), snapshot was employed to record the activities of individuals such as sit, play, chat, and whatever they did in the public realm. For this study, all activities in outdoor spaces such as working, interacting, playing, siting, relaxing, etcetera were documented with photographs as well as marking them manually in A3 printed map[8]. Dwellers involved in outdoor activities were categorized as man, woman, children, and mix. Whether they were in a group or individual was also recorded and photographed.

[8] Fixed and updated base map that has been created based on field observation

To capture the dynamics of social activity pattern thoroughly, three different times in a day were considered. They were activities in the morning (07.30 – 08.30), noon (12.30 – 13.30) and evening (16.30 – 17.30). These snapshots were conducted on Tuesday (weekday) and Sunday (weekend) to give a comprehensive picture of socio-spatial practices in the case study area. To be able to record all outdoor activities, the researcher was assisted by 12 surveyors who collected the information at predefined location/spot[9]. This observation has been made in two steps with two considerations[10]. First, observations were carried out in the predefined location for about 10-20 minutes to be able to capture stationary and moving activity then subsequently, the next step was, walking to nearby areas to capture the rest of space[11] on each zone. Second, the surveyor was directed to pay attention to peculiar linear open spaces such as riverbank and main streets/pathways where people also did several of activities. After the accomplishment of that main objective, it was up to the surveyor's intuition to observe remaining spaces/alleys until the defined survey time was over.

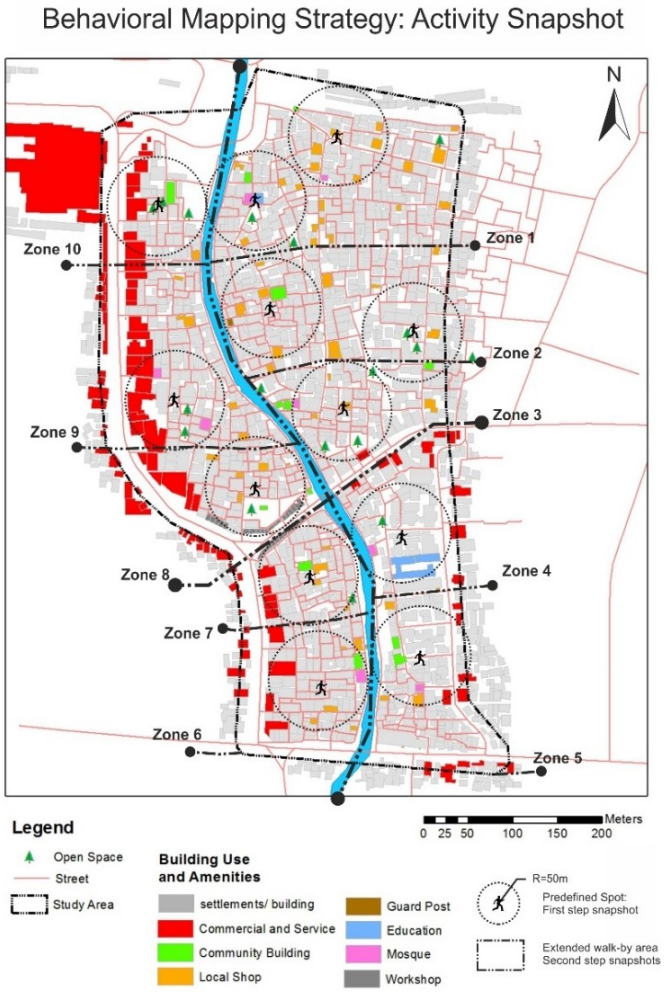


Figure 3-4. Strategy for Activity Snapshot

[9] Locations that have been observed earlier. These locations have high possibility of dwellers doing outdoor activity.

[10] The first consideration was that 12 surveyors are not adequate to observe every potential location for capturing outdoor activities due to the size of the study area. Second, some spaces/locations were not located in close distance. This required the surveyor to walk-by to capture the remaining activity.

[11] The rest of space mentioned here does not mean that all activities in the urban kampung were perfectly observed, e.g. some hidden places were not easy to access and observe (e.g. alleys, pathways, and small residual open spaces). However, this survey strategy was able to capture the majority of outdoor activity in the open space of the urban kampung.

All surveyors started and ended the snapshot simultaneously at the predetermined time (one hour of observation) to ensure the consistency of collected data at different snapshot locations. Finally, all the snapshots and marked locations on the printed map were digitized in a GIS with detailed attribute data such as type of activities, gender, and a number of people engage in the activity.

The limitation of this method was the possibility of an activity being not recorded due to the small time gap when the surveyor walked to a nearby location. Some activities that happened just for few minutes could be and could not be recorded. These activities, for example, people buying daily needs in a local kiosk then walking away or parents taking care for his/her kids. Moreover, observations focused on activities occurring within the urban kampung and payed less attention to the edges of the kampung.

3.4.3. Walking Interview

Walking interviews were employed to unravel and comprehended people's perception towards their habitat. This method is considered effective as it gives on the spot narrative responses (Evans & Jones, 2011). Particularly in the context of sense of place, walking interviews allow the researcher to understand how individuals articulate their urban kampung, locate their social network, express their sense of community in socio-spatial practices (Clark & Emmel, 2010).

The researcher did 12 walking interviews by being accompanied by one surveyor who was responsible to take photographs, mark the location with a GPS as well as on an A3 printed map. The researcher used prepared open-ended questions for the interviews. The interviews were recorded with a digital recorder device (see Appendix 2). Prescheduled appointments were made to interview the head of the kampung, community leader, and leader of the youth organization[12] while the other five interviews were done spontaneously with inhabitants when encountering them on the spot in the kampung. Some of the participants of the walking interviews were selected based on their spatial experience of the urban kampung, e.g. the head of the kampung (*Lurah*), leader of RW[13], leader of RT[14], and youth organization member (see Appendix 4). The remaining participants were selected randomly when they had time. Three respondents were not able to do walking interview instead they gave information on the spot the researcher meet them. This situation happened because of several factors such as unbearable heat during the day, busy with activities in home/kiosk, and reluctant to walk far. Finally, 12 people out of 15 participated in walking interviews.

3.4.4. Household Interview with Questionnaire

A questionnaire was designed and conducted in the study area. Questionnaires were addressed to the head of the household assuming that he/she knows the behaviour of the family member in terms of activities and place they go within and outside the study area. The purpose of the questionnaires was to inquire the subjective perception of the living habitat of the urban kampung about the fundamental idea of the sense of place.

The interviews were based on closed structured question with the combination of the direct answers, multiple answers, and graded answers in Likert scale format 1 to 5. Preliminary to conducting the interview, researcher took a sample of 12 respondents as a pilot survey to test the comprehension of the

[12] Youth organization / "*karangtaruna"* usually organize a local event in the kampung by mobilizing young people.
[13] RW or "*Rukun Warga"* is an organization of the settlement where one RW normally contains 30-50 heads of households. It is a formal administrative unit given by the government to manage units of settlements.
[14] RT or "Tukun Tetangga" borrow the same concept as RW but RT is the smallest unit of a formal administrative unit containing maximum 15 heads of households.

questionnaire. A substantial issue that emerged from this pilot sample was that the respondents did not really recall how many times and where they visited their neighbour in a past week. Consequently, the question was adjusted to just asking to guess the frequency and location they interact/visit. The adapted questionnaire was mainly carried out in the afternoon to have a higher possibility of the head of household to be at home. Interview lasted about 20 to 30 minutes. Finally, 162 respondents have successfully done the questionnaire.

The questionnaire was split into five chapters obtaining different types of information. The first and second part mainly asked about the social economic characteristics of dwellers followed by questions on daily activities for household member[15]. The locations of daily activities occurring within the boundary of study area were marked on an A3 printed map. Meanwhile, for activities occurring outside the study area, the location was named by the address and the common name of the area/district. The next section had questions about social interaction such as how many residents did you visit in the past week and the value of neighbourhood intimacy. The last part are questions about the perception of the physical quality of the urban kampung ranging from issue of safety during the day and night, comfort, liveability, sense of belonging, aesthetic, and access to go in and out and overall quality of the urban kampung (see Appendix 1).

3.4.5. Group Discussion

Focus group discussions (FGD) were conducted four times in different settings in term of gender and group of interest. The purpose was similar to the walking interviews but this can reveal wealth information since the respondents could explain their opinions towards a particular issue. The researcher asked about the most attractive places[16], daily activities, social connections, social values, and history (see Appendix 3).

Man, woman, teenager[17], and children were interviewed in a separated group[18]. Particularly for children, questions were adapted, using simple questions like "where do you like to play in the urban kampung?" and "how do you feel about that place?" The discussion was noted and recorded for further qualitative analysis.

3.5. Sample Size and Sampling Technique

The selection of the sampling strategy had to consider the representativeness of the sample, accuracy, allocated time, and resources. For that reason, the researcher employed quota sampling (probability sample method) since the sample were collected based on the division of sampling population into group (Kumar, 2011).

The number of samples within acluster was selected based on the space syntax integration value. Thus households living in a street/road which possesses high integration value will be considered as sample. The reason behind this was that households that probably perform either movements or stationary activities in outdoor spaces were those who living in space/streets with high integration (Can & Heath, 2015). This judgment has been made for the purposes of describing the sense of place using the insights of households who are likely to be exposed to outdoor activities. Considering the representativeness of the

[15] Household member including head of household (usually men), women (wife) and children below 14 years old (or in junior high school). The children above 14 (teenager) and adult (above 21) who haven't married and still stay with parent did not include in the questionnaire.
[16] Place in kampung where dwellers mostly are occupied with activities.
[17] Member of youth organization / "*karangtaruna*"
[18] However, for women FGD, the presence of few man was inevitable since they man was curious and just heard what the discussion looked like. In this case, man did not give any opinion, rather just being spectators of the discussion.

sample, limited time, and number of surveyors, thus, a ±5 % sample of the total population was considered as adequate. Thus from 2,586 of households in Kampung Code, the number of the sample was 160.

Table 3-2. Selection of sample in case study areas.

Kampung	Block	Number of House hold	Proportionate sample selection	Re-adjusted sample based on integration value
Code	1	422	40	Quota sampling
	2	1354	60	
	3	238	20	
	4	572	40	
Total		2586	160	160

After defining the streets/alleys which have a high degree of integration[19], it was up to the surveyor to select the households randomly along that line. The number of the sample in each block were readjusted so it proportionates to the population in each block.

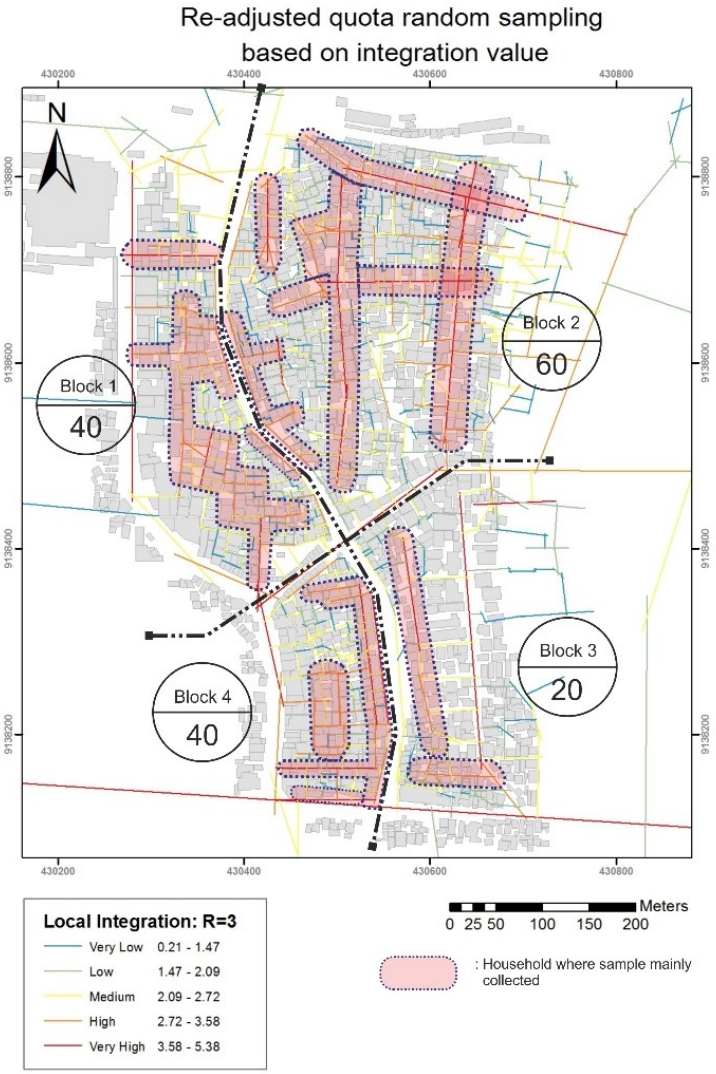


Figure 3-5. Sampling zone based syntax integration value

[19] Based on the visual interpretation of integration analysis from space syntax analysis.

3.6. Data Analysis Methods

Data analysis comprises three major parts in which each process is put in order to tackle each facet of sense of place. Those methods are spatial analysis (space syntax and spatial metric), activity pattern analysis, and qualitative data analysis.

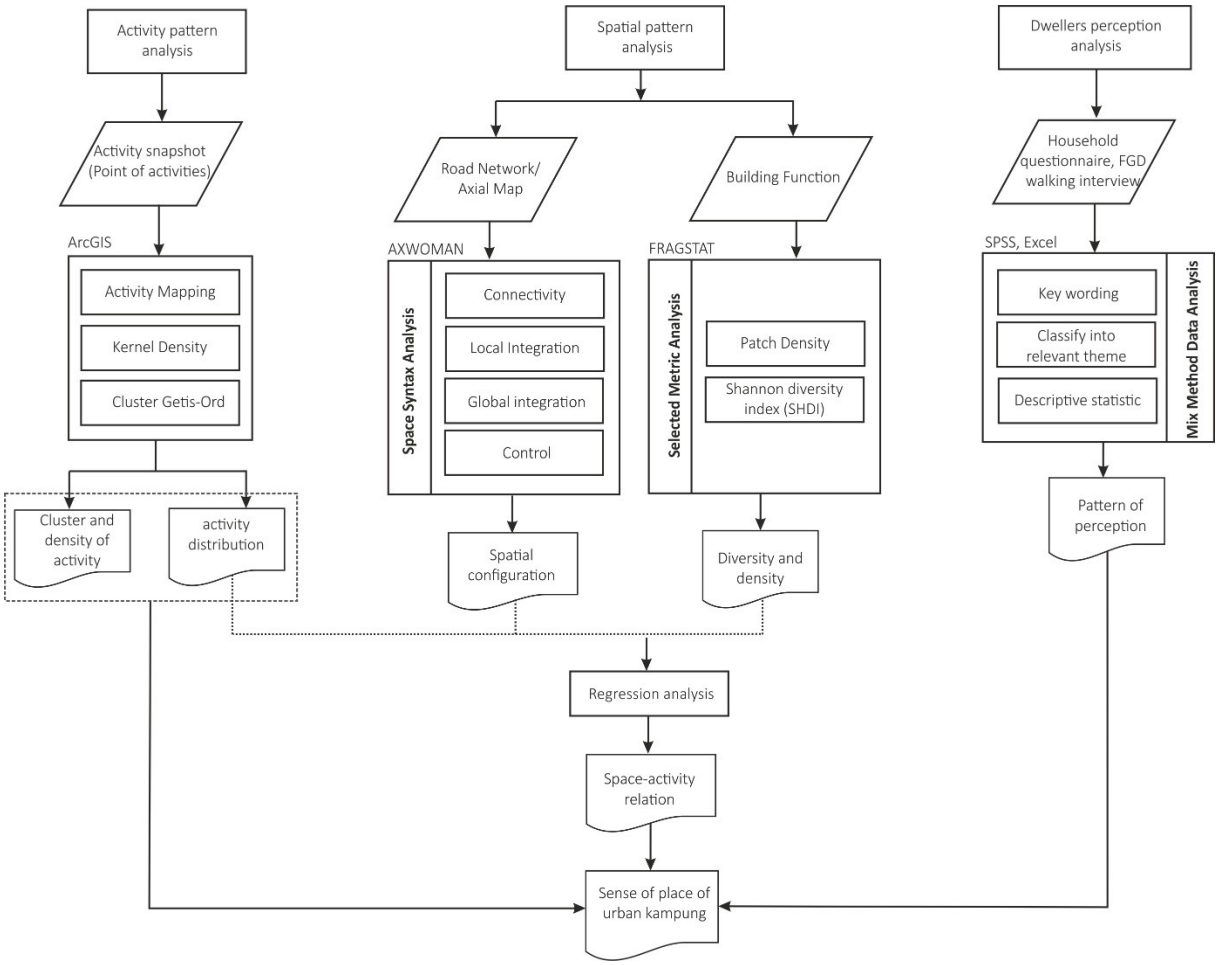


Figure 3-6. Methodological Framework.

As described in conceptual framework (see Figure 1-1), the sense of place of the urban kampung is created based upon the interplays of spatial configuration, use and activity, and dwellers perception. Those three attributes were analysed systematically as it is shown in figure 3-6. The first attributes, *spatial pattern* of the urban kampung were analysed using space syntax and spatial metrics. The spatial pattern was quantified based upon the topological relation of space and based on the information of urban patch. The second, *use and activity* were analysed using density and cluster Getis-ord to identify the pattern of activity. Subsequently, types of activities (necessary, social, optional, and necessary) were correlated with the spatial pattern (space syntax attributes, density, and diversity). This allows revealing the *activity-space relation* to explainthe creation of sense of place. The third, *dwellers perception* were analysed with a mix method approach to obtain a narrative explanation of perception pattern, which then was classified into a relevant themes. Finally, all outcomes converge to the discussion and conclusion on the concept of sense of place. The data analysis is explained in the following sub-chapter.

3.6.1. Activity Pattern Analysis

The author categorized the observed activities into four types namely necessary, social, optional, and religious (based on a modification of Gehl (2006) original classification of activity). The list of all outdoor

activities (digitized in ArcGIS) was used to perform activity pattern analysis and quantify the frequency of activity at three different times a day and two days of the week (weekday (Tuesday) and weekend (Sunday)).

Activities occurring in the morning, midday, and afternoon were visualized thematically based on the classification of activities, number of people engaging in a particular activity, and actors who performed the activity (e.g. man, woman, children, and mix) (Can & Heath, 2015).

In the context of spatial distribution of activities, activity patterns were analysed using kernel density and clustering Getis-Ord operation. The first function shows the magnitude of activity (weighed by number of people) within the boundary of the study area. In this operation, the search radius was set to default and the operation was limited by the boundary of study area. These results show the patterns of activities based on the intensity of inhabitant participation. The second operation, cluster Getis-Ord, analysed the pattern of activities based on the clusters of high or low values of activities. An experiment was carried out to determine an optimum distance band based on the highest Z-Score (high probability of data being significantly clustered). Consequently, the author defined 50 meters as the most suitable distance band (threshold distance)[20] (see Appendix 6). A visual result from this operation allowed the researcher to draw the conclusion of which places were likely to attract considerable amount of activities.

3.6.2. Space Syntax Measures for Analysing the Configuration of Space

Space syntax comes with various variables[21], which are able to analysis the configuration of space based on the axial map principle (theory of graph). Several operation described below are following Klarqvist (1993) explanation of first order measures of syntax variables.

A. Connectivity (Ci)
B. Measures the number of immediate neighbours that are directly connected to a space or street. The higher the connectivity value, the higher connectivity of space or street it has to access another space in the immediate vicinity. This operation is also called static local measure.

$$Ci = \mathrm{k} \qquad \text{Equation (1)}$$

Where, k = number of direct connection

C. Control (CV)

Control measures are the relative strength of axial lines in control / "pulling" the potential from immediate vicinity (Asami, Kubat, Kitagawa, & Iida, 2003). The degree to which space controls access to its immediate neighbours is calculated by taking into account the number of alternative connection of axial line (*li: 1,2,3…n)* that each neighbour (n) has. Spaces which have a control value of more than one will be considered as strong control over space, conversely, those below one will have weak control over spaces (Hillier & Hanson, 1984, p.109).

[20] Features within the specified critical distance (Distance Band or Threshold Distance) of a target feature receive a weight of one and influence computations for that feature. Once the critical distance is exceeded, weights (and the influence a neighboring feature has on target feature computations) diminish with distance.

[21] Variables in which represent the various topologic relation of space and describes it with mathematical operation by using the axial lines as representation of space.

$$Control = \sum_{i=1}^{n} 1/C(li) \quad \text{Equation (2)}$$

Where, n = number of immediate neighbours/space
li = number of connection

D. Mean depth (MD)
Mean depth representing the average number of steps to reach from each line in the graph to a particular line. This illustrates the relative difficulties in term of movement to access particular spaces in the system (Majumdar, Sliuzas, Munshi, & Brussel, 2009, p.52). The value suggests that the higher the mean depth of the space is, the lesser the movement or co-presence of interaction is (Peponis, Ross, & Rashid, 1997).

$$Mean\ depth = \ (Global\ Depth)/(n-1) \quad \text{Equation (3)}$$

Where, n= total number of lines in graph

E. Integration
Integration is a static global measure. It describes the average depth of space to all other spaces in the system. The spaces of a system can be ranked from the most integrated to the most segregated. Integration in a complex system has a two scale of analysis namely global and local integration.

Global Integration indicates the integration of the line with the all lines in the system / graph. It also can be measured by calculating relative asymmetry (RA) and real relative asymmetry (RRA). The measure of relative asymmetry is calculated by comparing how deep or shallow the spaces are directly connected to the original space (Bill Hillier & Hanson, 1984). The global integration value is then given based on the inverse value of RRA. To calculate the integration, the value quantification was follow the equation 4 and 5 respectively.

$$RAi = (2\ (MDi-1))/(n-2) \quad \text{Equation (4)}$$

Where, MD = mean depth of the line
n = number of lines in the system

$$RRA = RA/DK \quad \text{Equation (5)}$$

Where DK is the relativized configuration of diamond shape (Asami et al., 2003, p.48.6)

$$D_k = \frac{2\left(k\left(\log_2\left(\frac{k+2}{3}\right)-1\right)+1\right)}{(k-1)(k-2)}$$

Local Integration also can be calculated with the same principle as above with defined local parameters. The local parameters, according to some experts, range from three to five according to the complexity of the system. However, in the most case such as urban systems the value used is three (R3) (Jiang et al., 2000). Thus, R3 means that the spaces can be accessed with respect to all other spaces in the system in

only three steps away from it. In integration analysis, the higher the value, the better the integration of space in the system and vice versa.

In addition, it is also possible to develop *second order measures* by correlating the four first order measures in a regression analysis. *Intelligibility,* for example, can be derived by correlating connectivity and global integration. This explains how far the depth of spaces in the whole system can be inferred from the number of connections (Klarqvist, 1993). If the connectivity and global integration results in strong correlation then the people from inside (resident/inhabitant) and from outside (visitor/foreigners) have a clear perception of places (Bill Hillier, 2007). Thus, intelligibility can be associated with mental images of people in understanding spatial layout and orient themselves within the system. As stressed by Can & Heath (2015, p.9), intelligibility works with this analogy "one place can have high connected streets, but if they are not well integrated with the whole system, then it might be difficult to understand the structure of spaces in term of navigation".

3.6.3. Use and Diversity Analysis using Spatial Metrics Methods

The built-up environment such as building was analysed in terms of its density and diversity. In order to quantify diversity and density of the urban kampung, spatial metrics were used in this study. The building use information that has been collected during the initial field survey was used as a basic spatial data for diversity analysis of the urban kampung. In order to perform spatial metrics, vector data showing the building use were converted into raster data. The raster size resolution considered in this analysis was one meter. Nine classes of building use including the background were defined in the class descriptor table as an input of spatial metrics operation. Both diversity and density of the urban kampung were analysed using patch density (PD) and Shannon Diversity Index (SHDI). In principal, those operation was based on the quantification of the information per patch in the moving window. In this research, the size of window was determined as round 50 meters[22]. These operations were performed in FRAGSTAT software. Both operation resulted in a figure and map providing ancillary quantitative data for understanding the relation between density /diversity and activity patterns.

The selection of metrics to analysis form and pattern of informal settlement varies according to objectives of the study. In relation to the social characteristic of an urban kampung, indicators in object level (buildings) can contribute in understanding social phenomena such as activities in relation with the diversity of uses and density of urban kampung. Some metrics like PD and SHDI are selected to analyse activity and uses wherein Gehl & Svarre (2013); Gehl (2006); Jacobs (1961); and Montgomery (1998) argued that diversity and sufficient density will generate continuous and vibrant outdoor activities.

- **Patch Density (PD)**

Density analysis was performed to quantify the density of the urban kampung. This also leads to the hypothesis whether the density relates to the richness of outdoor activities in the urban kampung, which was explored via a regression analysis.

In this research, PD calculation represents the number of building footprints within the settlement. PD equal to the number of patches (N) per area in hectares (A). PD can be calculated using equation 5

$$PD = \frac{\mathrm{N}}{A}(10.000)(100) \qquad \text{Equation (6)}$$

[22] 50 meters is selected for moving window size based on the experiment of distance band for highest Z-score in clustering analysis. This size was also adapted for density and diversity analysis.

- **Shannon's diversity index (SHDI)**

The intention of SHDI was to quantify the diversity in the urban kampung. In general, a typical urban kampung is diverse in terms of use. This was compared with richness of outdoor activities. Similar with the density hypothesis, diversity in an urban kampung was tested whether it was related to outdoor activities.

SHDI measures the diversity of building use in a landscape level (boundary of urban kampung). The value of this index represents the amount of information (uses) of patch within 50 meters of moving windows. This measurement is calculated using equation 6

$$SHDI = -\sum_{i=1}^{m} Pi * ln.Pi \qquad \text{Equation (7)}$$

Where, Pi = proportion of the landscape occupied by patch type (class) *i*

SHDI equals to zero when the landscape contains only one patch (no diversity). SHDI increases as the number of different patch types (i.e., patch richness, PR) increases and/or the proportional distribution of area among patch types becomes more equitable.

3.6.4. Spatial Morphology Analysis Using Space Syntax

The morphology of the urban kampung was measured and analysed using space syntax method. Space syntax was used in this research because it is able to analyse the spatial configuration of space with respect to network topological relationship. Space syntax parameters used in this research were: connectivity, control, local integration, and global integration. This quantification was based on the equation one (1) to four (4) (see Chapter 2.7). The second order measure[23] used is intelligibility. This was performed to give further explanation on the clearness[24] of the spatial perception of the place. All space syntax parameters were analysed using AXWOMAN 6.3 as it works in the same platform as the new ArcGIS version 10.3. This new version of the AXWOMAN was developed by Jiang (2015). Space syntax parameters results were automatically recorded in axial line attribute tables (value recorded for each line (segment)). Further spatial and correlation analysis was performed by correlating activity data attributes. As space syntax analysis was based on the topological relation of space, thus, space was represented by axial lines. Axial lines were drawn manually with AXWOMAN with the following consideration.

1. Axial lines were drawn using VHR imagery combined with initial field survey results.
2. Road network (streets/alleys), riverbanks, fields, and small open spaces were traced based on their longest visibility lines of sight.
3. Once, the lines have been created, isolated lines in the network were checked carefully using "Get isolate lines" tool in AXWOMAN"

Once axial map was finished, AXWOMAN was used to execute space syntax analysis. The four syntax parameters values were calculated and can be shown in gradual colours. For example, the degree of integration: red coloured lines refer to higher degree of integration whereas the blue colour lines are less integrated (more segregated).

[23] Klarqvist (1993) uses the term "second order of measures" because the new measurement such intelligibility was derived by correlating first order space syntax parameters (Global integration and connectivity)

[24] The scholars such as Can & Heath (2015), Kim & Penn (2004), and Klarqvist (1993) describe that the intelligibility is related with spatial cognitive of resident and stranger to navigate or orient in space. The higher the intelligibility is the clearer the space in the system as the individual can imagine through their mental map.

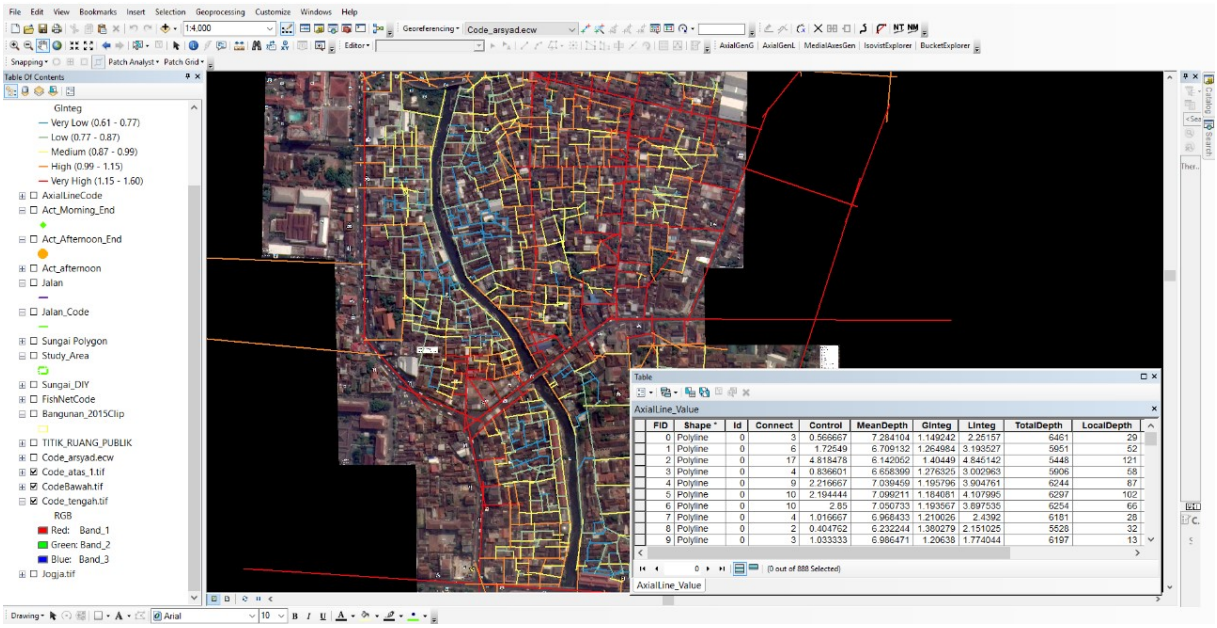


Figure 3-7. Screen shot of AXWOMAN 6.3 and syntax analysis results in ArcGIS platform.

3.6.5. **Activity-Space Correlation Analysis**

Three different types of correlation had been analysed to reveal the activity – space relationship. Those are: a relation of activity patterns and spatial configuration, activity patterns and density, and activity patterns and diversity. The correlation analysis was performed to reveal the hypothesis, which emerged based on the research finding that claims that typical urban kampungs in Indonesia are diverse in term of activity and use. In relation to the concept of sense of place of an urban kampung, activity-space correlation analysis might explain how the sense of place was created.

The first analysis explored the correlation of activity pattern and spatial configuration. Four space syntax parameters, connectivity, control, global and local integration, were correlated with three different types of activity[25] to give a deep explanation on how space influence outdoor activities in term of co-present of dwellers and encounter. Prior to conducting regression analysis, activity pattern data should have the same spatial level as axial lines. This was achieved by generating near table of activity point data. Thus the activity data attributes were associated with the nearest axial line (as attribute). Next, all activity point attribute data per nearest line (number of people) were summed up. Once the axial line and activity attribute data appeared in the same attributes table, it was exported to SPSS to perform spearman correlation and simple regression analysis.

The second analysis explored the relation of activity pattern, density, and diversity of the urban kampung. The correlation analysis of three variables was performed using Spearman rank correlation. Again, the two attributes data should have the same spatial level of analysis. Therefore, "extract value to point" operation was used to extract the PD and SHDI raster values to the point features of activity pattern. Once this operation was completed, the new attributes table (extract to activity point) was exported to SPSS in order to perform Spearman correlation analysis.

[25] Necessary, social, and optional. However Religious activity were not included in the regression analysis since the religious activity pattern always take place close to mosque. Therefore, this type of activity does not really relate with the spatial configuration of space.

3.6.6. **Quantitative and Qualitative (Perception) Data Analysis**

This research uses quantitative and qualitative data. Quantitative data from questionnaires were analysed with descriptive statistic in SPSS and displayed in respective charts and tables with Microsoft Excel. Meanwhile, prior to conducting qualitative data analysis employing coding, the narrative responses from walking interview and FGD were transcribed.

Analysing the perception through qualitative data analysis needs a strategy to transform respondent's ideas to key words or codes (Walsh, 2003). Narrative information collected from walking interviews and FGD were extracted based on the most repeated term/keyword that was used by respondent. This was done by identifying the passage of text (narrative response) including the quotation and applying labels (code) to them that indicated they are examples of some thematic idea (Online QDA, 2016). This was considered relevant for a specific analysis where the information was mostly collected from collective opinions such as discussion in groups and walking interview.

After organizing the keywords/quotations into groups of the similar thoughts in a table, the extracted information then was categorized into eight themes in which each of them lead to the description of sense of place from different thematic ideas. Some of the narrative answers were used as supporting evidence/argumentation that signify the quantitative data on perception towards space.

4. USE AND ACTIVITY WITHIN THE URBAN KAMPUNG

Use and daily activities within the study area are explored based on four dimension namely creativity, diversity, usefulness, and continuity. The methods involved are activity snapshot, activity distribution and pattern, and diversity index. Thus this chapter describes the first pillar of the concept 'sense of place' of the urban kampung (see fig. 1-1).

4.1. Observed Uses of Space and Activities in Study Area: Kampung Code

Snapshots of activities listed during observations were considered as stationary activities (of individuals and group) with various degrees of continuity at different times of a day. Some activities happened with very short duration and other prevail longer. About 45 activities in outdoor space were counted, which were grouped into the four categories (see table 4-1): necessary, social, optional, and religious.

Necessary activity

Necessary activities found in the urban kampung are activities that are mainly related to livelihood. These activities were, for example people working in the local kiosk, selling food and drinks in the tavern, make handcraft in a workshop, going to school, and cooking food. These types of activity are mainly found in the main streets/alleys and nearby shops.

Figure 4-1. Snapshot of Necessary Activities in the Urban Kampung

Social activity

The uniqueness of social activities in an urban kampung is that they occur in almost every public realm with different physical settings. Figure 4-2 shows social activities spontaneously occurring in the outdoor spaces such as in proximity to the guard post, local tavern, open space, and even on in-house terraces. Many social activities happened in streets where people unintentionally meet and chat.

Figure 4-2. Snapshot of Social Activities in the Urban Kampung

Optional activity

Self-oriented or optional activities in the urban kampung had no clear pattern rather they tended to occur based on the personal factors such as availability of time and the unique feature of the place. Some optional activities such as fishing occurred in the riverbank. Space such as a street are used to hang

ornamental birds on the ceiling. Places, which provide shading and a bench were also favored spots to do optional activities.

Figure 4-3. Snapshot of Optional Activities in the Urban Kampung

Religious activity

Religious activities are related to the religion of the community members. In this urban kampung, the majority of dwellers are Muslim which means they perform religious practices five times a day. The mosque was the pivotal spot where people came to pray or just to discuss about religion.

Figure 4-4. Snapshot of Religious Activities in Urban Kampung

Table 4-1. List of Observed Activities in Kampung Code

Observed Activities	Scaling Up the Sameness Activity	Gehl's activities category with modification
Men cooking a food in front of his house	men cooking food	Necessary activity
Illegal parking "guard" parking motor cycle	men guarding/parking vehicle	
Women selling food and beverages in local food stall	shop keepers	
Men selling phone call balance	shop keepers	
Men serving a street food in edge of bridge	shop keepers	
Men fixing a motor cycle in front of his house	men fixing motorcycle	
Men and woman deploying a tent to sell a food	men prepare for work	
Men sewing a clothes	men working	
Women serving costumer buying stuff in her kiosk	shop keepers	
Women making noodle in her food stall	women cooking food	
Women washing clothes in communal bathroom	women washing	
Women drying clothes in aisle in front of his house	women washing	
Men working in housing construction	men built a house	
Children buy food/vegetables/daily needs from local shop	children buying item	
Women cooking and packing a food before sell them	women cooking food	
Women buy some stuff in local kiosk	women buying daily needs	
Men preparing wagon filled up with art material before sell it outside kampung	men filled wagon with commodity	

Observed Activities	Scaling Up the Sameness Activity	Gehl's activities category with modification
Women cooking in the common kitchen in the aisle	women cooking	
Men playing chess in outdoor space	men playing chess	Social Activity
Children playing marbles in the aisle	children playing	
Men sitting and chatting in guard post	men chatting and relaxing	
Men chatting in food stall while drink a coffee	men chatting and relaxing	
Teenager boys playing dove sport	teenager playing dove sport	
Group of women sitting and chatting	women chatting	
Children running with other peer	children playing	
Men chatting while smoking	men chatting and relaxing	
Women nurturing her kids while chatting with other woman	women gathering	
Women gathering in house (PKK)	women gathering	
Men playing badminton in community building	men do sport	
Teenager boys playing table tennis in common open space	teenager boys do sport	
Teenager Playing Card	teenager playing card	
Group of teenage boys playing takrow	teenager boys do sport	
Children playing football in common open space	children playing	
Teenage girls learn dancing in community building	teenage girl learning dance	
Children gathering and Chatting in guard post	children playing	
Men taking care ornamental bird on cage	men feeding dove	Optional (self-oriented activity)
Men / teenage boy fishing in the riverbank	men fishing	
Men jogging	Men do sport	
Men Reading a Newspaper	men reading a newspaper	
Men feeding a dove	men feeding dove	
Women gardening	women gardening	
Teenager relaxing in riverbank	teenager relaxing	
Men smoking in the riverbank	men relaxing	
Children learning Ko'ran in Mosque	children recitation	Religious activity
Men congregating in mosque	men gathering	

Sources: author fieldwork, 2015

Table 4-1 indicates diverse of activity in urban kampung which were classified into four analytical categories. The table revels that 40% of observed activities were work based and household related activity. Work based activity were found in main streets/alleys and in the edge of study areas where the passersby (dwellers and strangers) traversed frequently. Meanwhile, household related activity was found in every public space of urban kampung. Social activity account for 38% in which some of these activities were sport activity (takraw, street football, and badminton). Social activity was diverse in term of age and gender. Optional activity account for 18% indicating that there was unique personal activity that dweller could do in typical urban kampung. These activities were gardening, fishing in riverbank, and keeping/feeding ornamental bird and dove. Furthermore, religious activities were counted very few as it no variance in Moslem religious practices.

4.2. Dynamic of Outdoor Activity in Urban Kampung in Different Days

The dynamic of outdoor activities through different times of the day may indicate the presence sense of place in an urban kampung. The continuity of activities in the outdoor space constitutes the series of event where dwellers can experience. Continuous activities in the outdoor space will promote the generation of a strong sense of space among dwellers (in terms of activity-space practices).

4.2.1. Activity on Weekday (Tuesday)

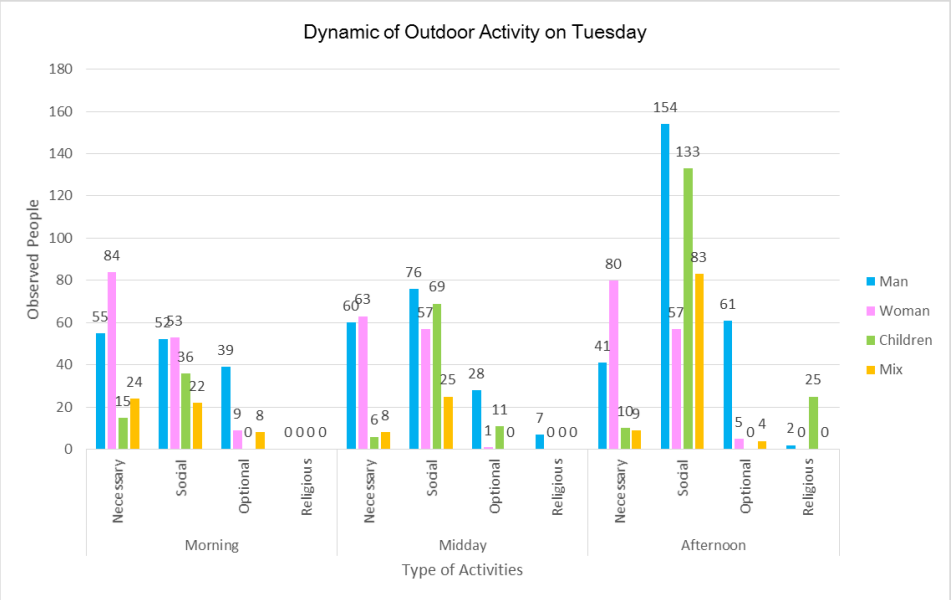


Figure 4-1. Intensity of Dynamic Outdoor Activity on the Weekday (Tuesday)

Based on the Figure 4-1, we found that man's necessary activity gradually decreased from morning to the afternoon, whilst, the woman's necessary and social activity continued in about the same intensity through the day (see Appendix 7-1). Man's social activity reached its peak in the afternoon as most of the head of household have returned from work outside urban kampung. The woman's necessary activity was often related to the work within urban kampung such as making and selling food, keeping shop, washing dishes and clothes, nurturing children and cooking food for catering. Children social activity was minimum in the morning due to school session and subsequently increased in the midday and afternoon. Lastly, people in groups (mix men, women and children) increased significantly from morning to afternoon indicating social activity were composed by different gender and age.

Figure 4-2. Woman Packing a Food (left); Children Pre-schooling (middle); Adult Men Playing Takraw (right) in the Weekday

4.2.2. Activities on Weekend (Sunday)

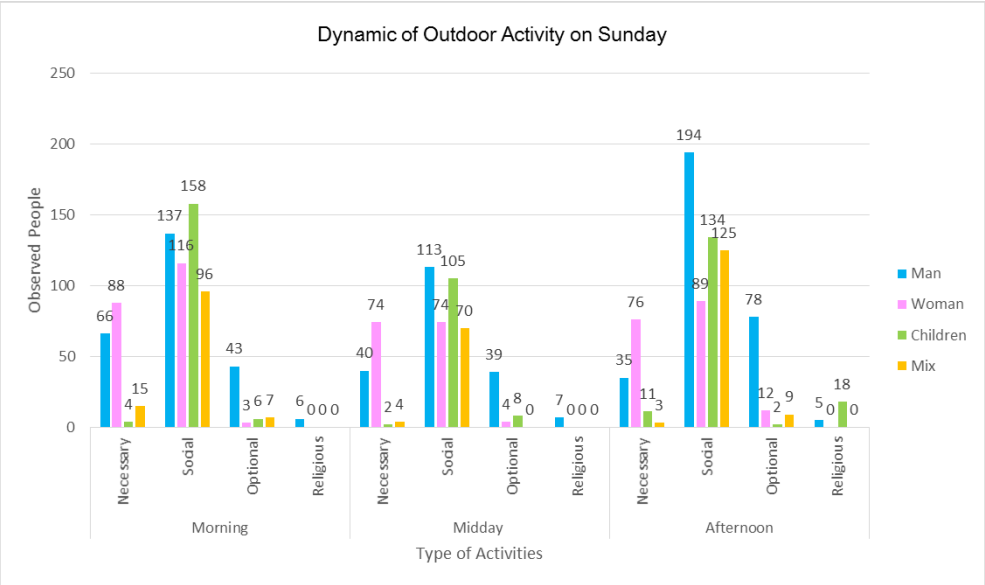


Figure 4-3. Intensity of Dynamic Outdoor Activity on the Weekend (Sunday)

Figure 4-3 shows the fluctuation of activities from morning, midday and afternoon during the weekend. Activities in the midday were less frequent compared to the morning and show the highest peak in the afternoon. This happened due to various factors for example, at midday, the surface and tin roofs of such a dense settlement are highly exposed to the sun. This caused the residents preferred to stay inside buildings or darker places (see Figure 4-4). At Sunday morning, necessary activities were the highest (26.2%) for men compare to in the midday (20.1%) and afternoon (11.2%) due to a routine practice in the urban kampung to clean up the area in a group[26]. The women's necessary activities were counted the highest in the morning and slightly decreased in the midday and afternoon. This was caused by the fact that women also work for making additional livelihood[27] or did a household chore. This also explains why men's necessary activities were less compared to women since men are off work at Sunday. Children's social activities like playing with peers were spotted the highest in the morning due to school holidays. Afternoon activities were recorded the highest for performing social activities. Men and children are spotted more frequently than women in outdoor spaces during the weekend (see Figure 4-3).

Figure 4-4. Dweller Trying to Avoid Heat by Searching Shading Areas at Midday

[26] Every Sunday morning, people in the urban kampung are cleaning their kampung collectively. This is a social practice based on the social system that inhabitants agreed on. In local term it is called *kerja bakti*.

[27] Local economic activity in urban kampung basically run seven days a week without break unless there was a major religious event. Women in urban kampung work in their own shop/tavern for selling daily needs and food.

In the midday, residents adapted to the heat by finding shade such as at the in-front of a house terrace[28] no matter if the owner is present or not. It is a common practise in the urban kampung that semi-public zones can be used by other neighbours. Due to lack of vegetation, some dwellers also installed a pergola in front of their house to create shading so they are still able to chat in the outdoor space. Some spaces in the urban kampung are narrow and to some extend the roofs overlap each other due to the high density of building. This creates mutual shadow in between buildings. Those spaces also were used after and during midday.

Figure 4-5. Man performing social activity in the afternoon (left); Children Swimming (middle); and Man Preparing Dumb Wagon for Cleaning Kampung / *kerja bakti* (right) on the Sunday.

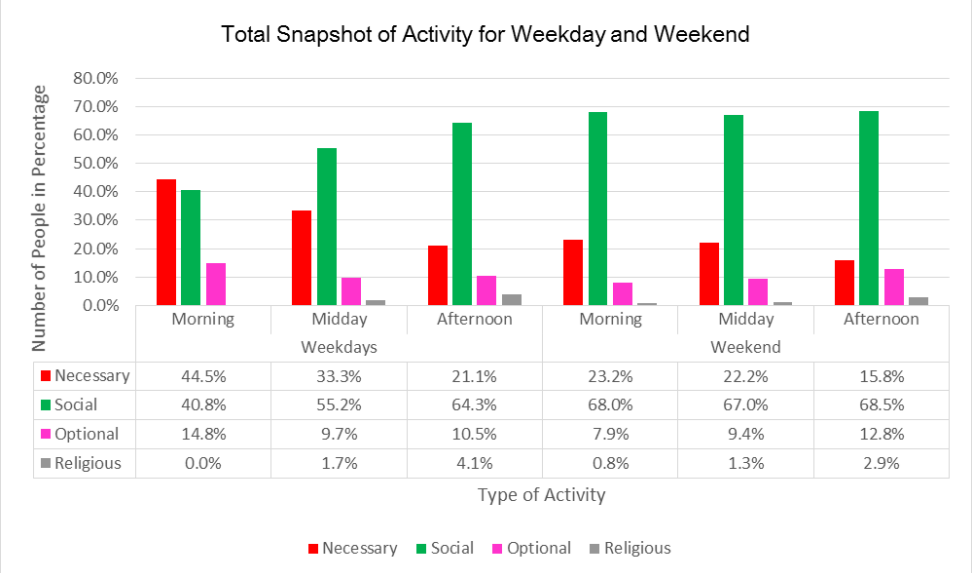


Figure 4-6. Total Weekday and Weekend's Outdoor Activities

The dynamic of outdoor activities is represented by the continuity of socio-spatial practices at different times of a day. Based on figure 5-6, it can be clearly seen that some types of activity increased and others decreased between weekday and weekend. Necessary activities gradually decreased throughout a day and particularly it plunged down on the Sunday morning. Social activities fairly increased during a weekday while optional activity showed no specific tend. The last, religious activities were spotted in midday and afternoon as the majority of dwellers are Muslim[29].

[28] Most of housing in an urban kampung does not have front gates that limit people to enter private space. Occupation of transition zones such as house terraces is common. Neighbours use that space for social activities. This indicates the social trust and communality (*rukun*) of dwellers in an urban kampung.
[29] Muslim people have to perform religious practices five times a day, two of those are in the midday and at dust.

4.3. Activity Mapping and Activity Pattern

4.3.1. Activity Mapping

Maps in figure 4-7 and 4-9 show the distribution of four types of activities (necessary, social, optional, and religious) in the urban kampung during the weekday and weekend. These maps contain thematic information including location, type, and frequency of activities residents were involved. Specifically, map 4-8 and 4-10 shows the distribution of activities based on the actor/performer, this also shows gender specific preference on space.

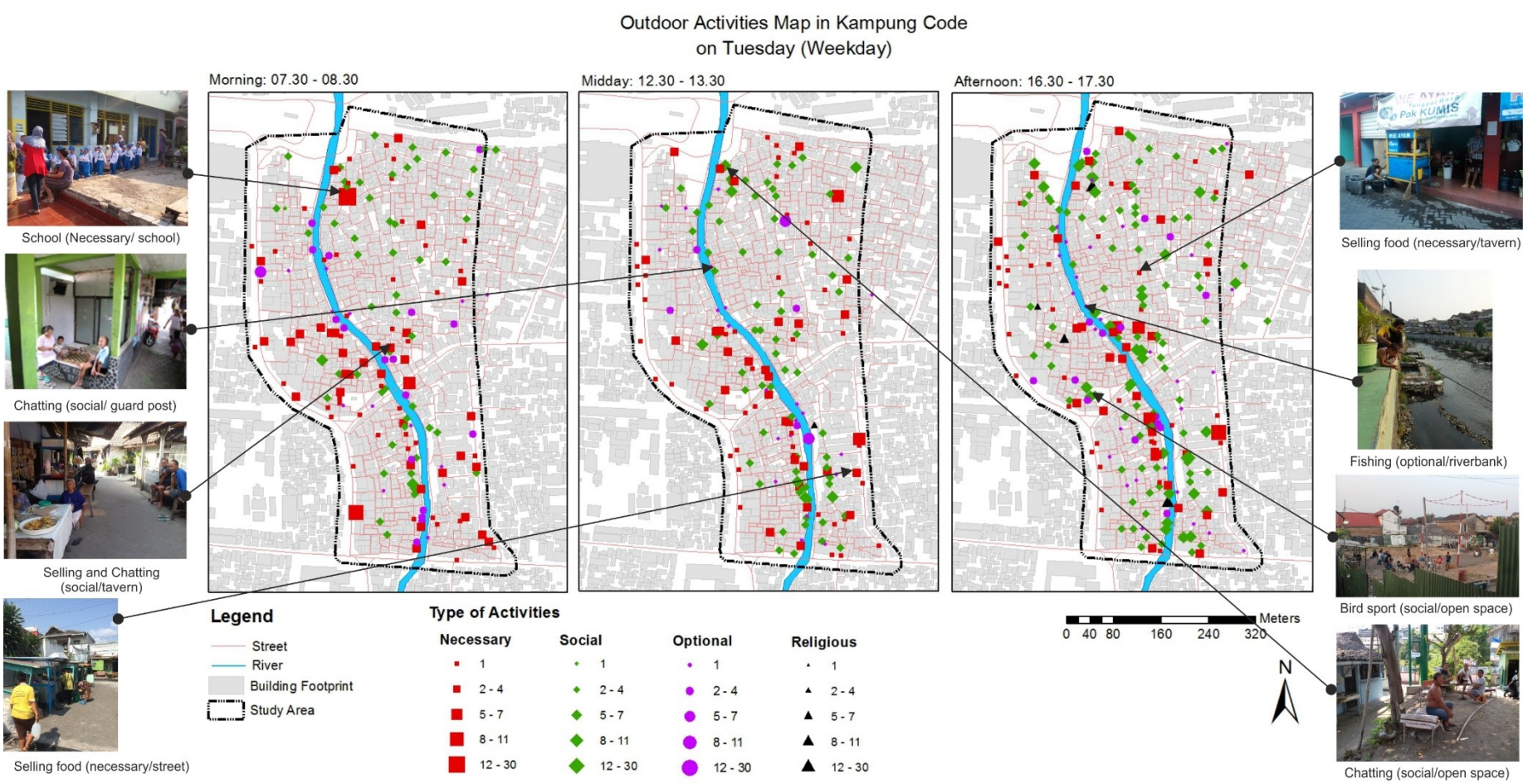


Figure 4-7. Snapshot of Outdoor Activities in Kampung Code on Tuesday

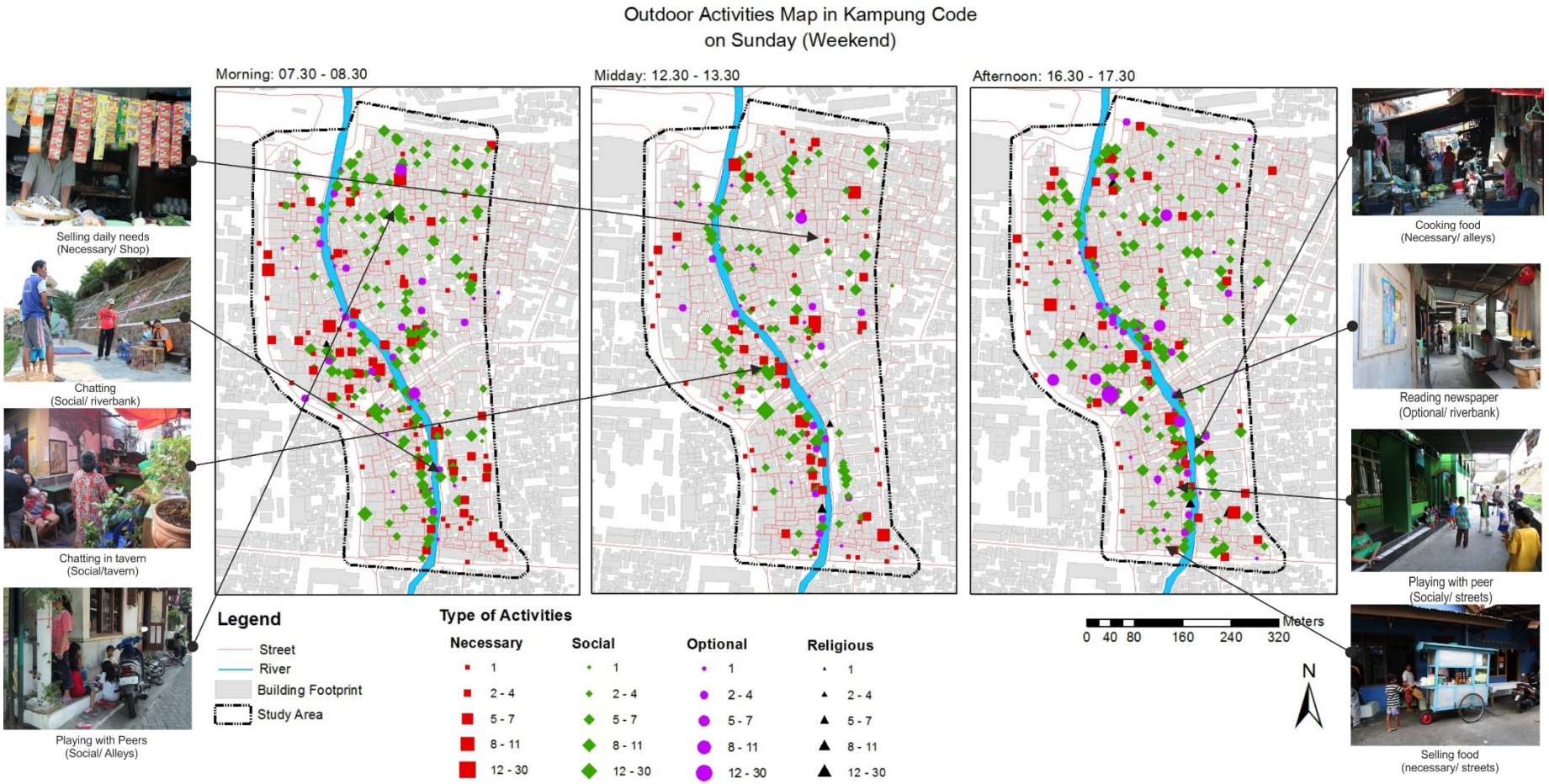


Figure 4-8. Snapshot of Outdoor Activities in Kampung Code on Sunday

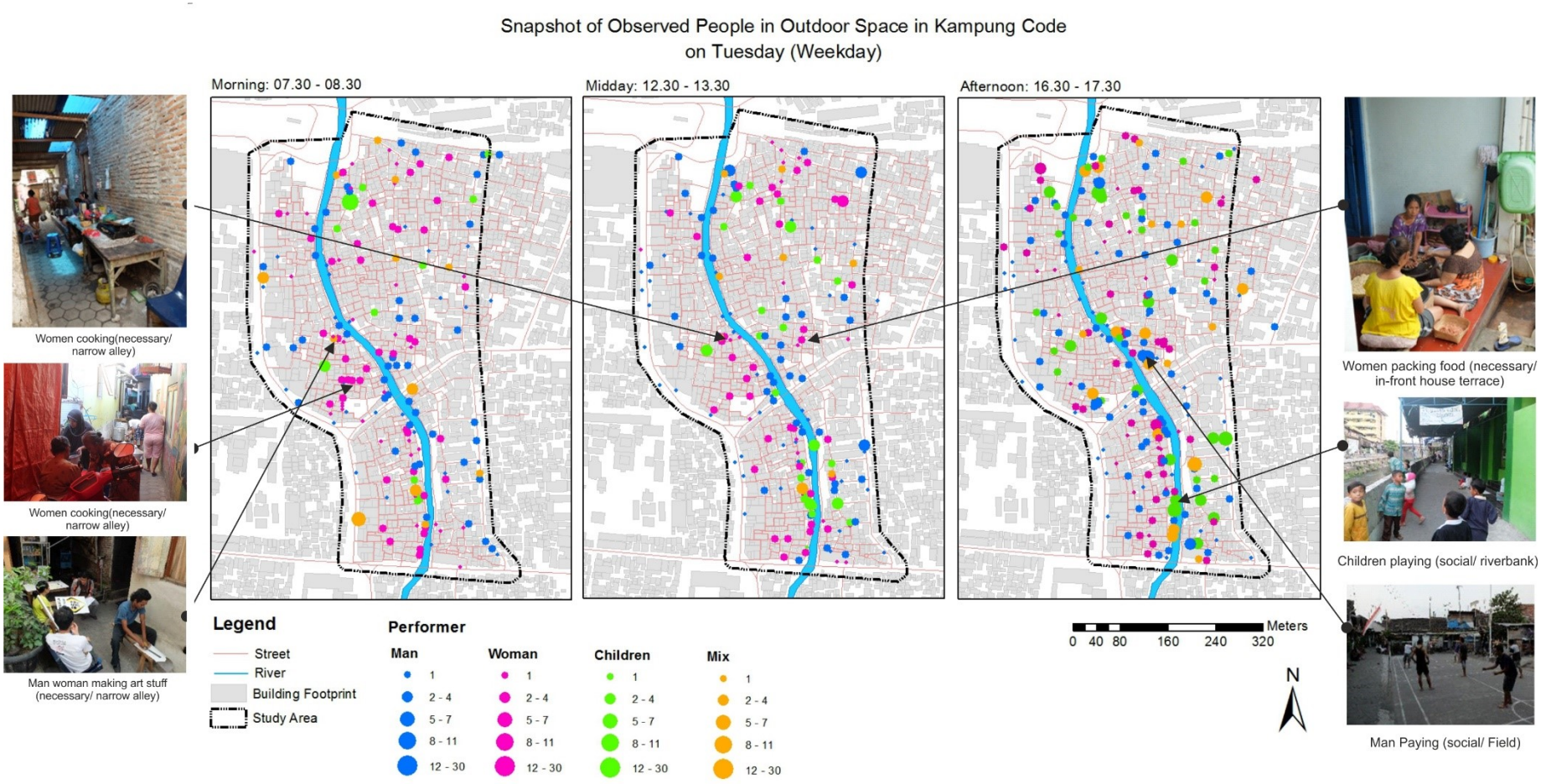


Figure 4-9. Snapshot of Observed People in Outdoor Space on Tuesday

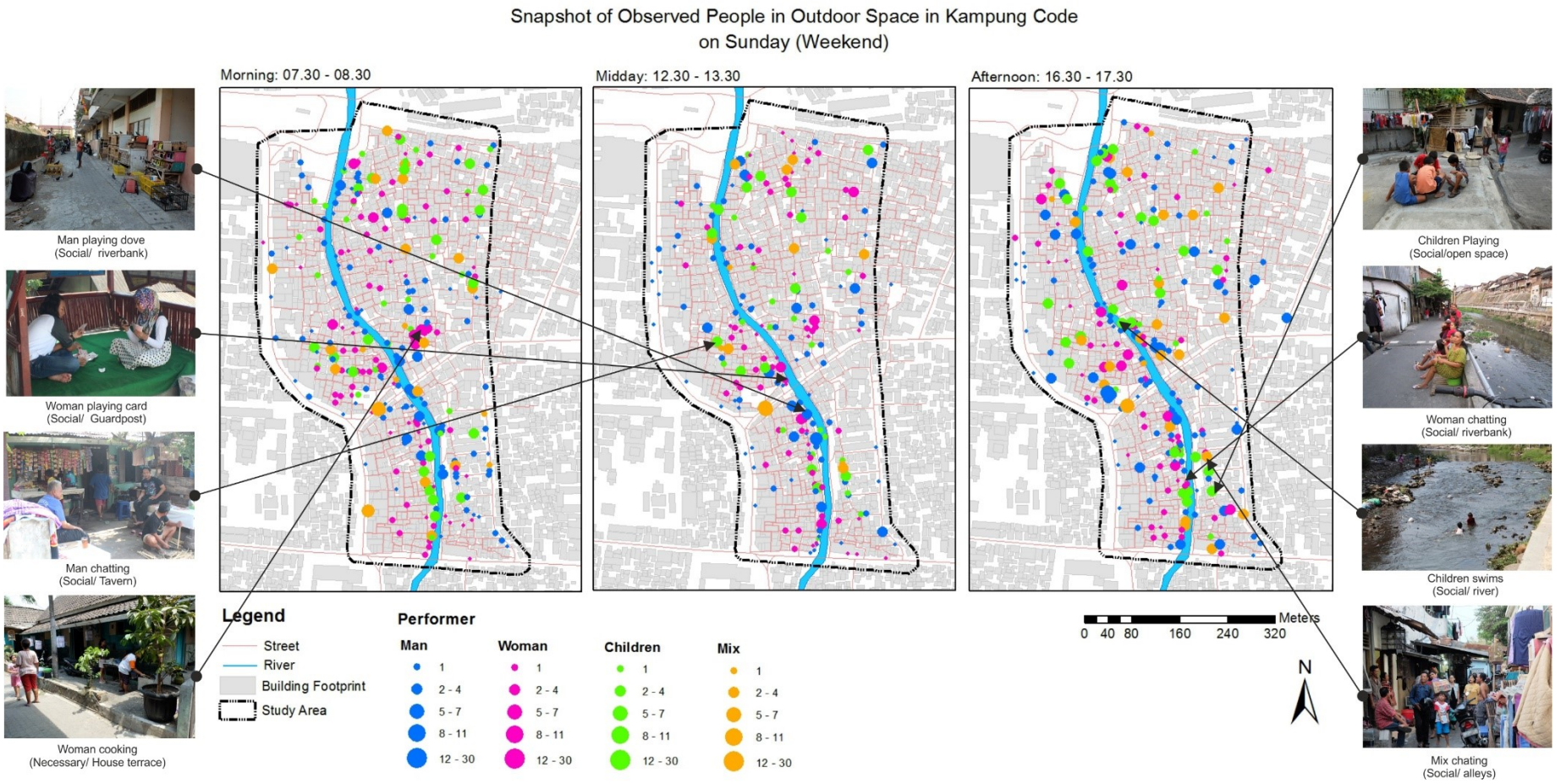


Figure 4-10. Snapshot of Observed People in Outdoor Space on Sunday

The distribution of activities in the urban kampung seems difficult to explain in term of a specific locations, as explained by Rahmi et al. (2001) and Setiawan et al. (2010), the dwellers occupy the space creatively to fit their needs in small and heterogeneous public spaces. Therefore, in general, distribution of activities in the urban kampung follow public spaces and amenities available in the urban kampung such as streets/pathways, community buildings, local shops/taverns, guard posts, riverbank, fields and open spaces, and mosques. As showed in figure 4-7 and 4-8, necessary activities related to making livelihood were located along streets and shops. Riverbank accommodates almost every types of either social or optional activity for example people chatting, children playing and swimming, fishing, or just sitting while smoking enjoying the view. In addition, religious activities were always centred close to mosque /*mushola*. However, the variation at different times a day, in general, did not change so much in terms of locations of the four activity types, merely the intensity increased.

Activities by actors displayed in figure 4-9 and 4-10 indicates a slight gender preference on space. Women's preferences on space were distinctly different from men' preferences. Often women were observed in a particular alley that provides them privacy (alley with limited sight). These activities often took place near the house, for example, washing and hanging clothes, cooking food in the communal kitchen, and resting in front of the house terrace. However, some women's activities were also performed in public spaces like the river bank. They appeared together with men and children. The men were spotted in the nearby public spaces, specifically riverbank, tavern, and fields and open spaces. Likewise, children tended to do social activities (playing) in the observable places[30] such as community building, field and open space, and main streets/alley.

[30] Places that visually observable by people / neighbor.

4.3.2. Spatial Attachment of Household Member in Urban Kampung

The spatial attachment of dwellers in the urban kampung was traced by looking at the distribution of daily activities. In this research, the daily activity was capture by questioning the habit of household members in the past week. Four categories of activity occurring within and outside of Kampung Code are shown in figure 4-11.

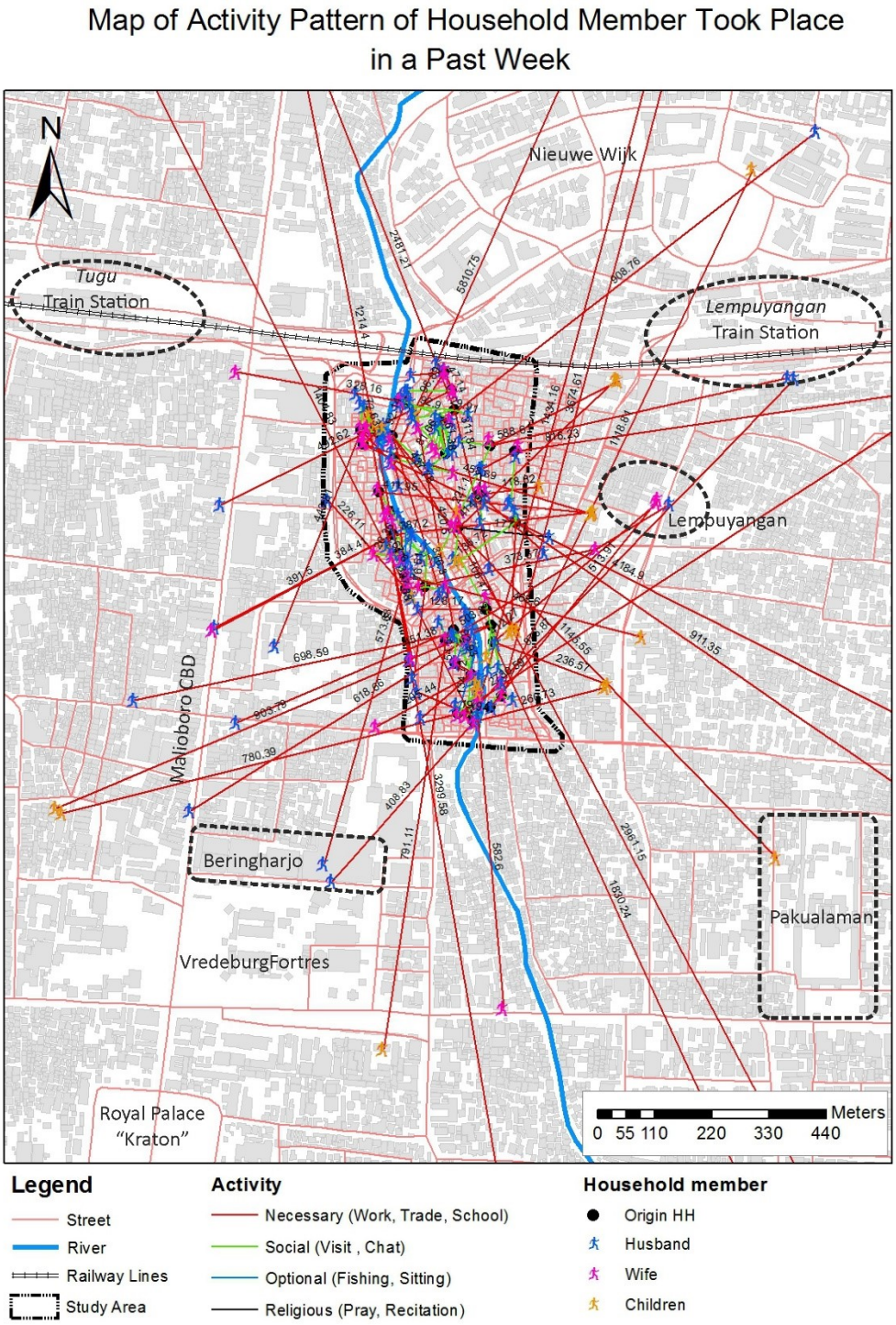


Figure 4-11. Map Showing Activity Pattern of Household Member in a Past Week

For this analysis, 40 random sample of households[31] were used for identifying a space-activity pattern in terms of interdependencies of the urban kampung over the city of Yogyakarta. This space-activity pattern reveals the behavior of dwellers within and outside of the urban kampung. Figure 4-11 describes the necessary, social, optional, and religious activity occurring within Kampung Code and in the city of Yogyakarta. Necessary activities (red line) were working activities mostly done by the head of household outside the urban kampung. Some necessary activities either formal or informal took place in a short distance of the urban kampung like in the Beringharjo and Lempuyangan traditional market. Conversely, women's necessary activities mostly took place within the urban kampung, for example, keeping kiosk and tavern. Social activities (green line) dominantly took place near the house. Dwellers (men, women, children) preferably did social activities in natural features like Code River and community building, being a medium to assembled social activities. Optional activities, however, do not have a clear pattern, yet, dweller still did those activities within the urban kampung (see Figure 4-11).

The sample of household member's activities shows that urban kampung is an autonomous social and economic entity. Urban kampung is a compact settlement wherein necessary activity such as selling food/daily needs were able to satisfy the daily needs of the residents in the urban kampung. In addition, even though kampung Code situated in the centrally strategic location (see figure 3-1), the activity still occurred frequently within the urban kampung without being drew out to the more attractive areas like Yogyakarta CBD and Kraton District. It shown from the map that the more activities appearing within the urban kampung indicates the strong spatial attachment of dwellers in the kampung.

4.3.3. Activity Pattern of Outdoor Activities with Kernel Density and Hot Spot (Getis-Ord)

Activity pattern was analysed with Hot Spot analysis to examine whether the distribution of activities was statistically clustered, random, or low clustered. Besides that, the magnitude of activities in space was analysed with kernel density. This analysis reveals the general pattern of activities within the study area. The pattern then was discussed to explore the significance of space and time dimension of outdoor activities in the urban kampung.

Density of Activity in the Weekday and Weekend

Based on figure 4-13 and 4-15, the density of activities considerably changed between weekday and weekend. The magnitude of outdoor activity was clearly seen concentrated along the riverbank in the south of urban kampung and expanded outwards in proximity to amenities (community building and tavern). Particularly on the weekday, the highest density of activities mostly appeared where huge number of people congregating for sport or social gathering. In general, the activity pattern does not change in term of location during the weekday and weekend.

Activity Hot Spot in the Weekday and Weekend

Prior to conducting a Hot Spot (Getis-Ord) analysis, conceptualization of spatial relationship in term of distance band/ threshold distance has been analysed to achieve the optimum statistical significance (z-score and p-score). Zone of Indifference[32] then was selected considering the distribution of activities over the study area size. The experiment results show that optimum Z-score and P-value were achieved at 50 meters' threshold distance (see Figure 4-13). This mean that, neighbouring activities weighed by number of people within 50 meters were taken into account to perform spatial relationship over other activity points. This parameter then was used to perform an analysis of activity patterns at different times and day.

[31] One household in this research comprises of head of household (husband), wife, and children below 14 years old.

[32] Features within the specified critical distance (Distance Band or Threshold Distance) of a target feature receive a weight of one and influence computations for that feature. Once the critical distance is exceeded, weights (and the influence a neighboring feature has on target feature computations) diminish with distance (ArcGIS Help).

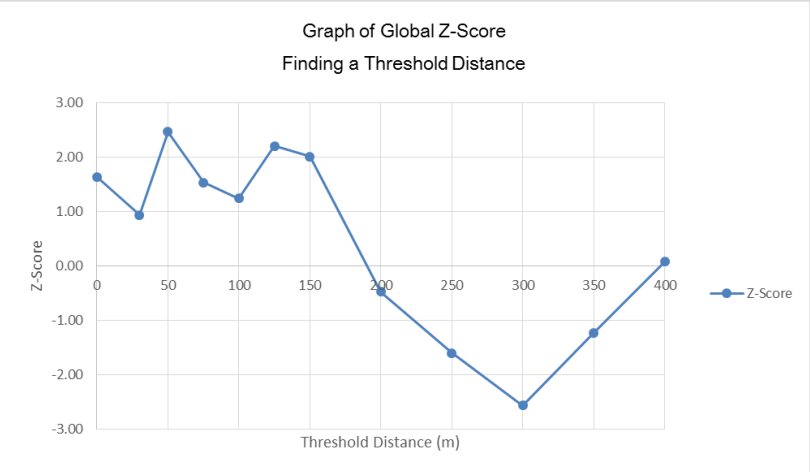


Figure 4-12 Graph of Various Threshold Distance and Global Z-Score Results

Figure 5-14 shows that the high cluster of activities appeared in the north and south part of the urban kampung whilst the majority of activities were randomly distributed and very few were low clustered. The high cluster activities within radius 50m threshold were spotted in the proximate of amenities such as community building, open space, shops and tavern, guard post, and riverbank. As evidence, there were such amenities in north and south part of the urban kampung within a radius 50 meters. Activity hotspots are slightly different in the weekday (see Figure 4-16). High cluster of activities was spotted at the bridge[33] of the urban kampung and in the field[34] with pavement which dwellers use it from doing sport (see Figure 4-17). The high cluster of activity mainly was caused by particular cultural event held by the community to commemorate the birth of the kingdom of Yogyakarta[35]. This event attracts considerable amount of inhabitant at that place (see Figure 4-17). The low clusters of activities were spotted at the edges of the urban kampung. These were individual necessary activity (e.g. hawker selling food and illegal parker "guard" work in street).

Figure 4-13. Cultural even (left), dove sport (middle), tackrow sport (right)

[33] Bridge situated in the mid of the urban kampung, separating and also connecting the north with south part of the urban kampung.

[34] Open space or field observed in Kampung Code includes field with pavement which is used for sporst like trackrow or volleyball, green open space (open space with greenery) and bare open space (open space with bare land)

[35] Obviously, during fieldwork, there was a cultural event held by communities of all kampungs and neighborhoods in Yogyakarta to commemorate the birth of kingdom of Yogyakarta.

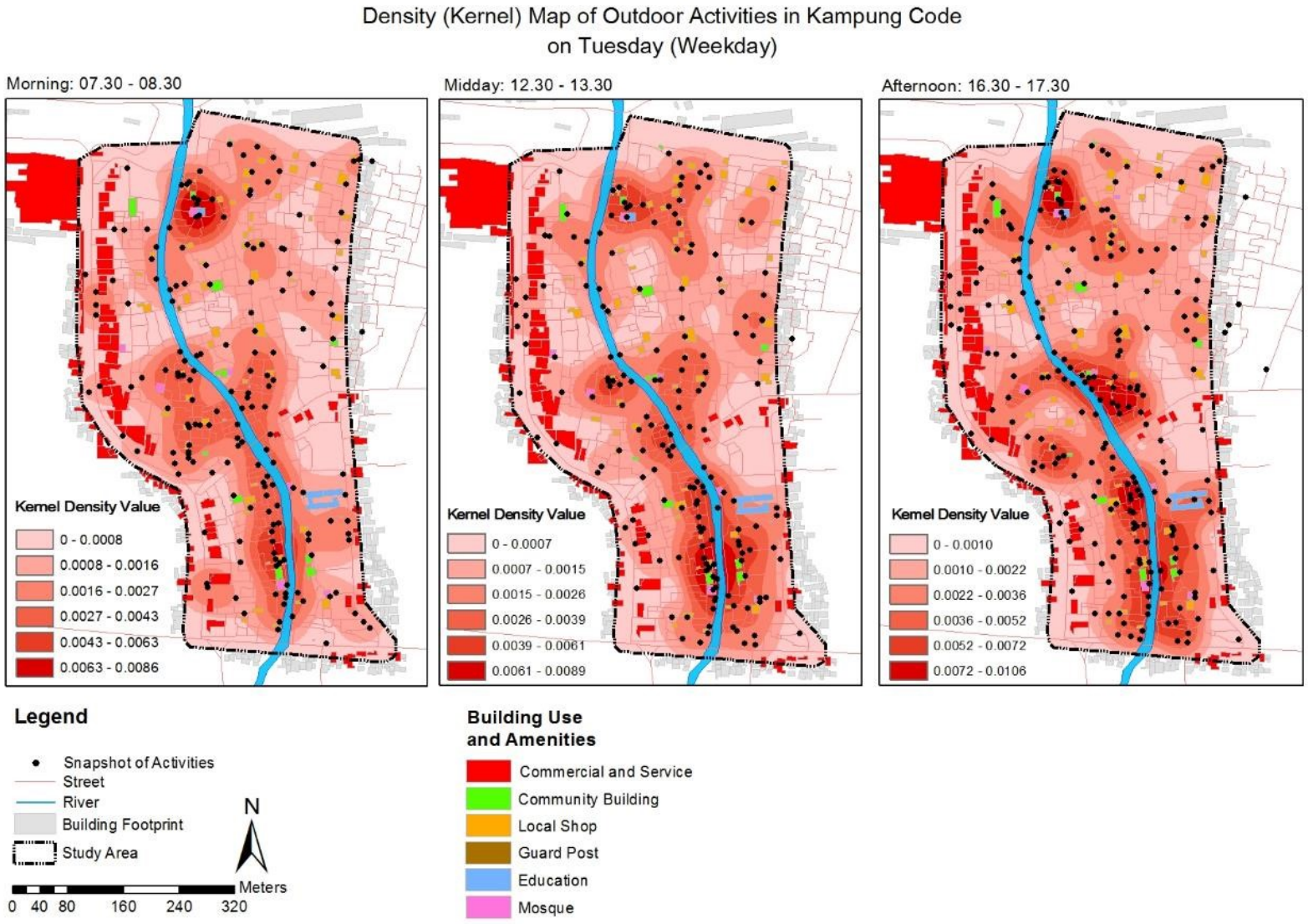


Figure 4-14. Density Map of Outdoor Activity during Weekday with Default Search Radius

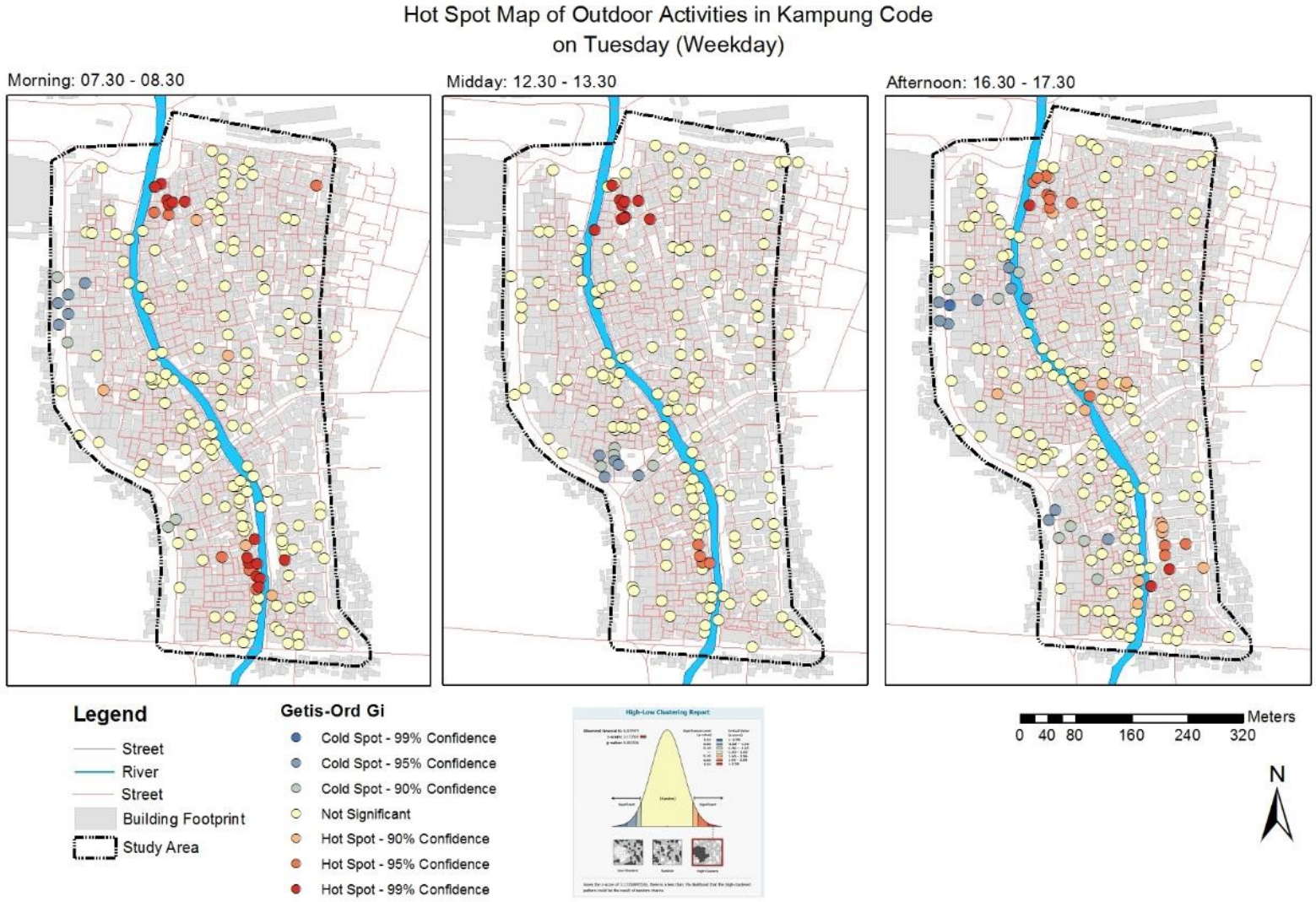


Figure 4-15. Hot Spot Map of Outdoor Activity on the Weekday with 50 Meters of Threshold Distance

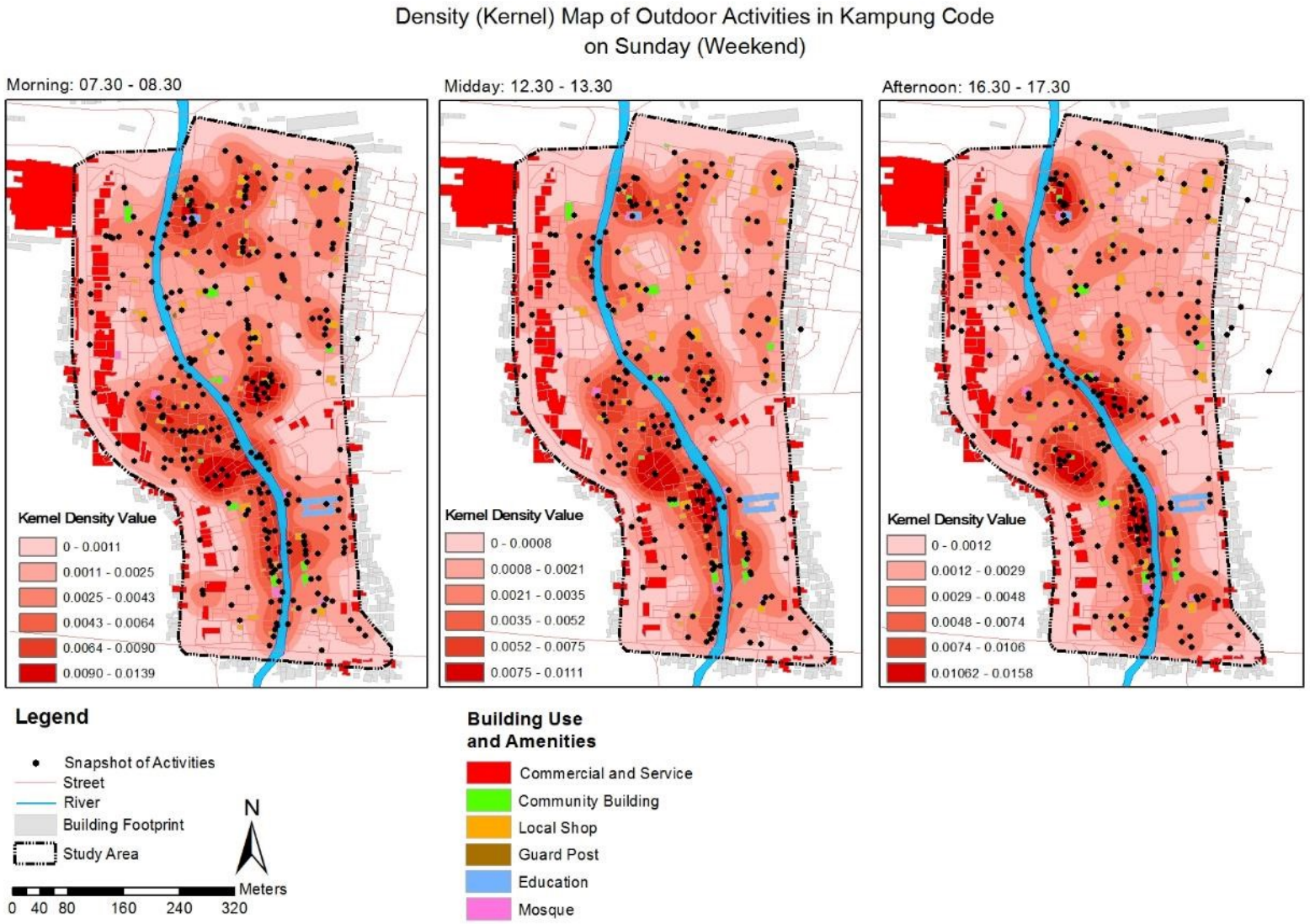


Figure 4-16. Density Map of Outdoor Activity on the Weekend with Default Search Radius

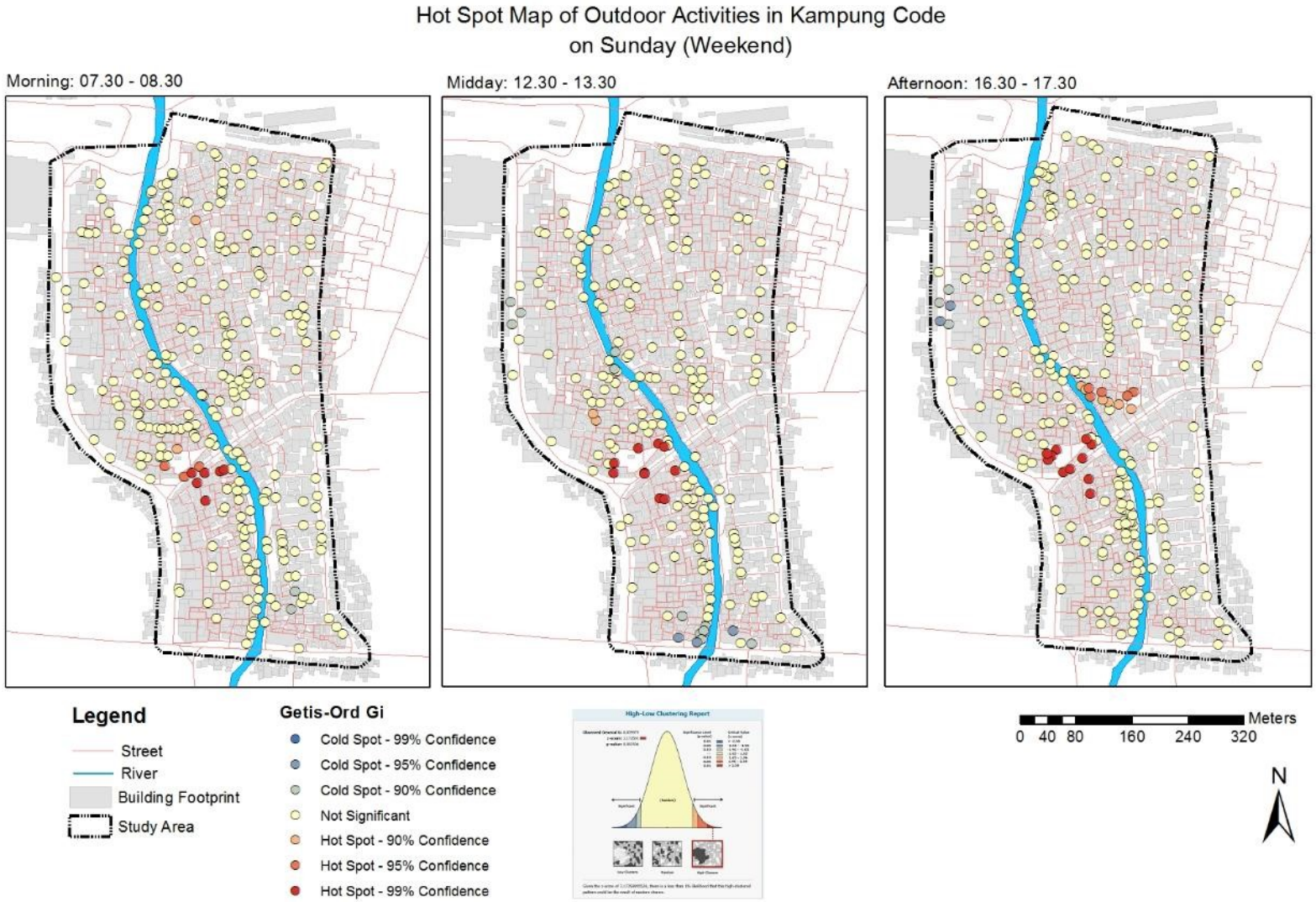


Figure 4-17. Hot Spot Map of Outdoor Activity on the Weekend with 50 Meters of Threshold Distance.

5. SPATIAL CONFIGURATION OF THE URBAN KAMPUNG

This chapter analyses the configuration of space, density and diversity of the urban kampung employing space syntax and spatial metric. The results from space syntax in from of indicators (connectivity, control, local, and global integration) are presented and illustrated in maps and histograms. Followed by spatial metrics, which are used to generate density and diversity maps. The last section, explores the activity and space relation by correlating the snapshots of activities and space syntax and spatial metric results.

5.1. Results of Syntatic Measures of Kampung Code

5.1.1. Connectivity Value

The connectivity value gives the idea of space that possess certain degree of connection to its immediate vicinity. It has been observed that the degree connectivity may attract or hinder a movement in space. Level of connectivity in the urban kampung is also associate to a shortcut which allow dwellers to do through-movement to their destination within the kampung.

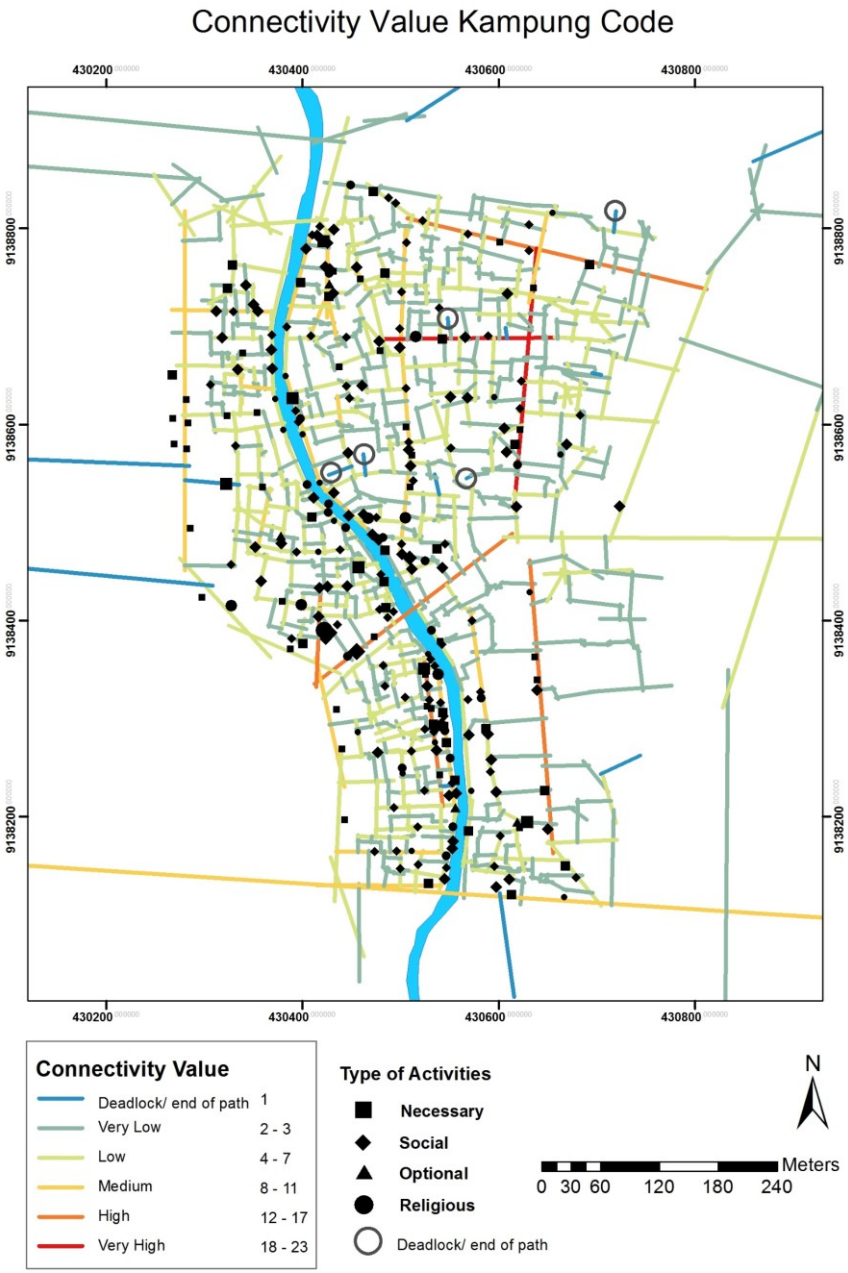


Figure 5-1. Map Showing Spatial Variation of Connectivity Values

Based on figure 5-1, the value of space/street connectivity ranged from 1 to 23. This is shown in the gradual colour (red-blue) representing high to low connectivity. The average number of connections of streets that join to another street is 3.4, while the highest frequency of connections per line is 2[36]. It means that one can access a space in the kampung from about two to three alternatives different space. From the observation, there are very few streets, which have connection values equal to one (representing the end of a road). Such a line could be a deadlock or the end of a street at the edge of the study area. Streets which have higher degree of connectivity apparently share more activities in immediate vicinity. Figure 5-1 shows that outdoor activities occur more frequent at more reddish lines/spaces.

[36] Lines with two number of connection counted for 287 lines, meanwhile, lines with three number of connection counted for 275. Thus, 2-3 connection per lines is the most frequent lines in the kampung.

5.1.2. **Control Value**

Similar with the connectivity, control value represents the relative strength of space by counting the number of alternatives connection of lines. The value gives an idea how big or small the opportunity of space is in taking control or to observe the activity occurring in the space.

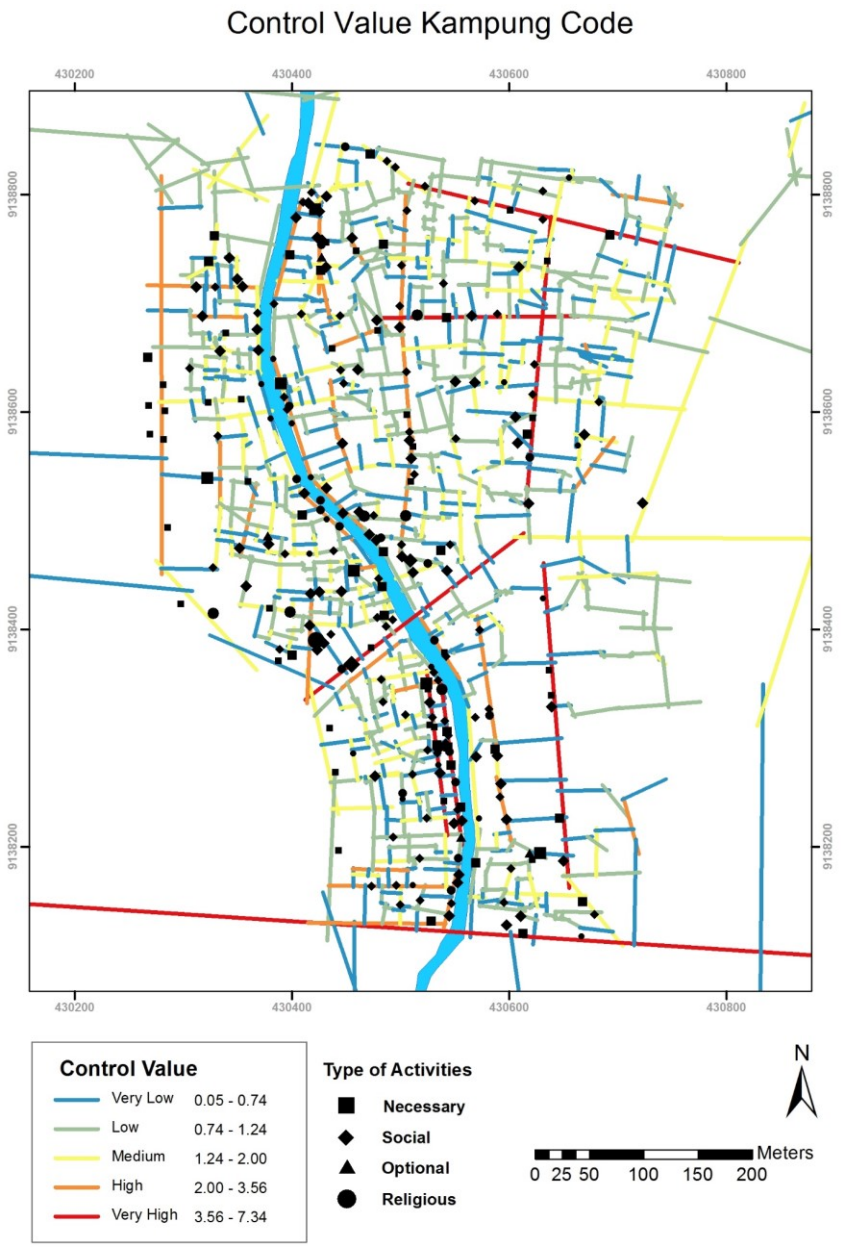


Figure 5-2. Map Showing Spatial Variation of Control Values

Based on the figure 5-2, the values of control are shown in the gradual colour from high to low (red-blue). We can observe that most of the outdoor activities occurred in the spaces, which possess high control value. These spaces (red lines) are streets/spaces in the western, northern, and the alley along the riverbanks. However, we can also observe some activities, which were located in the spaces with low control value. This indicates that some activities such as women washing clothes and cooking food in the communal kitchen occurred in the unexposed spaces. The reason behind this might relate with the privacy of women.

In principle, the higher the control value is the more the spaces or streets have control access to its immediate neighbourhood. Thus, a neighbour who resides along that line has a higher likelihood to meet and observe a people.

5.1.3. Local Integration

Local integration is a local parameter, which is associates with the resident's internal system. Local integration is calculated only three step away from the rest of the spaces in the system. Thus, the spaces with higher local integration cognitively can be reached within three steps away, thus it is locally closer to other spaces. Local integration has been used to describe the volume of pedestrians and possible social interaction.

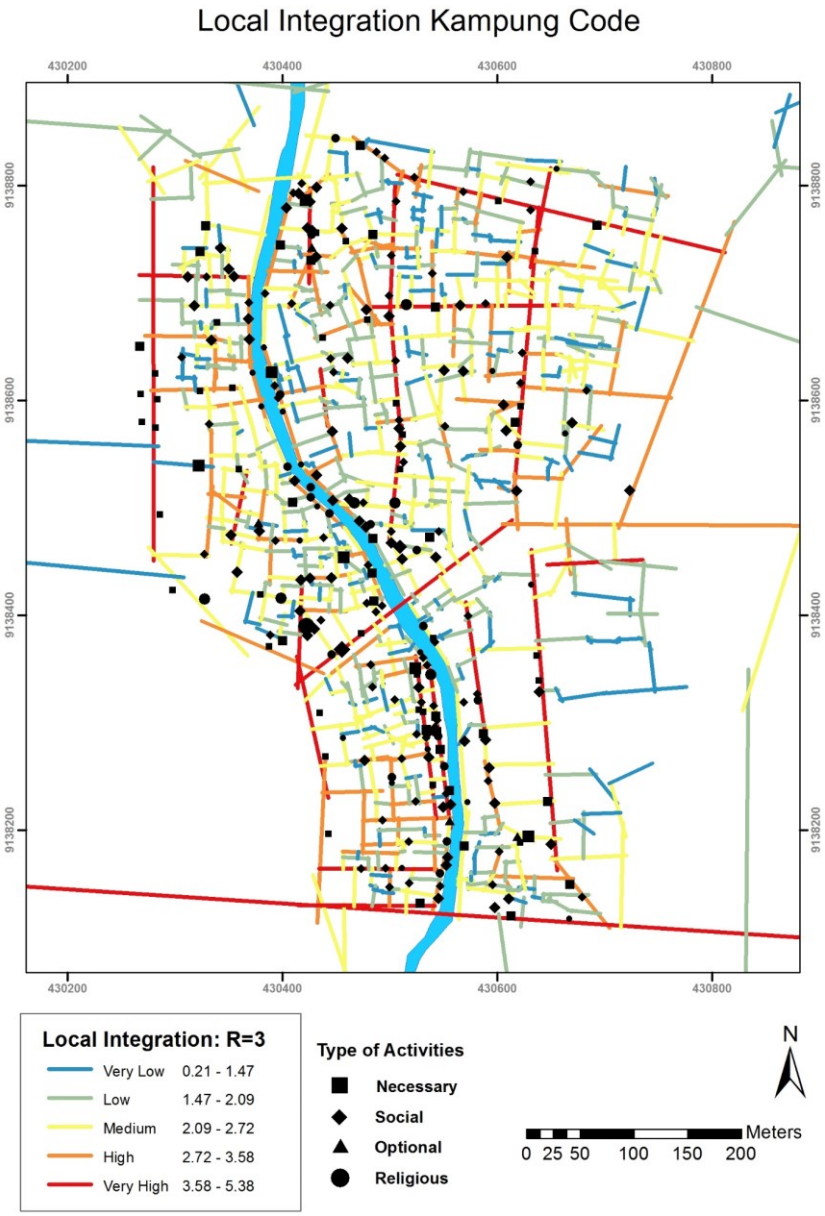


Figure 5-3. Local Integration Map of Kampung Code

The values of local integration are shown in the gradual colour from high to low (red-blue). Based on the figure 5-3, we can observe that the some locally integrated spaces are situated within the kampung. Some spaces at the edges of the kampung also indicate high local integration but this has different articulation

compared to global integration. The outdoor activities, particularly social interaction occurred in the high locally integrated space within the kampung.

5.1.4. Global Integration

Global integration highlights the spaces that are most likely to favour movement through the entire system of the kampung. This can also be used to see the integration of the kampung with the city of Yogyakarta. In city level, global integration is often correlates with car/vehicle movements.

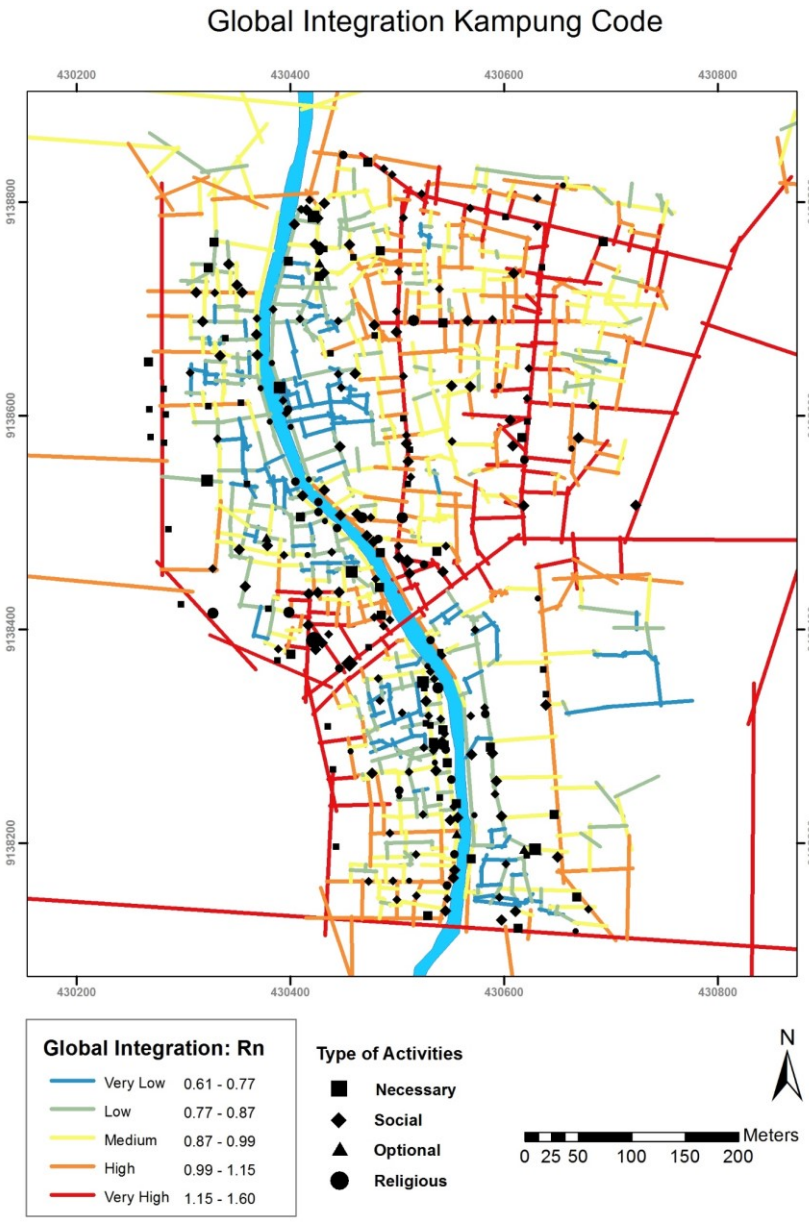


Figure 5-4. Global Integration Map of Kampung Code

Global integration map in figure 5-4 shows the accessibility variation of space towards others spaces in the entire urban kampung. The higher the accessibility (red lines) the better the integration since those spaces can be accessed with less turns and less depth over another space in the whole system. It can be seen that red lines strongly appear at the edges and at the bridge in the middle connecting the east and

west of the urban kampung. A higher degree of integration at the edge of the urban kampung indicates better access to the greater system (e.g. the neighbouring district/area such as CBD of Yogyakarta). We can observer from the map that the outdoor activities less occurred at the edges (high globally integrated spaces), instead they occurred more frequently within the kampung, or in the low globally integrated spaces (blue and yellow lines)

5.1.5. Intelligibility of Kampung Code

Intelligibility is a second order syntactic measure, which quantitatively measure the understand-ability of the spaces. Correlation between global integration and connectivity shows that the overall intelligibility score in Kampung Code is low, R^2= 0.101 (see Figure 5-5). This might indicate that the connectivity of streets is not well integrated with the whole system of the kampung. From a theoretical point of view, the intelligibility score influence on the spatial cognitive/mental map of the people (resident and stranger/outsiders) to navigate or orient in the space. Thus, in this case, the low value of intelligibility score results on low spatial cognitivity of people in the urban kampung. It might be true if the strangers/outsiders try to walk around in the kampung. Nevertheless, due the fact that dwellers are actually residents of the kampung, it is not an issue for them to navigate or orient in the urban kampung. This because they already developed their mental map of the kampung wherein they have been living for 43 years in average (see Appendix 12).

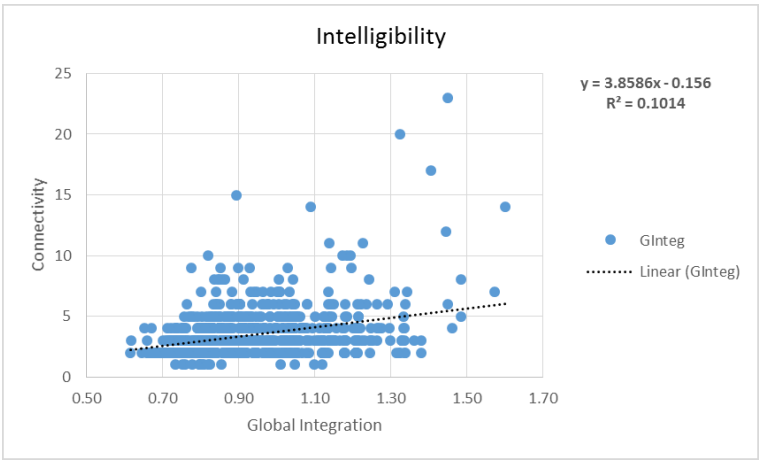


Figure 5-5. Intelligibility: Connectivity – RN

5.2. Density and Diversity of Kampung Code.

Spatial metric analysis was used to analyse the spatial characteristic of Kampung Code in terms of diversity of building use and density of built-up areas. Subsequently, correlation analysis was performed to see the association between outdoor activities and spatial metric variables.

5.2.1. Density of Kampung Code

Density map gives the depiction on how dense the built-up environment (housing) in Kampung Code is. The overall density of a typical urban kampung influences the activity pattern. This also suggests where the outdoor activities took place by correlating the result with outdoor activities,

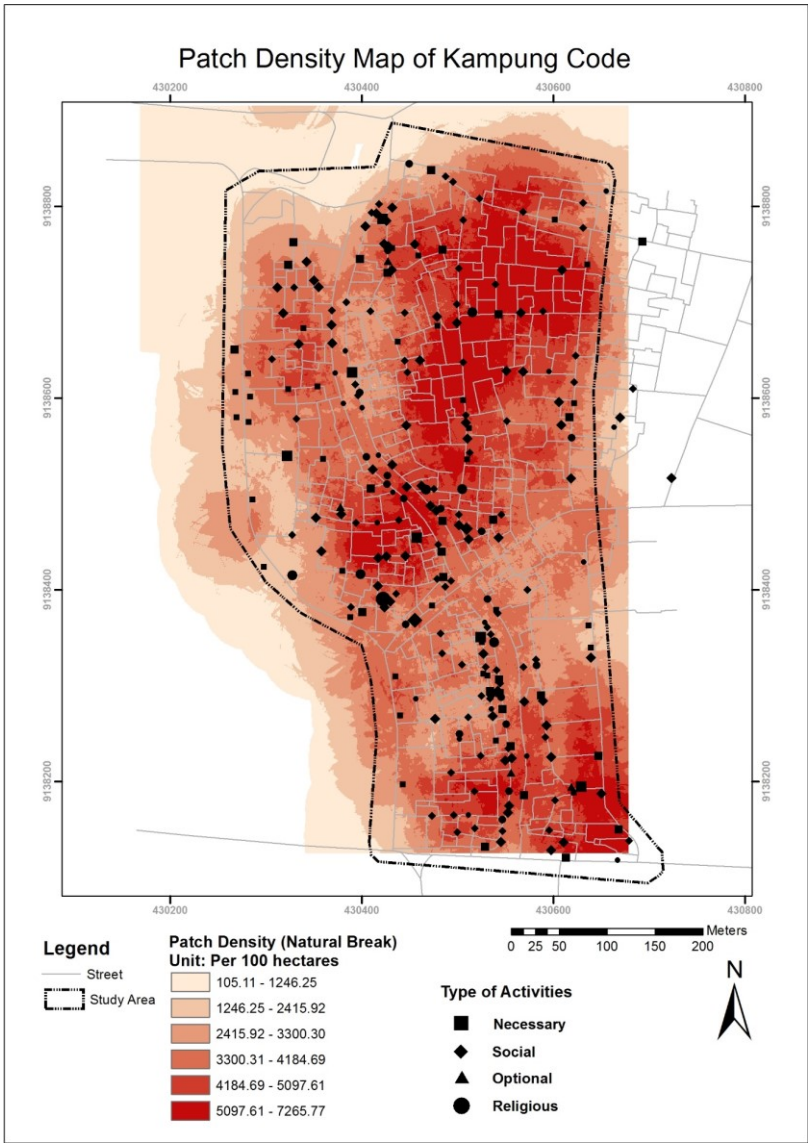


Figure 5-6. Patch Density Map of Kampung Code

Path density (PD) map in figure 5-6 shows the density variation of dwellings in Kampung Code. Areas of dark red colour represent higher dwelling density within the study area. The mean and maximum value are 3741.5 and 7265.7 density per 100 hectares respectively. This means that the average built-up density in kampung is equal to 37,4 densities per hectares. Considering the size of the kampung is about 25.6 hectares, it can be said that kampung code is over density. The maximum value shows that high density appears in the north and southern part of Kampung Code.

5.2.2. **Diversity of Kampung Code**

The diversity map gives the depiction of the variation of building uses within the radius of 50 meters. The diversity map also was used to describe the pattern of outdoor activities.

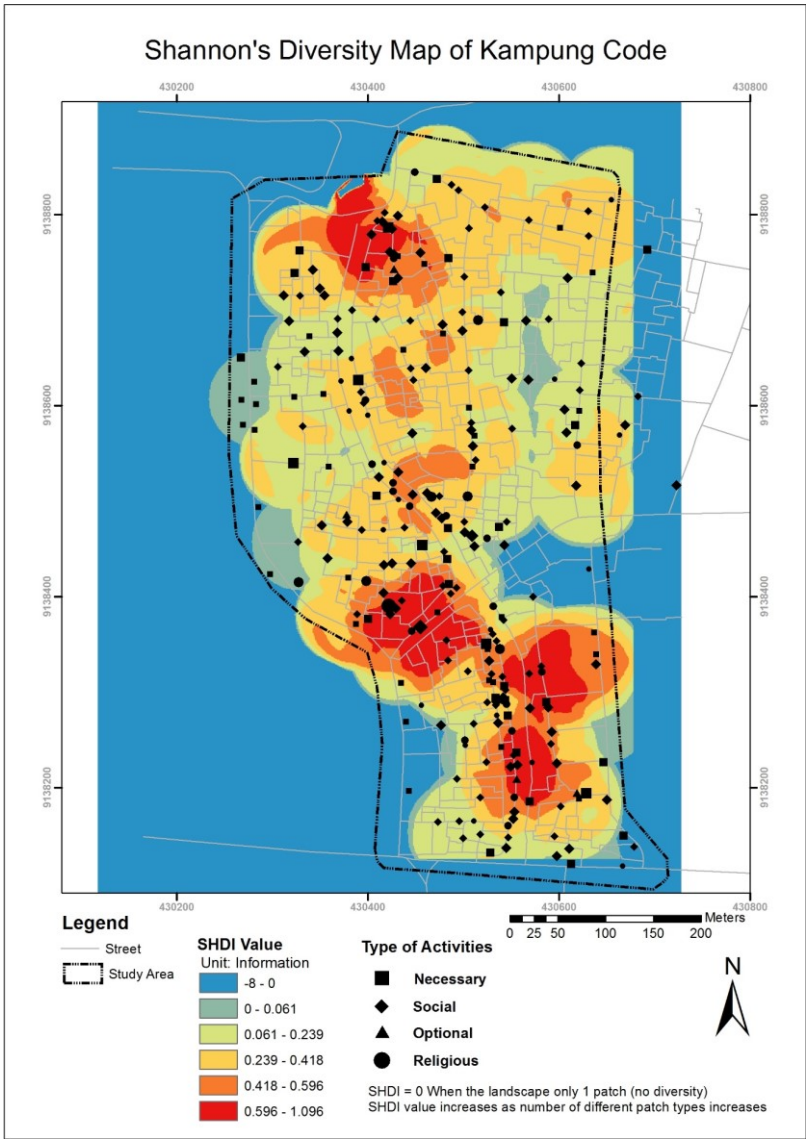


Figure 5-7. Diversity Index Map of Kampung Code

Figure 5-7 shows the diversity of building use, which varies between 0.0 (homogenous) and 1.096 (heterogonous). The strong red areas indicate the spaces with high variability of building use. This area is located at the north and south sides of the kampung where the different uses and amenities concentrated in radius 50 meters. The diversity also found within the kampung with less mix value (0.24 to 0.69). The diversity within the kampung were induced with the high variant of building use particularly the existence of many the local shops and taverns (see table 3-1).

5.3. Correlation of Activity and Space Syntax Variables.

Correlating activity pattern and space syntax variable is beneficial to understand the effect of the space configuration towards outdoor activity. In this case, linear regression is used to correlate each space syntax variables with different types of activity. Prior to conducting correlation, the researcher has observed several possibilities that might influence the correlation results. This is explained below:

First, the researcher observed that from 888 axial lines, only 168 lines (18.9%) have the record of outdoor activities (number of people in line/space), meaning that a large part of lines/spaces does not have a record of outdoor activities. Many of 81.1% lines that do not have an activity records could be a short

alleys/street segments, residual spaces, or deadlocks. The researcher therefore, decided to remove all axial lines of less than or equal to seven meters[37] in length. Interestingly, the activity –space syntax correlation results are slightly low compare to the original data set (before removing short lines segments) (see Table 5-1). This indicates that there is still a possibility of outdoor activities at short lines/spaces even though it is very small in number.

Table 5-1. Outdoor Activity and Space Syntax Correlation Results of Some Experiments

Correlation experiments	Original (R^2)	Removing Short Lines Segments ≤7 meters (R^2)	Removing Outlier Data and Short Lines Segment ≤7 meters (R^2)
Outdoor activities-Connectivity	0.2446	0.2408	0.2862
Outdoor activities-local integration	0.1755	0.1738	0.2045
Outdoor activities-global integration	0.0335	0.0324	0.0509
Outdoor activities-control	0.2346	0.2337	0.2345

The second attempt was removing outlier data due to the high concentration of people at some streets segments. This was caused by the fact that at the moment of activity snapshotting coincided with the commemoration day of 259th Kingdom of Yogyakarta. Dwellers from Kampung Code and people from neighbouring kampung commemorated this event by holding a feast. After removing this outlier data and short lines segments, we noticed an increase in the correlation analysis (see Table 5-1). Both experiments show that the activity and space syntax variables have a positive correlation. For the subsequent analysis the researcher decided to use the original data set.

Outdoor activities in the afternoon[38] both Tuesday and Sunday were merged then correlated with all syntax parameter. This was made to see the association between kampung's spatial layout and outdoor activities in general. The correlation results give the understanding on how configuration of space impacted on the creation of outdoor activities.

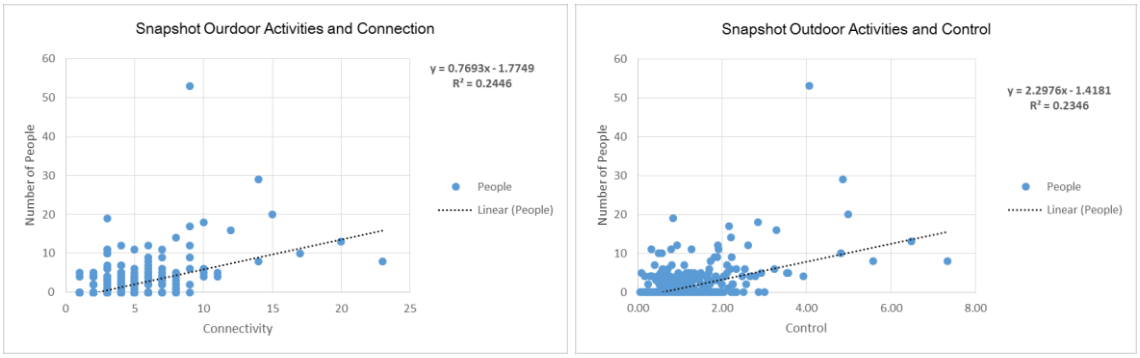


Figure 5-8. Snapshot Activities - Connection (left) and Snapshot Activities - Control (right)

[37] Why seven meters? Because the average length of the buildings in the Kampung is approximate 7 meters. Spontaneously housing construction in the kampung may left the residual space which we call it small alleys/passages. Dwellers may cross that alleys/spaces as a shortcut to their destination.

[38] Outdoor activities in the afternoon were selected for correlation analysis because this time represent the real condition of the kampung where dwellers occupy the outdoor space for different types of activities. Statistic shows (see Chapter 4.2) the afternoon are the peak time of the outdoor activities in the kampung.

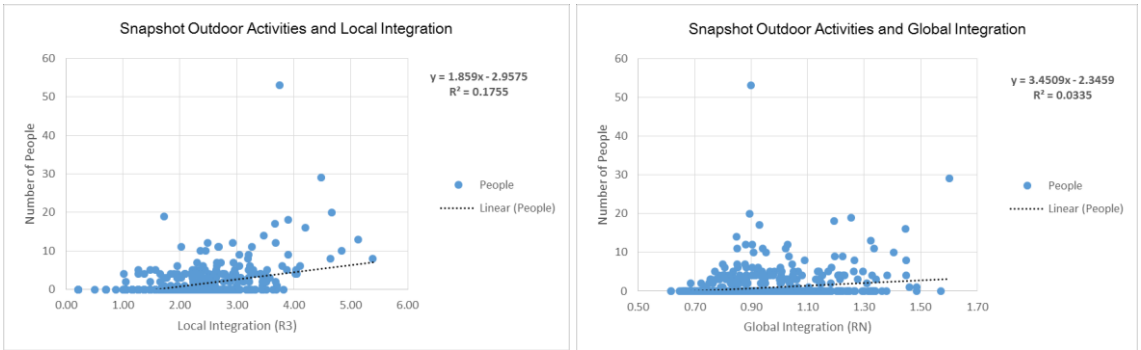


Figure 5-9. Snapshot Activity - R3 (left) and Snapshot Activity - RN (right)

The results in figure 5-8 and figure 5-9 shows that, configuration of space of the kampung has association (low value) with the creation of outdoor activities, meaning that the integration and accessibility (value) has direct impact in generating and arranging outdoor activities in the kampung. Further, for detailed analysis, the researcher correlated three different types of activities in the Tuesday and Sunday afternoon time and spatial configuration.

Table 5-2. Correlation between Activity Pattern and Syntax Variables
(All activities were made for correlation analysis is the activities occurred in the afternoon)

Activity snapshots and SSX - R^2 Linear	Connectivity	L.Integ	G.Integ	Control
Necessary (walk and work)				
Tuesday	0.174	0.091	0.004	0.141
Sunday	0.163	0.102	0.009	0.168
Social (interaction and play)				
Tuesday	0.139	0.122	0.027	0.093
Sunday	0.195	0.148	0.036	0.173
Optional (relax and sit/stand)				
Tuesday	0.129	0.081	0.003	0.123
Sunday	0.146	0.094	0.011	0.114

SSX: Space Syntax.

In general, table 5-2 shows the low consistency of correlation between activity pattern and syntax variables. Necessary activities are fairly correlated with connectivity while it has a weak correlation with the global integration. This indicates that necessary activity took place in spaces or street with a higher degree of connectivity rather being influenced by the global depth. Social activities are more related to local integration where depths are shallow (locally. Good connected spaces are the trigger of social activities. Co-presence of community in public realm also be found on space which has high degree of local accessibility and connectivity. Optional activities have a different spatial behavior towards topology of space, meaning that they are more affected by personal preference rather than topology of space. Optional activities also are less correlated with global integration as it is very unlikely those activities occurred at the edges of the urban kampung.

Table 5-3. Correlation of Outdoor Activities and Syntax Variables
(All activities were made for correlation analysis is the activities occurred in the afternoon)

SSX Parameter	Outdoor Activity on Tuesday Afternoon		Outdoor Activity on Sunday Afternoon	
	Spearman Coef (r_s)	Sig (2-tailed)	Spearman Coef (r_s)	Sig (2-tailed)
Connectivity	0.372**	0.000	0.284**	0.000
Local Integration	0.419**	0.000	0.301**	0.000
Global Integration	0.169**	0.000	0.284**	0.000
Control	0.242**	0.000	0.105**	0.002

**. Correlation is significant at the 0.01 level (2-tailed).

Spearman correlation results reveal that outdoor activities both on weekdays and weekend in the afternoon are positively correlated with all space syntax parameters. Outdoor activities, regardless the type of the activity are much more likely to occur in the shallow spaces (locally integrated space), which can be accessed within three steeps. Connectivity and local integration generate the outdoor activities within the kampung.

5.4. Correlation of Activity and Density and Diversity.

Prior to correlation analysis, test of normality Kolmogorov-Smirnov has been performed. The result shows all the data variables are not normally distributed ($p<0.001$). Hence, non-parametric correlation (Spearman Rho) was used in this analysis.

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
pd	.121	260	.000	.914	260	.000
shdi	.415	260	.000	.246	260	.000
Numb_of_Pe	.179	260	.000	.624	260	.000

a. Lilliefors Significance Correction

Table 5-4. Spearman Coefficient Table of Activity, Density, and Diversity.

Metric Variables	Observed People in Outdoor Space	
	Spearman Coef (r_s)	Sig (2-tailed)
Diversity (SHDI)	0.10	0.878
Density (PD)	0.195**	0.36

*. Correlation is significant at the 0.01 level (2-tailed).

The hypothesis for this analysis is that diversity of building use will attract activities in outdoor places. The correlation result show that the diversity has positive direction of association towards outdoor activities, but the association is not significant in indicating such a relationship. This might be explained by the fact that area the high concentration of outdoors activities was not occurred in the highest level of density in the particular areas in the kampung, instead, those activities distributed in nearby amenities. Second hypothesis is whether high built-up density in the urban kampung has an influence the outdoor activities or not. The correlation result in table 5-4 shows the density of the urban kampung (PD) has a low correlation with outdoor activities. This indicates that outdoor activities actually occurred in low densely built-up places. Dwellers tend to seek a spacious environment that can accommodate outdoor activities. This can be seen from the activity map in chapter 4.3 where high density of activities was spotted close to the river bank and open space/field. (see figure 4-7 to 4-10).

Regression model between multiple variables shows low association and statistically insignificant for the SHDI variable (see Appendix 11). This correlation results in very low coefficient of determinant value (r^2=0.8%). Thus, it can be said that the SHDI and PD variable is not significantly related to the creation of outdoor activities. The model shows that the coefficient of determinant for SHDI has a positive direction. This means that the diversity is slightly increase the frequency of the outdoor activity. This result of regression model is not robust enough to depict the real circumstances of the outdoor activities in the urban kampung.

6. DWELLERS PERCEPTION TOWARD PHYSICAL QUALITY AND NEIGHBOUR'S KINSHIP

This chapter explains the perception of dwellers regarding the physical quality and neighborhood kinship in Kampung Code. Perceived physical quality and neighborhood kinship are explained using descriptive statistic and it is supported qualitatively by using relevant quotations from FGD participants or walking interviews. Next, a summary of narrative answers is provided based on eight themes leading to the discussion of sense of place of the urban kampung.

6.1. How dwellers perceived Neighbour Kinsdhip

The dwellers perception regarding neighbor kinship can be described as the awareness toward the presence and interaction of individuals in space. Continuous interaction creates the opportunity of sharing information and experience, which can contribute to the formation of a sense of place exist in an urban kampung. The dwellers perception was measured using indicators that include relational status, length of residency, frequency and duration of interaction, place to interact, and value of neighborhood concordance.

6.1.1. Relational Status between Dwellers in the Urban Kampung

Relational status between dwellers was classified into four categories namely family, professional, cordial and no-relationship. Figure 6-1 shows the relational status between dwellers in Kampung Code was knitted mostly based on cordial relationship. About 19.56% of the interviewees mentioned that they also have family living in the same kampung. Professional relationship is not a common phenomenon where one neighbour is working for another neighbour (e.g. as tailor and food catering owner). Surprisingly, few heads of households also do not have relationship with their surrounding neighbour. This might be due the respondents were just moved into the kampung due to marriage with local people and they have not yet bounded with the neighbours.

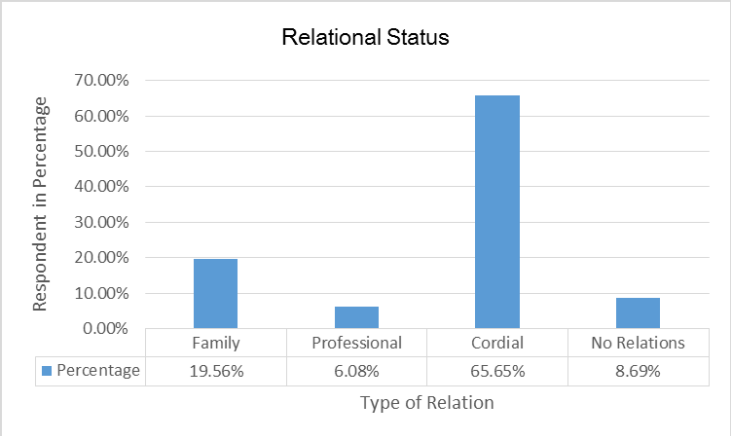


Figure 6-1. Relational Status among Dweller in Kampung Code

A cordial relationship in the urban kampung is described as an intense and continues interaction among dwellers. This type of relation is then preserved and becomes a habit where dwellers commonly yell and greet each other on the street or on the house terrace commonly also having spontaneous short talks. During a focus group discussion, a residents mentioned:

"…we are all neighbours here, if you named someone who live in this kampung we will know them. If we don't maybe it is too far or those people are hardly communicating with the community…" (FGD, group man). This shows that the dwellers actually are aware of their neighbours in the urban kampung by daily interaction. It also indicates that the neighbour's kinship in Kampung Code was created based upon the cordial relation of its dwellers.

6.1.2. Frequency and Duration of Social Interaction of Dweller in the Urban Kampung

One indicator of strong neighbour's kinship is the frequent social interaction in the form of dweller's visit. This is quantified based on the number of dwellers' visit to others neighbour for social interaction. The number of visit was counted within one week and it is classified into five class (fig. 6-2).

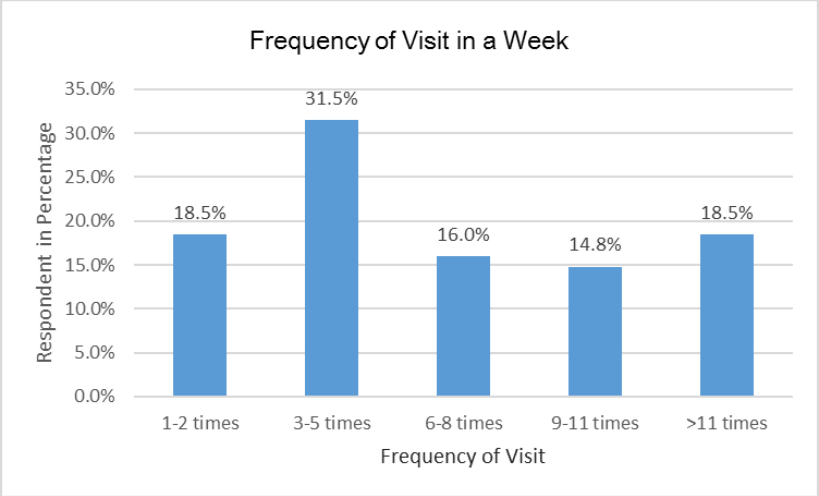


Figure 6-2. Frequency of Visitation of Dwellers within a Week

Social interaction of dweller in the urban kampung shows variations in terms of frequency of visits within a week. The household survey shows the majority of households interacted at least 3 to 5 times a week. Another 16% and 14.8% of household had more intense social interaction in term of visits. Interestingly, 18.5 % of households very frequently interacted with their neighbours (more than 11 times). However, the same percentage of households interacted less than 2 times a week.

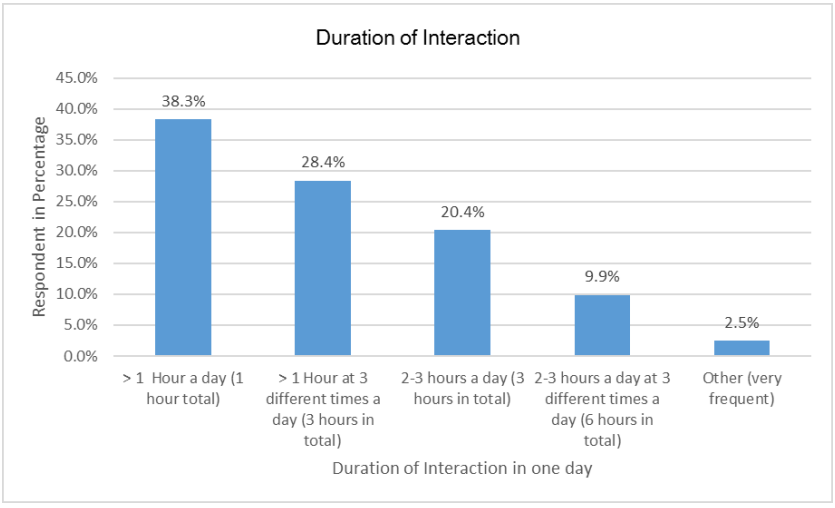


Figure 6-3. Duration of Interaction within a Day.

Interactions in the urban kampung are dominated by short interaction durations with less than one hour in a day. About 38.3% of respondents have limited time to do social interaction during the day and 28.4% are available at three different times of the day. Surprisingly, there some of respondents who spend about two till three hours in three different times of the day to have a chat with others. The different levels of interaction most likely relate to the occupation of the respondent. In addition, the intense and continuous social interaction within a day indicates that there are liveable and maintained social practices in the urban kampung.

6.1.3. Perception of Social Space Where Dwellers Interact.

Social interaction of dwellers in Kampung Code can be identified by means of looking where the social interaction takes place. Based on multiple responses (figure 6-4), the majority of households usually have conversation on-house terraces, which is still part of public realm (neighbours commonly just stand in the front of the house). Street or alley is the second most frequent option (common place to have spontaneous conversations in a high-density settlement). River/riverbank as the only natural place situated along Kampung Code became is the third frequent choice for social interaction. Other places were community building, guard post, and open spaces. In addition, informal businesses like local shops and taverns are also an option to have interactions.

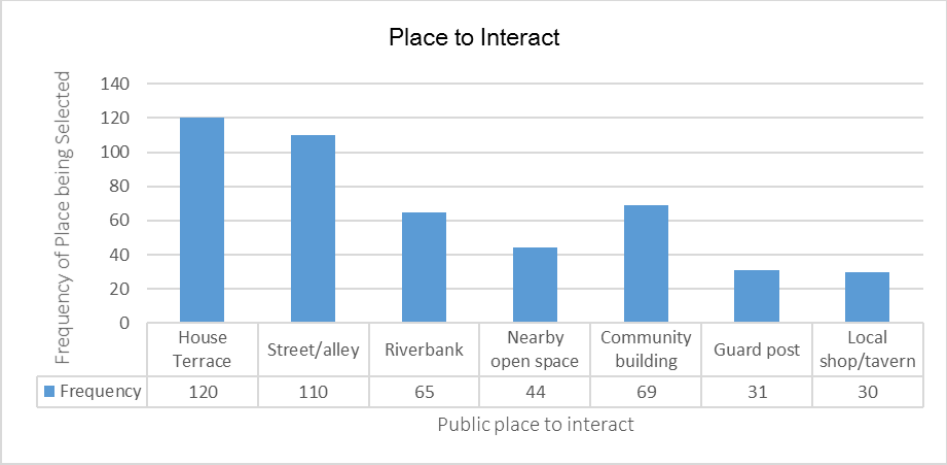


Figure 6-4. Common Place to Interact in The Urban Kampung (multiple answers were possible)

6.1.4. Value of Neighbourhood Intimacy/Concordance

In this research, the value of neighbourhood intimacy means the communality and concordance (in the local term: *kerukunan/gotongroyong/keguyuban*) of dwellers in the coexistence of living in the urban kampung. In practice, neighbourhood intimacy can be formed such as dwellers helping each (concerns for someone else burden), participating in community practices, tolerance and understanding of other neighbour's behaviour based on a social norm.

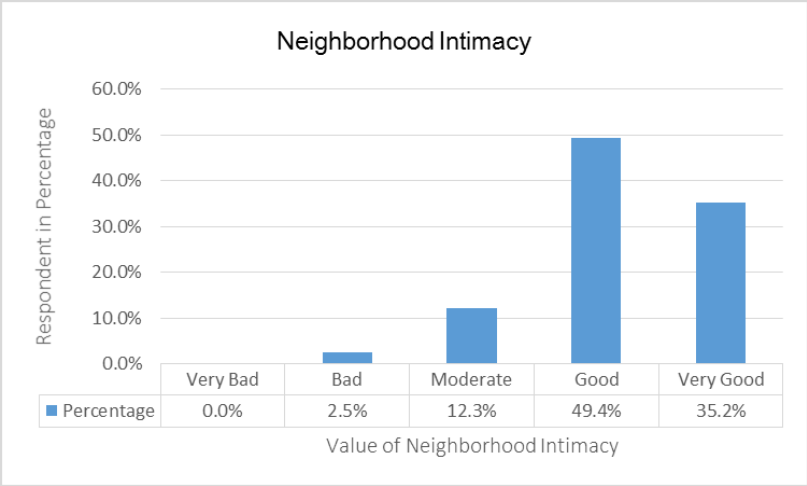


Figure 6-5. Value of Neighbourhood Intimacy in The Urban Kampung.

The questionnaire revealed that neighbourhood intimacy in Kampung Code is good and beyond. The majority of households agreed that the community values are important to keep the living in the neighbourhood sustained and steady. About 35.2% of respondents also pointed out that relationship among neighbours is beyond good. Meanwhile, a minority of the respondents mentioned the neighbourhood value is bad. The strong neighbour's kinship reflects the social cooperation among neighbours and tolerance in using a public space (sharing place). To describe this attitude, for example, women created communal kitchens in the alleys/streets and dwellers are not reluctant to use front terraces of other neighbours. Apart from the statistical data, the social cohesion and concordance were also experiences by the researcher during field work. During an interview it was mentioned that *"...social cohesion in Kampung Code are the best compare to other kampungs in Yogyakarta. Here people are welcoming, greet and yell to other neighbours. You can easily find people chatting in the street or just hang out in the tavern for long duration. I have never seen a serious fray among neighbours here only a little fight of youngster. In Kampung code we have some programs such as community service to clean the kampung (kerja bakti), patrolling overnight (ronda), and routine meeting in the community building. One of the example, indicating social concordance in this kampung is good, is we usually organize an agenda to support neighbours who are sick and somehow raise some money to relieve their medical expense..." (FGD, group man).* This statement shows that neighbourhood intimacy in Kampung Code is strong. The dwellers are willing to sacrifice their time and even money to help each other and sharing burden. This is the social capital that the community of Kampung Code has to keep surviving in the urban area.

6.2. How dwellers perceived physical quality in urban kampung

Understanding the sense of place of the urban kampung as a whole 'entity of human habitat' needs an approach to identify particular places as representatives of the whole settlement. A particular place in this research is a place that represents a familiarity and identity of individual's or group's cognition. Based on the information from FGD and walking interview, eight types of places were identified then used in the questionnaire. The dwellers perceptions towards these eight favourite places were assessed using a Likert scale to evaluate safety, visual aesthetic, cleanness, liveability (co-exist), place that enable daily activity (adaptability), and overall quality of the urban kampung.

6.2.1. Favourite Place in Urban Kampung: Respondent's perspectives

The eight favourite places in Kampung Code are: house terrace, streets/alleys, field/open space, riverbank, guard post, local shop / tavern, and other including a mosque represent the public social space for doing different outdoor activities.

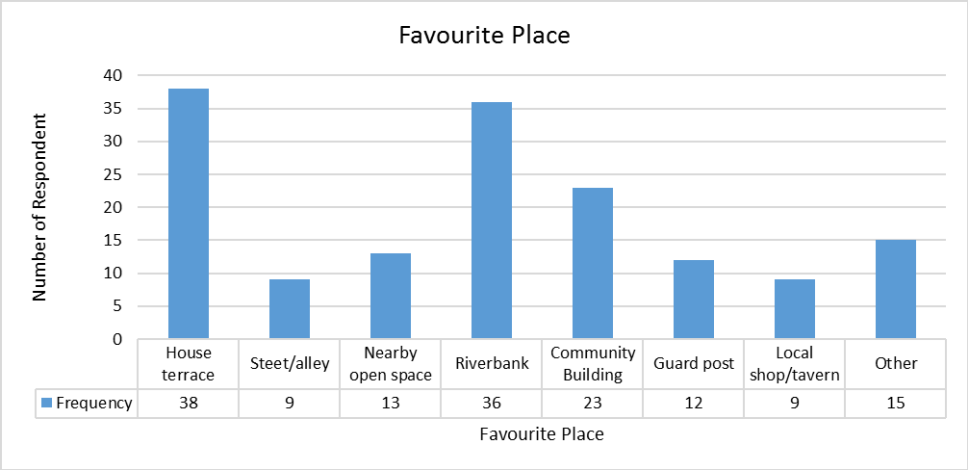


Figure 6-6. Favourite Place Where Dwellers Frequently Spend Their Time in Kampung Code

Based on the figure 6-6, the majority of respondent (38 head of households) point out that their house terrace is the most favourable place. Here, house terrace refers to the public area in surrounding house including the space in adjacency to the closest neighbour's houses and street. Riverbank are mentioned 36 times as it serves as a main attraction in kampung where people chat, sit, fish, or just relax. Community buildings, which were formally designed for community gathering are mentioned 23 times. Nevertheless, few respondents could not find their favourite place within these eight types and instead mention other places such as the bridge in northern side, the food hawkers in the far side of the kampung, and warehouse (cage)/place for keeping a dove[39].

6.2.2. Perception of Safety in Favourite Place

In this research, perception on safety refers to the conducive situation in term of minimal social tension among dwellers and safety of property ownership. First, the researcher asked about the safety of property ownership like the event of thievery or robbery in the urban kampung, then followed by asking about the social tension like fighting or noise made by the dwellers.

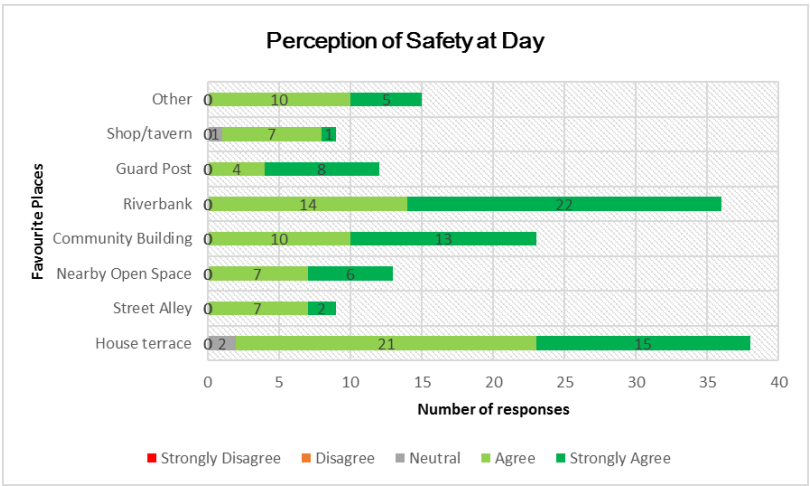


Figure 6-7. Perception of Safety during the Day

[39] Keeping birds is one of individual's hobby in the urban kampung. There are two types of birds, ornamental birds and doves. The first one usually is kept/hang in front of the house, while the second one is kept far from houses due to the dirt and odor of the doves and its cages.

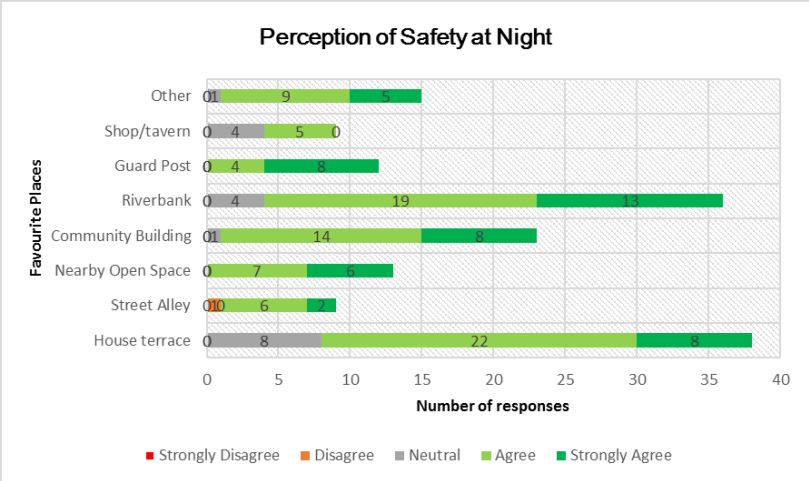


Figure 6-8. Perception of Safety during the Night

Figure 6-7 shows about half of the respondents agreed that all favourite places are save during the day and 46% stated strongly agree with the safety circumstances in Kampung Code. Meanwhile, during the night (figure 6-8), few respondents mentioned that particular places such as street/alley were not save. Eight respondents also mention neutral to house terrace, indicating that the thievery ever occurred once in the past. The community has established a has established a patrolling system ensure the safety in the kampung at night. One of the respondents mention about this issue. *"…as you can see here, people just park their motorcycle in the alley. They do so at day and night because they don't have a garage to park. They never lost their bike or motorcycle compare to if they park in the street over there. But, there was a thievery here. For example, people from other kampungs stole an ornamental bird, which was left outside by the owner. However, the culprit never comes from this kampung. Every night we are patrolling in the kampung and stay in guard post till dawn. We have a schedule for whom it is obligated to patrol every night" (FGD man).* Even though the dwellers perceived a safety of property, there were some conflicts at night that according to some dwellers were considered as social insecure (uncomfortable). This issue was caused by youngster who like to drink alcohol until late at night. To some extent, they made an upheaval and noise at night. *"Usually at Saturday night, youngsters in this kampung and maybe some from neighbouring kampungs, we don't know exactly, assemble to chit chat (nongkrong) and drinking. When they were drunk, somehow they started to scream and shout and somehow could not be controlled. If this happened, then we complained to the guard man*[40] *to make the situation conducive again. We actually don't like young people drinking in this kampung, but we understand that some of these youngsters actually are good boys" (participant in walking interview)".* This response shows that there were two different groups who address different sentiment on this issue. One group perceived that youngster who like to drink are considered intolerable in the kampung, but the other groups were fine with this situation.

[40] Dwellers in the urban kampung did a routine control at night till dawn and they were stationed in guard post. Their main job is to maintain the security from outward and inward of the kampung. In addition, if the case was related with criminal law, these guards are responsible to send the culprit to the nearest police station and made an official report to the police.

Figure 6-9. Open Space Just Transformed into Parking Area by Afternoon (left), and Motor cycle just parked in the alleys at the day and night.

6.2.3. Perception of Pleased Visual Aesthetic

Figure 6-10 shows that some respondents have negative perception regarding the visual aesthetic of their favourite place. Eleven (11) respondents stated that the river does not have pleased visual aesthetic, fifteen (15) perceived neutral, and only eight respondents agree with a pleasant visual aesthetic. It is an interesting circumstance since most of the respondents pointed out that the riverbank is the second most favourite place (see Figure 6.8) regardless the visual comfort of the place. In general, 37 of the respondents disagreed, 68 are neutral, and 45 agreed of having pleasant visual aesthetics in their kampung.

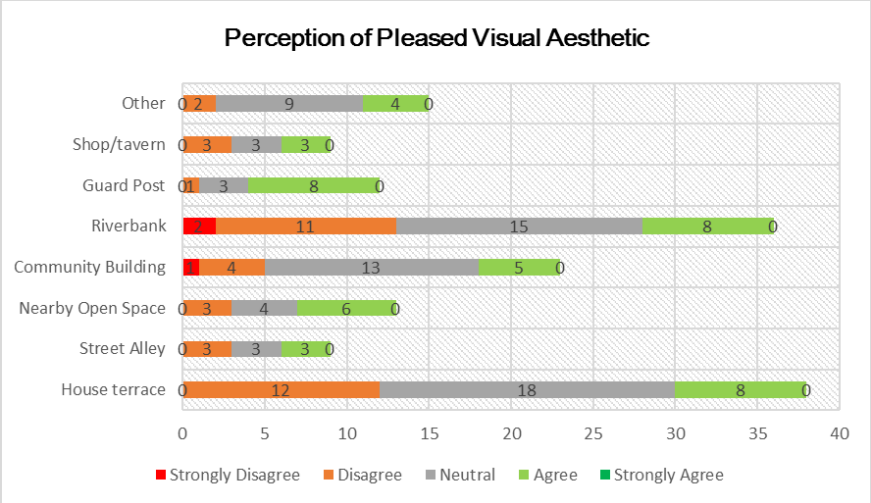


Figure 6-10. Perception of Visual Aesthetic of Kampung Code

6.2.4. Perception of Cleanness

When it comes to the perception of the surrounding environment of the urban kampung, issues of cleanliness were noticed by dwellers. From the questionnaire, most dwellers who like to spent the time in the riverbank agreed that cleanliness was bad, some respondents were neutral, and few perceived that it was clean. This according to FGD is caused by some dwellers residing in the riverbank littering their household trash directly to river Code. A similar issue existed about keeping ornamental birds and doves, the place to store doves was actually dirty. Other places such as shops, tavern, community building, in front house terraces, streets were perceived neutral or clean. Some respondents who mentioned neutral

might indicate that they are not bothered so much about the cleanness situation in the urban kampung, and still want to do outdoor activities no matter the situation is.

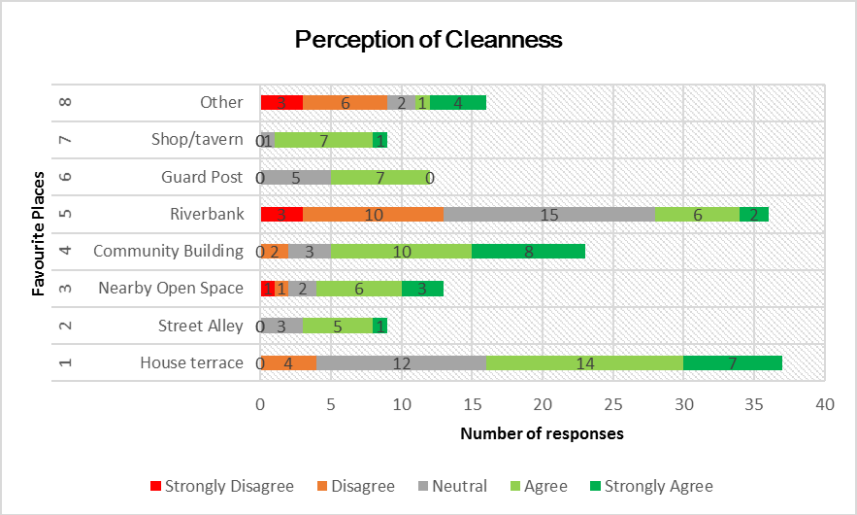


Figure 6-11. Perception of Cleanness

Problems of cleanness are illustrated by statements of residents. During a focus group discussion, a female participant stated: *"Personally, I don't like to be in riverbank because as you can see it's dirty with trash of people who reside in front of the riverbank. They seem not paying attention about this issue. I usually see a housewife throwing away trach bag into the river. Yeah no body is angry about this maybe because the temporary dumpster was located close to the main road above there." (FGD, woman)*. The dirt in riverbank was caused by several factor such as children who bought a snack from the local shops close to riverbank littered the plastic when they played nearby. Moreover, the temporary rubbish container was located far away and somehow full due to the bad maintenance from local government caused the dwellers to litter in the river.

Another resident mentioned during the walking interview:*" I don't like to pass through the street close to the dove cages because it smells, stinks and the bird shit is smeared nearby. I have warned them through the youth organization (karang taruna) to make the nearby place clean but they (the men) just don't give a damn. Hmm they like to keep doves for competition, e.g. the male dove was released somewhere outside the kampung, and the female were placed in open space. The fastest male arrived at the female is the winner. The dove sport is familiar here in the kampung so that's why most of the men keep doves as a hobby." (youngster, walking interview).* Apparently, this type of individual's hobby is inherent to the cultural history of dwellers (mostly man) in the rural kampung which then adopted in the urban kampung. Thus, the cleanliness issue related to this hobby could be the difficult to cope as the resident mention "they (men) don't give a damn…".

6.2.5. Perception of Lively Space

Dwellers perceived the lively of space through the co-presence of the others in the same place throughout the day. The researcher asked how lively do you feel in spaces by giving a clue to the respondents about the presence of others in the space, no matter the activity they performed. The higher is the co-presence of neighbours in the same place the better the liveliness of the space.

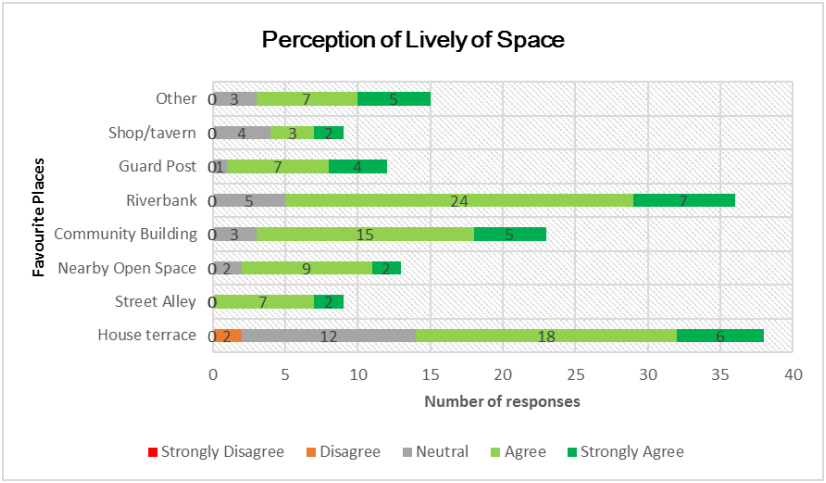


Figure 6-12. Perception of Liveable Space in Kampung Code

Respondents judge that all favourite places in the urban kampung have its vitality/liveability in terms of continuity of usage by dwellers. Particular places such as the riverbank show the highest liveability. Such places have the possibility to be occupied by varies types of activity throughout the day (**see Appendix 7**). The overall perception of respondents is classified as high (agree and strongly agree) for all favourite places, except the very few respondents who expressed a negative judgement of liveability for the house terraces.

6.2.6. Perception of Place that Enabling Social Interaction (Adaptability)

Figure 6-12 shows that people feel they can easily have conversation in all favourite places. Those places are capable of accommodating social interaction by giving no boundaries of privacy and exclusion in terms of gender and age. In-house terraces and the riverbank are perceived as the most favourite places to do social interactions. "*Almost every time after working we usually relax and chit chat in the riverbank*" and "*I don't like to go far, usually my friend and me gather in my house (in front house terrace)*". This indicates an examples of the eight favourites places which are adaptable to do social interaction and optional activities. This is also supported by the evidence of dwellers opinion from FGD particularly on the favourite places (see Table 6-1).

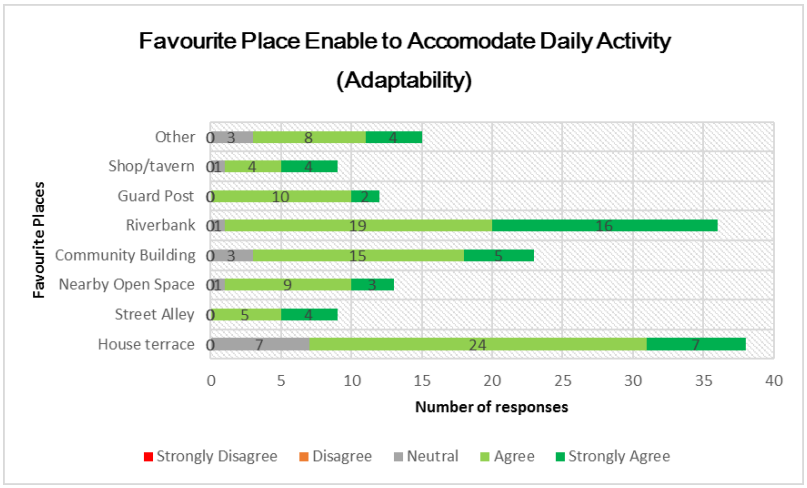


Figure 6-13. Perception of Favourite Place Enable to Accommodate Social Interaction

6.2.7. Perception Overall Physical Quality

The overall physical quality refers in particular to the physical maintenance within the kampung, including the condition of the housing, street and alley (paved/unpaved/gravel), and infrastructure (street lamps, gutter, etc.).

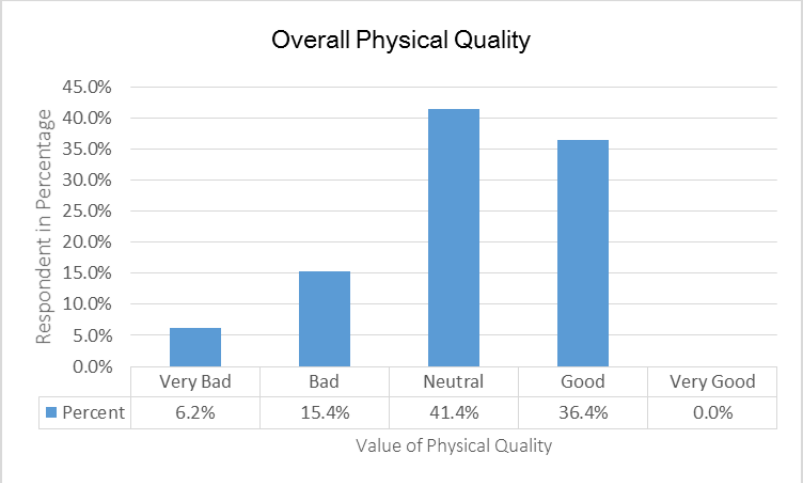


Figure 6-14. Overall Physical Quality of Kampung Code

Perceived overall physical quality of Kampung Code shows different sentiments. The majority of respondents choose the category 'neutral'. However, 15.4% judge that Kampung Code is 'bad' whilst 36.4% selected 'good'. This condition was described by one dweller *"... I have been living in this kampung for more than 36 years, the condition is as you can see, so dense, and the condition didn't change much except the reinforcement of the riverbank due to cold lava flood*[41]*. If there is heavy rain the water will pop up from the drainage. It seems the government is only concerned with disaster mitigation, not with an improvement program..."* (Respondent of walking interview). This statement on one hand depicts the concern of dwellers toward the physical improvement in their kampung but they cannot do anything. On the other hand, it infers that the physical condition in Kampung Code lacks maintenance by the local government.

6.3. Pattern of perception Information from Focus Group Discussion (GFD) and Walking Interview

Narrative answers from FGD and walking interview were used to explain the pattern of perception about sense of place including physical quality and activity including the perceived neighbour's kinship and neighbour' kinship. The pattern of perception was classified into eight relevant themes (table 6-1).

[41] Cold lava flood struck the settlements situated in riverbank of three major rivers in Yogyakarta city (Code, Winongo and Gadjah Wong river). This disaster was the aftermath of Mount Merapi erupted in October 2010. The heavy rain in the surrounding mountain (up-stream) carried the volcanic materials to the downstream, resulting on the massive damage to the nearby river environment. The two small bridges in Kampung Code collapsed and embankments left in damage.

Figure 6-15. FGD in urban kampung with dwellers in Different Gender and Age Group.

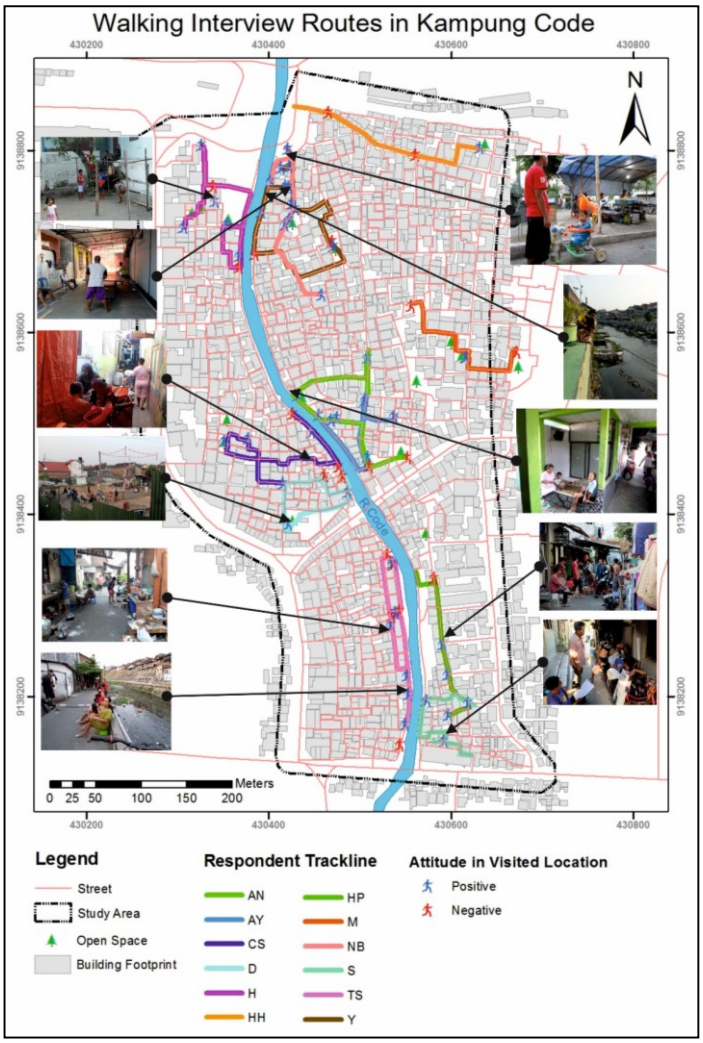


Figure 6-16. Walking Interview Routes in the Kampung Code (12 walking interviewees involved.

Table 6-1. Summary of FGD and Walking Interview with Local People in Urban Kampung

Key wording/quotation	Theme	Description
• "This kampung is famous for the people who make handicraft" • "We have a kiosk over there" • "That guy is working with Mr Rahman (neighbor) in running a food catering business" • "Some people are working in Beringharjo and Lempuyangan market" • "My wife is making food to sell" • "I am not working in this month, usually my boss calls me if there is a project" • "I am working at night in the street over there"	Occupation	Necessary activities (work) in Kampung Code vary from entrepreneurs like running a business in the kampung (local shop, tavern, food catering), being employed by others in or outside the kampung (employee), working as an unskilled laborer in a traditional market, and craftsman (engraver/*grafir*). Some people are seasonal workers who work if there is a call from the employer/friend. Head of households mainly worked outside the kampung while women stay often at home and run a business at home, do some chores, besides taking care for the kids.
• "Yes we (men) start working in the morning at 8 am until afternoon" • "Because some of the dwellers are employed, they go to work in the morning so that's why you see less people here" • "Usually people playing tackrow over here (pavement field) in the afternoon" • "You see we like to chit chat (*nongkrong*) in the riverbank after working time of course" • "I prefer to stay inside in the midday" • "No, we don't work on the Sunday, we prefer to sleep and do chores" • "I am a housewife, I just stay in the house and keep the kiosk"	Daily activity	During weekdays, necessary activities started in the morning until afternoon. Normally, the head of the household returns from work in the afternoon then socialize with others in the public realms like in-house terrace or river bank. It somehow left the kampung a bit deserted in the morning and merrier in the afternoon. The majority of dwellers start to come out to public realm around 3 to 5 pm until night. Some of the food stalls/taverns are open at night and closed at dawn. In the weekend, outdoor activities were more frequent from morning to afternoon.
• "Almost every time after working we usually relax and chit chat in the riverbank" • "I like to play table tennis and badminton in the community	Favorite place	A particular place, which was mostly used either for interaction and self-oriented activities are streets/alleys, in-house terraces, nearby open spaces, guard posts,

building" • "We just playing football in the street because that large field (field with pavement) is always used by adults to play tackrow" (children answer) • "I usually go to the tavern for eat and drink, and we have long free discussions (*nongkrong*)" • "My neighbor did a "friend yell" at me occasionally from outside/street, especially if its urgent matter" • "I don't like to go far, usually my friend and me gather in my house (in front house terrace)" • "In the afternoon, I like to sitting in the riverbank, waiting the sun set" • "In the afternoon we set up a bench and table in the open space to sell a food" • "I like to walking with my kinds in the open space of RW 1, a lot of people are there" • Yes, we use the guard post mostly at night, while guarding a kampung we play cards and chit chat till dawn" • "This is my favorite place (dove cage), because my pets (doves) are there, I have to feed them every morning and afternoon" • "Sometimes, I am fishing in the river"		riverbank/river, community buildings (hall), local shops or food stall/ taverns and mosques. Those places are essential in bonding the community together. Almost no conflicts of spaces are spotted in the open space of the kampung.
• "No, I think, we also relax and chatting with neighbors in the riverbank. (woman answer) • "I prefer to have conversations with neighbors on my house terrace" • "We cook in the street because we don't have enough space in my house. Yes, we share the kitchen" • "We play in the street and in the community building, and when the dusk come, if we have not yet returned to home, my parent	Gender/group preference place	There is a subtle and almost no difference in using spaces between men and women for conducting the outdoor activity. However, the majority of men used the river bank, community building, and tavern to do social and optional activity while women preferred to interact in the areas nearby the house. Children were flexible in using space as they can play football in the street and fly a kite in the riverbank. Moreover, children in elementary school still play/roam with peers within the boundary of urban

will search and hail me in the place I used to play"		kampung whilst the senior (teenager) one also play outside.
• "If our neighbours were sick, we usually pass by to check and give them support" • "Once, one of our neighbors was gravely ill and we decide to raise money for him" • "We do a patrol every night (*ronda*)" • "At night, every motorcycle entering the kampung should be engine-off" • "In Kampung Code, we collectively do a massive cleaning every Sunday morning" • "I help him to build a kiosk" • "I know where to meet him, we usually have a nice-long chatting while drinking in the tavern, routinely, we play badminton together"	Community value (sense of community)	Neighbour's kinship in Kampung Code is well-maintained with beholding to the social norm. They are able to create a social system, which is practiced by dwellers in their daily activities. For example, adult men are obligated to do night patrols in turns, a motorcycle should be engine-turned off while entering the kampung especially at night, and the kampung is cleaned every Sunday morning by the dwellers. Tolerance and cooperation-based interaction (helping each other) are the basic community value in Kampung Code.
• "Somehow we cannot play football in the open space because there are a lot of building materials and it used for parking motorcycle in the afternoon" • "Some of dwellers still litter into the river" • "The shit and stink from dove cages smeared in the street" • "Some dwellers have a dog which is not friendly, the dogs are barking every time I pass by." • "The temporary dumpsite over there (pointing at corner far in the close to the bridge) was barely maintained by government body. I saw it always full.	Environmental issue	High built-up density causes a lack of open spaces. Some open spaces are not well maintained because they are used to park motorcycles and piled building materials. Some people who reside close to riverbank still threw their household waste to the river. The temporary dumpsite placed close to urban kampung was rarely maintained by the sanitary government body. Lastly, people who have the hobby to keep a pet (dove, ornamental bird, and dog) on the street were not conscious about hygiene issues.
• "We do a patrol every night (*ronda*)" • "Some youngster like to drink on Saturday night" • "We just park our motorcycle in the outdoor and it looks intact in the morning"	Safety and security	In the past, safety was the major concern in Kampung Code. The community established night patrols to keep the kampung save during the night. However, few social problems still happened, for instance, some youngsters like to drink homemade alcoholic beverages in a particular spot

• "Few of the thievery once occurred in this kampung. Some ornamental birds were lost as it was popular once for competitions" • "I think everybody fell save here in Kampung" • "We are just afraid in the raining season, because if heavy rain occurs, the flashflood will reach our home"		in urban kampung (some spot in the riverbank and open space) this causes to some extents noise at night. Interestingly, some dwellers think the opposite. They tolerate (*memaklumi)* the youngster to drink as long as they can control themselves. The recursive, natural disaster like cold lava flood or deluge from heavy rain become the major safety concern for dwellers living close to the riverbank.
• "I was born here, and I recall that the riverbank used to be a bamboo forest" • "In the past, some people who were living in this kampung worked in the Dutch railway warehouse" • "I don't know the earlier situation of this kampung, when I was born, this kampung looked like today"	History	Kampung Code was an unplanned settlement situated in Code riverbank, where employees who worked in the city used to settle. Some residents worked in Dutch railway factory and the two biggest markets in the city (in the 19th century) namely Beringharjo and Lempuyangan market. Those two markets still exist till today and serve as a regional needs of people in the City. Some heads of households also work there as an hourly laborer.

Table 6-1 shows the classification of the dweller's perception into the eight relevant themes namely occupation, daily activity, favourite places, group and gender preference to space, social value (neighbour's kinship) environmental issue, safety and security, and history.

The sense of place of Kampung Code can be describe by looking at the eight themes. First, occupation, representing what dwellers do for living, this is also affecting their daily activities. Many dwellers are self-employed, particularly handcraft maker. Some dwellers also employ their own neighbours in food catering business. When it comes to the sense of place, people and dwellers recognize that Kampung Code in well-known for handcraft maker (engraver/*grafir* and a disposal paper art). Second, the daily activity infers the behavioural pattern of dwellers. The outdoor activities are influenced by the behaviour of the dwellers. Many head of household working in the morning at around 8 am and they return home in the afternoon. However, some people who work as employee and hourly labourer in the traditional market leave the kampung earlier in the morning. Kampung social life reach its peak in the afternoon. Next, favourite places represent the symbolic identity of dwellers. Favourite places play an important role in accommodating neighbours activity, particularly social interaction, which occurred spontaneously. In particular, riverbank as one of the unique features of Kampung Code give the distinctive character for the kampung. This place allows the dwellers to do necessary and optional activity in the same places. Moreover, there is a subtle gender and group preference in using space for daily activities. Like one of the woman said "no, I think, we also relax and chatting with neighbours in the riverbank" – indicating that the women also willing to mingle with other (man) in the riverbank. However, when it is related with woman necessary activity like cooking a food, they will occupy the communal kitchens, which are situated in un-exposed places.

The list of quotations that create the community value indicates good neighbour's kinship. The dwellers show their commitment to follow the social system in the kampung such as cleaning the kampung every week (Sunday morning) and patrolling the kampung at every night. This also supported by the safety and security wherein the dwellers feel safe due to the establishment of night patrolling. There is also less social tension among dwellers in the kampung except about youngster during the night. Cleanliness issue are mainly caused by the dwellers hobby in keeping birds (doves) and they seem not paying attention to the hygiene of the bird's cages. Another cleanness problem is the location of the temporary garbage, which is far away and sometimes it is full with the garbage. The dwellers accused the local government for not taking out the trash routinely. From the historical point of view, the youngsters are not aware about the history of the kampung, whereas the old generation still remembers how the kampung was developed and where the folks worked in the past.

7. THE SENSE OF PLACE OF THE KAMPUNG

This chapter discusses the results from the previous chapter sand relates them with concept of 'sense of place' of the urban kampung. The research questions are used to structure the discussion.

Which spaces are used for specific activities?
There are eight particular spaces in the urban kampung, which attract activities thus giving meaning to the place. Those places are house terrace, street/alley, nearby open space (e.g. field and space between buildings), riverbank, community building, guard post, local shop/tavern (*kios*/*warung*), and others (include mosque) (see Figure 4-9 and 4-10). Riverbank, house terrace, street/alley, and community building are the places, which have high frequency of social interaction among neighbours (see Figure 6-4). Meanwhile, riverbank, house terrace, and mosque are the most favourite places to spend time (see Figure 6-6). The riverbank is a place, which allows dwellers to do more than a single type of activity. Dwellers have the option to do activities apart from social interaction, for example fishing, sitting and sightseeing, and or contemplating alone (optional activity). The house terrace, in fact, is a very commonplace in an urban kampung, which plays a role to construct a good social value and kinship among neighbours. Dwellers can occupy the terrace, which is part of the semi-public space, to interact with other neighbours even though the owner of the house is not present. Tavern (*warung*[42]) and local shop (*kios*[43]) are places, which not only serve inhabitants daily needs but are also places to congregate. Dwellers like to have spontaneous social interaction in the tavern while the initial motivation was just to buy some food or drink then have long social interaction. Street, alley and footpath are important social feature of space in an urban kampung. They function not only as circulation corridor but also bridging the social connection among dwellers. Most social interaction and necessary activities can be found in alleys/pathways.

These eight places in Kampung Code have been identified as tangible community assets that are able to accommodate different types of activity. This is asserted by Rahmi et al. (2001) that public spaces in an urban kampung play an important role in building and maintain the identity of the kampung through the continuous process of space-activity practices. In addition, similar to the findings by Thompson (2004) and Setiawan et al. (2010), also this research confirms that every place in an urban kampung is actually a socially public space.

What are types of activity of dwellers in an urban kampung?
Based on the observation at three different times of the day in the weekday (Tuesday) and weekend (Sunday), the author found many kinds of activities occurring in Kampung Code (see Table 4-1 and Appendix 5). These habitual activities were classified into social, necessary, optional, and religious activities. Social activities are the most common activities, which can be found in every place of the kampung. The occurrence of the social activities obviously depends on the co-present of dwellers in outdoor spaces. The co-presence of the dwellers was spotted in the high connected and high locally integrated spaces/streets. Necessary activities took place either within the kampung (selling daily needs in kiosk and food in tavern) or outside the kampung in the proximity distance (minimum: 2 m, average: 559 m, and maximum: 5810 m from the point of origin/house). Concerning gender related activities, most of the men's necessary activity (e.g. work) and children's necessary activity (e.g. school, take a course)

[42] *Warung* or tavern in English is almost similar like a bar in western. They sell food and drink. People are congregate and having chat each other. The difference is in *warung* they don't sell alcoholic beverages.
[43] *Kios* or local shop in English is like a store, which sell daily needs mainly for people living in the neighborhood or kampung. The level of service thus considered local and normally - only people in the kampung who buy in the kios. The owner is used to buy the stock of daily needs in the traditional market or wholesale market.

occurred outside the kampung while the women mostly stays within the kampung. Optional activities are related with the personal preference and the functionality of the space itself. Riverbank, open space, and dove cage thus are the most visited place for dwellers' optional activities. Moreover, religious activities have different pattern compared to the other three types of activity. This activity is concentrated nearby the mosque.

In regards to the creation of a sense of place of the kampung, the different types of activity induce the dwellers to experience the diversity of outdoor activities. This is not only the daily routine activities but on particular occasions, they hold cultural events that really represent the people of the kampung. When strangers or visitor come to this kampung, they will easily notice the behaviour of dwellers through their daily outdoor activities. The diversity of outdoor activities in Kampung Code is a unique feature, which occur continuously in space. This finding is supported by Yandanfar et al. (2013) who suggest that the collective component of people or society in place have a substantial impact in attracting people, giving emotional feeling and creating a sense of place.

What is the dynamic of activities that take place at different times a day?
Activities in the kampung are diverse and continuous through different times a day. At a weekday, necessary activities were more frequent than at the weekday. While, social activities were more frequent on the weekend. In general, despite the continuity of activities throughout the day, the frequency of activities differed at different in times a day. In the midday, all activities slightly decreased and subsequently culminate in the afternoon. Necessary activities (work) had an opposite trend to social activities. In the afternoon, social activities were more frequent than necessary activities while in the morning it shows the opposite. Religious activities were spotted in the midday and afternoon. The dynamic of activities in the kampung induces the creation of a vibrant place. Similar studies of space and activities by Gehl (2006), Mehta (2013), Jacobs, (1961), and particularly Rahmi et al. (2001) stated that the continuous flow and presence of people in public spaces throughout the day indicates the liveability of an area or neighbourhood. This study showed that the kampung is a lively and vibrant human settlement.

How can spatial patterns be measured and quantified?
Spatial pattern is defined by the spatial configuration between urban solid (buildings) an urban void (open space, street, and network). Physical characteristics of the urban solid (for example buildings) can be defined and quantified by its area, density, and building usage (e.g. residential, commercial, community services, and amenities). Based on the building usage the diversity pattern of the kampung can be measured, meanwhile, the built-up area (roof area) can be quantified as patch density. The urban void is also a physical feature of space, which represent outdoor spaces such as street, network, and open space. This space can be measured by analysing its topological relation of one space to another space.

When it comes to analyse the configuration of space and the relation of space to another space based on its topological relationship, the space syntax is by far the most advantageous theory as well as methods (B Hillier & Vaughan, 2007; Bill Hillier & Hanson, 1984; Bill Hillier, 2007; Jiang & Liu, 2010; Peponis et al., 1997). Not only the embedded information regarding the space configuration can be calculated, the space syntax method is proven capable of revealing the complexity of urban phenomenon. There is one similar method which can be used as complementary analysis of space syntax. This method called Urban Network Analysis[44] (UNA).

[44] Urban Network Analysis (UNA) is the method as well as the software/plugin which compatible with Arc GIS. The program was developed in City Form Lab with the collaboration with MIT (http://cityform.mit.edu/projects/urban-network-analysis.html)

In this study, considering the study area is the kampung, which has the same level as neighbourhood/settlement unit, the space syntax is useful with its capability to associate with the social phenomena like the co-presence of dwellers in the high locally integrated space. The configuration of space in terms of topological relation of space is quantified and measured using connectivity, local integration, global integration and control parameters. Meanwhile, building density and building use, which represent the diversity pattern of the kampung is analysed with patch density (PD) and Shannon's Diversity Index (SHDI).

What are the configuration of spaces/spatial morphologies of an urban kampung?

The morphology of space in terms topological relationship of each space to another space was identified with space syntax parameters such as connectivity, global integration, local integration, control, and intelligibility. Kampung Code has a specific configuration of space. Dwellers are able to go though from origin to the destination (through-movement) at least with three different alternatives streets (the average number of connected lines per streets is three). The number of connected lines in the kampung is created spontaneously when the dwellers erected the houses. These lines (small portion of space or gaps) in between the buildings somehow can serves as shortcut for dwellers, explaining why the outdoor activities less occurred in alleys. Similar to the findings from Brown & Darjosanjoto (1999) who studied spatial configuration of traditional coastal settlement (kampung) in eastern Java, the houses which do not directly face or are connected to the road/street are undesirable for doing outdoor activity. Conversely, the streets/alleys in the edges of kampung (aside the shoreline) have high pedestrian movement and outdoor activities because the streets have a direct orientation to the house. In Kampung Code, the streets/alleys which have high level of connectivity also have high level of control over the spaces. Further, intelligibility is low meaning that the strangers/visitors will find difficulties to navigate within the kampung. However, residents will be able to easily navigate within the kampung since they already develop the mental map of the kampung. The low value of intelligibility are either caused by the streets/spaces which have low connections to its immediate street or the streets have a weak connection to the global system (Can & Heath, 2015).

Globally accessible spaces are situated at the edges connecting the kampung to the main city structure of Yogyakarta. It makes sense since the west side of Kampung Code is connected with the CBD of Yogyakarta. The high locally accessible spaces are situated within the kampung. The results of local integration measurement suggest the space at the edges of the kampung also have relatively high degree of integration (see figure 5-3 and 5-4). In the kampung, locally integrated spaces can be seen as the internal main structure of urban kampung.

The spatial configuration of Kampung Code has an impact on the frequency of outdoor activities and crime. In relation to crime such as thievery and robbery, generally, criminals do not prefer to take action in the space where there have a high risk of detection and surveillance (Jones & Fanek, 1997). The finding from Bill Hillier & Sahbaz (2008) and Jones & Fanek (1997) stressed that criminal actions occurred where there are less observers in the public realm – and it is associated with the low integration of space. In Kampung Code, obviously, there are many spaces (low integrated) which have no adequate amount of outdoor activities, yet the kampung still be considered safe by its dwellers. The safety issue is successfully controlled by the dwellers with the establishment of daily night patrol.

Spatial morphology of spaces was also described with the density of buildings. The density of building varies from the north to the south part of the urban kampung. In the north-west (block 2, Tukangan), the density of building was spotted the highest because lack of green open spaces. Meanwhile, the low density was situated in the north-east (block 1, Gemblakan) and upper part of block 3 (Juminahan) and block 4 (Cokrodirjan).

How diverse is the urban kampung in term of building use?
The kampung is diverse in terms of building use. The diversity varies within the kampung wherein the highest diversity of function occurred in the north and south sides of the kampung. The diversity of building use gave the dwellers the opportunity to do various type of outdoor activity, especially social interaction. The dwellers were attracted by the nearby local shops, taverns, and other amenities in the kampung. This explains the positive association between diversity and outdoor activities. Apart from the statistical results, diversity actually exists in the kampung (see Figure 4-14 and 4-16). This result is similar with Gehl (2006); Jacobs (1961); and Montgomery (1998) who found that diversity of use is an effective attractor of diverse outdoor activities.

How do dwellers perceive an urban kampung regarding social cohesion and kindship?
The dwellers perception regarding social cohesion and kindship were measured using indicators such as relational status between dwellers, frequency and duration of interaction, preference place to interact with, and value of neighborhood concordance. The perception was measured and inquired using a Likert scale, walking interview, and FGD.

In general, strong neighbor kinship and social cohesion were perceived by dwellers (see section 6.1.4). This is embodied in the form of a well established social system (norms) wherein the dwellers consciously participating into it. For example, dwellers voluntarily participate in patrols within their kampung every night and do massive cleaning of their environment (*kerja bakti*) every Sunday. The dwellers also took an initiative to help each other in needs and like to sharing burden. This positive social process is created by the understanding and tolerance among dwellers. The social capital arguably results from less and almost no conflict of space and a strong social cohesion among dwellers. This can be seen from the use of alleys/pathways for a communal kitchen and to setup a temporary food stalls.

People in the kampung spent at least one hour or more (see section 6.1.2, figure 6-3) to socialize and have conversation with neighbours. This social interaction happened spontaneously where they meet like in streets or tavern. The continuous and frequent social interaction promotes conviviality between dwellers. Neighbour's kinship was created in the long process of understanding each other. The interviewed dwellers in Kampung Code, head of household, have been residing in Code for 43 years in average (see Appendix 9). This length of residency, similar to study by Billig (2006) has strengthened the sense of place in the urban kampung.

How do dwellers perceive an urban kampung regarding place?
The emotional experience of dwellers in a place in the urban kampung influences their perception. This was measured using a Likert scale and questioning their sentiment about favourite places. The perception of dwellers refers to the eight places (house terrace, local shops and tavern, community building, nearby field and open space, riverbank, guard post, streets/alleys, and others (mosque). Moreover, the dwellers also have a knowledge regarding the topology of space in which they were able to navigate within the kampung. The dweller's spatial cognition in perceiving the place were associated to the local space (R3). Kim & Penn, (2004) showed that the residents who live in the neighbourhood naturally develop a mental map of their environment. They suggest that the residents were more associated to the local environment rather than global structure of neighbourhood.

Personal factors that drive dwellers feeling towards the favourite places are safety and security, cleanliness, visual aesthetic, liveable space, and adaptability of space for daily activity. The dwellers perceive that their kampung is safe both in daylight and night. The safety in daylight is conceivably related to the continuous of outdoor activities in the kampung that play role as control of space through community awareness. Meanwhile, safety at night were achieved by routine patrol. The safety in kampung was also arguably

related to the social trust between dwellers, which have been developed since many years. Dwellers' perception regarding visual aesthetic was neutral, indicating that some of the dwellers did not really have concern of the visual aesthetic of the kampung and tried to adapt with the environment. The cleanliness of the kampung is arguably related to the social culture of the dwellers such as the individual hobby to keep a bird but do not concern on the hygiene of surrounding space. Further, some dwellers who reside in the riverbank still throw the garbage in the river, leaving a pile of trash in particular spot in the river. This issue, fortunately, is anticipated by the establishment of the weekly massive cleaning in Sunday morning. The co-presence of dwellers in the outdoor space and especially in favourite places coupled with the good social relation among them creates the perception of lively kampung. In addition, it is easy to find local people and conduct social interaction (mixing optional and necessary activity) in favourite places. This suggesting that those places are adaptable for daily activities.

In short, the dwellers perceive that places in the kampung were safe during the day and night, arguably clean in some spaces, fair visual aesthetic, and very liveable, and adaptable of space for daily activity – particularly for accommodating social interaction. These dwellers' perception regarding place is conceived as the attributes of place contributing to shape the sense of place.

What are the interplays between spatial configuration and activity patterns of dwellers in an urban kampung?

Spatial configuration of Kampung Code determined the creation of outdoor activities. Similar to Gehl (2006), dweller's spatial cognition toward space in Kampung Code comes not only from the physical settings but also from the topological relation of one space over other spaces. Outdoor activities in the kampung were significantly related with the spatial configuration of space. For instance, social interaction is spotted more in shallow spaces (locally integrated) and in the more connected spaces. Social interaction is less spotted at the edge of the kampung because that places (globally integrated places) are directly connected to the structure of Yogyakarta city. People tend to be where the other 'local' people are Gehl (2010). A locally integrated space generates the possibility of dwellers encountering each other and promotes spontaneously social interactions. This is supported by Can & Heath (2015) stating that a settlement with high local integration is more successful to pertaining long-duration of stationary activities within the settlement compared to two another settlements with the lower local integration.

Necessary activities are related with connectivity, control, and local integration. The activities related to work were situated in the places, which have high degree of connection and control over the space. This arguably indicates that work related activities took place were a lot of people pass-by. However, necessary activities showed a weak relation at the edge space of the kampung. This can be explained by the fact that the activity observation focused on the activities within the kampung and payed less attention to the edge area. The spaces selected for optional activities reflect more to the preference of dwellers rather than the topology of space. Dwellers will seek particular places to satisfy their needs/hobby, for example, they will go to the riverbank for fishing or just sitting while waiting for sunset. Thus, it can be concluded that dwellers' necessary and social activities were associated with the configuration of space of the kampung wherein they could meet and encounter with others. Meanwhile, the optional and religious activities were influenced mostly based upon the dweller's preference toward space and the functionality of space itself.

What attributes of spaces are important to shape the sense of place in an urban kampungs?

The attributes of space are identified in creating the attachment towards space then later, collectively construct the sense of place of the kampung. Those attributes are safety and security during the day and night, visual aesthetic, liveability of place, cleanliness, and adaptability of space for daily activity. However, those attributes were not compared quantitatively to find the most important one, rather the impression of the dwellers' perception inferred which attributes that important to shape the sense of place.

The co-presence of dwellers with high degree of social contact creates the control over the space. The sense of security was perceived by children Similarly, safety and security were perceived by the dwellers at night. This is related with the establishment of the patrolling system (*ronda*) every night. Safety issue apparently has direct correlation with the configuration of space. The high integrated spaces generate high frequency of dwellers/passer-by in outdoor space wherein the burglar/robber mostly avoid for taking action. This is asserted by Jacobs (1961) that the co-presence of dwellers in outdoor space works like "eye on the streets" that mutually supervise the surrounding environment thus creating a perception of safety. Feeling safe in the kampung was the foundation of residing side by side with neighbours in the kampung. A minor social issue like youngsters being drunk and making noise is still tolerable by some of dwellers in the kampung.

Although some dwellers perceived poor visual aesthetic in Kampung Code, they still feel attached to the place and visit the favourite places for their daily activities. Dwellers have adapted with the living environment in the kampung. Some of them do not really pay attention to the aesthetical issue, and some tried to improve it by planting decoration flowers in pots. Similar with cleanliness, the dwellers perceived that it was bad particularly in the riverbank. These attributes of spaces can fulfil the personal satisfaction of the dweller, reasoning that dwellers seem comfortably settle in the kampung. The good perception of space along with the co-presence of dwellers were essential to create prolonged social outdoor interaction. In Code, dwellers creatively use a space to meet their needs.

Like the adult, the children also perceived the sense of place of the kampung through the social and physical interaction with the place. The attachment of children to the kampung occurred in the particular places such as streets, riverbanks, guards post, community buildings, and open space where they usually play with the peers. Due the limited space, sometimes the children have to give up using the field and need to play in the streets/alleys since the teenage take usually over the places for takrow. The children's perception to their kampung is affected by the safety of the kampung (social control) as they could play everywhere as their parent knew where they played in the kampung.

Similar to Sattarzadeh & Asl (2015), a conducive living environment in the neighbourhood makes dwellers feel comfortable and attached to the place rather than the geometric architectural style and detail visual aesthetic of the building. Unlike the three attributes mentioned previously, the dwellers have not perceived the impression of good visual aesthetic and cleanliness of the kampung. If these two issue could be altered into positive condition, it might improve personal satisfaction toward place. This, eventually, signify the sense of place of the kampung.

How are activities, spaces, and perception intertwined towards the construction of a sense of place in an urban kampung?

The sense of place of Kampung Code is created based on the interplay of daily activities, configuration of space, dwellers perception on space and social cohesion of the kampung community.

The first attribute of sense of place in the kampung is uses and activities. The result from chapter four shows that there is a large variation of activities in Code. The liveability of a human settlement or a neighbourhood according to Gehl (2006), Jacobs (1961), Montgomery (1998), is made up from the diversity of functions distributed in close distance. The study reveals that the favourite places in Kampung Code are able to accommodate dweller's necessary, social, optional, and religious activities. The availability of favourite places in the kampung plays an important role as a medium for promoting frequent social interactions among dwellers. This can be seen from the kernel density map of outdoor activities at three

different times of the day. High activity densities occur in close proximity to the favourite places (see Figure 4-14 and 4-16). Similar to the finding by Hickman (2013), the favourite places are recognized to convey longer social interaction. Therefore, it is perceived as the symbolic identity of the kampung.

Gehl (2006, p.101) and Jacobs (1961, p.144-145) stated that good spatial integration of space (well-connected and integrated spaces) and diversity of function are being a pivotal element in attracting people and encouraging lengthy use of space. The first statement on configuration of space is also supported by Can & Heath (2015) who compared there planned residential area.. These planned residential areas showed a relatively strong association between space syntax parameter (connection, global integration, and local integration) and outdoor activities in the Sunday. One of the area, the correlation result was the highest with R^2=0.916 (interaction and local integration), R^2=0.931 (interaction and global integration), and R^2=0.916 (interaction and connectivity). Meanwhile, the results from our study show low correlation coefficient with R^2=0.148 (interaction and local integration), R^2=0.036 (interaction and global integration), and R^2=0.195 (interaction and connection). These values are also similar for necessary and optional activities in kampung Code (see Chapter 5.3). The low association between configuration of space and frequency of outdoor activity is suggested by either the fact that the irregular and spontaneous development of the kampung or the dweller's preference toward particular space for doing outdoor activity. Similarly, low correlation results were also found in two traditional fishing settlements (kampung) in East Java (Brown & Darjosanjoto, 1999). They found that the women's social and necessary activity was confined to the closeness of their home (work that associate to home such as washing and cooking) while the men were spotted in the social and necessary feature of place like tavern and fish storage.

The diversity of function such as resident, services, and commercials in close proximity promotes different types of activity and attract people together in place (Gehl, 2006 ,p.108). This is proven by the magnitude of dwellers in nearby favourite places, especially along the riverbank. The availability of these places induce the diversity of activities of the kampung. Further, the correlation of different building function/amenities and the configuration of space was analysed. The correlation results show a low association between the building function and configuration of space (see Appendix 10), meaning that the establishment of those functions does not always follow the opportunity of space to acquire buyers/people, inferring to the high locally integrated space will attract more outdoor activity and passers-by. In this case, some of the local shops/taverns and amenities were also located in the medium to low integration of space, yet the dwellers still spotted doing outdoor activities nearby. This means that building functions itself that attract the dwellers to have activities nearby but the dweller's spatial cognition dictated them to access those places easily even it is not situated in accessible places.

Similar to the result of Can & Heath (2015); B Hillier & Vaughan (2007), Karimi & Parham (2012), the outdoor activities in Code tend to occur in high locally integrated spaces, high connectivity and high control value. These spaces play an important role in supplying continuous passers-by and the co-present of dwellers in the form of social interaction. In addition, outdoor activities have a higher likelihood to occur in the less density spaces. In relation to the creation of a sense of place of the kampung, the spatial configuration of space contributes to the creation toward attachment to the place. However, the motivation of dwellers participating in outdoor activity is because the co-present of other in favourite places and it less associated to the configuration of space. This is supported by fact that favourite places are perceived by dwellers as the place where they can find the other (adaptable for social interaction). Regardless the low correlation results, it is apparent that the spatial configuration is impacted in generating encounter and co-presence wherein these bearings motivated dwellers for engaging in social interaction. Gilroy (2010) signified that high possibility of encounter of dwellers in a place might induce the conviviality among them. This creates a positive experience of dwellers when exploring the space and meeting people at the same time.

The dweller's perception (through cognitive and emotional experience in their kampung) generates a sense of place of Kampung Code. Dweller's perceptions toward their kampung are: first, the attitude towards the physical quality (tangible senses), and second, the sentiments towards neighbour's kinship (intangible senses). The physical quality, refers to the eight favourite places in Code (see Chapter 6.2 and table 6-1). Dwellers also perceived a positive daily interaction and good value of neighbour's kinship (see Chapter 6.1). The three themes, namely community value, favourite places, and daily activity (see Table 6-1) signifies the motivation of dwellers doing outdoor activities because of the co-presence and the conviviality relationship between dwellers. Thus, it can be inferred that the sense of place of Kampung Code is related to the daily activities of dwellers within the kampung (favourite places) supported by the understanding, tolerance, and communality of its dwellers (neighbour's kinship).

Dwellers perception towards the sense of place of the kampung might be biased to the specific environment in the kampung. This is related to the sample of the respondents which was drawn based on the high local integration scores wherein the dwellers in this spaces were high likely to be exposed to frequent outdoor activities. The sentiment to the sense of place might be different if the respondents were a mixture of high local integration (more exposed) and low local integration (low exposed).

The three attributes of sense of place show, based on the interview with the dwellers, that established social activities and well-developed neighbour's kinship are more important for generating the sense of place in Kampung Code. Dwellers seemed not to have an adequate consciousness about spatial layout when they developed their kampung in the beginning. Instead, they spontaneously erected the house in the limited space they had. In addition, the attributes of space such as safety, cleanness, liveable kampung, and adaptable of space for social interaction give the positive experience (exuberant/merry) for dwellers to stay longer in the favourite places. Similar to the outcomes study of Karami et al. (2014) in residential complex of Tehran, feeling of security and tranquillity are the most important factors that created sense of place in residential complexes. Moreover, appropriate design attributes of neighbourhood social space promotes frequent social interaction, hence signifies the sense of belonging among inhabitants (Karami et al., 2014).

8. CONCLUSION AND RECOMMENDATION

This chapter contains the conclusions of the research, which aimed at the exploration of the concept of sense of place in an urban kampung. Next, limitation of the study and recommendations are given in order to contribute and enrich the multidisciplinary study of sense of place. The conclusion will be structured per each sub-objective.

8.1. Conclusion

The **first objective** investigated the activity patterns of dwellers in the urban kampung. Activity snapshots showed many kinds of activities, which could be classified into social, necessary, optional, and religious activities. Dwellers' outdoor activities particularly happened at their favourite places. Those places are house terrace, riverbank, local/shop, tavern, community building, guard post, field and nearby open space and mosque. Thus, the pattern of activity in the urban kampung follows the distribution of favourite places, especially the riverbank is a unique natural feature. This explains the linear pattern of activities along the river.

The pattern of activities changes throughout the day, indicating the dynamic and continuity of outdoor activities in the urban kampung. Necessary and social activities show an opposite trend in terms of continuity of occurrence. In the morning, necessary activities are more intense and eventually decrease in the afternoon. Conversely, social activities increase and culminate in the afternoon. The dynamic of activities indicates liveability and a vibrant environment in the urban kampung.

The **second objective** explored the configuration of space. This was quantified by four space syntax parameters and two spatial metrics (PD and SHDI). The results showed that the configuration of space in Code influences the frequency of outdoor activities. High frequency of outdoor activities (particularly social interaction) was spotted in high locally integrated spaces and occurred less at the edges of the kampung (high global integrated spaces). A good configuration of space (more connected lines/spaces and locally high integrated spaces) contributes to the creation of the sense of place by encouraging a co-presence of dwellers within the space. Similarly, local attractors such as diversity of use (e.g. local shops/tavern and other amenities) stimulate outdoor activities in its surrounding. Diversity works by giving dwellers the opportunity to participate in different kinds of outdoor activities. Further, very densely built-up area in Kampung Code drives the dwellers to seek more spacious space such as riverbank and open space/field.

Regarding the **third objective**, dwellers perceived both physical and social cohesion/ neighbour's kinship in the kampung. Through experiencing the places and interacting with others individuals the dwellers perceive attributes of space such as safety and security, visual aesthetic, liveability, and adaptability of space for social interaction. Eight favourite places in the kampung are marked by dwellers as symbolic tangible spaces where they can satisfy their needs of social interaction. Dweller perceived good neighbour's kinship by voluntarily participating in social activities and agreeing with norms of the social system they built. The similarity of socio-economic background and long duration of residency supported the development of understanding and concordance among dwellers. This helps in avoiding social tensions and conflicts of the limited space.

Finally, for the **fourth objective, the research** concludes that the sense of place of the urban kampung is not only composed by the interplay of dweller's daily activity and morphology of space, but also by the cognition of dwellers towards the perceived place, activities and social values of the community in the kampung. Dweller's perception towards their place is related to personal factors, social factor, activity features, and time factor.

Personal factor refers to the experience/memory and satisfaction of individuals or group in a place. Dwellers perceive that the favourite places in the urban kampung were safe during the day and night, arguably clean, fair visual aesthetic, very liveable, and adaptable for accommodating social interaction. These experiences create the satisfaction toward place and further develop the attachment towards place. In addition, the satisfaction of dwellers settled side by side with neighbours in the kampung resulted from the good neighbour's kinships (social factor). Lastly, the length of residency (average of 43 years) allows the dwellers to understand each other (time factor), their physical environment, and creates the attachment to their kampung.

From the eight favourites places, the riverbank and house terraces are the most favourite places in the kampung. It is obvious that the riverbank is one of the most favourite place in the kampung because this place is the only natural space in the kampung which provides various opportunities for dwellers doing social and optional activity. Dwellers also mention that the house terrace, street/alley and riverbank as their preference for having interaction with others. Streets/alleys are highlighted here because the social interaction occurred spontaneously when they meet and encounter each other. The spaces and streets which are well-connected and locally integrated to other space generate opportunity of co-presence and encounter for social interaction. Therefore, it can be said that there is a co-benefit between the configuration of space and the motivation of people doing outdoor activities, especially for social interaction. The dwellers are motivated to participate in outdoor activities where they see others (co-presence), the co-presence is a positive product of the configuration of space.

In conclusion, the physical space represented by eight favourite places has two significant roles in creating the sense of place of the urban kampung. First, it accommodates the outdoor activities and it promotes social interactions among dwellers. Second, it creates tangible symbolic representation of dwellers in the kampung, meaning that the community exists and controls the places. Moreover, the diversity of use and variation of outdoor activities in the kampung provide individuals with experiences and creates numerous opportunities for dweller to connect with others.

This study through the combination of space syntax and spatial metrics and the dweller's perception is able to describe the character of space that contributes to the creation of a sense of place in terms of generating co-presence and places of encounter of dwellers. This demonstrates that the sense of place of the urban kampung relies on the presence of others in conducting daily habits, particularly social interaction.

8.2. Limitations in the Research

Some of the limitations in this research are listed as follow:

- Activity mapping with snapshot cannot reach all narrow spaces in the urban kampung
  There was a little time gap when activity mapping was conducted simultaneously at the observation spots. Some activities, which only happened in a minute, were possibly not recorded while surveyors did walk-by the snapshot. This happened due to the large number of street segments, which cannot be observed one by one. In addition, observations focused more on the outdoor activities occurring

within the study area and less observed at the edges. The result might have affected the weak correlation between space syntax variable and outdoor activities.

- Respondent for questionnaire
  The questionnaire was addressed to the head of household where 90.7% were male. It means that the perception of sense of place was constructed dominantly based on a male perception, which may lead to a biased articulation to the sense of place. However, the FGD tried to compensate the gender bias since dwellers from different gender and age group contributed their thoughts about sense of place.

- Axial line and axial map
  Drawing axial lines manually in the study area was based on personal judgement where the researcher decided to draw the longest visibility lines from an arbitrary start-point to an end-point in space with the help of a high-resolution image. Within the study area, the outcome of the axial map might be different when another researcher would draw axial lines with the same principles. This issue could happen due the fact that the intricacy and irregular form of the study area which was built unplanned and spontaneous. For instance, some of narrow streets /alleys are covered by over-layered roof from adjacency buildings, thus it cannot be seen in a high-resolution image. Moreover, irregular open spaces and different street widths create a different line of sight resulting on heavy subjectivity to draw axial lines. The drawing of axial line was supported by the local knowledge and experience of the research instead of merely relied on high-resolution image.

- Diversity index based on urban patches
  Quantifying the diversity index using SHDI seems could not reveal a true depiction of the mixture of building function in the urban kampung. SHDI is calculate based on the various types of urban patches where its size will affect the outcome of the diversity index. The SHDI result might be compared with other method such as mix-use index based on the polygon grid with adjustable scale (Ye & Nes, 2014). The both result, therefore, can complement the diversity analysis of the urban kampung.

8.3. Recommendation

- Future research from methodology point of view
  It would be possibility with nowadays technology to design a comprehensive behavioural mapping strategy with modern devices such as 360-degree mountable camera attached in particular space for time lapsed recording. This strategy will make a survey more efficient in cost as well as improve consistency of acquired data. It also would help to count the frequency of people in outdoor spaces and identify what kind of activities being performed. Subsequently, for further analysis, it could be used to correlate with various explanatory variables such as space syntax parameters.

  However, in the context of monitor behavioural activity of dwellers in the kampung with such strategy, it might be difficult. Not to mention the execution or technical issues, but it is more relate to the code of conduct of doing such an observation in a kampung wherein the dwellers might feel unsafe/uncomfortable of being monitored continuously with the camera. Nevertheless, behavioural mapping with this technique could be done in public realm in urban area as long as the permission has been granted by local government, municipality and the community.

  The new development of space syntax allows the researcher to modify the code and function to be compatible with another platform. One of this example is Depthmap X, which can be run with

Quantum GIS. This has the possibility to model space syntax with augmented reality for automation of analysis with the pre-set (predefined rule set). This, for example, can be done in Rhinoceros + Grasshopper 3d software with pre-installed "SpiderWeb" plugin. This attempt has been made by Vasku (2013) for parametric modelling of informal urban settlement in Jeddah. The advancement of space syntax with augmented reality can model various spatial configuration that would give the optimum result for accessible and more integrated urban kampung.

- Policy recommendation for kampung upgrading/improving program
  The importance of the sense of place toward a sustainable and liveable urban kampung should be take into account in any urban reform policy, which is related to housing, formal or informal settlements. Any improvement or partial development project (e.g. improvement basic infrastructures) up to full upgrading programs (e.g. changing spatial layout) should consider the structure of the existing community and availability of social facilities / amenities in such well-integrated spaces. Moreover, the appearance of natural spaces like river or lake where many informal settlements are located nearby are important in facilitating social interaction thus giving the unique identity and sense of place. Therefore, such natural places should be preserved and improved in terms of physical and aesthetical quality to maintain inhabitant attachment to their kampung.

LIST OF REFERENCES

Alexander, C., Ishikawa, S., & Silverstein, M. (1977). *A Pattern Language*. New York: Oxford University Press.

Altman, I., & Low, S. M. (1992). *Place attachment*. (I. Altman & S. M. Low, Eds.). New York: Plenum Press. http://doi.org/10.1007/978-1-4684-8753-4

Asami, Y., Kubat, A. S., Kitagawa, K., & Iida, S.-I. (2003). Introducing the third dimension on Space Syntax: Application on the historical Istanbul. In *4Th International Space Syntax Symposium* (pp. 48.1 – 48.19). Retrieved from http://www.spacesyntax.org/symposia/SSS4/fullpapers/48AsamiKubatIdapaper.pdf

Billig, M. (2006). Sense of place in the neighborhood, in locations of urban revitalization. *GeoJournal*, *64*(2), 117–130. http://doi.org/10.1007/s10708-005-4094-z

Brown, F. E., & Darjosanjoto, E. T. (1999). The Use of Street:Configuration, Culture, and Space-use in the Coastal Settlements of Eastern Jave. In *Space Syntax Second International Symposium* (p. 14). Brasilia.

Bryman, A. (2012). *Social Research Methods* (Fourth Edi). New York: Oxford University Press.

Can, I., & Heath, T. (2015). In-between spaces and social interaction: a morphological analysis of Izmir using space syntax. *Journal of Housing and the Built Environment*, 1–19. http://doi.org/10.1007/s10901-015-9442-9

Clark, a, & Emmel, N. (2010). Using walking interviews, 1–6. Retrieved from http://www.manchester.ac.uk/realities/resources/toolkits

Cross, E. J. (2001). What is Sense of Place? In *12th Headwaters Conference* (p. 14). Colorado.

Doherty, G., & Lino e Silva, M. (2011). Formally informal: Daily life and the shock of order in a Brazilian favela. *Built Environment*, *37*(1), 30–41. http://doi.org/10.2148/benv.37.1.30

Evans, J., & Jones, P. (2011). The walking interview: Methodology, mobility and place. *Applied Geography*, *31*(2), 849–858. http://doi.org/10.1016/j.apgeog.2010.09.005

Funo, S., Yamamoto, N., & Silas, J. (2002). Typology of Kampung Houses and Their Transformation Process a A Study on Urban Tissues of Indonesian City. *Journal of Asian Architecture and Building Engineering*, *1*(2), 193–200.

Gehl, J. (2006). *Life Between Building: Using Public Space* (Sixth Edit). The Danish Architectural Press.

Gehl, J. (2010). *Cities for People* (First Edit). Washington: Island Press.

Gehl, J., & Svarre, B. (2013). *How to Study Public Life*. Washington: Island Press.

Gil, J. (2015). Examining " Edge Effects ": Sensitivity of Spatial Network Centrality Analysis to Boundary Conditions. In *Proceedings of the 10th International Space Syntax Symposium* (pp. 147:1–147:16). London.

Gilroy, R. (2010). Planning and Diversity in the City: Redistribution, Recognition and Encounter. *Planning Theory & Practice*, *11*(1), 132–133. http://doi.org/10.1080/14649351003622433

Hashem, H., Abbas, Y. S., Akbar, H. A., & Nazgol, B. (2013). Comparison the Concept of Sense of Place and Attachment to Place in Architectural Studies. *Malaysia Journal of Society and Space*, *9*(1), 107–117.

Hernndez, B., Carmen Hidalgo, M., Salazar-Laplace, M. E., & Hess, S. (2007). Place attachment and place identity in natives and non-natives. *Journal of Environmental Psychology*, *27*(4), 310–319. http://doi.org/10.1016/j.jenvp.2007.06.003

Herold, M., Goldstein, N. C., & Clarke, K. C. (2003). The spatiotemporal form of urban growth: Measurement, analysis and modeling. *Remote Sensing of Environment*, *86*(3), 286–302. http://doi.org/10.1016/S0034-4257(03)00075-0

Hickman, P. (2013). "Third places" and social interaction in deprived neighbourhoods in Great Britain. *Journal of Housing and the Built Environment*, *28*(2), 221–236. http://doi.org/10.1007/s10901-012-9306-5

Hillier, B. (2007). *Space is the Machine* (electronic). United Kingdom: Press Syndicate.

Hillier, B., & Hanson, J. (1984). *The Social Logic of Space* (First Edit). Cambridge: Cambridge University Press.

Hillier, B., & Sahbaz, O. (2008). An evidence based approach to crime and urban design Or, can we have vitality, sustainability and security all at once? *Designing Sustainable Cities: Decision-Making Tools and Resources for Design. Oxford: Wiley Blackwell*, (March), 163–186.

Hillier, B., & Vaughan, L. (2007). The city as one thing. *Progress in Planning 67*, pp 205–230. http://doi.org/10.1016/j.progress.2007.03.001

Hummon, D. M. (1992). Community Attachment: Local Sentiment and Sense of Place. In I. Altman & S. M. Low (Eds.), *Place Attachment* (pp. 253–278). New York: Plenum Press. http://doi.org/10.1007/978-1-4684-8753-4_12

Jacobs, J. (1961). *The Death and Life of Great American Cities*. Penguin Books.

Jiang, B. (2015). *Axwoman 6.3: An ArcGIS Extension for Urban Morphological Analysis*. Retrieved from http://fromto.hig.se/~bjg/Axwoman/

Jiang, B., & Claramunt, C. (2002). Integration of Space Syntax into GIS: New Perspectives for Urban Morphology. *Transactions in GIS*, *6*(3), 295–309. http://doi.org/10.1111/1467-9671.00112

Jiang, B., Claramunt, C., & Klarqvist, B. (2000). Integration of space syntax into GIS for modelling urban spaces. *International Journal of Applied Earth Observation and Geoinformation*, *2*(3-4), 161–171. http://doi.org/10.1016/S0303-2434(00)85010-2

Jiang, B., & Liu, X. (2010). Automatic Generation of The Axial Lines of Urban Environment to Capture What We Perceive, 1–13.

Jivén, G., & Larkham, P. J. (2003). Sense of Place, Authenticity and Character: A Commentary. *Journal of Urban Design*, *8*(1), 67–81. http://doi.org/10.1080/1357480032000064773

Jones, M. A., & Fanek, M. F. (1997). Dr Michael A Jones and Mamoun F Fanek Texas Institute of Technology, Lubbock, United States 25. *Space Syntax First International Symposium*, *2*(1), 25.1–25.11.

Karami, S., Ghafary, M., & Fakhrayee, A. (2014). Analyzing the correlation between urban spaces and place attachment Evidence from : Narmak neighborhood in Tehran. *European Online Journal of Natural and Social Sciences*, *3*(4), 129–139.

Karimi, K., & Parham, E. (2012). An Evidence Informed Approach To Developing an Adaptable Regeneration Programme for Declining Informal Settlements. In *Proceedings of the Eighth International Space Syntax Symposium* (pp. 1–27). Saniago de Chile.

Kim, Y. O., & Penn, A. (2004). Linking the Spatial Syntax of Cognitive Maps To the Spatial Syntax of the Environment. *Environment & Behavior*, *36*(4), 483–507. Retrieved from 10.1177/0013916503261384

Klarqvist, B. (1993). A space syntax glossary. *Nordisk Arkitekturforskning*, *2*, 11–12. Retrieved from https://fenix.tecnico.ulisboa.pt/downloadFile/3779573909551/glossarySS.pdf

Kohli, D., Sliuzas, R., Kerle, N., & Stein, A. (2012). An ontology of slums for image-based classification. *Computers, Environment and Urban Systems*, *36*(2), 154–163. http://doi.org/10.1016/j.compenvurbsys.2011.11.001

Kuffer, M., Barros, J., & Sliuzas, R. V. (2014). The development of a morphological unplanned settlement index using very-high-resolution (VHR) imagery. *Computers, Environment and Urban Systems*, *48*, 138–152. http://doi.org/10.1016/j.compenvurbsys.2014.07.012

Kumar, R. (2011). *Research Methodology: A Step-by-Step Guide for Beginners* (Third edit). London: SAGE Publication.

Low, S. (1992). "Symbolic Ties that Bind: Place Attachment in the Plaza." In I. Altman & S. Low (Eds.), *Place Attachment* (pp. 165–185). New York: Plenum Press. http://doi.org/10.1007/978-1-4684-8753-4_8

Lowry, J. H., & Lowry, M. B. (2014). Comparing spatial metrics that quantify urban form. *Computers, Environment and Urban Systems*, *44*, 59–67. http://doi.org/10.1016/j.compenvurbsys.2013.11.005

Lynch, K. (1960). *The Image of the City*. Cambridge: MIT Press.

Majumdar, A., Sliuzas, R., Munshi, T., & Brussel, M. (2009). Exploring the Relationship Between Urban Roads , Urban Form and Economic Activity in Ahmedabad Using Space Syntax. In *International Workshop on GIS for Transportation* (pp. 51–57). Wuhan, China.

Mehta, V. (2013). *The Street*. Routledge.

Montgomery, J. (1998). Making a city : Urbanity , vitality and urban design. *Journal of Urban Design*, *3*(1), 93–116. http://doi.org/10.1080/13574809808724418

Online QDA. (2016). Online QDA - What is Qualitative Data Analysis (QDA). Retrieved April 23, 2016, from http://onlineqda.hud.ac.uk/Intro_QDA/what_is_qda.php

Ostwald, M. J. (2011). The Mathematics of Spatial Configuration: Revisiting, Revising and Critiquing Justified Plan Graph Theory. *Nexus Network Journal*, *13*(2), 445–470. http://doi.org/10.1007/s00004-011-0075-3

Parham, E. (2012). THE SEGREGATED CLASSES : spatial and social relationships in slums. In *Eighth International Space Syntax Symposium. Santiago de Chile: PUC, 2012.* (pp. 1–19). Santiago. Retrieved from http://www.sss8.cl/media/upload/paginas/seccion/8150_1.pdf

Peponis, J., Ross, C., & Rashid, M. (1997). The structure of urban space, movement and co-presence: The case of Atlanta. *Geoforum*, *28*(3-4), 341–358. http://doi.org/10.1016/S0016-7185(97)00016-X

Project for Public Space. (2015). Concept of Place Making. Retrieved August 23, 2015, from http://www.pps.org/reference/what_is_placemaking/

Raharjo, W. (2010). *Speculative Settlements: Built Form/Tenure Ambiguity in Kampung Development*. University of Melbourne.

Rahmi, D. H., Wibisono, B. H., & Setiawan, B. (2001). Rukun and Gotong Royong : Managing Public Places in an Indonesian Kampung. In P. Miao (Ed.), *Public Places in Asia Pacific Cities: Current Issues and Strategies* (pp. 119–134). Kluwer Academic Publishers.

Ratti, C. (2004). Space syntax: Some inconsistencies. *Environment and Planning B: Planning and Design*, *31*(4), 487–499. http://doi.org/10.1068/b3019

Ratti, C. (2005). The lineage of the line: Space syntax parameters from the analysis of urban DEMs. *Environment and Planning B: Planning and Design*, *32*(4), 547–566. http://doi.org/10.1068/b31045

Raymond, C. M., Brown, G., & Weber, D. (2010). The measurement of place attachment: Personal, community, and environmental connections. *Journal of Environmental Psychology*, *30*(4), 422–434. http://doi.org/10.1016/j.jenvp.2010.08.002

Rogers, Z., & Bragg, E. (2012). The Power of Connection: Sustainable Lifestyles and Sense of Place. *Ecopsychology*, *4*(4), 307–318. http://doi.org/10.1089/eco.2012.0079

Sastrosasmito, S. (2009). Compact Kampungs : Formal and Informal Integration in The Context of Urban Settlements of Yogyakarta , Indonesia. *Journal of Habitat Engineering*, *1*(1), 119–134.

Sattarzadeh, D., & Asl, L. B. (2015). Identification of the Components of Sense of Place in Architecture of Houses in First Pahlavi Era in Iran (Case Study : Tabriz). *European Online Journal of Natural and Social Sciences*, *3*(3), 436–450.

Setiawan, B. (1998). *Local dynamics in informal settlement development: A case study of Yogyakarta, Indonesia. ProQuest Dissertations and Theses*. Retrieved from http://search.proquest.com/docview/304493359?accountid=13771

Setiawan, B., Oblo, D., & Djati, R. (2010). *Kampung Kota dan Kota Kampung Potret: Tujuh Kampung Kota di Jogja (Urban Kampung and Kampung Urban: Portrait of Seven Urban Kampungs in Jogja)*. Yogyakarta: Centre of Environmental Studies UGM.

Sirueri, F. O. (2015). *Comparing Spatial Patterns of Informal Settlements Between Nairobi and Dar Es Salaam*. University of Twente.

Stanley, D. (2003). What Do We Know about Social Cohesion: The Reserach Perspective of the Federal Goverment's Social Cohesion Research Network. *The Canadian Journal of Sociology*, *28*(1), 5–17. http://doi.org/10.2307/3341872

Stedman, R. C. (2002). Toward a Social Psychology of Place: Predicting Behavior from Place-Based Cognitions, Attitude, and Identity. *Environment and Behavior*, *34*(5), 561–581. http://doi.org/10.1177/0013916502034005001

Thompson, E. (2004). Rural villages as socially urban spaces in Malaysia. *Urban Studies*, *41*(12), 2357–2376. http://doi.org/10.1080/00420980412331297573

Tuan, Y.-F. (1974). *Topophilia: A Study of Environmental, Attitutes, and Values*. New York: Prentice-Hall Inc.

Tunas, D. (2008). *The Spatial Economy in the Urban Informal Settlement*. International Forum on Urbanism (IFoU).

UMass Landscape Ecology Lab. (2016). FRAGSTATS: Spatial Pattern Analysis Program for Categorical Maps. Retrieved March 21, 2016, from http://www.umass.edu/landeco/research/fragstats/fragstats.html

UN-Habitat. (2003). *The Challenge of Slums*.

UN-Habitat. (2006). *State of the World's Cities in 2006*. Retrieved from http://mirror.unhabitat.org/pmss/listItemDetails.aspx?publicationID=2101

United Nations Development Group. (2014). DELIVERING THE POST-2015 DEVELOPMENT AGENDA: Opportunities at the National and Local Levels.

Vasku, M. (2013). Generative Improvement of Street Networks Based on Space Syntax Applied in a case study on an informal settlement in Jeddah. *Spatial Performance and Space Syntax*, *1*, 367–374.

Vaughan, L. (2007). The spatial syntax of urban segregation. *Progress in Planning*, *67*(3), 205–294. http://doi.org/10.1016/j.progress.2007.03.001

Walsh, M. (2003). Teaching Qualitative Analysis Using QSR NVivo 1. *The Qualitative Report*, *8*(2), 251–256.

Retrieved from http://www.nova.edu/ssss/QR/QR8-2/walsh.pdf

Wang, M. (2012). Extending geographic information systems to urban morphological analysis with a space syntax approach, (June).

White, H. W. (1980). *The Social Life of Small Urban Spaces*. New York: Project for Public Spaces.

Yandanfar, S. A., Heidari, A. A., Behdadfar, N., & Eskandari, M. (2013). Effect of Place Attachment in Creating Sense of Place Case Study : Tajrish old Bazaar and New Commercial. *Journal of Applied and Basic Sciences*, *4*(4), 855–862. Retrieved from www.irjabs.com

Yatmo, Y. A., & Atmodiwirjo, P. (2013). Spatial strategies for domestic service activities in urban kampung houses. *International Journal of Technology*, *4*(1), 24–33.

Ye, Y., & Nes, A. (2014). Quantitative tools in urban morphology : Combining space syntax , space matrix and mixed-use index in a GIS framework. *Urban Morphology*, *18*(2), 97–118.

Yin, K. R. (2003). *Case Study Research Design and Methods* (Third Edit). London: SAGE Publication.

APPENDICES

Appendix 1. Structured Household Interview

Questionnaire interview for Assessing and Determining a Sense of Place of Urban Kampung in Yogyakarta

Good day. My name is Irsyad Adhi Waskita Hutama, currently following a M.Sc. course in urban planning and management at the University of Twente, in the Netherlands. I am conducting the study about spatial and social pattern to assess the sense of place of urban kampung in Yogyakarta. This research is a partial fulfilment of the requirements for The Master Science degree in Geo-Information Science and Earth Observation. You have been selected as one of the people who can contribute to required information. All information collected is for academic research purpose only, therefore, the information you give will remain confidential.
Thank you for your valuable time to participate in my research.

Email: irsyad.adhi@mail.ugm.ac.id

Basic Information

- Date of survey:
- Name of surveyor:
- Location (Write with the official name):

A. Household Personal Information: (Addressed to head of household)

1. Initial Name? ……
2. Address number (RT and RW)? ……
3. Date of birth (dd/mm/yy)? ……
4. Household size? ……
5. Number of children below 14 years old (in Junior high school)? ……
6. Head of household's place of origin? ……
7. Length of residency in urban kampung? ……

B. Questions About Socio-Economic and Occupational Information

1. Are you currently employed? YES (1) / NO (2)
2. Occupation (indicate here):

	Self Employed (Entrepreneurship)	**Employed by some of else**	**Currently not working (including seasonal work)**	**Retired**	**Others**
Indicate with tick					
Please specify your work					

C. Questions About Daily Activity within a Past Week

1. Head of household

How do you spend your time in a past week? **(Please indicate your activity here)**

No	Daily Activity	Where *	Hours	Times a week	Description
1	Working (activity related to work) a. …… b. ……... c. ……....				
2	Socialize (activity related to socialize / visit others) a. ……..... b. …… c. ……				
3	Voluntarily / Optional a. …… b. …… c. ……				
4	Others (if any) a. …….. b. …….. c. ……..				

*if the activity take place inside the boundary of study area, please specify on map. If it's NOT, only specify name of the area with the detailed information such as neighbourhood/district name or street name

2. Woman / Wife

How do you spend your time in a past week? **(Please indicate your activity here)**

No	Daily Activity	Where *	Hours	Times a week	Description
1	Working (activity related to work) a. …… b. ……... c. ……....				
2	Socialize (activity related to socialize / visit others) a. ……..... b. ……				

	c. ……				
3	Voluntarily / Optional a. …… b. …… c. ……				
4	Others (if any) a. …….. b. …….. c. ……..				

*if the activity take place inside the boundary of study area, please specify on map. If it's NOT, only specify name of the area with the detailed information such as neighbourhood/district name or street name

3. **Children** (Children between 6-14 years old or at least in their junior high school/ toddlers doesn't necessary to be asked)
   How do you spend your time in a past week? **(Please indicate your activity here)**

No	Daily Activity	Where *	Hours	Times a week	Description
1	School (activity related to go to school or course) a. …… b. ……... c. …….....				
2	Socialize / play (activity related to socialize and play) a. …….... b. …… c. ……				
3	Voluntarily / Optional a. …… b. …… c. ……				
4	Others (if any) a. …….. b. …….. c. ……..				

*if the activity take place inside the boundary of study area, please specify on map. If it's NOT, only specify name of the area with the detailed information such as neighbourhood/district name or street name

D. Questions About a Value of Social Interaction and Kinship in Urban Kampung:

1. How many neighbors did you visit or have a chat in a past week? ……
2. Can you locate them on map below? ……
3. Do you have any relationship / kinship with the people in urban kampung? YES (1)/ NO (2)
4. Can you indicate your relational status with your neighbor?

Indicate with tick (✓)

Family	Professional	Cordial	Other	No relationship

5. How many times a week do you visit to interact with neighbor in urban kampung?

Indicate with tick (✓)

1-2 times	3-5 times	6-8 times	9-11 times	>11 times

6. How long do you usually have a chat / socialize with the neighbor in urban kampung?

Indicate with tick (✓)

Less than 1 hour a day	Less than 1 hour in three different times a day (morning, noon, afternoon	2-3 hours a day	2-3 hours in three different times a day (morning, noon, afternoon)	Other

7. How would you describe your social interaction with neighbours in urban kampung?

Indicate with tick (✓)

Very bad	Bad	Fair	Good	Very Good

E. Questions Relate to a Place to Interact With

1. Where do you usually or most preferably have a chat / interact with others? (please locate on the map)
2. Still related to question number E.1. Do you usually use that space to have a chat / interaction with others? YES (1) / RARELY (2) / NO (3)

F. Questions Relate to Perception of Favourite Place in Urban Kampung

1. What is your favorite place in urban Kampung? ……
2. Can you locate it on the map! ……
3. Please give a remark to the place you mention before (question number 1) in the column below?

Please encircle the number below representing your attitude!

No	Pernyataan	Strongly disagree	Disagree	Neutral/ Fair	Agree	Strongly agree
1	Street/alley that leads to your favourite place is easy to access	1	2	3	4	5
2	Do you feel it is easy to navigate within kampung	1	2	3	4	5
3	Many shortcuts (alley) to go to favourite place	1	2	3	4	5
5	Easy access to go in and out kampung	1	2	3	4	5
5	Favourite place is safe during the day	1	2	3	4	5
6	favourite place is safe during at night	1	2	3	4	5
7	I am satisfied / pleased with the visual aesthetic of favourite place	1	2	3	4	5
8	Favourite place is vibrant/livable	1	2	3	4	5
9	Favourite place is clean	1	2	3	4	5
10	There are adequate support amenities (lamp, bench, vegetation, and shading) in favourite place	1	2	3	4	5
12	Favourite place is adaptable to accommodate to social interaction and self-oriented activities	1	2	3	4	5
14	I will absolutely go to favourite place to have interaction	1	2	3	4	5
15	I feel comfortable to stay longer in favourite place	1	2	3	4	5
17	Overall physical quality of my kampung is	Very poor	Poor	Fair	Good	Very good

G. Household Income

1. How much money do you make in a month?

Indicate with tick (✓)

Category (in Rupiah)	Income (Indonesian rupiah)	
I	<1.000.000	
II	1.000.000 – 2.500.000	
III	2.600.000 – 5.000.000	
IV	5.100.000 – 7.500.000	
V	≥7.600.000	

Appendix 2. Questionnaire for Walking Interview

Semi-structured Questions for Walking Interview: Assessing and Determining Sense of Place of Urban Kampung in Yogyakarta

Good day. My name is Irsyad Adhi Waskita Hutama, currently following a M.Sc. course in urban planning and management at the University of Twente, in the Netherlands. I am studying a sense of place based upon how dwellers perceive their kampung. As a part of walking interview, I will ask several question and you will explain and lead me to the location you mention. The routes you take will be your decision. There is no right or wrong answer rather its mere your opinion toward your kampung. All information collected is for academic research purpose only, therefore, the information you give will remain confidential.

Name of the kampung:
Date of walking interview:

Interviewee information

1. Initial Name:
2. Gender: male / female
3. Age:
4. Do you live in this kampung? YES/NO
5. How long have you been living in Kampung?

Part 1: Perception toward Sense of Place

1. Which space or place in urban kampung do you like the most?
2. Can you please lead/guide me to that place?
3. What do you do usually do in this place, in your favourite place?
4. How would you describe this place?
5. Does this place look engaging/appealing to you?
6. Why do you think this place is appealing?
7. Can you name or explain the reason why this place is appealing?
8. Does this place safe during the day?
9. How about at night?
10. Do the other dwellers usually come to this place?
11. At what time usually dweller come/visit this place?
12. Are you usually going alone or invite someone else to go here?
13. What is the situation of this place through the day (from morning to afternoon)?
14. Is this place capable of accommodation social interaction with other?
15. Is this place important to you?
16. Why is it important?

Part 2: Perception on a sense of community (kinship)

1. Do you know well your neighbors who lived in nearby your house? YES / NO
2. What type of relationship do you have with people in kampung?
3. How often do you interact with people in a week?
4. Where do you usually interact with people in kampung?
5. Is it the same place as you mention before as your favorite place? YES/NO
6. Do people in kampung like to engage in social activity? YES/NO

7. Can you just briefly explain what type of social activity that most people likely to involved with?
8. How would you value social interaction in kampung? GOOD/FAIR/BAD
9. Can you give me example to support your argument above?

Appendix 3. Questionnaire for Informal FGD

Open Questions for Informal FGD: Assessing and Determining Sense of Place of Urban Kampung in Yogyakarta

Good day. My name is Irsyad Adhi Waskita Hutama, currently following a M.Sc. course in urban planning and management at the University of Twente, in the Netherlands. I am researching a sense of place based upon how dwellers perceive their kampung, behaviour of dwellers in outdoor space and social value that exist to control the community. In an informal FGD cession, I will ask several question and you will explain briefly. There is no right or wrong answer rather it's merely your opinion on the circumstances in kampung. All information collected is for academic research purpose only, therefore, the information you give will remain confidential.

1. Please name specific places that majority of dweller in urban kampung favor to go or feel belonging to?
2. What do people usually do in those favorable place?
3. Can you describe your kampung in term of physical and social aspect?
4. What social connection exist between the various dwellers?
5. Can you describe social system or norm that prevail and control community in kampung?
6. To what extent using public service/amenities in urban kampung?
7. When do dwellers activity using and engage with other in public services/amenities?
8. What is the dominant economic activity of dwellers in urban kampung

Appendix 4: Profile of Respondents Participating In Walking Interview

Profile of Respondent Participating in Walking Interview in Kampung Code

No	Initial Name	Age	Gender	Role
1	H	37	M	Villager
2	N.B	25	F	Paper craftsmanship
3	Y	42	M	Head of RW 1
4	S	57	M	Head of Youth organization
5	M	51	F	Villager
6	S	44	M	Villager
7	T.W	35	M	Head of RW 8
8	H.P	43	M	Head of RW 14
9	D	38	F	Villager
10	C.S	67	M	Villager
11	A.Y	25	F	Youth member organization
12	A. N	24	M	Youth member organization

Appendix 5. List of Daily Activities Occurred in Kampung Code

List of daily activities occurred in Kampung Code (Summary from weekday and weekend observation)

Take place in the morning (07.30 – 08.30 local time)

1. Men doing sport / jogging
2. Men taking care ornamental birds on the cage
3. Teenager play dove sport
4. Men chatting in guard post
5. Men chatting in food stall while drinking coffee
6. Men fishing in the river
7. Women cooking a food before sell them
8. Women buys some stuff in local kiosk
9. Women gardening (planting in pottery)
10. Women drying / hanging a cloth in alley
11. Group of women sitting and chatting
12. Men preparing art materials into wagon before sell.
13. Children playing with others
14. Washing clothes in common bathroom
15. Men reading newspaper in bulletin board
16. Women gathering (PKK)

Take place in the noon (12.30 - 13.30 local time)

1. Women serving a food at street food vendor
2. Men sewing clothes
3. Men working on housing construction
4. Men chatting while smoking
5. Women drying clothes in outdoor space
6. Teenager boy fishing
7. Women serving costumer in local kiosk
8. Women cooking in the aisle
9. Children playing near community building
10. Men feeding a dove
11. Women chatting with others
12. Women selling a daily need in home kiosk
13. Men selling phone call balance
14. Men fixing a motor cycle in his own terrace

Take place in the afternoon (16.30 – 17.30 local time)

1. Men Feeding a bird while chatting with other
2. Women chatting in front of house
3. Children play football
4. Adult and teenager play with dove sport
5. Children playing traditional game
6. Men fishing in the river
7. Men preparing wagon filled up with food
8. Children playing and talking
9. Sitting and Relaxing with other
10. Men eating in local food vendor

11. Teenager communicate with other
12. Women selling daily needs in local kiosk
13. Teenager Feeding and playing with a dove
14. Men fishing while chatting
15. Women taking care/nurturing a child
16. Sitting and chatting in guard post
17. Children play marbles in the aisle
18. Children go to small mosque / *mushola* for Qur'an recitation (muslim revelation)
19. Children ordering a food in local food stall
20. Women selling food and beverages (food vendor)
21. Illegal parking "guard" keeping the vehicle
22. Playing chess
23. Men cooking a food in front of his house
24. Men/teenage boys play takrow in the field
25. Teenage girls chatting with seller in front of kiosk
26. Men and teenage boys playing table tennis in common open space
27. Men paying badminton in community building

Appendix 6. General-G and Significant Value (Z-Scores) of Various Distances Band

Distance	Z-Score	P-value	Observed General-G
default	1.631	0.1028	0.0203
30	0.935	0.3499	0.0305
50	2.462	0.0138	0.0538
75	1.529	0.1263	0.0201
100	1.237	0.2160	0.0111
125	2.203	0.0275	0.0173
150	2.005	0.0449	0.0123
200	-0.480	0.6309	-0.0068
250	-1.604	0.7727	-0.0056
300	-2.571	0.0101	-0.0132
350	-1.233	0.2173	-0.0074
400	0.077	0.9389	-0.0037

Appendix 7. Frequency of People Observed in Outdoor Space in Three Different Times During Weekday (Tuesday) and Weekend (Sunday)

Total Snapshot of Activities on Tuesday (weekday)

Observed	Morning				Midday				Afternoon			
People	Nec	Soc	Opt	Reli	Nec	Soc	Opt	Reli	Nec	Soc	Opt	Reli
Man (%)	37.7	35.6	26.7	0.0	35.1	44.4	16.4	4.1	15.9	59.7	23.6	0.8
Woman (%)	57.5	36.3	6.2	0.0	52.1	47.1	82.6	0.0	56.3	40.1	3.5	0.0
Children (%)	29.4	70.6	0.0	0.0	7.0	80.2	12.8	0.0	6.0	79.2	0.0	14.9
Mix (%)	44.4	40.7	14.8	0.0	24.2	75.8	0.0	0.0	9.4	86.5	4.2	0.0

Nec: necessary activity; Soc: social activity; Opt: optional activities; Reli: Religious Activities

Total Snapshot of Activities on Sunday (weekend)

Observed	Morning				Midday				Afternoon			
People	Nec	Soc	Opt	Reli	Nec	Soc	Opt	Reli	Nec	Soc	Opt	Rel
Man (%)	26.2	54.4	17.1	2.4	20.1	56.8	19.6	3.5	11.2	62.2	25.0	1.6
Woman (%)	42.5	56.0	1.4	0.0	48.7	48.7	2.6	0.0	42.9	50.3	6.8	0.0
Children (%)	2.4	94.0	3.6	0.0	1.7	91.3	7.0	0.0	6.7	81.2	1.2	10.9
Mix (%)	12.7	81.4	5.9	0.0	5.4	94.6	0.0	0.0	2.2	91.2	6.6	0.0

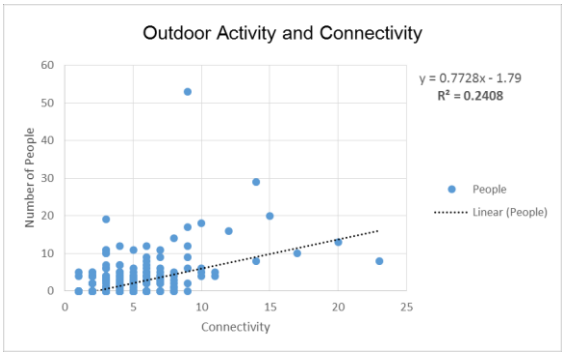
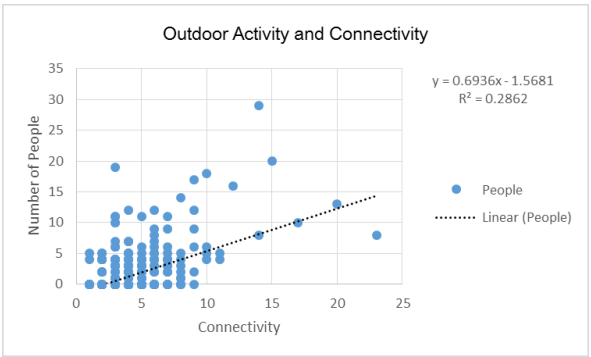
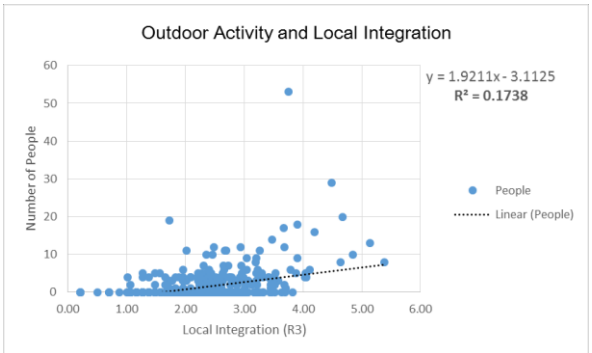
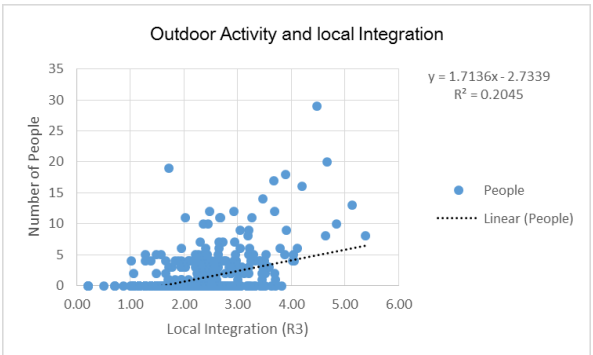
Nec: necessary activity; Soc: social activity; Opt: optional activities; Reli: Religious Activities

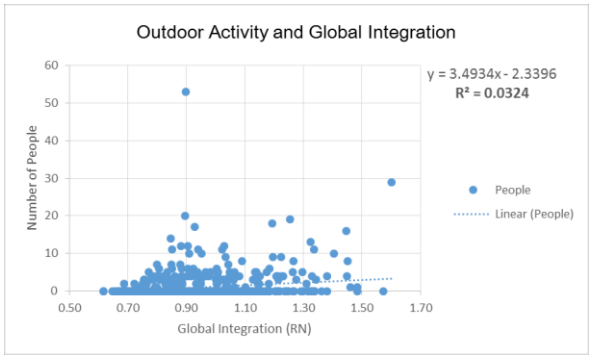
Appendix 8. Some Experiment with the Correlation of Space Syntax Variables and Snapshot of Activities.

Correlation of Activity Snapshot and Space Syntax Parameters after Removing Outlier Data and Short Lines /Space ≤7 Meters

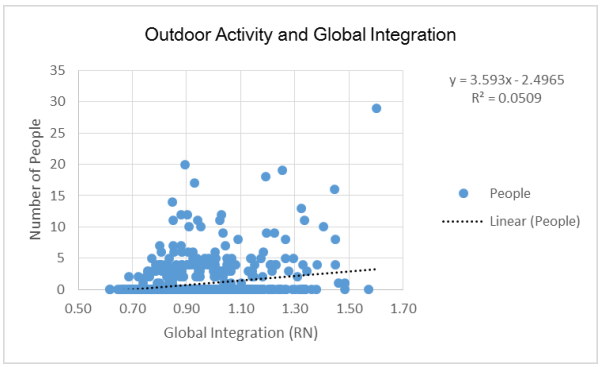
Activity snapshots and SSX - R^2 Linear	Connectivity	L.Integ	G.Integ	Control
Necessary (walk and work)				
Tuesday	0.211	0.121	0.006	0.171
Sunday	0.193	0.142	0.013	0.198
Social (interaction and play)				
Tuesday	0.221	0.208	0.045	0.142
Sunday	0.257	0.238	0.066	0.215
Optional (relax and sit/stand)				
Tuesday	0.175	0.102	0.006	0.136
Sunday	0.188	0.114	0.027	0.129

Significance comparison of Syntax – Outdoor Activity correlation value

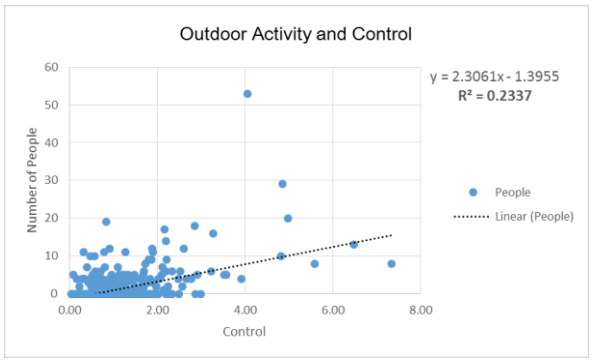
Removing Short Lines Segment ≤7 meters	Removing Outlier Data and Short Lines Segment ≤7meters
 Outdoor Activity and Connectivity	 Outdoor Activity and Connectivity
 Outdoor Activity and R3	 Outdoor Activity and R3



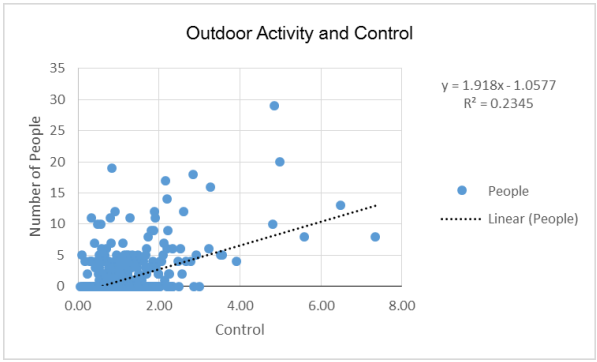
Outdoor Activity and RN



Outdoor Activity and RN



Outdoor Activity and Control

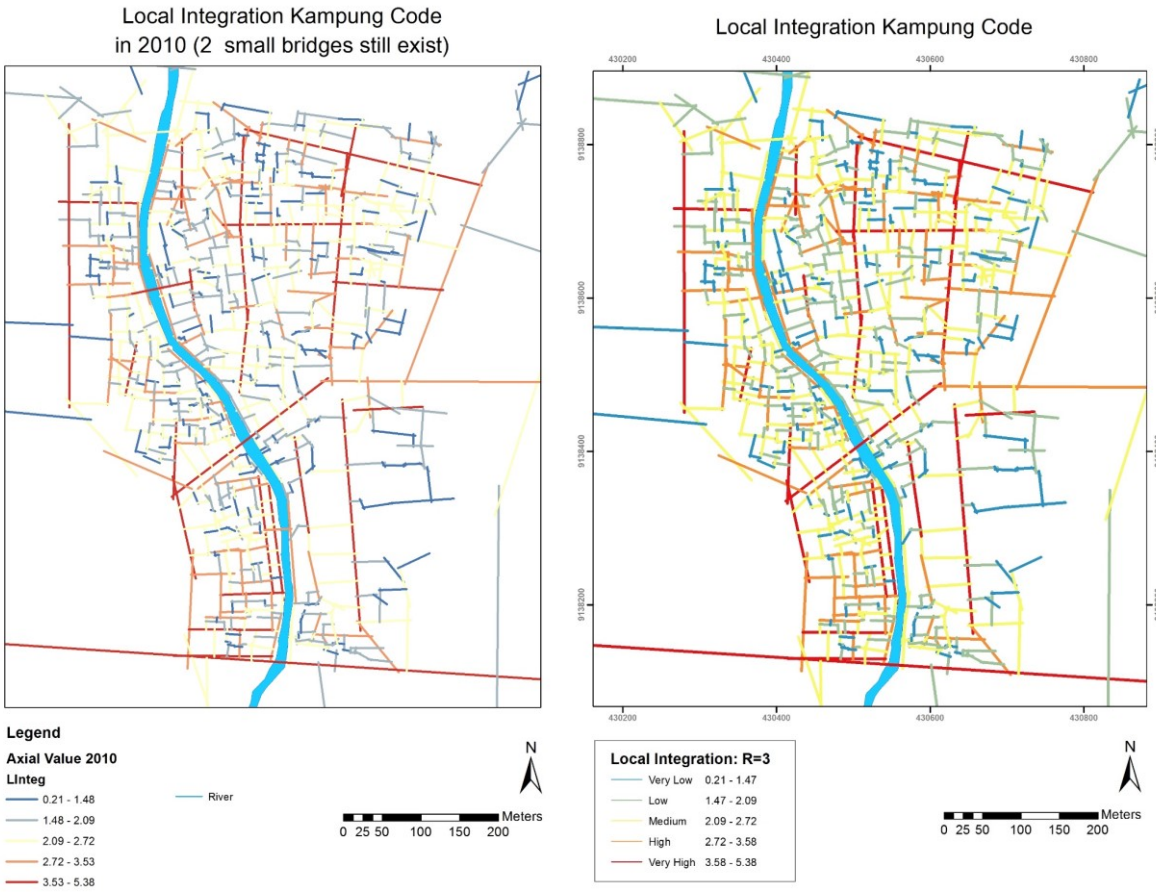


Outdoor Activity and Control

Appendix 9. Accessibility Comparison of Kampung Code Before and After Disaster

Comparison between the configuration of space in recent situation and the last five years of post-natural disaster given the different result in space syntax parameters. This mainly caused by the demolished of two small bridge connecting east and west side of Kampung Code. The result can be seen from the table below.

Space syntax parameters	Kampung Code in 2015				Kampung Code in 2010 (2 bridge still exist)			
	Min	Max	Mean	Std.Dev	Min	Max	Mean	Std.Dev
Connectivity	1	23	3.450	1.968	1	23	3.460	1.987
L.Integ (R3)	0.211	5.388	2.064	0.690	0.210	5.387	2.070	0.693
G.Integ (RN)	0.616	1.602	0.935	0.162	0.678	1.614	0.959	0.1.51
Control	0.050	7.343	1.000	0.645	0.050	7.343	1.000	0.649
Synergy (RN-R3)	R^2 Linear: 0.222				R^2 Linear: 0.260			
Intelligibility (RN-Connect)	R^2 Linear: 0.101				R^2 Linear: 0.122			



Appendix 10. Correlation Results of Building Function (commercial services and local shops + amenities) and Space Syntax Paramaters.

Since there were two types of services observed in the study area, the one is the commercial and service serving for regional level and the other is the local shop which is located within the Kampung Code. The same principle as described in methodology, generating near table function was used to made the point data (building function) appeared in the same level of spatial analysis with axial lines data.

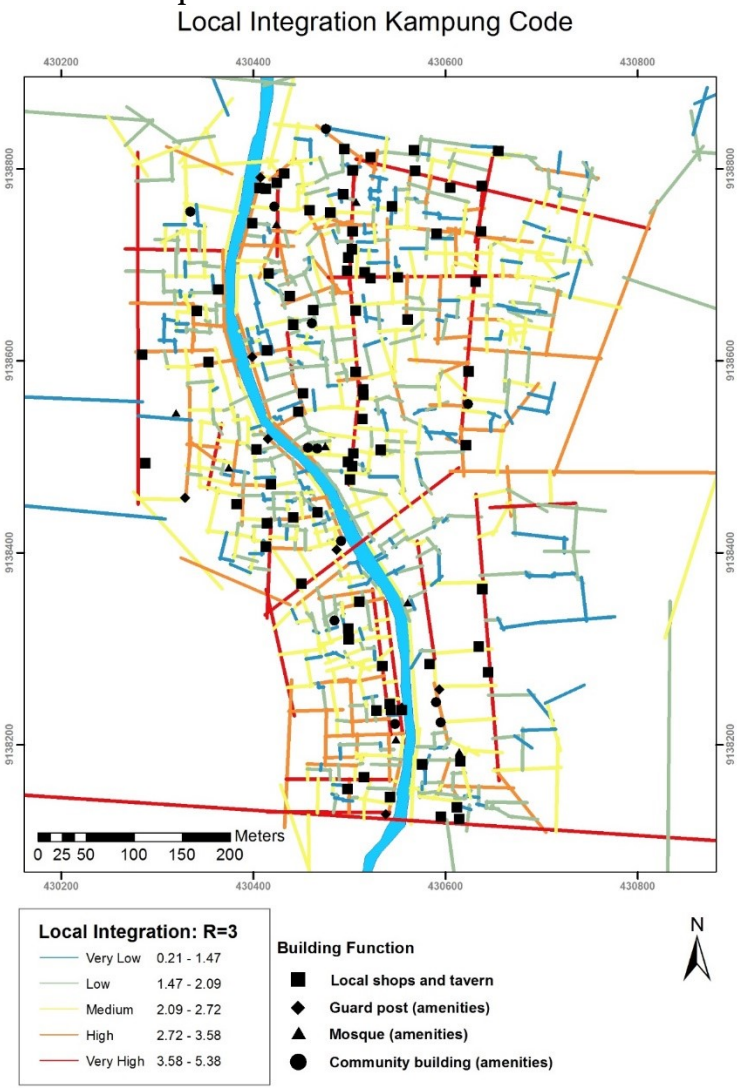
Correlation table between building function in the urban kampung

SSX Parameter	Local Shop + Amenities		Commercial/Services	
	Pearson (*r*)	Sig (2-tailed)	Pearson (*r*)	Sig (2-tailed)
Connectivity	0.120**	0.000	0.152**	0.000
Local Integration	0.104**	0.002	0.147**	0.000
Global Integration	0.042	0.207	0.196**	0.000
Control	0.125**	0.000	0.150**	0.901

**. Correlation is significant at the 0.01 level (2-tailed).

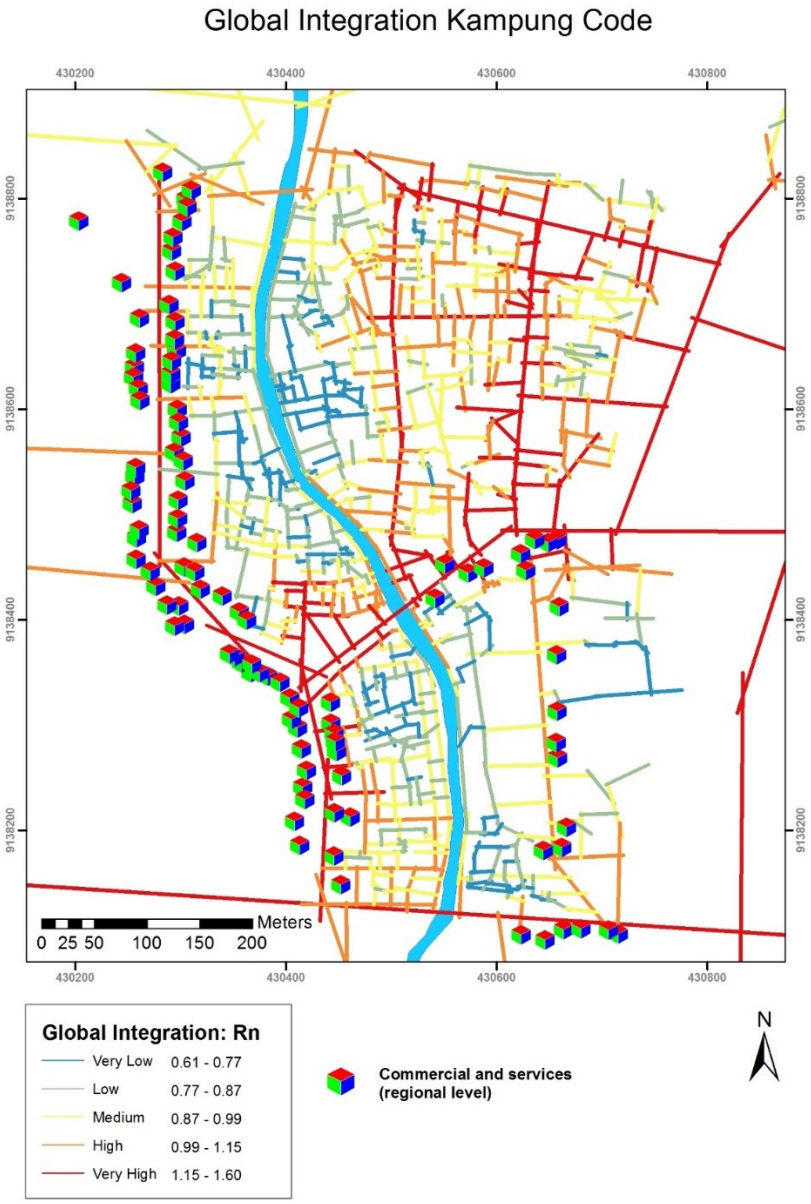
The correlation results are the local shops and amenities is more associated with connectivity and local integration. This means that the distribution of local shops and amenities within urban kampung is more influenced by which they can be reached in locally movement. Meanwhile, the commercial and service which serve regional scale is more associated with global integration, giving them eases to be assessed form global movement (city structure). This explains that the commercial and service were concentrated mostly at the edges of the urban kampung. See the map below for the details.

Distribution of local shops and amenities within the context of local integration



One can observe that the local shops and amenities were established in the locally integrated spaces. This function can be reach within three steps away from the system of space in the kampung.

Distribution of commercials and services within the context of global integration



It can observe that the commercials and services were established in the globally integrated spaces for giving an easy access to the consumer. This also explain that this function was located at the edges of the urban kampung which is actually adjacent with the Yogyakarta central business district.

Appendix 11. Summary Table of Regression Model of Activity, Density, Diversity

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.092[a]	.008	.001	2.219	.008	1.097	2	257	.335

a. Predictors: (Constant), shdi, pd

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.410	.509		4.730	.000
	pd	.000	.000	.087	1.248	.213
	shdi	.019	.117	.011	.162	.872

a. Dependent Variable: Numb_of_Pe

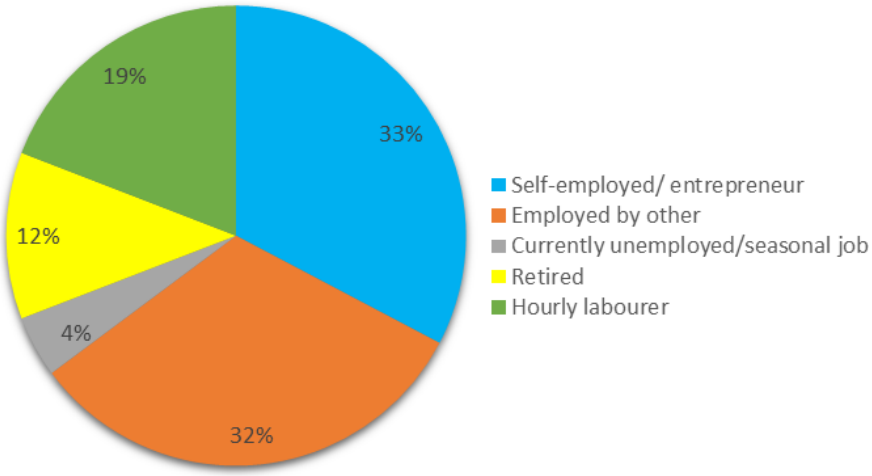
Appendix 12. Socio-Demographic Structure of Head of Household

Summary of Socio-Demographic Structure of Head of Household in Kampung Code

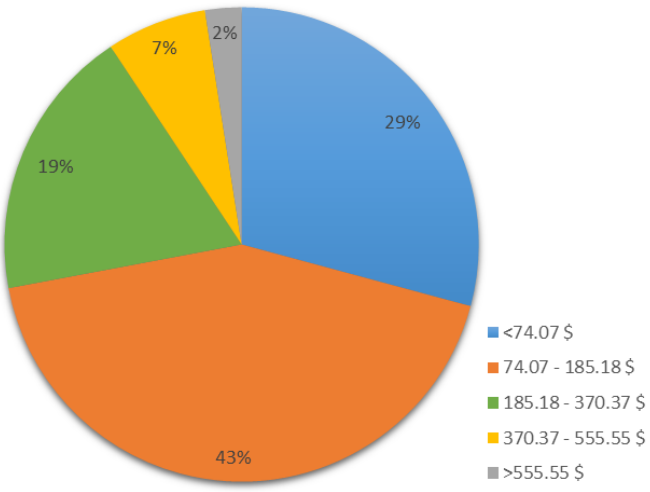
Socio-demographic structure	Age	HH size	Children below 14 yrs	Been living in kampung (years)
min	29	1	0	5
max	87	7	4	76
mean	49.67	3.89	0.69	42.65

Gender (Head of household)	
Male (%)	90.70%
Female (%)	9.30%
∑ sample (HH)	162
∑ population (HH)	2586

Occupational status of respondents in Kampung Code



Income Status of respondents in Kampung Code



Appendix 13. The Portraits Describing the Situation in Kampung Code


The river Code is looked clean but in some spots is found a plastic form household garbage. The dwellers maintain the cleanness of the river by cleaning it every Sunday morning (*kerja bakti*)



The warehouse / cage for keeping dove is looked dirty and smelly. Some of these cages were located in the far end of riverbank leaving a dirty trace in the riverbank. Some of the passage were blocked with the pile of sand bags.

Hotels and large building in the back of the kampung describe the CBD of Yogyakarta just in close distance with the Kampung Code.