Significance of Location Factors in Creating Sustainable Neighbourhoods in Developing Countries: Insights from Colombo, Sri Lanka

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Abstract
Neighbourhoods across the globe are progressively gaining attention as key planning units with strong potential to contribute to sustainable development. Certification systems for sustainable neighbourhoods consist of quantifiable and measurable standards that are collectively used to evaluate and define development in terms of its environmental superiority and functionality. Resourceful location counting connectivity, accessibility and linkage is a principal objective in developing neighbourhoods enriched with public infrastructure systems. The focus of this study is on the evaluation of the degree to which a neighbourhood’s locational factors correlate with the sustainability of inhabitants’ contentment in the context of a developing nation.

The evaluation methodology is based on the analytical comparison of three predominant urban neighbourhoods in Colombo and is articulated in three proceedings. First and foremost, the case neighbourhoods are introduced and locational attributes within their physical context are investigated. Secondly, the inhabitants’ perceptions and responses are acquired through the forms of interviews and acute observations to assess the enactment of location for each case. Finally, the cases are analytically compared, to evaluate the sustainable identity construed by its location. This defines the essential attributes of a scrupulous location in the aspects of land use, layout, connectivity, accessibility, and transport infrastructure for promising sustainability. This proposes guidelines for the selection of localities for workable neighbourhoods to resolve the matter from the designation of site and design.

Keywords: sustainable neighbourhood, location, connectivity, accessibility, inhabitant, Sri Lanka, Colombo
Introduction

The development of residential neighbourhoods represents an important part of urban land use at the local level in the urban context. It is increasingly influenced by the concept of sustainability. In the context of developing countries, residential developments are, for the most part, based on subdivisions, piecemeal solutions or master plans. In any of these circumstances, the neighbourhood form as one entity holds a significant position in defining the sustainability of the area.

Despite sustainability being a compelling consideration in the development of cities, it is allocated with far less attention at neighbourhood levels, particularly in the context of developing countries (Moroke et al., 2019; Yigitcanlar, 2015). Hence, no perfect definition is universally agreed upon for sustainable development formulated at the neighbourhood scale. The definitions, guidelines, and principles for a livable and sustainable neighbourhood may have transformations over time (Dehghanmongabadi, 2014). Planning theories on sustainable neighbourhoods, approach to create new mutual relationships between urban dwellers and neighbourhood entities, to enhance quality of life. It encourages three (03) key features; compactness, integration, and connectivity, as prerequisites for sustainable neighbourhoods and cities (UN-Habitat, 2014). Sustainability criteria for neighbourhoods have been defined based on; adequacy of connectivity with street network, appropriateness of layout, land-use patterns, density measures, housing appeal and building characteristics (Dempsey, et al., 2010). Adequacy in connectivity with the surrounding street network is a principal attribute that adopts a neighbourhood into the contiguous context, to be a part of it. Thus, the inhabitants spontaneously become recognized by the total setting as its living component.

1.1 Research Problem Statement

Developing an appropriate and efficacious level of street network, for private and public transportation and in particular, pedestrian and cycling are the apprehensions of neighbourhood connectivity. Primarily, the inhabitants need to be physically linked to the surrounding context. In this milieu, it is pivotal that the neighbourhood location is prominent in stamping its sustainable distinctiveness for it to be environmentally, socially, and economically progressive. Deciding an appropriate location that ensures neighbourhood sustainability is a challenging consignment. The research problem focuses on how to designate and plan a location for a sustainable neighbourhood.

1.2 Research Objectives

This study intends to investigate a criterion for the effective designation of a location for a sustainable neighbourhood in the environmental, social, and economic consensus; followed by three objectives stated below.

▪ To Examine the attributes of a neighbourhood location.
▪ To Investigate the level of predilection of inhabitants in such locations.
▪ To Ascertain the attributes of resourceful location for sustainable neighbourhoods

2. Literature Review

This defines the neighbourhood and the concept of sustainable neighbourhood. The criterion for neighbourhood location in the Sri Lankan urban context is recognized within the parameters allocated in sustainable neighbourhood rating systems, focusing on connectivity to the context, and its activities.
2.1 Neighbourhood and Concept of Sustainable Neighbourhoods

A neighbourhood is the immediate geographical area surrounding an individual or household’s place of residence, bounded by physical aspects of the environment (Raymond et al., 2016). It is described as a basic planning entity in modern residential planning theories (Al-Hagla, K. 2008). As a unit community, it emerged as a concrete urban component; constantly a part of a larger whole and, more importantly, a system, having its own definite mechanisms and functions (Kullus, 2000). It is a social, as well as a spatial phenomenon, which connects inhabitants with their immediate surrounding community. The demarcation of a neighbourhood could either be on administrative geography or self-defined mental mapping (The Young Foundation, 2010).

As per the common definition, ‘sustainability’ is sited at the intersection of environmental responsiveness, economic progress, and social integrity. The concept of neighbourhood sustainability has different definitions and interpretations. However, sustainable urban development aims to create ‘user-friendly’ ‘resourceful’ urbanities, in terms of their form and energy efficiency, as well as their function, as a good place for living (Elkin et al., 1991). A sustainable neighbourhood has value as a place to live over several generations (Falk & Carley, 2012). Throughout the years, scholars have carefully examined how sustainable communities were designed and physically laid out. Accordingly, Falk and Carely (2012) have conveyed the conclusions composed into four themes: healthier and stronger communities; secured, safer streets and living places; a greater choice of homes; and desirable environmental conditions and features. Efficient neighbourhoods are nourished with connectivity, having linked to its surrounding urban setting, with physical relations, street network, public transit, walkable community facilities and commercial establishments. (Falk & Carley, 2012; Moroke et al., 2020).

2.2 Criteria for Location of Neighbourhoods

There is a global acceptance that, neighbourhoods with residences and employment opportunities located closer together, with commercial establishments and mixed-use developments, tend to reduce automobile usage and the associated pollution concerns are desirable for public health. Mixed-use developments with an appropriate network of streets encourage recreation, walking, bicycling, and the use of public transportation for day-to-day commuting. Appropriate location and linkage review the physical conditions of the neighbourhood including its location and the protection of natural resources (CCP, 2019). Spatial dispersions of land use linked together with physical infrastructures and related transport networks (Bertolini, 2005) denoted in neighbourhood formation, further stamp the neighbourhood connectivity in location.

Connectivity refers to the ability to reach the location from several directions, deliberating easy access to goods, services, activities, and destinations (Kamble & Bhadure, 2019). The physical connectivity of a location signified by accessibility, linkage and transport infrastructure enables all groups of the population to move around easily, for the needs of daily routine activities of living. This has been accepted globally, as a fundamental aspect in certification on sustainability.

Certification systems for sustainable neighbourhoods started to emerge nearly a decade ago (Sarachaga et al, 2018), intending to promote good neighbourhood-based designs. Particularly, LEED-ND; ‘Leadership in Energy and Environmental Design-Neighbourhood Development’ contains a set of measurable standards that are collectively used to identify a development or proposed development in terms of its environmental superiority, location and access, internal pattern and design, and application of green technology and construction techniques (Welch et al, 2010). It emphasizes features such as site selection, design, and construction practices that help sustain neighbourhoods. It integrates buildings and infrastructure to relate new construction to the surrounding landscape and its local context.
2.3 Role of the location in sustainable neighbourhoods

Sustainable neighbourhoods effortlessly share resources with collaborative spaces created for communities to interact in. They are forward-thinking localities being developed or redeveloped to support the future of urban livability, mobility, and connectivity. In terms of location, sustainable neighbourhoods are well connected to the immediate context, conveniently accessible to public services and facilities by public transit and encourage walking and cycling and other embodiments of recreation (APA, 2016; Al-Hagla, 2008). Smart locations for sustainable neighbourhoods are globally identified as:

- Central locations, with a clustering of employment, retail, residential, and other activities and uses.
- Areas that are accessible, inclusive of multimodal transportation infrastructure, allowing people to get around easily on foot, bicycle, and transit; (BC Climate action toolkit, 2019; City of Pickering, 2011)

The physical form of an urban area more often embraces a set of both physical features and non-physical characteristics including size, shape, scale, density, and land use distribution (Kotharkar, 2014). Further, it accounts for housing and other building typologies, urban block layout and dissemination of open spaces (Dempsey, et al., 2010). Convenient accessibility for pedestrians and bicyclers with narrow and interconnected streets free from dead ends enhances connectivity (Firoozi, et al., 2017) within neighbourhoods. Similarly, Jacobs (1961) demonstrated that frequent streets and short blocks are valuable; because of the fabric of intricate ‘cross-use’ they permit, among the users of urban neighbourhoods. It is a combination of a multitude of characteristics, which include transportation infrastructure and urban design features of the area (Jenks, 2010). Connectivity through built forms and transportation infrastructure contributes immensely to form (Dempsey, et al, 2010), influencing the quality of place and quality of urban living. Consequently, land use diversity, integrated layout, connectivity, and accessibility to public transit are predominantly important in considering the location of a neighbourhood in contemporary urban planning.

2.3.1 Urban Planning initiations in Colombo for sustainable neighbourhoods

In the Sri Lankan context, Modern Town Planning has its roots related to British Town Planning systems. The Colombo Municipal area consists of residential neighbourhoods of different types of social, cultural, and economic backgrounds. The Sri Lankan approach to New Urban Planning would thoroughly concern the inclusion of sensitive and essential aspects of being people-friendly and sustainable housing neighbourhoods (UN Habitat III, 2015). The intention was to protect people’s rights to physical and emotional well-being, access to public and private open spaces, and to interact with nature, natural light, and fresh air. These are the foremost concerns in planning regulations under each zone (Gazette, 1999, 2008, CCDP, 2018). To reach this vision of creating sustainable; resource-efficient, user-friendly, and long-lasting neighbourhoods, it is essential to establish public transit-oriented neighbourhoods. Similar to land use diversity, the linkages to the exact location and integrated layouts are fundamentally important. This aspect seems to not have been given adequate priority in some occurrences, and consequently, residents are inclined to use more private vehicles for their day-to-day commuting. This creates circumstances where high traffic congestion is created with poor environmental conditions, decreased mental and physical health levels, and inhumane urban settings. At this juncture, it is concluded that residential neighbourhoods are essentially to be sited in strategic locations for being sustainable.
3. Research Methodology

Neighbourhoods are unit urban forms. In a close analysis, these unit forms are identified based on their influence on sustainability and human behaviour. Humans are naturally aware of their position in the environment, with the feeling of a need for a sense of place and they sense an identity of any location they experience (Cullen, 1996). Human behaviour is mutually related to their implicit understanding and realization of the living atmosphere. Human experience: how we sense it, and its’ changes, is the most important consequence of the built environment at any of its resolutions.

As explained by Seamon and Mugerauer (1985) Phenomenological inquiry in both human response and behaviour comprehends that there is a growing body of qualitative and descriptive research focusing on definite living places, built environments, and environmental experiences. Hence, in evaluating the quality of a place which closely relates to residents’ lives, live surveys were commonly used by scholars as a research strategy (Hwang & Shin, 2020). Appropriate sampling to best portray the research problem is centralized in the methodology, with detailed examinations of three case neighbourhoods from Colombo, followed by a comparative analysis based on both secondary and primary information.

In this research, the neighbourhood is conceptually regarded as a self-defined community, with distinct boundaries selected from varying activity zones and urbanities. Hence, the case residential neighbourhoods are from the following administrative wards within different activity zones in Colombo Municipal Council; physically, from the inner city, intermediate city, and outer city; (Refer to figure 1,2).

a) Newham Square neighbourhood from the inner city; within Concentrated Development Zone
b) Chitra Lane neighbourhood from Intermediate city; within Mix Development Zone
c) Veluwarama Road neighbourhood from the outer city; within the Primary Residential Zone

The research is carried out in three key steps. Initially, the neighbourhoods are investigated in terms of their location in the physical context, based on land use, layout and connectivity illustrated by accessibility, and transport infrastructure, through secondary sources of information. Secondary sources of information for the research are ordinance surveys, site surveys, local authorities.

Secondly, residents’ opinion on the desirability of the location of their neighbourhood is obtained based on a structured interview. A questionnaire is framed, and categorized under matrices; land use, layout, connectivity; accessibility and transport infrastructure, that of evaluating the location in inhabitants’ experience, followed by authors’ deep observations. Households are considered as the research unit, and 35 numbers of random samples from each neighbourhood are considered. The questions on the level of desirability are answered by an adult in each household. Questions are structured and close-ended where the answers are recorded in a five-level Likert scale to comprehend the rating as very good (5), good (4), moderate (3), poor (2), and very poor (1). Data analysis was conducted with the aid of the Software Package for Social Sciences (SPSS).

In the accumulation of data, resulted convenience level of inhabitants as users, to sense them as a convenient neighbourhood is revealed. The responses are recorded as against the indicators of location, regarding land use, layout, accessibility, and linkage including transport infrastructure in overall urban form. Notably, the level of which the inhabitants recognize their neighbourhood as appealing or sustainable, in terms of its location is the question answered. With the aid of SPSS, the mean values of desirability are obtained for the final evaluation for comparison.
Thirdly, in the comparative analysis, the relative significance of contributory factors of neighbourhood form responsive to the resulted convenience level of location is recognized. The strengths and weaknesses are identified and their transformation into physical forms is analyzed comparatively. Learning prerequisites of form, for resourceful locations of urban neighbourhoods from varying urbanities in inhabitants’ experience are the outcomes of this study.

Fig. 1: Case Neighbourhood Locations on Zoning Map for Colombo Municipality. Source: Colombo Development Plan-2020/Urban Development Authority
4. Discussion and Analysis

The discussion consists of a brief introduction of case studies with secondary sources of information and the author’s deep observations. This leads to the analysis, focusing on a thematic comparison of inhabitants’ experience on the location of their own neighbourhoods, concerning sustainability determinants of location on neighbourhood form as per the methodology.

4.1 Case Study-1: Newham Square Neighbourhood

The Newham Square neighbourhood is a vibrant multi-racial and multi-religious community, located east of the harbour wall in North Colombo, within the concentrated development zone. By its location, formation, and inherent architectural character, it is an attractive and striking urban community in the prevailing urban fabric. It is bounded by two sets of parallel roads: Colombo Port Main Road and Srimath Ramanathan Avenue on the west, K.B. Christie Perera Avenue on the north and Ratnam Road on the east and south, accompanied by public transit (Figure 3). The Newham Square neighbourhood with its unique identity was said to have been built before Sri Lanka gained independence, dating back to 1930, by the British government to settle the working labourers of the Colombo harbour.

The layout of the neighbourhood is compact, and simple, with its outer main arterial roads, and inner semi-public road (Newham Square), accompanied by pedestrian alleyways in between two housing rows. Every house block possesses a narrow road frontage and is directly accessible from the road at ground level. Upper-level housing is entered from the alleyway side.
Internal streets are narrow and interconnected and do not contain separate or designated pedestrian space. Vehicle parking is on the road and is used as an extended area of the residents’ living space in front. The rear space of residences forms a narrow alleyway common to pedestrians, which is unique to the neighbourhood. Narrow entryways from main arterial roads to alleyways are special features, forming shared community spaces. (Figure 3,4)

Effectively, most amenities required for convenient living, including shopping, health, education, and travelling are available within a 500-to-1000-meter radius and are well accessible through walking and public transit. Every household in the neighbourhood is conveniently connected to its immediate surrounding context by public roads, semipublic roads, and alleyways. Though pedestrian pavements are not provided on internal semipublic roads, they are transformed into communal spaces and pedestrians are prioritized within the neighbourhood. Public transportation is mostly engaged, and private vehicle usage is minimized.

4.2 Case Study 2: Chitra Lane Neighbourhood

Chitra Lane housing neighbourhood is a planned neighbourhood that originated and developed replacing shanties, during the late 1990’s. It is located by Chitra Lane on the east and is visually a small-scale development, mainly for lower-middle-income communities. The layout of the neighbourhood is convenient and quite simple, with main arterial roads, and internal roads, both for vehicles and pedestrians. Every house block possesses a road frontage at different levels and is accessible directly from the internal roads. Units at ground level are accessed directly and upper levels by common staircases.

Internal streets are wide with a designated pedestrian space with parking on roads that are made wider at connecting junctures. They are used as extended areas for resident hang-around and social space in between households. These widened circulation areas at certain intervals are special features, forming shared community spaces on roads while allowing both children to play and adults to spend their leisure time in.
Fig. 5: Physical Layout and links to context
Sources: Google maps, GIS-Urban Development Authority, 2015, personal observations

Fig. 6: Internal roads and extended open areas create interactive communal spaces within the neighbourhood
Source: Author

The neighbourhood layout is spacious, demonstrating a high level of connectivity within the neighbourhood and with the surrounding urban context. In the macro context, commendably, all amenities required for convenient living, including shopping and marketing, education, health, and travelling are available within a 500-to-1000-meter radius. Each household in the neighbourhood is well connected to its immediate surrounding context by semipublic-internal roads eventually leading to public roads. Pedestrians are prioritized within the neighbourhood. Public transportation and the convenience of commuting are optimal with private vehicle usage being minimized.

4.3 Case Study 3: Veluwanarama Road Neighbourhood

Veluwanarama Road housing neighbourhood is a pleasing multi-racial and multi-religious community accessed by both Hampdon Lane from the west, and Veluwanarama Road from the south. It is located north of the Veluwanarama road, which runs parallel to the Dehiwala canal, within the primary residential zone. By the location, formation, and inherent architectural character, the neighbourhood appears as an attractive and peaceful urban community in the area, demonstrating a sociable and livable urban environment for inhabitants.
The internal layout of the neighbourhood is spacious, convenient, and simple, with access from main arterial roads, and internal roads, for both private vehicles and pedestrians. Every house block possesses a road frontage at different levels and is accessible directly from the road at ground level while providing access to upper levels by common staircases. Internal streets are wide with designated pedestrian spaces and parking on the road. Circulation areas are wide, forming shared community spaces allowing both children and adults to engage in recreation, including cycling.

The neighbourhood layout demonstrates a high level of connectivity within the neighbourhood and the surrounding urban context by physical street layout. In the spatial arrangement of the macro context, it is notable that transportation nodes, commercial centers, schools, Institutes, health centers, community areas, and religious centers seem to not be in proximity. Technically, the amenities required for living, including shopping, marketing, education, health, and travelling are not conveniently available within a one-kilometer meters radius. Within the neighbourhood, pedestrians are prioritized. Pedestrian spaces are provided on both public and internal semipublic roads and are transformed into spacious outdoor areas within the neighbourhood. However, public transportation is not conveniently in use, and private vehicle usage is widespread.

5. Comparative Analysis of locations with inhabitants’ perspective

The case studies are comparatively analyzed based on the secondary information and primary data obtained in structured questionnaires with inhabitants, in terms of their locations, concerning the land use, layout and connectivity theorized in the literature review. The mean value of the recorded level of desirability level is obtained with the aid of SPSS. In comparison, this mean value is considered as the level of desirability of the inhabitants for each query. The inferences
reached by both secondary data and primary findings are discussed accordingly on a comparative basis under land use, layout, and connectivity and accessibility.

5.1 Land Use
5.1.1 Observations on Inhabitants’ Judgement

Data received from interviews with inhabitants recorded on the Likert scale and analyzed using SPSS are shown below in a graphical briefing as a bar chart (Figure 9). This refers to the comparative mean values of desirability for each question in the questionnaire under land use. Each neighbourhood is represented by a colour as shown in the key.

Fig. 9: Comparison of the desirability of mean value on the land-use aspect
Source: Author

In comparison, residents’ desirability stands at a higher level in cases 1 and 2 in most variables such as movement and interaction patterns, land-use functioning proximity of commercial establishments and having a location in concentrated and mixed development zones. The Case 1 layout lacks provisions for dedicated community facilities and open spaces within the neighbourhood. Case 3, which is in the primary residential zone, shows lesser competencies in almost all key considerations, except for the existence of sufficient impervious surfaces and movement patterns within the neighbourhood.

5.1.2 Analysis-based Inferences

In the technical analysis of the macro context, within a 1 Km radius, as against the total land usage, Case study-1 has the least residential usage (28%), followed by Case study-2 (56%) and the third case study with the highest usage (62%). The reason for this pattern of variation may very well be the higher concentration of other land uses, moving from primarily residential to mixed development and concentrated development zoning. (Refer Figure-10, Table-2)
Nevertheless, focusing on the ‘neighbourhood area’, the residential land usage is observed in opposite bearing. Accordingly, residential land use in Case-1 is the highest (70%), Case-2 the second highest (33%) and Case-3 the lowest (28%). Commercial and Institutional usage are highest in Case-1 and gradually decreases when moving to Case-2 and Case-3. Land usage for streets and roads increases remarkably from case-1 to case-2 and to Case-3 sequentially (Refer Table 2).

Table 2: Pattern of Land use distribution within and around the neighbourhood
Sources: GIS Information, Urban Development Authority, 2015

<table>
<thead>
<tr>
<th>Land use</th>
<th>Case-1 Newham Square</th>
<th>Case-2 Chitra Ln.</th>
<th>Case-3 Veluvanarama Rd.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Macro Context/1m-radius</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1 Residential use</td>
<td>28%</td>
<td>56%</td>
<td>62%</td>
</tr>
<tr>
<td>1.2 Commercial use</td>
<td>22</td>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td>1.3 Institutional</td>
<td>27</td>
<td>7</td>
<td>-</td>
</tr>
<tr>
<td>1.4 Educational</td>
<td>-</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>1.5 Roads</td>
<td>7</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>1.6 Industrial</td>
<td>2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1.7 Parks &amp; Open</td>
<td>2</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>1.8 Health</td>
<td>1</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>1.9 Religious</td>
<td>3</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>1.10 Other</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2 NH area</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1 Residential/Individual or group</td>
<td>70%</td>
<td>33%</td>
<td>28%</td>
</tr>
<tr>
<td>2.2 Commercial &amp; retail</td>
<td>14%</td>
<td>2%</td>
<td>0</td>
</tr>
<tr>
<td>2.3 Roads/Streets/Public</td>
<td>14%</td>
<td>60%</td>
<td>78%</td>
</tr>
<tr>
<td>2.4 Religious</td>
<td>1%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2.5 Community</td>
<td>1%</td>
<td>5%</td>
<td>-</td>
</tr>
<tr>
<td>2.6 Leisure/Recreational</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2.7 Outdoor Recreational</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2.8 Offices</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>2.9 Industrial</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>
5.2 Layout
5.2.1 Observations on Inhabitants’ Judgement

Grounded on the analysis of data recorded from the interviews with inhabitants, cases 2 and 3 are coherent with the concerns of the qualitative aspect of the street network. Within the neighbourhood, they demonstrate a quality safe and spacious street environment. Case 3 is considered to have the most preferable shaded and landscaped streets. For easy access to public services, and convenience levels of connectivity, cases 1, and 2 score higher.

![Fig. 12: Comparison of desirability; mean value on layout aspect](image)

5.2.2: Analysis based inferences

In a spatial analysis of a macro context, the layout pattern is premeditated in figure-ground maps. All three areas are highly dense in terms of their built footprints. Focusing on the neighbourhood entity, the layouts convince a gradual loosening of built masses, from the central city area to Intermediate and outer city limits. Numerically, the built massing of neighbourhood areas varies from 85% in case-1, 35% in Case 2 and 28% in case-3; (Refer Figure-11)
Fig. 11: Lay out pattern and built masses in macro context, in 1km radius and neighbourhood area. From Left to Right; cae-1; Newham Square, case-2; Chitra lane Housing, and case-3; Veluwanarama road Housing

Source: GIS-Urban Development Authority; 2015, CAD-based calculations

5.3 Connectivity and Accessibility
5.3.1 Observations on Inhabitants’ Judgement

The physical facilitation of non-motorized transportation; walking and cycling bear significant consideration in inhabitants’ assessment. Accordingly, local cultural identity is best demonstrated in case 1, with circumstances in case 2 also being desirable. However, case 3 exhibits a general lack concerning the cultural identity aspect.

Fig. 12: Comparison of desirability of mean value on connectivity aspect

The availability of employment opportunities within the neighbourhood is rare in these contexts. Ideally, provisions in proximity or convenient accessibility concerning employment are
desirable. Overall, cases 1 and 2 are better facilitated with this respect; whereas case 3 shows that the provisions are not satisfactory (Figure 12).

5.3.2: Analysis based inferences

Within the notion of connectivity, the community togetherness, harmony and coexistence of different cultural groups, encouragement of communal life and harmony in planning and engineering standards with community lifestyle are observed as qualitative consequences of social sustainability. Connectivity and accessibility related to transport infrastructure an important consideration of both potential and existing inhabitants of urban residencies.

Fig. 13: Lay out pattern, street layout and transit stops in micro context
From Left to Right; case-1; Newham Square, case-2; Chitra lane Housing, and case-3; Veluwanarama road Housing- Source: GIS-Urban Development Authority, 2015

<table>
<thead>
<tr>
<th>Table 3: Level of convenience for public transit in distance and time</th>
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<tbody>
<tr>
<td>Case-1 Newham Square</td>
</tr>
<tr>
<td>----------------------</td>
</tr>
<tr>
<td>Walking distance to the closest public transit stop</td>
</tr>
<tr>
<td>Walking time to the closest public transit stop</td>
</tr>
</tbody>
</table>


As such, cases 1 and 2 are well valued by residents, whereas case 3 receives a weaker position, with the main reasons being that case 3 is composed of, weaker adaptability in the neighbourhood environment towards public transit, inadequate street connectivity, lower convenience in rout directions, lower pedestrian accessibility and inadequate pedestrian network coverage. Hence, case 3 neighbourhood is largely dependent on private transportation modes, which do not fall under an environmentally sustainable framework, though the layout concerns are highly favourable (Figure-13). In the analysis, physical implications such as walking distance and time to the closest public transit stop have become significant considerations (Table-3).

6. Conclusion and Perspectives

Automobile-oriented neighbourhoods tend to be expensive to build and maintain and are hazardous for pedestrians and bicyclists. In the context of a developing country like Sri Lanka, developments like this tend to not be economically viable in the long run. Although city planning,
urban design and architecture should primarily be attentive to the physical elements of communities, this study integrates social research that can assist planners and designers, to inform policies that influence and shape the built environment. In scholarly arguments, conducting careful, rigorous social studies can help architects and planning scholars shed light on how the environments we build shape our society; where this knowledge can be used as a foundation to develop better livable communities (Freeman 2001). As Jacobs (1961) states, cities are ‘immense laboratories of trial and error’ and the neighbourhoods are the components of experimentation.

This study examines the desirability levels of three neighbourhoods as perceived by residents: the inhabitants, based on their locational factors. Its determinant elements on neighbourhood form are scrutinized as land use, layout, accessibility, and connectivity, based on closely evaluated case studies. Colombo, as the capital city of a developing country, is in the process of continuous upliftment of its urban localities; specifically, urban neighbourhoods. In this process, it is important to reach sustainability levels to optimize energy efficiency and improve environmental conditions to create a healthy and resourceful atmosphere for residents. Strategic locations require innovations that are specific to different localities to ensure effective sustainability evaluations.

In a nutshell, the comparative analysis leads to the following recommendations and guidelines, as fundamental for the resourceful location of urban neighbourhoods.

1. Strong Land use diversity with commercial establishments in proximity:
2. Infrastructure and public community provisions such as open spaces, childcare services, schools, health care, community and religious centers, public libraries, and skills development facilities - to be in proximity and conveniently accessible:
3. Effective physical connectivity of layouts integrated with the surrounding street network of locality, are encouraging walkability, recreation, and cycling:
4. Proximate public transit stops with convenient, safe, and appealing street links:
5. Availability and convenience of the public transportation network and continuous upgrading and maintenance of systems:

These interrelated factors create and maintain the relationship that results in enhanced neighbourhood connectivity, with convenient and walkable layouts, and strengthened pedestrian convenience and safety. This is reinforced by upgrading walking amenities with the norms of mixed land use, and encouragement on using public transit indulging resource efficiency. Therefore, the strategic location is principally important in the designation of localities or zones for residential neighbourhoods, in branding as appealing, sustainable neighbourhoods, uplifting the quality of urban living standards. Factually, this requires a higher level of concern in developing residential neighbourhoods specifically in primary residential areas.

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