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SPATIAL RE-CONFIGURATION INITIATIVES FOR INFORMAL-LIKE SETTLEMENT REVITALIZATION: A CASE OF YOGYAKARTA URBAN KAMPONG

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ABSTRACT

Informal-like settlements such as urban kampong is a human habitat which has similar characteristics as an urban slum. They co-exist within urban ecosystem but progressing backward to sub-standard living quality. The recent status of urban kampong is worsened due to lack of basic service and sometimes neglected from spatial plan and program. Spatial reconfiguration is seen as an alternative model to revitalize informal-like urban kampong by creating the condition where the positive loop is available within the kampong. This model can be built by connecting and integrating the inner structure of the kampong's spatial layout to the network of city structure. This research aims to re-configure the spatial arrangement of urban kampong for gradual changes from informal condition to be a more formal, vibrant, and robust neighborhood. This method involves several approaches such as acknowledging the informality of urban kampong, understanding the favorite place and place attachment, reconfiguring new spatial layout, and comparing syntactical properties between existing and new spatial plan. The research result depicts a new spatial design proposal for urban kampong becoming more integrated and connected with the city structure, resulting in the progress of self-regeneration works by itself.

Keywords : *informal-like settlement, urban kampong, spatial re-configuration*

A. INTRODUCTION

Global south countries including Indonesia - experienced a rapid urbanization process that entices more people living in a city for better opportunity and well-being. This process is responsible for approximately 881 million of urban inhabitants living in an informal settlement in 2014 compared to some of 776.7 million recorded in 2000 (UN-Habitat, 2015). Urban informal settlement in this research refers to urban kampongs which are much likely shared similar characteristics as an urban slum. They co-exist within the urban ecosystem, but unfortunately it progresses to sub-standard living quality due to inadequate basic services. The recent status of urban kampongs is worsened by the fact that they suffer from lack of spatial inclusion plans and programs, leading to the state of deprivation and slum (Uddin, 2018). This condition needs an urgent call for spatial policy intervention and good coordination between stakeholders to define the programs innovation as well as resources allocation.

Reflecting to Indonesian's urban slum revitalization programs which have been evolving over many years without any significant changes (Sastrosasmito,

2009), critics evoke a superficial and partial upgrading program. These critics acknowledged such as paint the buildings with rainbow-like color, road pavement, sanitation installation and sometimes - local economic empowerment aid (Dovey, 2015). Instead of allocating million rupiahs to some revitalization projects which are deemed superficial, the government could focus on much fewer projects but more comprehensive including fixing spatial layout condition which positively affects both physical and social aspect of urban kampongs.

Kampong Code in Yogyakarta has unique spatial characteristics due to its strategic location in the city center. As typical urban kampong, it has relatively good social ties, sustained through informal economic activity occurring within and at the proximate distance to Malioboro district. However, the kampong itself is identified as a slum based on Mayor of Yogyakarta Decree 393/2014. Low physical quality, sub-standard services, lack of place attachment, lack of secure tenure, no maintenance program trigger deprivation where it has also long been related to the dwellers' low income – hindering self and collective motivation to revamp the current socio-spatial condition positively. Moreover, Code river divides the kampong into two sides – east and west, which emerge as a spatial barrier of social interaction and movement. Besides the spatial segregation, the ecological quality of the river is questioned with the neighborhood pollution and cleanliness issue. Revitalization in some rationale of academic discourse (Roy, 2005) can help urban kampong to sustain and regenerate through time to time amid the dynamic of the city.

Urban spatial reconfiguration initiatives can be an alternative experimental model for revitalizing the informal-like urban kampong by creating the condition where the positive loop is available within the kampong. In this study, the revitalization only focuses on physical and spatial issues of the kampong with the judgement where the improvement of space quality and arrangement will result on the activities and induce better quality of life (Hillier, 2007; Omer & Goldblatt, 2012). Reconfiguration model can be built by integrating and connecting the inner structure of Kampong's spatial layout with the network of city structure. Vasku (2013) shows the potential of generative street network improvement of informal settlement using space syntax operation by connecting and integration inner structure to its edges. This model was also suggested by Karimi & Parham (2012) for which the spatial reconfiguration model shows adaptability for the improvement of socio-spatial interactions as the street network connection and integration had been remodeled. Both researches have goals to shape more vibrant and robust informal settlements, as well as more integrated with the city structure.

This study is inspired by the authors' previous research on socio-spatial interaction of informal-like settlement of urban kampongs in Yogyakarta. I. A.W. Hutama (2018) highlighted that the influence of spatial layout has on the social activities in the kampong. Irregular street network is one of the physical characters of urban kampong which is valued relatively low to the production of patterned outdoor social activities through natural co-presence in public spaces. Thus, this study is intended to propose a new spatial layout of urban kampong through spatial reconfiguration initiatives which could trigger the process of regeneration. To achieve the research objectives, the researchers propose three

research questions as follow: (1) What are the current socio-spatial condition of an informal kampong?; (2) What are the spatial parameters and considerations for the spatial reconfiguration initiatives?; and (3) How can the design proposal gradually improve sustainability and robustness of urban kampong? Lastly, this study is structured into four main chapters. The first chapter introduces the current state, issues, and the purpose of spatial reconfiguration as part of the revitalization program. Chapter two explains informal settlement revitalization, spatial morphology, and its impact on the community followed by the methodology in chapter three. Result and discussion are elucidated in chapter four, and finally the conclusion is presented in chapter five.

B. LITERRATURE REVIEW

1. Socio-Spatial perspectives in Informal Settlement Revitalization

Diverse discourses about informal settlement revitalization have emerged from different locus, scale best practices experience, and to some point in details addressing sectoral issues like social, governmental, infrastructure, physical and environmental (Abbott, 2002; Dovey, 2015). Revitalization can refer to the physical development of informal settlement to improve housing and infrastructure along with environmental quality which in turn affects residents' quality of life (Menshawy, Aly, & Salman, 2011). In addition, Lutafali & Khoja (2011) argued that social and economic sectors are also inherent to the revitalization program as it can empower the community to strive and sustain. The selected socio-spatial considerations are presented in the following Table 1.

Table 1. Socio-Spatial Consideration in Revitalization Program

Considerations	Description	References
Spatial layout improvement	Spatial layout configuration of urban kampong governs socio-economic distribution and activities in space. Well-connected and integrated spaces promote good social interaction and economic activities.	(Can & Heath, 2015; Hernbäck, 2012; Hillier, Greene, & Desyllas, 2000; Taki, 2017)
Sense of place and favorite places	Favorite places of urban kampongs such as community building, riverbank, open space, terraces, and streets are acknowledged as consideration for designing as it can signify the sense of place of urban kampong.	(I. A. Hutama, 2016; Setiawan, 1998)
informal economic activities	The provision and adoption of spaces for informal economic activities within the kampong will have a substantial impact on vitality and sustainability of kampong's residents	(Lutafali & Khoja, 2011; Tunas, 2008)
Co-presence, social ties, and kinship	Planning social and open spaces in higher connected and integrated network result on higher change for encountering and sharing experience among residents.	(Can & Heath, 2015; Hernbäck, 2012; Irsyad Adhi Waskita Hutama, 2018)
Natural surveillance, block size and active frontage	Small block division and active building frontage are suggested in improving positive outdoor activities, more compelling for mingling. As results, it creates natural surveillance (eyes on the street).	(Dovey, 2016; Gehl, 2006; Jacobs, 1961)

2. Spatial Reconfiguration: An Instrument for Urban Self-Regeneration

Jacobs (1961, p.144-145) stated that the spatial connectivity which illustrated by the term "urban block must be small" and diversity of function at proximity distance are key elements in successful urban space. Those elements could attract people and encourage lengthy use of space in the vicinity. Her argument relates to the morphology of urban fabric in which block size and configuration of street layout matter in spatial connectivity. This postulate is used as a conceptual bridge that connects the spatial reconfiguration to self-regeneration concept for informal settlement revitalization.

Morphological structure of urban spaces has proven related to social phenomena, pedestrian movement, and the formation of co-presence of people in place (Can & Heath, 2015; I. A. Hutama, 2016). The relation between space and activity system can be operationalized through the syntactic analytic of street networks properties using SSX principle where the interpretation of space could have a higher or lower degree compared to others. In this case, the degree of connection and integration have a strong correlation with activities and movements/encounters; hence, by configuring good connection and integration, urban designers and planners can define which spaces are needed for spatial improvement

Montgomery (1998) supports the argument of urban regeneration that has a strong association with vitality and diversity which, again, it revolves around spatial configuration and its accessibility, and the distribution of function at a threshold walking distance. These are an instrument for urban regeneration that put spatial layout as a determinant factor that governs the expected outcome of activity pattern and mobility in space (Karimi & Parham, 2012; Ujang & Zakariya, 2015). Spatial reconfiguration-led self-regeneration describes as a technical approach to spatially adjusting an existing layout into more accessible and integrated space/street networks. It will create gradual improvement from within as the new spatial layout is expected to generate a new pattern of activities, permeability of space, and the encounters rate between locals and visitors in space (Hillier et al., 2000; La Rosa, Privitera, Barbarossa, & La Greca, 2017). Some scholars have been using this approach for informal settlement revitalization to signify the importance of spatial layout in self-generation informal settlement (Greene, 2003; Karimi & Parham, 2012; Vasku, 2013).

C. METHODOLOGY

1. Study Area

Kampong Tukangan, Gemblakan, Cokrodirjan and Juminahan are residential neighborhoods located along Code riverbank, strategically laid in the center of Yogyakarta city. These kampongs, for this study, are called as Kampong Code to annotate the similar spatial characteristic between them. Having a proximate distance to the CBD of Yogyakarta makes Kampong Code become more popular for low-income people to dwell and work in informal sectors. As results, overly density kampongs formed where 10,059 inhabitants or 2,596 households reside in the typical landed house of one or two floors maximum within 25.69 hectares (Irsyad Adhi Waskita Hutama, 2018).

Figure 1. Situation of outdoor activities and physical settings of the Kampong Code

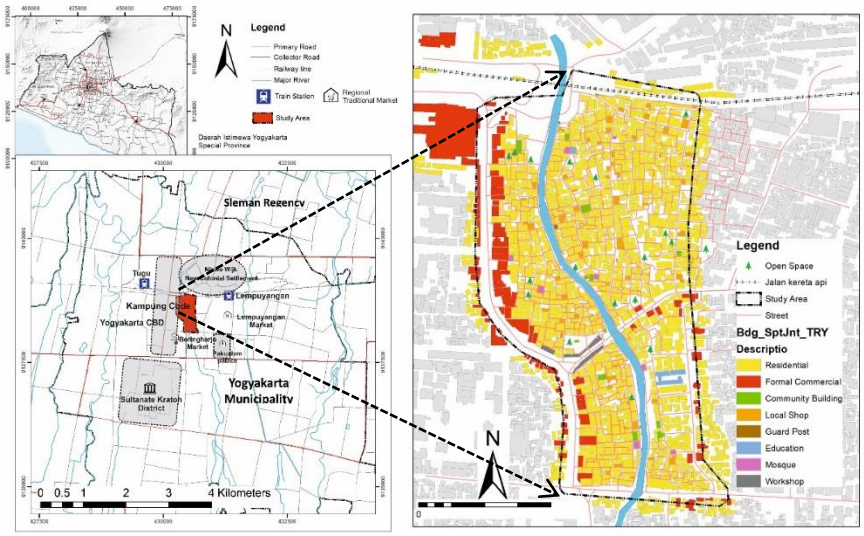

Figure 2. Study area of Four Kampongs Crossed by Code River in the Middle. The Map on the Right Shows Building Function of Kampong Code

2. Data Sources and Collection

Spatial and outdoor activities data are essential information in this study. The spatial morphology of urban kampong is represented with road networks (paths/alleys), building density, and building orientation. The outdoor activities are all forms of activities performed outside a building which can be classified into necessary, social, and optional activities (Gehl, 2006). The researchers employed primary data collection such as observation and activity snapshot to record all possible outdoor activities into maps. However, A drawback in this study was recognized related to the unavailability of land parcel data due to limited access from land administration agency.

3. Spatial Re-Configuration Metrices

This study employs GIS spatial analysis and Space Syntax (SSX) as main method for reconfiguring the spatial layout of Kampong Code. The first was used to map and identify characters of the kampong where the latter specifically analyzed the existing and evaluate the future spatial layout. SSX was used in this study as it's superiority in analyze spatial and morphological layout of urban fabric using graph representation which able to calculate some spatial parameters. We adjusted some spatial parameters to some points where the re-configuration is possible to improve accessibility of the kampong spatial layout.

Syntactic parameters of connectivity, integration, and intelligibility were used as measurement and indicators for the existing condition and proposed design alteration. The first parameter, connectivity measures the direct connection of each space/street linked to other spaces/streets in their immediate vicinage (van Nes & Rueb, 2009). This is the static local measure which represents the depth between space/street accounted on its number of intersections. The higher the degree of connection, the more accessible people to access the spaces from its vicinity. Integration is a fundamental concept in Space Syntax as it measures how many turns and changes people have to take in order to access one space to all other spaces within the system. Integration has both global and local measure which work within the same principle of spatial depth (Hillier & Hanson, 1984). Global integration, as it is named, measures the depth of one space to another within the whole network system – giving a big picture of networks system governing the economic activity and mobility in the space (Morales, Flacke, Morales, & Zevenbergen, 2017). Local integration measures the depth of spaces within 3-5 steps away – giving a more local representative of space like a social activity, walkability, and co-presence (Can & Heath, 2015; Hillier et al., 2000).

Spatial information related to individual's spatial cognition in space was identified with intelligibility analysis. This can be conducted by statistic regression between connectivity and global integration. Intelligibility to some extend has to do with the complexity of network system where spaces with good connection to the edge/main networks yield a higher legibility of space – incurring the residents and visitors to have clearer perception and navigation through the places (Kim & Penn, 2004). All above SSX metrices were employed to evaluate the existing and future design proposals by comparing the improvement between metrices value.

4. Spatial Re-Configuration Procedures.

To begin with the spatial reconfiguration model, irregular street network should be acknowledged as a current state which has an impact on the production of social activities pattern. The irregular street networks were experimentally optimized into a more regular street pattern with still respect to the kampong inner structure and the existence of favorite places (I. A.W. Hutama, 2018). The operation of this model was performed in GIS using AXWOMAN plug-in to execute the syntactic parameters of urban networks (Jiang, 2015). Prior to the operation, axial line was manually drawn in GIS to ensure the scale and geometric properties of each line which crosses cutting with the others.

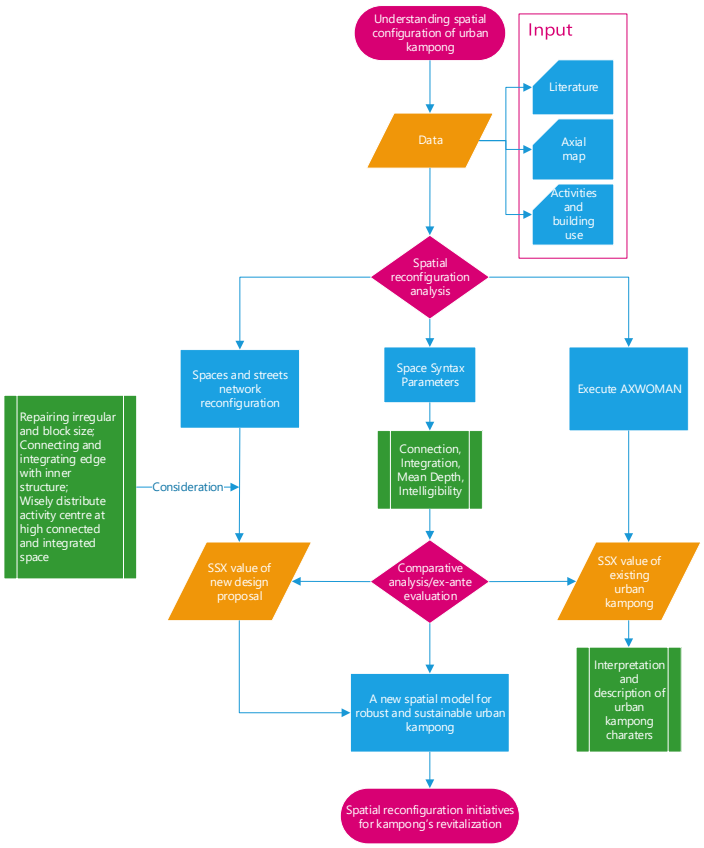

Figure 3. Flowchart of Spatial Reconfiguration Process.

5. Scenario development for Rational Reconfiguration Model

To achieve the vitality and sustainability of urban kampong, the spatial layout was improved which enabled the proses of self-regeneration which span from the sense of belongings, informal economic robustness, and co-presence between locals and visitors within the frame of spatial reconfiguration. This scenario parameterization comprises some actions which resolve around man-activity-space perspectives as follows (see Figure 4):

1. Integrating east and west side of the kampong by building six bridges.
2. Connecting the inner structure with the edge of the kampong with straight paths.
3. Increasing the route access directly to riverbank area to signify the place attachment between residents and visitors.
4. Consolidating land parcel into more grid pattern with relatively similar in size.
5. Compromising the spaces between buildings as public realm and green open space as possible.

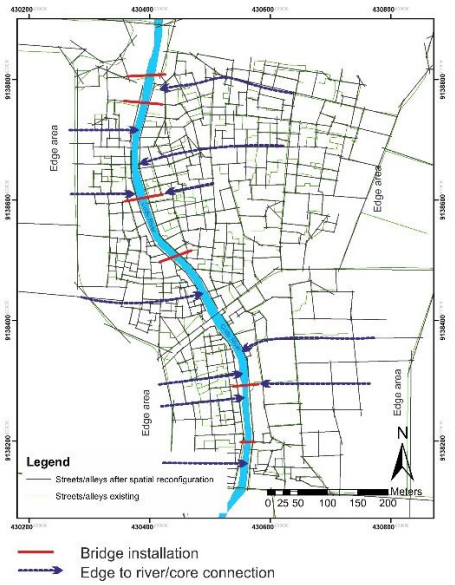

Figure 4. Consideration for Spatial Reconfiguration Model

D. RESULTS AND DISCUSSION

1. Socio-Spatial Condition of Existing Kampong

Four difference activities (necessary, social, optional, and religious) have a different spatial occurrence which is correlated with the existing spatial layout. In Figure 4, the map depicts the overlay information between types of activities and the kampong's spatial layout. Each SSX parameter describes information regarding the socio-spatial characteristics of the kampong. For instance, mean depth map describes that the deeper of the space can hold more social activities longer since, at some point, the spatial layout limits access of the edges with the inner structure. Therefore, the sense of community can prevail. Local integration map illustrates the local spaces which have more social activities and a sense of locality at fair step distance. Furthermore, global integration map presents more informal activities (necessary activity) taking places compared to social and other activities.

The SSX analysis also suggests that the segregation exists between the west and east side of the kampong since there is no single bridge crossing the Code river except the large one in the middle that accommodate vehicles. This condition affects the spatial interaction filtering two sides of kampong and limiting access to social assets such as community building, mosques, and open spaces. In addition to them, this condition might lead to the social segregation toward kampong community.

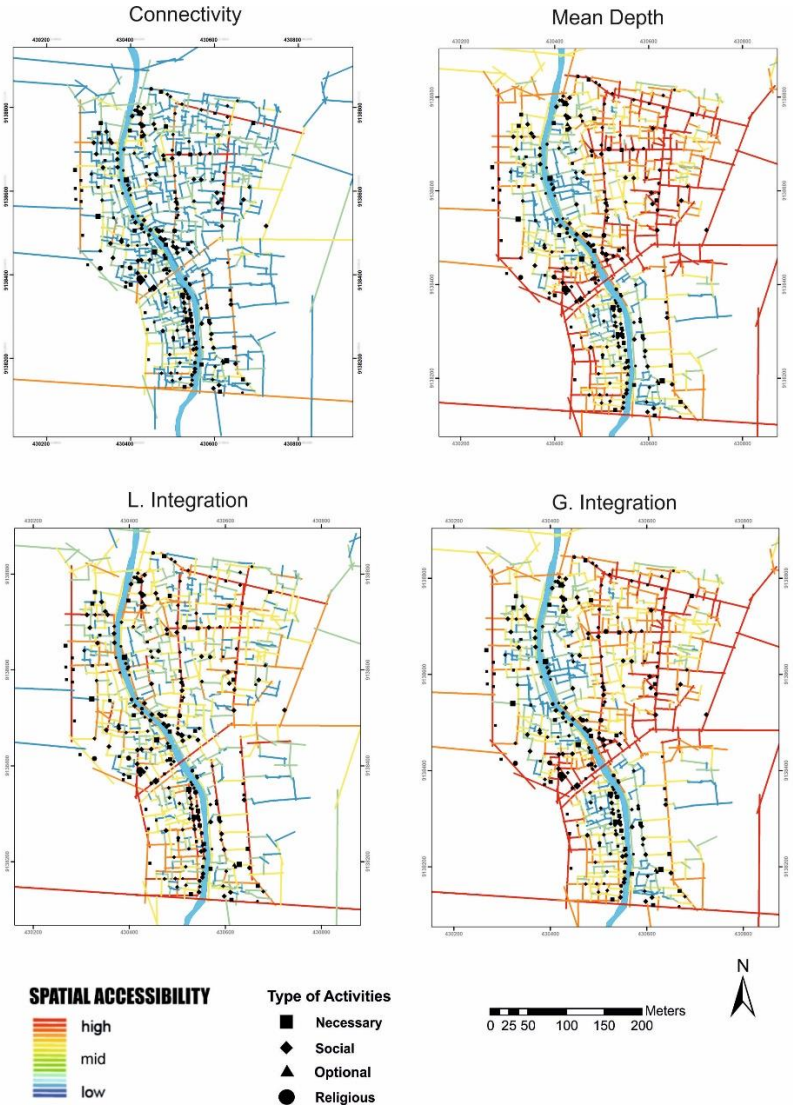

Figure 5. Spatial Configuration Analysis of the Existing Kampong (SSX Parameters: Connectivity, Mean Depth, and Local and Global Integration)

2. Spatial Reconfiguration Model and Space Syntax Parameters

The new spatial layout focuses on connecting and integrate the edge with the inner structure of the kampung as well as integrated the west and east side of the kampong by creating a seam access with bridges. In addition to them, the model is designed to reduce spatial complexity within the kampong by reducing short spaces, dead-end, and unnecessary residual spaces between buildings. These changes still consider the property owners when the land division is needed.

The spatial reconfiguration model, as shown in Figure 6, creates more integrations between the west and east side of the kampong. Red color lines frequently appear at the middle where the bridges have planned so as the integration value increases. Moreover, in local integration map, the inner structure of kampong is distributed more evenly close to the riverbank – resulting in more social activities distributed on those spaces. At whole networks system, the edges of kampong have a higher degree compared to the inner parts since it is shallower

to the city structure. Furthermore, mean depth map shows the red color lines penetrate the inner structure of the kampong; thus, people (visitors and locals) feel easier to access from the edge to the inner spaces of the kampong.

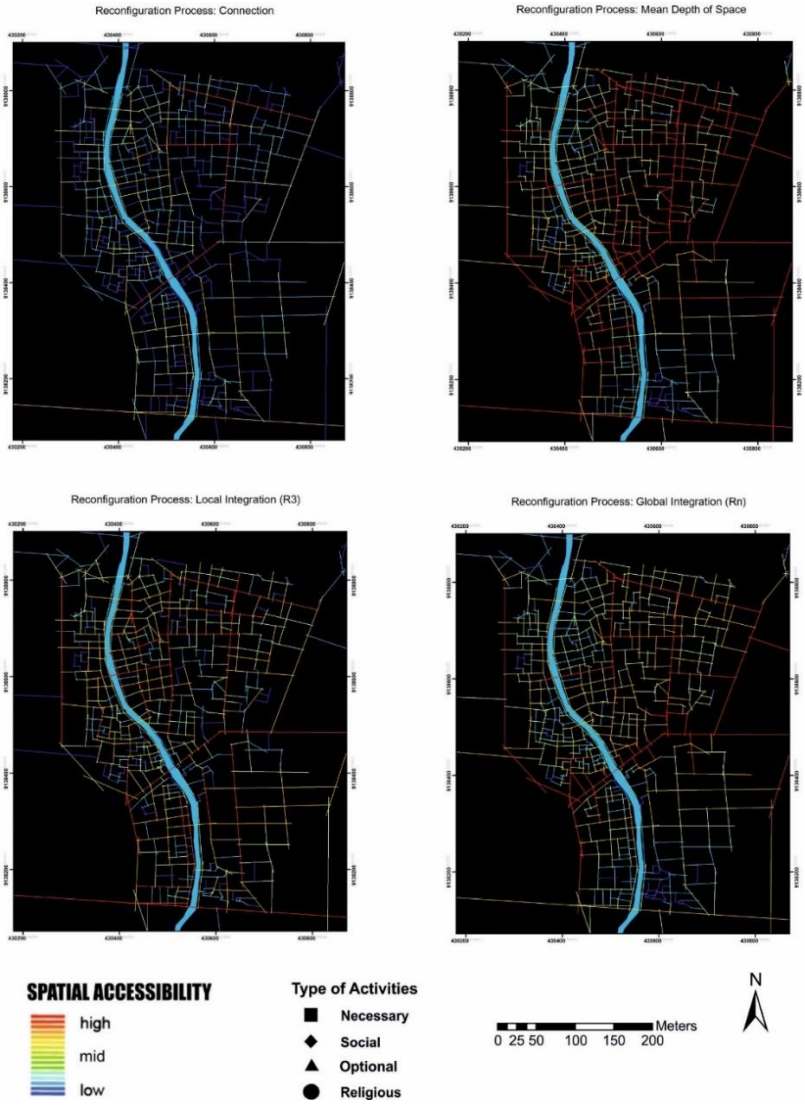

Figure 6. The New Spatial Layout of Kampong Code after Reconfiguration Showed in Four SSX Parameter Map.

Table 2. SSX Comparation between Existing and Reconfiguration Model

Space Syntax parameters	**Existing condition**				**Spatial reconfiguration model**			
	Min	Max	Mean	Std.Dev	Min	Max	Mean	Std.Dev
Connectivity	1	23	3.45	1.968	2	20	4	2.276
L.Integ (R3)	0.21	5.38	2.06	0.689	0.211	5.133	2.331	0.732
G.Integ (Rn)	0.616	1.601	0.934	0.162	0.679	1.779	1.131	0.171
Mean Depth	5.508	12.714	8.946	0.645	4.647	10.552	6.868	0.903

Intelligibility (Rn-Connectivity	R2 Linear: 0.101	R2 Linear: 0.221

Source : analysis, 2019

Comparative analysis as shown in Table 2 describes the increasing value of all SSX parameters as the spatial is reconfigured based on the considerations elaborated in the previous chapter. First, the connectivity score is increased by two (Min) indicating that there are no dead-end paths within the street networks. In addition, the mean connectivity score, after reconfiguration model, can connect one space to others in the vicinity in four possible ways. Both local and global integration show an increase in the mean value wherein SSX principle. This influences more activities taking place at the inner structure (local space) while still maintaining interaction with the edge. Quantitatively, the new design proposal is more straightforward in term of network complexity where this rationale is associated with the depth of space which changes from 8.946 (more depth/complex) to 6.868 (more shallow/simpler). The last, the intelligibility score increases to 0.221 where it was 0.101. Therefore, in theory, the spatial layout of Kampong Code is easier to be understood from one's spatial cognition (Kim & Penn, 2004) – providing more encounters between locals and visitors/passersby (Can & Heath, 2015; Irsyad Adhi Waskita Hutama, 2018).

The process of spatial reconfiguration in Kampong Code is deemed as "hard plan/whole revitalization" as it does not only alter the behavior of the residents but also change the existing urban layout. It means the process of revitalization constitutes land consolidation program by which the owner and government (Badan Pertanahan Nasional/BPN) are willing to cooperate in registering, subdivision/dividing, and sharing the land parcel into the proposed spatial layout. As argued by Greene (2003), this reconfiguration model, however, will take effect if the former spatial layout has changes according to the previous proposal – whether it must radically be revamped or at least there is an opportunity to connect the edge (global) with the inner structure (local) at highest possibility of improvement. One of the major works for stakeholders in implementing spatial reconfiguration infinitives is the land consolidation as the success and failure of informal settlement revitalization depends on the consolidation process (Herman, Birasa, & Claude, 2014).

E. CONCLUSION

This research suggests the spatial configuration initiatives could foster the revitalization progress from within kampong by shaping new activity pattern in more accessible and integrated places. The new spatial layout which connects and integrates the structure of the kampong and the city would gradually reshape the social and informal economic activities of the kampong into more vibrant and robust as more co-presence between locals and visitors appears in shallow spaces while keep maintaining the intimacy of residents in higher local integration of spaces (eg. riverbank). Compared to the existing layout, the new design proposal promotes the spatial and social integration between two sides of kampong's community by adding some bridges that connect the east and west side. Apart

from the potential of spatial reconfiguration initiatives, this approach is regarded as a radical transformation for slum revitalization considering the amount of funds, period, and tough negotiation between dwellers – government regarding land consolidation approach. In city scale, particularly in spatial planning perspectives, the new kampong spatial layout is more accessible not only for residents but also visitors and neighbouring settlements or kampongs.

Spatial reconfiguration initiatives using space syntax method is proven to be useful in term of its analysis since the quantitative parameter such as connection, local integration, global, integration, and intelligibility can assess the spatial reconfiguration of Kampung Code. Hence, it can increase connection, integration, intelligibility score reflecting the improvement of socio-spatial interaction such as social activities and informal economic pattern in the kampong. However, in this research, the result of spatial reconfiguration initiatives influencing the improvement of social and economic activities cannot be identified due to the complexity of the ex-ante evaluation analysis. The use of agent-based analysis in space syntax can simulate how the new spatial layout affects the people moved and patterned in the spaces. This limitation will be addressed in the next research agenda.

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