Short Paper

Ref 025

Evolution and Change in Street-Use

A Functional and Morphological Analysis of City Corridors in Eastern Java

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inner city, city corridor, development priority.

Abstract
This paper presents the findings of a study of an inner-city street network in a regional capital in eastern Java, Indonesia. Empirical work illustrates the diversity of inner-city growth. More specifically it shows a powerful tendency towards spatial and functional differentiation among what have been identified as 'city corridors'.

Building on the concept of 'natural movement', that has developed the theory of the 'movement economy' which links centralities of spatial order with those of a social order, the findings present an understanding of the formation of inner-city developments. In the present study, we have been able to define trends in street-use with the support of 'segment analysis', a combination between the applications of transect method, and the approach of morpho-typology. Through clarification of the spatial structure of the city, especially the city center zone, the research here offers a valuable tool, which can be used to assist in the process of decision-making.

1. Introduction

A regional capital in eastern Java, Indonesia, namely Surabaya is indicated by the mean integration value of 0.675. To Surabaya this values express substantially more depth and less integration. This is indicated by the many segregated pockets within the inner part of the urban area and the existence of settlements throughout the fringes coastal area of the city which is important to the syntactic character of the city. The segregated pockets within the inner part of the city are mostly represented by the native quarters or settlements. These quarters express a particular concept that is included inside. However, they all remained open and easily penetrated.

A 'global integration' map of the city (Figure1) shows the integration core center on the north. It is an area where the 'primary open space' of Surabaya - Tugu Pahlawan square (shows as a dot on Figure 1) - is located. Axially, all settlements which are situated in the inner part of the city could be seen to be directly linked to this integration core. The local/global scattergrams - scattergrams of *Rn* against *R3* (Figure 2) – clearly shows that the streets of Rajawali, Kembang Jepun, Kapasan and Kenjeran scatters (the cluster of dark points) are closely positioned on the main regression line.

2. The application of *space syntax* technique – segment analysis

The study will test and/or prove this statement; while examining how far Hillier's statement (1999) – globally, the process selects locations which have the appropriate degree of integration with respect to the settlement as a whole and locally, locations are selected with certain local grid conditions – working in the scope of Surabaya city center zone: It focuses on the connection between one line and the other in a continuous street or the city corridor, including other lines within the 'island' surrounded. An 'island' referred to as a 'block' (in the scope of a zone called the

'site') is filled with various forms and sizes of *'pocket area(s)'.* A network of streets within originates from the main streets surrounding it.

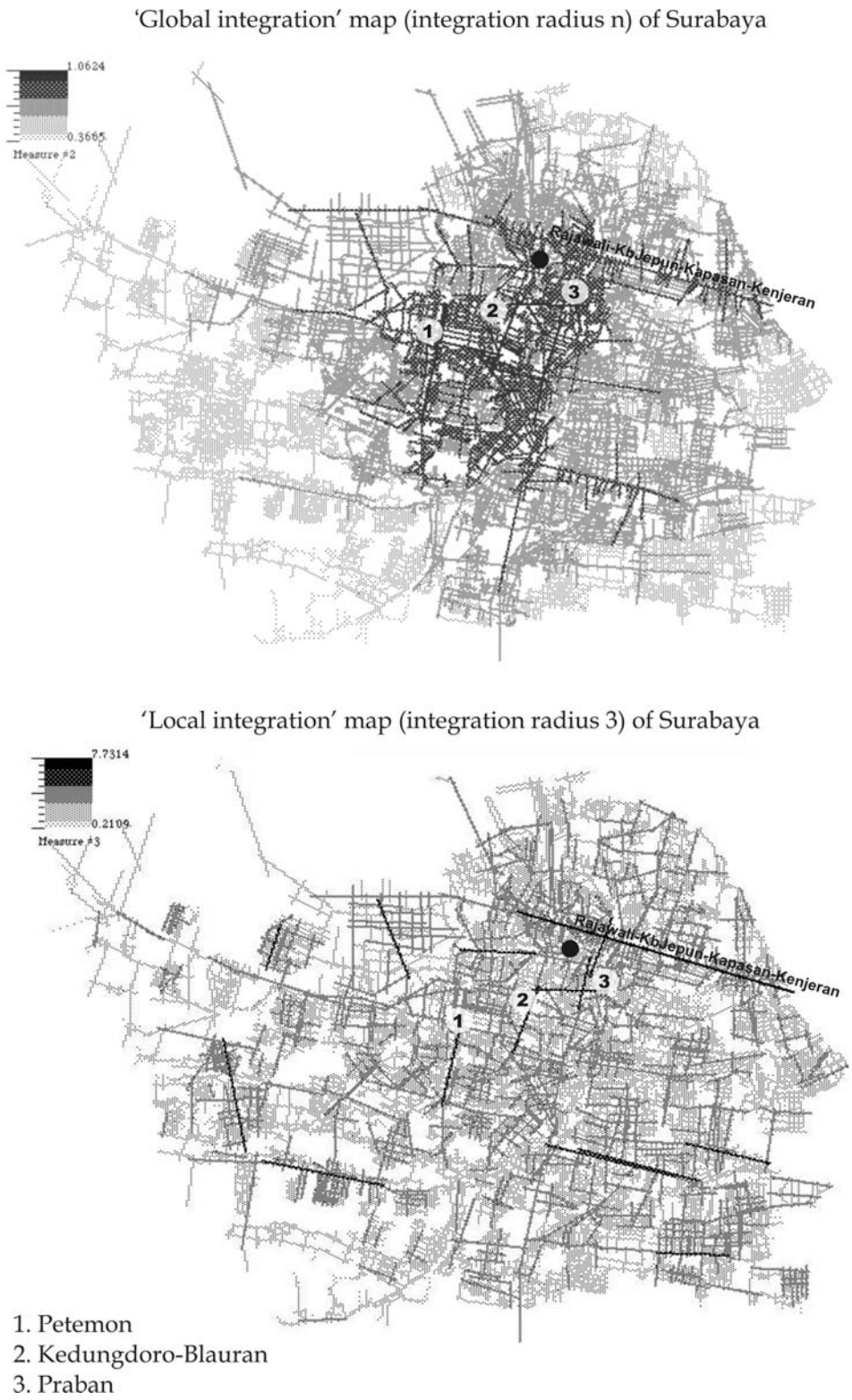

Figure 1

Integration Map of Surabaya: global integration map (integration radius n) and local integration (integration radius 3

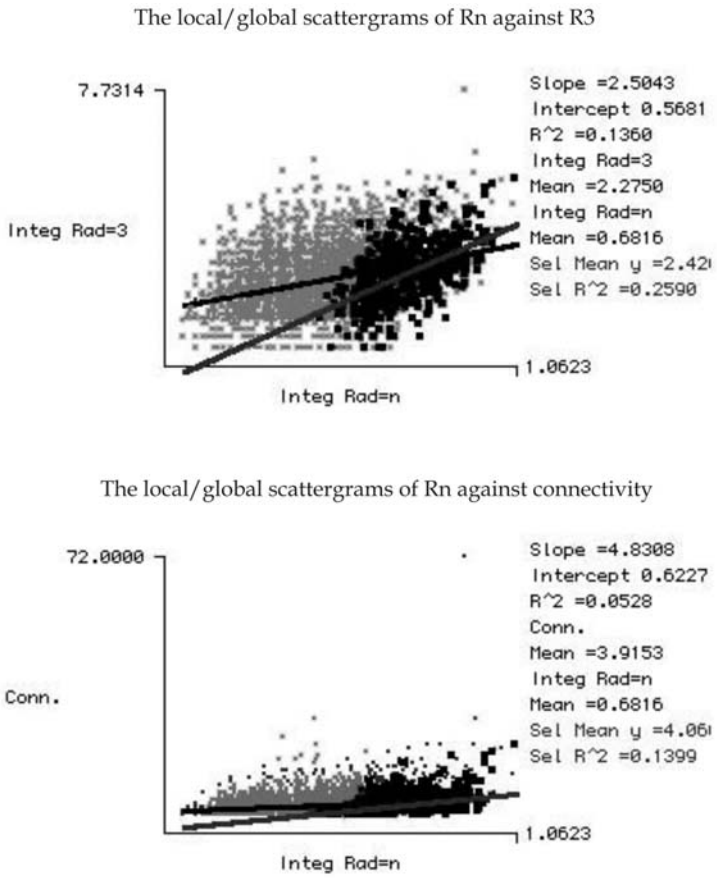

Figure 2

The local/Global scattergrams- scattergrams of Rn against R3: it highlighted the continuous street of Rajawali-Kembang Jepun-Kapasan-Kenjeran within the city as a whole

Following Loeckx, in describing the city center zone is "seeing further the form (morphology) of a region from a different level/scale starting from the street surrounding it that is also called 'spine road', 'island' or 'block', rows of buildings appearance (*building façade*) and buildings of the 'island' (*inner pockets*)" (Loeckx, 1989). Segment analysis in this research, thus is a combination between the applications of *transect method,* the idea of Hillier (1997) and the approach of *morpho-typology* introduced by Loeckx (1988).

3. Kampong-city as a 'site' for Surabaya's city center zone

The 'island' mentioned above locally known as city-kampong is freely organized orthogonally. Buildings on the outskirt of the city-kampongs are used as stores and various non-store buildings such as schools, banks, function buildings, restaurants and other commercial activities. A brief picture of the city-kampong as a 'site' or an 'island' in the city center zone in Surabaya can be described as follows. *Firstly,* it is *'the open space structure'* that is formed behind the spine road of the city center zone. *Secondly,* it is *'very heterogenic'* as a result of the city growth process that it slowly forms what resembled a network of the city streets. *Thirdly,* it is *'the network of street which forms a 'hierarchy'*. *Fourthly,* it is the 'system of 'island' or 'block' which as a whole shows *'a combination of different shapes'*.

4. The characteristic of city-kampong as a city center segment

The inner city 'segment' or the 'island' of the city center zone of Surabaya (Figure 3) consists of three kinds of city-kampong, namely *four-sided kampong* (1), *three-sided kampong* (2) and *a ladder like kampong* (3), see Figure 4. These are extremely long and narrow which sometimes slicing across the built landscape at acute angles – quite different from western towns with their compact, rectangular blocks and parcels in the case of medieval London (Brown and Hanson, 1985). However, this is still dramatically different from the characteristic growth in and around the

city center zone of Surabaya. The inner part – the city-kampong – is growing to complement the needs of buildings that support business activities along the street.

Figure 3
The location of city center zone, including the 19 important main streets penetrated which link the center economy activities (mall/plaza, hypermarket and big traditional market)

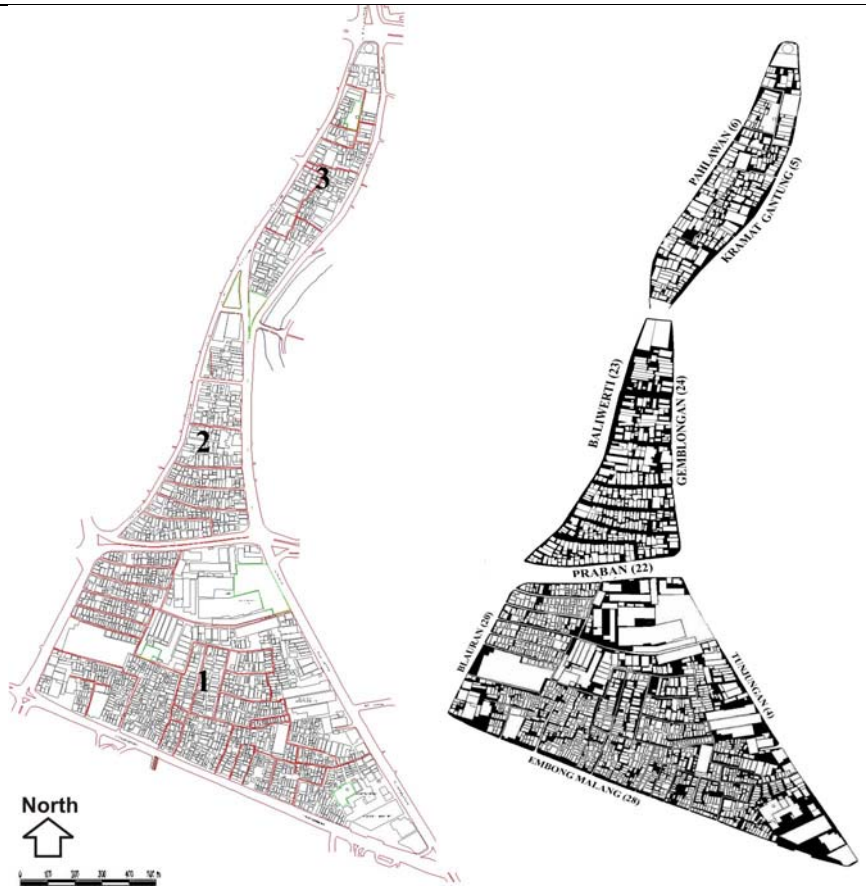

Figure 4
The inner city 'segment' or the 'island' of the city center zone of Surabaya: it consists of three kind of city-kampong, namely four-sided kampong, three-sided kampong and a ladder like kampong: (a) the plan and (b) the open space structure

Originally, three kinds of city-kampong are formed for the needs of the city's economic activities. Several Dutch governmental regulations, especially the rules connected to the spatial organization of a city seem to be aiming at supporting the rules of centralization of economic activities for the benefit of the government. With the intention to clear up the area of city center from slums and unattended environment, the regulation of spatial organization in the city center at that time was to 'envelop' the city-kampong with a row of commercial buildings particularly shop-house (cf. *the shop-house's facade*) along the main streets. At present these streets gradually expand inside the kampong. These additional streets followed through by kampong alleys and paths together generate unfinished and heterogeneous grid (i.e. 'semi'-grid).

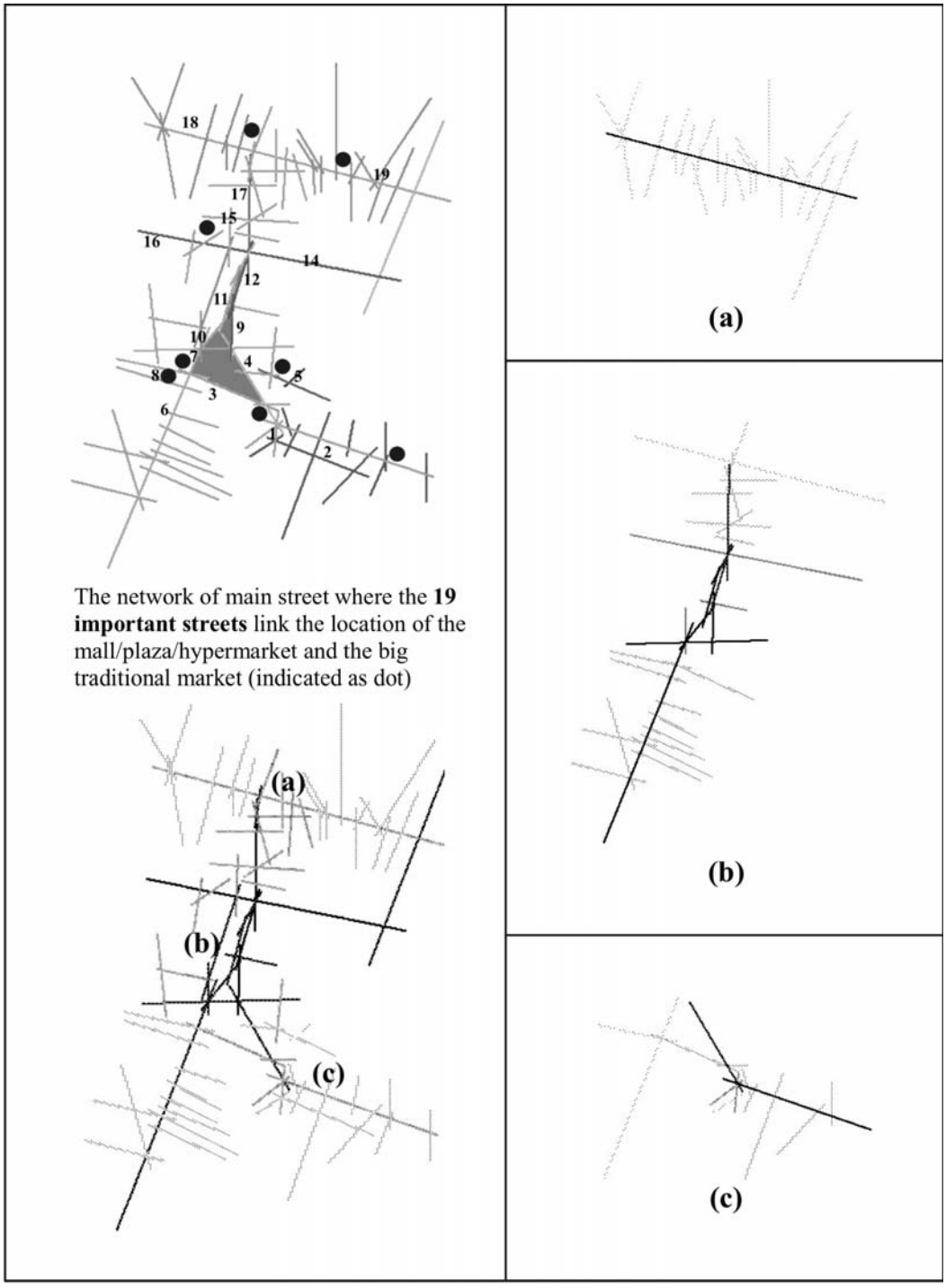

Figure 5

The network of 19 important streets link the location of the mall/plaza/hypermarket and the big traditional market (indicated as dot)

The proximity between the three kampongs topological position including its existing potentials and the current economic growth and the activity centralization help to describe the characteristic of Surabaya city center zone. In the case of Surabaya the activity centralization of the city center zone located in the 4 malls/plazas and hypermarket, namely Tunjungan Plaza, Surabaya Plaza, Blauran Junction Hypermarket, including Jembatan-Merah Plaza and 4 big traditional markets (termed as *'pasar'*), they are Pasar Genteng, Pasar Blauran, Pasar Turi and Pasar Kapasan (black dot in Figure 5). Nineteen main streets or city corridors passing the city center zone are well connected and make up a distinct network of the city. The inter connection of these streets is forming a range of shopping rows (shopping streets) locally. Specialized land and/or type of business in each street make the range of shopping rows become a vital part in the space of Surabaya city center zone.

Figure 6 which show the axial map of the main streets or city corridor network of the city center zone with all streets up to 2-steps from it (the minimum condition for creating an orthogonal grid) allow us to examine syntactically the changing local grid condition along the main streets or city corridor of Surabaya. The important street lines which are in this map indicated as section a, b and c: each forms a pattern of a network of streets when they reach more than 2-steps grid. This condition is different for seven streets line – a continuous or circular street of the inner city 'segment' or the 'island'. Only 2-steps grid is needed to achieve a pattern of network (grid pattern) of the back city-kampong. The grid pattern inside city-kampong is structured in different levels. Together they create a number of smaller blocks close to the seven streets.

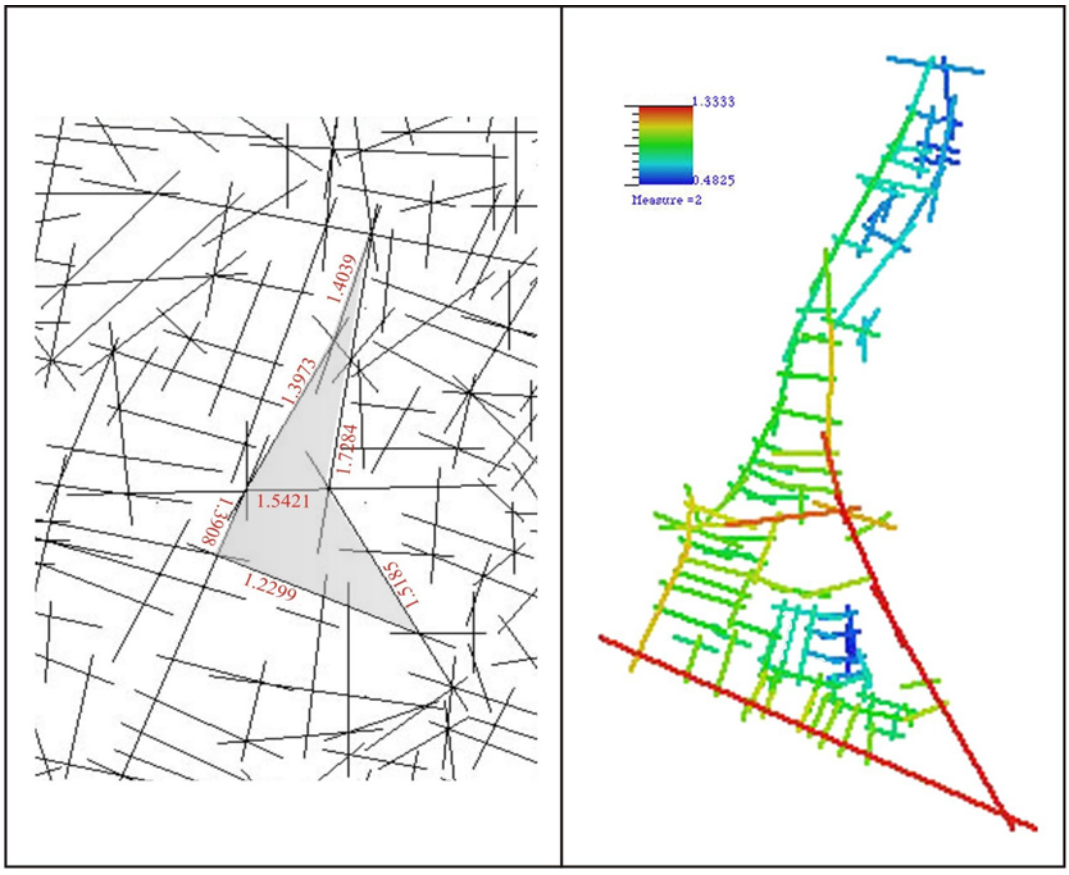

Figure 6
Surrounded main streets integration values and the axial map of three city-kampongs axial map

Seven of the nineteen main streets passing through the city center zone encircled the three kampong-city (cf. *four-sided kampong*, *three-sided kampong* and *a ladder like-kampong*) and act as "a primary integrator". This means that, axially, the three city-kampong have a good position. In relation to the main streets that have high rank integration of those ranging from 0.7460 to 1.7508.

They are Embong Malang 1.2299, Blauran 1.3908, Praban 1.5421, Balewerti 1.3973, Pahlawan 1.4039), Keramat Gantung 1.7284 and Tunjungan 1.5185. Along its length not only does local distinct live center exist, but also a specialized land and/or type of business is created.

Globally, the city center zone shows three city-kampong gains an average integration value of 0.8763. This condition indicates a network of alleys and its branches that have *'more depth'* and '*a lack of integrated streets'*. The high depth mentioned here, first, is the condition that shows a high number of alleys which position is far or separated from the main street surrounded. Second, is the condition that shows a high number of alleys that end up by a common garden or becoming a dead end alley separated from the related main street The average integration value of the three kampong (0.8763) which is higher than that of the city as a whole (0.6816) indicates the strength of this zone within the city of Surabaya.

	Av. Global Integration (Rn)	Av. Local Integration (R3)	Connectivity	Depth	Intelligibility
The city as a whole	0.6816	2.2750	2.2750	11.2104	0.0528
The city center zone	0.8763	1.8949	3.1270	6.6825	0.1542

Table 1
The syntactic characteristics of the zone and the city

From Table 1 a consecutive correlation which links connectivity to integration and integration to intelligibility can be examined. In term of connectivity, the network street of city center zone expresses a higher connectivity value (3.1270) than the average connectivity value of the city as a whole (2.2750). This is physically seen as the high number of intersection along the seven of the nineteen main streets passing through the city center zone. The city center zone thus covers the geographical center of the corresponding areas. This also means that Surabaya exhibits strong regionalization which occurs around a strong common center – the network of the seven streets. To some extent, this common center corresponds to the stages of urban growth which has been marked as an attempt to plan and regularize the city at various stages of its evolution. The city center zone is more intelligible than the city of Surabaya as a whole. Physically, it can be seen as the effect of the deformation of urban grid. This deformation of the grid of Surabaya also acts as a principle of local areas differentiation.

5. Conclusion

The characteristic of the spatial network and the relationship between spatial form and function of Surabaya is quite different from what former researchers stated. It expresses a city which activated external mercantile function and served as a meeting place of various cultures that engaged in the movement of economy of Surabaya. A distinctive feature of the inner part of Surabaya is the superimposition of the large scale urban grid on the historical layout. Surabaya can thus be understood as a city of parts, each with a strong sense of identity.In fact, the trend of street use strongly supports the theory of configuration and natural movement. The natural movement is explicitly connected to the proportion of movement and traffic. The existence of various street vendors which kinds follow the type of business of shopping streets in various positions of main streets or the city corridors within the grid layout does not have to be removed as it complements the continuity of live-centrality.

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