

The Role of Socio-Spatial Relationships in Sustaining Communities: Case Study of Low Income Settlements in Colombo

Kasunjali Mahamudalige

Department of Architecture, University of Moratuwa.
kjmrocks@yahoo.com

Shaleeni B A Coorey

Department of Architecture, University of Moratuwa.
sbacoorey@gmail.com

Abstract

Low income settlements in Colombo represent communities that have high interdependence and social ties. Such communities are observed to be significantly linked and dependents on their public and semi public spaces where social activities and ties are reinforced and sustained. But it is observed that when such communities are resettled in other vertical or horizontal neighbourhoods such socio-spatial relationships are ignored and hence results in disruption of communities and loss of social ties. Therefore the existing socio-spatial relationships in such settlements can be considered as an asset to the settlement that urban designers and Architects must recognize in future resettlement programmes.

This paper examines the levels of physical integration or segregation of public – private spaces within such settlements and explores the impact on social integration. The importance and role of such spaces for enhancing social integration among the community is highlighted. Spatially integrated and segregated spaces within the settlement are analyzed via axial maps and their social integration is explored through activity maps, photographic surveys, observations and semi structured interviews. The study sheds light on the success of highly integrated spaces as oppose to the segregated spaces and highlights that spatial integration, the integration of private to public space in the form of space, form, activity and function plays a vital role in creating and sustaining socially integrated communities.

Keywords: *Low Income Settlements; Socio-Spatial Relationships; Spatial Integration, Colombo.*

1.0 Social space and spatial configuration in low income housing

Housing should not be restricted to its physical or economic characteristics rather the aspirations and concerns of the residents need to be considered (Galal Ahmed, K, 2012). Sanoff (in Galal Ahmed, K, 2012) argues that the success of designed environments depends on its ability to satisfy and support particular functional, spiritual and socio-cultural human needs. Rapoport (in Galal Ahmed, K, 2012) states that the socio cultural values of a community include the community's religious beliefs, family and clan structure, social organizations, ways of gaining a livelihood, and social relations between individuals and the survival and continuation of cultures are highly dependent on the form of housing capable of supporting the cultural core.

Dayaratne, R and Kellett, P (2008) in their research on home making in urban low income settlements identifies the desire for community as an important characteristic among the urban poor. The lifestyles and survival is highly dependent on sharing and such settlements are found to be not a collection of houses of separate families but groups of families that are closely related in many ways. Having common friends, response to each others outdoor spaces, creating informal paths across gardens and even through houses 'crossing homes' are factor identified as ways of establishing closer social relations. They further state that the forces behind the layout of settlements, houses, orientations, and spatial linkages are community – oriented and encourage

social interactions which enhance sense of home among the urban poor. The urban networks that connect home to its surroundings are discussed as extremely important in such low income settlements; the networks become as important as the house itself. These networks offer opportunities to construct the urban community. Places such as temples and religious places are identified as significant places in Colombo's low income communities offering a network to be established as a broader 'home range', a sense of orientation and also a way of 'connecting' to and 'becoming' a part of the larger community (Dayaratne, R and Kellett, P, 2008).

The spatial arrangement of a housing settlement contributes to and supports human activities, relationships, interactions which are important in building communities. In such communities the social spaces both indoors and outdoors play an important role in tying the physical and social networks. The social space can be interpreted as a collection of activities or behaviour patterns of different groups in a particular space. Brown and Moore (as cited in Rapoport, 1977) discuss this space as behavioral space or action space which has the ability to move and activate often. Further Hurst states (as cited in Rapoport, 1977) this space can vary according to several factors of its groups such as age, sex, ethnic group etc. and it reflects their perceptions, behaviours and relations. Madanipor (2000) explains that behavior patterns and social norms affect personal space and behavior in social space. Further he states about the group space where the people shared private space in the middle of public space. It determines that group space can be considered as social space and further describes the city as a social world where the individuals established socially and physically.

The important fact is that physical spaces need to be compatible to the social spaces. These social spaces facilitate social integration of a community and its distribution within the physical settlement can further enhance the levels of social integrations that are established in low income housing. Therefore an understanding of how the physical spaces enhance the social spaces is important and factors such as the spatial integration of spaces within settlement and also the quality of such spaces should be explored to understand its contribution to social relationships in communities. The links, distribution and composition of public to private space will affect the flow of pedestrian activity, its intensities and interactions among activities (Hillier and Hanson 1984). Research discuss that when high intensities of necessary and optional activity takes place in satisfactory conditions of public spaces, more social activities will be encouraged (Gehl 1996; Moirongo 2002).

Hillier (1996) as cited in Prayitno, B (2013) states that a space can be used for any activity such as walking, chatting, studying or sleeping but what is termed as spatial configuration is the order of space arrangements on spatial pattern. It explains how the inter-spatial connections work, the connections among elements and connection of the space itself. It explains the connections among units of space – not based on distance but topographic values. It is a measurement of depth rather than a distance between spaces which explains the connection among spaces. Hillier and Hanson (1984) establishes the Space syntax method to identify and read the spatial configuration of urban spaces. Spatial configuration describes the patterns of space in more complex terms rather than a general description. It is a theory of space and a set of analytical quantitative and descriptive tools for analyzing the spatial formation in different forms: buildings, cities, interior spaces and landscapes. It is a relation between human beings and their inhabited spaces and is structured according to a specific social logic. It is able to express the social meaning and social consequences of space and read space objectively while maintaining associations between physical and social structure of space. As stated by Hiller and Hanson (1984) it expresses the potential for people to get together and explore the relations or logic behind people and space. Hillier and Vaughan (2007) discuss that with space syntax theory it is possible to detect the forces or influences of social factors which construct the spatial patterns of social life.

The following figure 1.1 shows the spatial theories developed by the various planners and architects (Nolli, 1984; Cullen, 1961; Alexander, 1977; Krier, 1979; Hiller, 1996) within the passage of time.

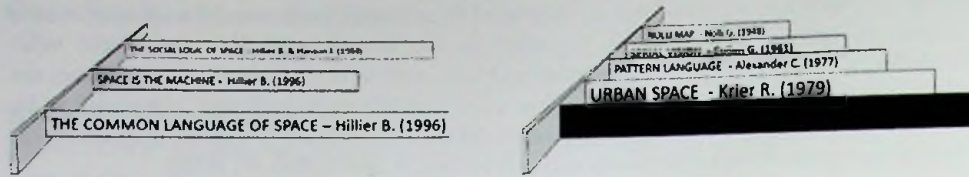


Figure 1.1: The conceptual diagram shows the spatial theories developed by the various planners and architects (Nolli, 1984; Cullen, 1961; Alexander, 1977; Krier, 1979; Hillier, 1996) with the passage of time.

Source: Retrieved from <http://spacesyntax.com>

In space syntax theory, there are two basic formal ideas of space described as follows: 'Space not as the background to human activity, as we think of it as the background to objects, but as an intrinsic aspect of everything human being's movement through space, interacting with other people in space, or even just seeing ambient space from a point in it, all have a natural and necessary spatial geometry.....'(Benedikt, 1979, Chapter 1(as cited in Hillier and Vaughan, 2007).

The ideas of space describe some aspect of how we use or experience space and how buildings or cities are arranged according to these ideas. Benedikt (as cited in Hillier and Vaughan,2007) explains that movement is always linear and the spaces are arranged according to that movement, such as streets, boulevards, avenues, alleys etc. and interactions need more spaces like public spaces, squares which are called convex spaces. The second idea about space as stated by Benedikt, (as cited in Hillier and Vaughan, 2007) is that human space is not just about the properties of individual spaces, but about the inter-relations between the many spaces that makes up the spatial layouts of buildings or cities. This is called the configuration of space. Space is further emphasized not as individual one but a collection of spaces which creates spatial patterns or language and has social meaning. The configuration of space expresses the meaning of spaces rather than a typical description of the physical space and it is able to express the property of space by which space both acquires social meaning and has social consequences (Hillier and Vaughan, 2007).

Space syntax method can be used to analyze the integration of urban spaces in cities and housing settlement. The links or connectivity between social and spatial structures are called "integration" and less connectivity is called "segregation". "Providing a measurable scale for segregation and integration, enables a statistical comparison of different spatial forms across cultures, and hence provision of a platform from which social origins and consequences might be investigated." Hillier B, Hanson J, (1984), (as cited in Hillier and Vaughan, 2007). Axial maps are used in syntax theory as the straight lines which pass through the spaces representing the maximum visual distance from one space to another. There may be several axial lines in a particular settlement which pass through the spaces. Longest lines and the shortest lines are interpreted by a statistical value to identify the integration and segregation of spaces.

Palframan (2005) has researched on the socio-spatial characteristics in low -income housing settlement in South Africa. He identified the appropriate typologies for redesign of the spatial linkages of the housing settlement. The space syntax method was used to explore the spatial configuration typology to study the functional relevance and appropriateness of several housing settlements. Finally he concludes his research result through the syntax configuration analysis identifying the cases with healthy environment and well-functioning spatial layouts. Study by Prayitno, B (2013) in his research uses space syntax for exploring the consolidation patterns of the use of alley spaces in Kampung housing in Indonesia. He establishes that such alley spaces are used not only for circulation and as dwelling unit connectors but also as spaces for

interaction. Pocket spaces in alleys in residential clusters with high integration values were identified to have high social interaction.

2.0 Research objectives:

This study explores the spatial integration levels of public - private spaces within a selected low income settlement and examines the impact of integrated and segregated spaces on social interactions and levels of activity among its residents. Results shed light on the importance and characteristics of such spaces in order to sustain communities of similar nature. However, it must be stated that apart from the integration of public – private spaces within a community many other factors such as the social harmony among its members, social and economic interdependency, sense of belonging, identity, political and economical factors also have impact on the social ties within a community.

3.0 Method:

The physical integration and segregation of the settlement layout is examined via Space syntax method. Axial maps were produced for exploring the spatially integrated and segregated spaces within the settlement. Following which activity maps, photographic survey, observations and Semi structured interviews among 10 residents are done to explore the activity in the identified integrated or segregated spaces and examine the residents' social integrations in such spaces.

Finally the objective of how spatial integration levels impact on social integration is explored. If it facilitated better social integration or segregation and the factors and reasons for such observations are discussed.

3.1 Identifying the spatial integration and segregation in housing via axial maps:

The standard quantitative approach of space syntax method (Hiller .B, Hanson .J, 1984) has been chosen to study the first objective of spatial integration in housing settlement. An axial map was constructed for the housing layout with manual calculations. The output confirmed the high integration and low integration (segregated) spaces within the settlement.

3.2 Socio-spatial relations through activity maps:

Having considering the axial calculations of highly integrated and low integrated spaces, casual observations were done to verify the locations of activities that people visited the most. The levels of activity within the settlements' outdoor spaces were also identified. In addition a random sample of 10 residents was asked to identify the places they visited the most and indicated on the layout map.

The activity map verified the socio-spatial relations of integrated spaces within the housing settlement at a particular time. This supports to identify the spaces linked to the human activities and the reasons for people to gather in such spaces. Therefore the activity maps were ideal for understanding and verifying the activity levels and functions in space.

3.3 Spatial connectivity through photographic survey:

Casual observations are done to further study the integrated and segregated spaces using a photographic survey. Further it verifies the calculation result of the axial maps and observations made with the activity map. It further observed the factors and characteristics or qualities of the spaces that were found to be of high or low integration value. A comparison was made to establish the physical differences between the integrated and segregated spaces.

3.4 Social relations of integrated spaces through interviews:

Factors influencing social integration apart from the method of axial calculation, activity map and, photographic survey was explored via in depth interviews. The semi structured interview questionnaire aims to gather the data of social integration among the communal spaces, neighborhood spaces and the physical environment they live in and how often they integrate, the

purpose and its implications on their social ties in the community is also explored. Interviews explored the places where meetings took place, type of meetings – optional, necessary or social (reasons), frequency of meetings, places where social events takes place and their participation and role in such activity, spaces for social gathering, availability of communal spaces, ideal places for meeting neighbours and interactions and their attitudes towards same, etc. Questions were all open ended in order to facilitate further discussion.

4.0 Analysis and Discussions:

4.1 Axial maps & spatial integration - Spatial integration and segregation in Harbor and Pettab fish market community housing at Mattakkeuliya

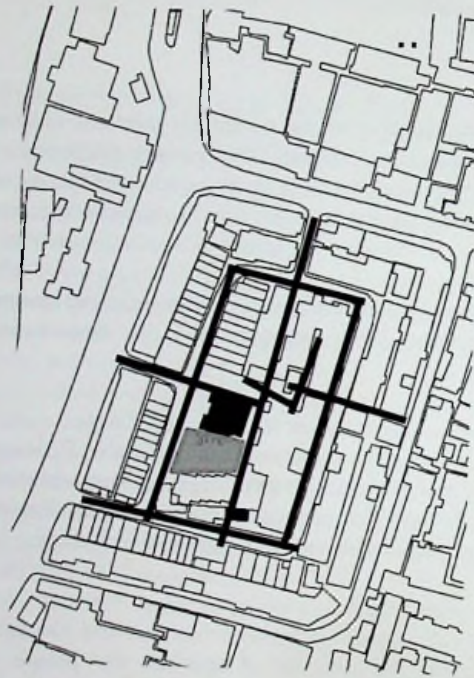


Figure 4.1: Maximum visual distance in settlement
Source: Author

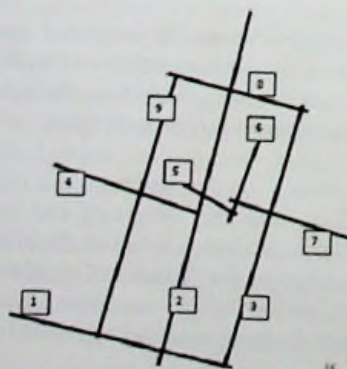


Figure 4.2: numbered axial line
Source: Author

The axial lines that interpret the maximum visible distance of Newham Square were constructed. These axial lines run through the streets and alley ways of the neighborhood. There were 9 axial lines constructed for the layout as shown in figures 4.1 and 4.2.

Table 4.4: shows the final calculation of spatial integration. Red shows the high value of which has high spatial integration. Yellow shows less value which has less spatial integration.

A	$\Sigma = A / \Sigma A$
1	1.15
2	0.76
3	1.06
4	0.93
5	0.84
6	1.15
7	1.04
8	1.05
9	0.84

	$1/(\Sigma = A / \Sigma A)$	
1	1 / 1.15	0.86
2	1 / 0.76	1.31
3	1 / 1.06	0.94
4	1 / 0.93	1.07
5	1 / 0.84	1.19
6	1 / 1.15	0.86
7	1 / 1.04	0.96
8	1 / 1.05	0.95
9	1 / 0.84	1.19

Source: Author

The high integration and low integration lines were identified as shown in table 4.1. The line number 2 show high connectivity and therefore high integration and line numbers 1 and 6 shows less connectivity and therefore low integration. When considering the layout pattern of this neighborhood, line number 2 has more integration since it is the main central alley way of the neighborhood. Number 1 line shows another road entrance to the square and 6 shows the narrow alleyway among the houses. Line No 9 also shows a high level of integration.

- High value shows the high integration (more connectivity) – 1.13
- Low value shows the less integration (Less connectivity) – 0.86

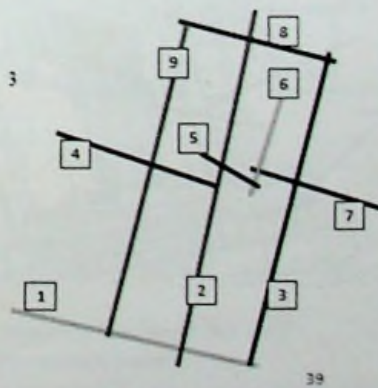


Figure 4.3: Value added axial lines
Source: Author



4.2 Location of activities – Layout map

The axial map results show the high spatial integration in line number 2 which is main alleyway of the neighborhood. The next step is to check the accuracy of the actual situation whether they integrate or not. This method shows the spatial integration theoretically but the activity map focus on the layouts potential spaces where people integrate and segregate and the factors that encourage same.

Location map was done by asking the question from people where they visit the most. Ten people described the places they visit most and this map was marked out according to their answers. The numbers indicates the most visit place relevant to the person. Considering the answers the findings show that most people visit the St' Anthony's church and high spatial integration which is not limited to the neighborhood is seen in outer boundary of the settlement. The playground and the community center are also major nodes for children and young people while other alleyways only act as circulation paths for daily use.

As shown in figure 4.4 it shows that the spatially high integrated spaces were identified by the residents as places and areas that they visit the most. Also figure 4.4 show that the spatially less integrated spaces also reflect less activity and choice of residents to visit these areas. Results show that the spatial integration is in line with the actual choice of activity and meeting places of residents.

Location of activities – Layout map

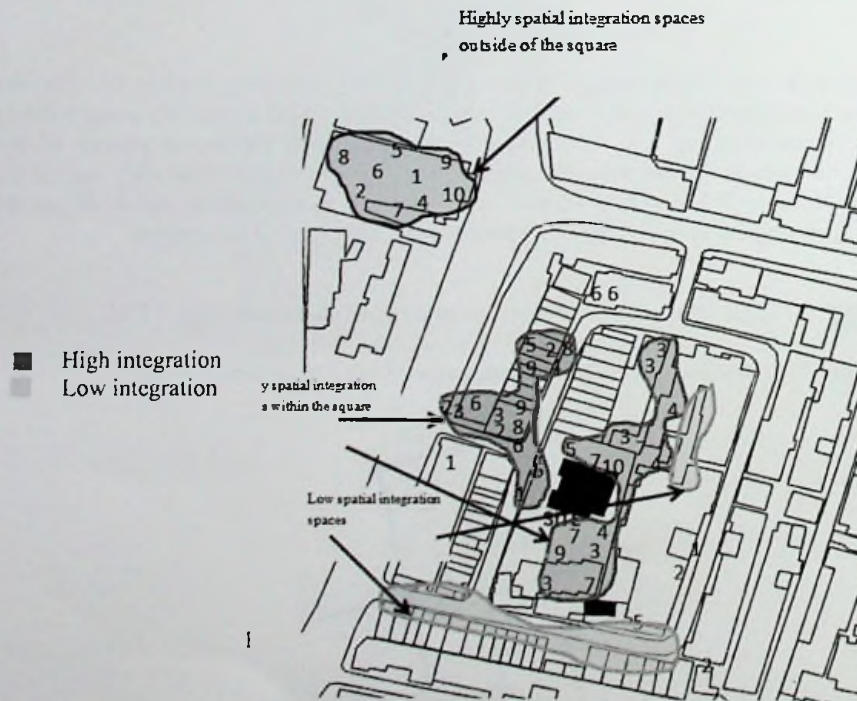
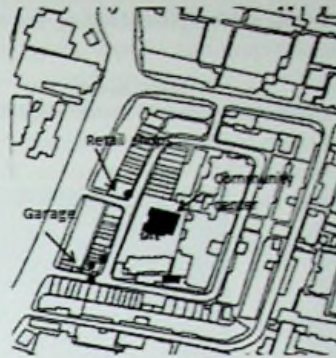
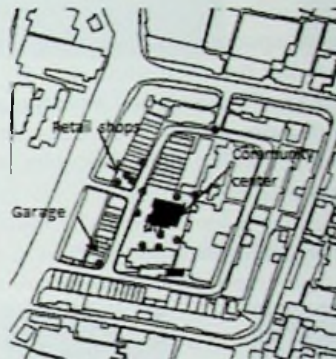


Figure 4.4: layout map of residents' answers
Source: Author

a) Activity map on highly integrated spaces



Activities - 8 to 10 a.m.



Activities -12 to 2 p.m.



Activities -3 to 5 p.m.

Figure 4.5: Activity Map of High Integration Spaces
Source: Author

Observed area map of the integrated spaces (Fig 4.5) mainly include the commercial activities and playing activities near the community center and basketball court. Therefore it can be classified into two types of activity,

Commercial activities – the garage, retail shop

Considering the 8 to 10 map the people integration on this spaces shows much higher amount than the 12 to 2 p.m map, during the day time it shows the less amount of people and the evening 3 to 5 p.m map shows the high people integration in retail shop area than the garage. But these two shops functions the whole day with activities.

Playing activities – the basketball court and open space

The playing activities on 8 to 10 p.m map shows the number of people were participated in basketball court and the shaded open spaces for play. During the day time 12 to 2 p.m map shows no playing activities.

Compared to the morning map, evening map shows much higher integration in areas with playing activities such as the basketball court and open area and some street nodes. The axial map findings were also verified by the activities of the integrated space. Therefore these public spaces such as the basketball court shaded open area, integrated spatially as well as functionally bringing people together.

4.3 Spatial connectivity through photographic survey

4.3.1 Photographic Survey on highly integrated spaces

Integration of living and commercial spaces: The marked red colored area shown in figure 4.4 consists of houses and small outlets and tea room which are very well-known/popular places in that area. Considering the arrangement of building, and building facades of every two or three story building consist of three foot wide balconies and these balconies face the narrow street (Fig 4.6). People engage in domestic activities within these balconies and they even talk to other neighbors while engaging in these activities.

(a) Photographic Survey on highly integrated spaces



Figure 4.6: Through the alleyway (left) Tea room (right)
Source: Author

The street shown in figure 4.7 provides the parking space for them and all the vehicles are parked at the door step and this arrangement of private spaces facilitates to secure their privacy.



Figure 4.7: The main alleyway
Source: Author

Mix of private and public spaces: The alleyway ends with the huge mango tree which was located at the rear space of the community center considering this narrow space all the household spaces (private spaces) provides a boundary for the public space which is the street shown in figure 4.7. Within this narrow space there is an interesting activity pocket which is 'Rahumaniya's tea room'. This is a well patronised space which was a very public space amidst the private dwellings. Therefore the mix of private and public spaces facilitates more integration.



Figure 4.8: The street vendor (left) the basketball court (right)
Source: Author

The special trading activities can be seen at this street. Variety of pedestrian vendors was highlighted at the neighborhood. This public space is a good opportunity for them to sell the products. Textiles and all the household items are sold by pedestrian vendors every weekday. The basketball court is located in between the mosque and the community center and act as a public space of the neighborhood as shown in figure 4.8. The open space (fig 4.9) next to the community center and other houses function with younger members of the community. Though they have the basketball court next to the community center there is much integration observed within this open space where the shaded areas encourages various forms of play such as cricket. This space was observed as the only open spaces with sufficient shading due to greenery.



Figure 4.9: The open space
Source: Author

The axial map results of high spatial integration (shown in figure 4.3) and the people's location map in figure 4.4 and activity maps in figure 4.5 correspond well with each other in terms of its physical spatial integration within the settlements, its activity, use and function. The combination of private and public spaces creating activity pockets amidst the habitable spaces reflects the close ties between private and public functions.

4.3.2 Photographic Survey of less integrated spaces



*Figure 4.10: Entrance to the square (left) arrangement of private spaces (right)
Source: Author*

Public space boundaries: The yellow lines of axial map in figure 4.3 and the yellow coloured area in figure 4.4 represent the low spatial integration areas. Although this area has similar character of building masses of the main alleyway the activities are not integrated. The private spaces and the mosque boundary define the road as public space but this space is for circulation purpose only as shown in figure 4.10 and 4.11. These spaces do not function as alleyways because priority is given to the mosque and it limits other types of informal activities in order to respect the religious activity of the Mosque.



*Figure 4.11: The road
Source: Author*

4.4 Social relations of integrated spaces through interviews

The interview was carried out among 8 out of the 10 people and the answers were categorized as follows. The interviews were done in a very informal manner to avoid the reluctance of the residents to discuss their neighbourhoods in an official manner. The residents were also more comfortable with informal conversations rather than a questionnaire survey due to their previous experiences on surveys done for relocation of their housing etc. The relevant data of socio-spatial relations was collected focusing on the residents' integration across private to public spaces.

Integration of living and commercial spaces: House is a primary unit of the social system and it is the place where integration begins. The domestic spaces and their social behavior reflect the different personal attitudes towards the domestic spaces. Most of the people are satisfied with

their domestic spaces and they have done many additions and alteration to the houses during the last 20 years. These domestic spaces are categorized according to the living purpose and commercial purpose as well. The fishing business man Mr. Weerawardana said,

'We stay in upper floor, it's easier for us. My ground floor has been rented out to the electrical shop and we get paid monthly by them, I think most of our neighbors do that'.

Weerawardana (Personal communication, March 2, 2013)

'First we had the ground floor only, after my son got married they developed the upstairs for us to live also and the ground floor became the retail shop. It belongs to him now and it's his side business.' T. Krishna.

(Personal communication, March 2, 2013)

Commercial activities were part and parcel of their domestic spaces. There was no major concern for privacy in domestic space rather the income generated from letting out part of their domestic spaces seems important. Household activities and business activities were easily managed. Mr. Selvam the tailor and the Mr. rahumaniya tea room owner gave the similar answers relevant to this topic. Other interesting factor is that they arrange their special functions at home while neighbours also share facilities with them.

Extension of domestic space – converted as intermediate public spaces: The arrangement of domestic spaces such as the balconies, act as extensions to the living room and the street became the intermediate public space within the domestic spaces. It's related to every resident in every culture. However they managed to conduct their social activities within their own private spaces.

'We arrange in our own house, if there's not enough space, we hired the tents and chairs and do it in street as well. There were so many funeral functions celebrate like that. Otherwise, where else to go?' Weerawardana

(Personal communication, March 2, 2013)

'My son has many friends and he often comes with his institute friends to dine here. They play cards in the balcony during the afternoon' Mrs. Farook

(Personal communication, March 2, 2013)

The residents also reflect a sense of belonging to their environment and rely on the functions and facilities around their home. Their lives are very much embedded in the immediate environment.

'Of course yes, this was my father's house; it's hard to live elsewhere without leaving this place. These noises are very familiar to us, I'll tell you one thing, last week I went to Ragama for my private work I couldn't stay one hour there and I was in a big hurry to come home, that day. And there is no place like this; if someone couldn't make food in a situation, the Church provides the lunch packets every day. It's a unique item specific to this context, and there are many facilities to live here'.

Weerawardana (Personal communication, March 2, 2013)

Private space arrangements: Residents also show satisfaction with face to face housing arrangement as a form of better interaction and mutual support among residents while maintaining a sense of security.

Mrs. Nilufer's statement further explains,

'Yes, it works a lot I think, the reason is no one can get to the house without authorization, there is less chance for that to happen because other neighbours keep an eye on that, very few robberies happens here. If someone comes to our house my neighbours tell me, and we have good support'.

Nilufer (Personal communication, March 2, 2013)

Landmark spaces for social integration: The community center and the basketball court play a significant role as an activity node and is part of the resident's memory of their neighbourhood. This was a main gathering point of the context. Most residents identified these spaces as a well-functioning public space within the context.

*'I have played there since I was in primary. Now I'm 25'
'We also have played the basketball there, there are so many children selected for national team also.'*

Weerawardana and Dilshani (Personal communication, March 2, 2013).

Social events and the celebrations were also major factors for social integration. The differences in religion and culture didn't segregate the community and instead was a factor for integration. The Sinhala Tamil New Year was celebrated by all residents and they participated in every festival of the St' Anthony's church.

'Yes, we celebrate every Sinhala Tamil New Year, Tamil people also same as that, they celebrate their functions Deepawali and Thaipongal and Christmas as well. I'm Buddhist but I go to Katchchikade church also.'

Weerawardana (Personal communication, March 2, 2013)

'well yes, there are basic facilities to live here and this is the place we grow up, and it's easier to everything to our business, living conditions etc... we have good mutual support which is not seen in other housing settlements and without that support we feel very uncomfortable and we become strangers. There are less social issues such as heroin business and drugs. But that is also less than 10 cases. It happens everywhere as I know compared to the other housing settlement this one can be ranked in high position.'

Mr.Weerawardana (Personal communication, March 2, 2013)

The neighbours and neighbourhood activities made an impact on their social relations. This indicates the public space cannot be limited to the physical context and spaces but also their shared values, interdependence and cultural beliefs etc. had an impact on the levels of interaction among the residents.

5.0 Conclusion

The study shows that the physical configuration of spaces in terms of integration and segregation is very much reflected in the activity, use and function of spaces within the settlement. Highly integrated spaces reflect high activity levels as observed in activity maps and low integrated spaces show low activity levels. Photographic observations and interviews further show that the built environment surrounding the highly integrated areas plays a role in enhancing the levels of activity and interactions made in these spaces, and vice versa. Factors such as integration of living and commercial spaces, mix of private and public spaces, public space boundaries, and extension of domestic space – converted as intermediate public spaces, private space arrangements, landmark spaces play an important role in enhancing these integrated spaces for sustaining interaction and communities were found to be important in enhancing the social interactions in physically integrated spaces.

The arrangement of private spaces ensures the protection layer or a buffer and the uses of private spaces for multifunctional purposes further enhance the activity levels and social integration. Every well-functioning or active space has to have a social purpose as well. The streets, alleyways, internal pathways, playground, community centers, social centers can be considered as encouraging public spaces. The more application of these public spaces will provide social and cultural benefits. Organization of these spatial structures facilitates the opportunity for residents'

interaction. The well integrated private-public space arrangements will avoid the isolation or segregation of groups in community housing. Study finally highlights that in addition to a spatially integrated layout the private to public integration of space, form, functions and activity can play a major role in building a socially interactive and a cohesive living environment. But it must be noted that in addition to the spatial integration and the built factors the shared values, interdependence and cultural values play a major role in the social integration of these communities.

List of references:

- Alexander, C. (1969) *A Pattern Language*, New York: Oxford university press.
- Altman, I. (1975) *The Environment and Social Behavior: Privacy, Personal Space, Territory, Crowding*, California: Brooks/Cole, Monterey.
- Dayaratne, R and Kellett, P. (2008) Housing and home making in low-income urban settlements: Sri Lanka and Columbia. *Journal of Housing and Built Environment* 23, 53-70.
- Galal Ahmed, K. (2012) Residents socio-cultural dissatisfaction in the two stages of public housing in Cairo, Egypt: What has changed in the third 'current' one? *Urban Design International* 17, 159-177.
- Gehl, J. (1996) *Life between buildings: Using public space*. Copenhagen: Arkitektens Forlag.
- Hillier, B and Hanson, J. (1984) *A Social Logic of Space*, London: Cambridge University Press.
- Hillier, B and Vaughan, L. (2007) The spatial syntax of urban segregation 67 (3): 205–294
- Madanipour, A. (2000) *Public and private spaces of the city*, Canada: Routledge.
- Moirongo, B. O. (2002) Urban public space patterns: human distribution and the design of sustainable city centers with references to Nairobi CBD. *Urban Design International* 7: 205-216.
- Palfaman, A. (2005) A syntactical analysis of settlement form-an investigation of socio-spatial characteristics in low-income housing settlements in Port Elizabeth, South Africa. Retrieved from <http://www.google.com/spacesyntaxpdf.com>
- Prayitno, B. (2013) An analysis of consolidation patterns of Kampung alley living space in Yogyakarta, Indonesia. *Journal of Habitat Engineering and Design* 5 (1): 99-112
- Rapoport, A. (1982). *The meaning of the built environment*, California, Sage publications ltd.
- Rapoport, A. (1977) *Human aspects of urban forms: towards a man environmental approach to urban form and design*, Pergamon press.
- Rapoport, A. (1969). *House form and culture*: foundation of cultural geography series, Englewood cliffs, NJ, prentice Hau.
- Sommer, R. (1969). *Personal space*, London, Prentice-Hall International ltd,