

Samarawickrama, Sumanthri, et al (eds), 2018, "Sustainability for people - envisaging multi disciplinary solution": *Proceedings of the 11th International Conference of Faculty of Architecture Research Unit (FARU), University of Moratuwa, Sri Lanka, December 08, 2018* Galle pp. 292–307. ©

URBAN ALLEYWAYS AS A FUNCTIONAL LANDSCAPE ELEMENT AND ITS EFFECT ON LIVEABLE CITY

A study with reference to Kandy City

GUNARATHNE. C. P. A.¹ & CHANDRASEKARA. D. P.²

Department of Architecture, University of Moratuwa, Moratuwa, Sri Lanka

¹*chathurigarathne1230@gmail.com*, ²*dpcha@uom.lk*

Abstract

A good city is a fascinating manmade creation which stimulates the physical and psychological satisfaction of its dwellers. Positive public realm is the core of liveable city. Urban alleyways are one such significant, micro contextual public territory generally located at the core of the city. They are multifunctional and act as linking paths, gathering spaces and commercial spaces. Urban alleyways could also generate negative consequences due to dis-functioning and lost spaces. The heritage city of Kandy in Sri Lanka was selected for the investigation of functionality and liveability of the alleyways. According to the literature survey, "Figure-ground theory" explains the relationship between built fabric and spaces in-between. The study adopted the "Linkage theory" to evaluate the circulation space and spatial connections. Integration, connectivity and intelligibility of alleyways were measured as spatial configuration through Space syntax maps. "Place theory" addresses behavioural patterns of people within public spaces in accordance with the physical and psychological attributes. Psychological satisfaction of people is evaluated concerning the fulfilment of physical attributes. Direct field observation and interviews with city dwellers are done for accurate data. Activity maps are used to evaluate detailed description about the relationship among the location, physical environment and behavioural patterns of people.

The study shows that the behavioural patterns of people in urban alleyways are consequence connected to two paradigms; the impact of spatial configuration and effects of physical & psychological dimensions. Hence, the equilibrium of both paradigms influences the performance of alleyways, the study concluded that positive spatial configuration in equilibrium with affirmative physical & psychological attributes of alleyways, deeply effect the satisfaction of people and the liveability of city.

Keywords: *liveable city, urban alleyways, public realm, psychological attributes, spatial configuration*

1. Introduction

A city is a creation of people for their satisfactory living as an expression of themselves and their ambitions. It provides with an acceptable enchantment for urban living. A city is identifiable with its configuration and structural composition of the city elements. Positive dimensions of the city formation are very significant as it generates a liveable city entity where city dwellers can be found with meaningful associations throughout the public spaces of the city. Thus, positive public spaces can be addressed as the most impressive elements of a liveable city which bind together with the spatial progression of the city users. These public spaces can be divided into two categories as macro contextual public spaces and micro contextual public spaces. Streets and urban squares are concerned as in macro perspective while alleyways, pocket spaces are addressed in micro scale context. Micro contextual public spaces of the city are not planned deliberately as in macro contextual approach. They are formed all over the city generating a readable city form.

When considering the alleyways as a micro contextual city space, they are narrow urban corridors rather than planned streets which confine the movement of city dwellers and very much attached with

the city life. Characteristics and social activities of the urban alleys sustain an interesting and a greater social interaction beyond the planned functionality.

1.1 NEED OF THE STUDY

Natural physical setting of the alleys has a high possibility in generating lost spaces and dysfunctions in the city which can affect a negative public realm. If alleyways generate lost spaces in the city centre, the city can be immensely damaged as alleyways together are vast spaces spreading throughout the compacted city core. Thereby neglected alleyways tend to generate an extreme threat to the public realm of the city. Thus, it is important to investigate the role of alleyways and its physical nature as it tends to stimulate psychological satisfaction of the city dwellers and spatial progression.

1.2 RESEARCH ISSUES

Behavioural patterns of people in urban alleyways are concerned in evaluating positive existence of alleyways. Impacts of physical dimensions, psychological dimensions and spatial configurational factors on human behavioural patterns are addressed in the research problem.

Research questions:

- How do behavioural patterns of people relate to the physical and psychological dimensions of urban alleyways?
- How do behavioural patterns of people relate to the spatial configuration of urban alleyways?

1.3 OBJECTIVES OF THE STUDY

- Study the physical and psychological attributes towards the nature of alleyways.
- Study the spatial configuration of the urban alleyways.
- Investigate the behavioural patterns of city dwellers in urban alleyways with causal factors.
- Evaluate the vital role of alleyways as a resource to the liveable city.

1.4 SCOPE AND LIMITATIONS

The scope of the study is limited to the city of Kandy, which has a unique appearance in the city formation and also unique characteristics as a heritage city. Furthermore, the study area is limited to the core area of the city as the city centre is a significant expanse for a liveable city.

Two commercially oriented alleyways were selected for the case study and the investigation. Evaluated framework is applied on case studies discussing the physical, psychological dimensions and spatial configuration effects on the behavioural patterns of the city dwellers.

2. Liveable city and alleyways

2.1 THE CITY

“Cities are amalgams of buildings and people. They are inhabited settings, from which daily rituals -the mundane and the extraordinary, the random and the staged- derive their validity.” (Kostof, 1991, p. 16)

According to Kostof, the city is a fascinating creation of people for their living satisfactory as an expression of their culture, practices and their ambitiousness. The emergence of the city might be followed back to the initial stage of the civilization where small communities were created. Steadily small communities created villages and step by step evolved in-to larger and larger cities with its transformations.

“City form is three-dimensional composition of physical objects and spaces which can be referred to as volumes and masses of the city.” (Lynch, 1962, p. 110)

Kevin Lynch describes that city formation is a combination of the built fabric and space organized in-between the built environment. Those city elements tightly attached to the city and tend to generate pleasing visual access and long-lasting memory to city dwellers. (Lynch, 1962) According to Lynch there are five constructive elements in the city; paths, edges, districts, nodes and landmarks. These elements exist with strong integration among each other.

2.2 THE LIVABLE CITY

The thought of the liveable city within the Western World started, maybe, with the idea carried by Jane Jacobs regarding the rise and drop of American cities. Jane Jacobs contended about the sense of liveability that emphasizes the character of communities in cities that were getting to be exceptionally unoriginal in nature. (Jacobs, 1961)

Hahlweg (1997) amplifies the meaning of the liveable city to enable people to empower individuals to have a solid life within the city. He appreciates the easy mobility within a liveable city. E. Salzano defines the liveable city as an interference between the past and the future. The liveable city acts as the engrave of history, legacy, and admire the not born yet. (Salzano, 1997) Liveability of a city also imitates a quality that conserves the natural resources regarding the future generations. Entirely, liveability permits us to encounter ourselves as genuine people within the city. (A.Casselati, 1997)

According to the literature expressed by those scholars, Liveable city can be captured with the essence of sustainable city which runs deep throughout the city and the communities.

“Liveability means that we experience ourselves as real persons of the city.” (A.Casselati, 1997)

Casselati describes the city dwellers as a part of the city instead of observers or spectacles of the public realm in the city. Day today lives of the city dwellers fully attached with the specific places of the city. Thus, Figural open domain of the city or the public realm acts as the heart of a liveable city.

2.3 PUBLIC REALM OF THE CITY

“The public realm is, in my view the most important part of our town and cities. It is where the greatest amount of human contact and interaction take place.” (Tibbalds, 1992)

Great, unique public spaces of the cities fortify the esteem to the city image. Positive public spaces of the city tend to create liveability in the city public realm. Those spaces are very significant elements of the city as they interact with the city dwellers directly and make meaningful, liveable picture. Macro contextual public realm of the city acts as outstanding components of the city configuration. Streets and public squares of the city can be identified as basic macro contextual public spaces. (Krier, 1975) In the city, most vital and fascinating public spaces are shaped within micro contextual conditions. Micro contextual public realm is not the kind of deliberately planned zones as macro contextual components. They are created by urban voids which carved out by the built fabric of the city.

“To make a design whole, it is essential that the space created by the building have a positive character. This is difficult to gasp, because in our time urban space has become negative...the left over after buildings are built.” (Christopher Alexander, Sara Ishikawa, Murray Silverstein, 1977)

This statement expresses that the city configuration is made by the macro elements. Urban voids considered as meaningful city entity that directly affects the city liveability. These tiny public spaces addressed in the micro contextual approach can be identified as urban alleyways, pocket spaces and niches etc. which are spread all over the city.

Trancik Roger expresses the lost space or urban voids as leftover spaces created at the base of built fabric, high rise buildings, towers etc. They are lightly composed in the city mosaic and cause to create fascinating intermixture of city functions which tends to generate a liveable city. In the same dimension, these micro elements could create dysfunctions due to improper, negative nature of those spaces. (Trancik, 1986) Therefore, positive dimensions of the micro contextual elements are significant in creating a liveable city.

2.4 ALLEYWAYS OF THE CITY AND ITS FUNCTIONALISM

2.4.1 *What is an alleyway?*

As Christopher Alexander defines, alleyway is highly enclosed, narrowest pathways through the urban built fabric which facilitates the humanistic associations. (Christopher Alexander, 1977) He states that

height of the flanked facades in sides of the alleyway is higher than the width of the narrow path and creates a limited movement and behavioural patterns of city dwellers.

Most crucially alleyways are much needed in urban circulation system which integrate the main road system of the city. Those are created among the built environment and specific boundaries, at times defying regulations of local authority, like building reservations, road reservations, fire gaps and fabricated spaces from housing lots. (Rahder.B., 2010)

Spaces in alleyways are rich in crating social interactions, different kind of functions and communities in such alleyways have created strong groups with a specific subculture. (Paul, 2013)

3. Application of theoretical framework

The origin of the city and the present formation of the city layout is significant character to be addressed in recognizing what fabricate the liveable city. Therefore, Roger Trancik's paradigms for positive urban design are addressed here with respect to more integrated city formation and urban system. As alleyways play a vital role with reference to micro contextual phenomena, idealized urban areas and organic spatial structure is taken into consideration. Therefore, three approaches are applied in research of functionality of urban alleyways in a liveable city. (Trancik, 1986)

3.1 FIGURE GROUND THEORY

Figure-ground theory explains the relationship between built fabric and the spaces in between the built. It expresses left over spaces, circulation spaces and connections among built areas. Solid-void pattern of urban fabric can be analysed clearly through the figure-ground theory. Layer of the built and layer of the void can be evaluated separately. (Trancik, 1986) In the framework of this research, the figure-ground theory is helpful in evaluating the voids between built areas and visualizing the circulation through alleys.

3.2 LINKAGE THEORY

The linkage theory describes the circulation space and streets' spatial linkages throughout the urban fabric. Hierarchical system of the streets in the city represent through the linkage theory more specifically. Dynamic patterns of the roadways play a major role in making the urban formation. (Trancik, 1986) In the framework of this research, Linkage theory is helpful in investigating alleys as a part of the circulation system of the city. As the study focuses on a grid city, it expresses the street system considering the organization of links.

3.3 PLACE THEORY

Place theory addresses the behavioural patterns of people within a physical space. (Trancik, 1986) It is all about identifying a specific space by examining the behavioural patterns of people with respect to the physical environment. It matters what people prefer individually. Different people get different kinds of experiences within the same space, because their preference matter based on what they have experienced in their life, their culture and relationships etc. Same place makes unique picture for any individual person at all.

As alleyways play a vital role in an urban system that guide the patterns of the functionalism and the unique character of the city. This theoretical framework is applied to investigate the alleys' role in a liveable city.

3.4 SPATIAL CONFIGURATION

Spatial configuration can be expressed as a systematic process which discovers the complex relationships among the space, people who experience the specific space and the configurational spatial patterns. (Asyra Ramadanta, Endang Titi Sunarti B. Darjosanjoto, 2012) Those relationships can be

affected physically and also visually in between the space in configuration. Two factors are considered in spatial configuration regarding urban alleyways.

3.4.1 Connectivity

“Connectivity is defined as the number of paths, streets, or nodes directly linked to each individual street or node in the road network.” (Amber Farhana Ferdous, Keith Diaz Moore, Jeffrey M. Burns, 2015)

Connectivity is expressed as the basis of the street system which describes the directly connected spatial units of the network. It is the measurement of the spatial configuration with respect to the city fabric as a whole. When consider with the alleyways, connectivity is a significant factor which describes the linkage of the city circulation system.

3.4.2 Integration

“Integration measures how many turns must be made from a street segment to reach all other street segments in the network, using the shortest paths.” (Amber Farhana Ferdous, Keith Diaz Moore, Jeffrey M. Burns, 2015)

Integration is addressed as a measurement of the urban fabric which describes whether the system is integrated or fragmented. Therefore, alleyways’ contribution for the city integration is discussed through the grid city formation.

3.5 PHYSICAL AND PSYCHOLOGICAL DIMENSIONS

Liveability can be identified through the extreme relationship between the human and the physical environment they used to live.

“It is man who creates and experience sensation of space, and the final product in the perception process in a single sensation- a feeling about that particular place.” (Schulz, 1971)

It describes the human sensation about a particular space totally relates to the psychological aspects in human mind. As it is justifiable psychological dimensions woven together with the visibility of physical environment, human behaviour of the city is very closely linked with the place. It is a strong combination of both physical, psychological attributes and human functions in the city. As urban alleyways are persistence for the city liveability, people’s sensitivity for physical environment of alleyways in relation to psychological attributes are discussed through the research.

Physical attributes → Psychological attributes → Human functions

3.5.1 Psychological dimensions

Sensitivity of people may differ towards the physical environment from one to another. People may prefer different choices in relation to their different attitudes and values. In the book of Urban Design: Streets and squares, the way that Moughtin Cliffs describes Norberg Schulz’s opinion on psychological dimensions denotes three positive fundamental attributes. (Moughtin, 1992, p. 48) It strongly indicates a basic concept on psychological attachment towards physical environment. Alleyways will be addressed through basic notion of psychological attributes.

a. Centre

As Schulz describes in Existence, space and Architecture, Centre can be any kind of community space that are experienced by the people. (Schulz, 1971) It can be varied with different characteristics of the space. At a “Centre”, eyes bound to a specific focusing point which tends to make human sensation a centralized axis.

Regarding alleyways, “Centre” can be any space experienced by the city dwellers throughout the linear pathway of the alley. It makes people tie up into a common focus while making it a unique entity in the city.

b. Enclosure

Enclosure relates to the position of a person within a particular space. Observable physical nature of a specific space, strength of the specific boundary gains a higher recognition in enclosure. (Christopher Alexander, Sara Ishikawa, Murray Silverstein, 1977, p. 87) Alleyways in urban fabric flanked and shaped by built fabric of the city. Enclosure is experienced through the defined boundary demarcations of the alley within its territory. Width of the alley, height of the canyon, textures and colours express the territorial demarcations and affect the psychological needs of city dwellers.

c. Continuity

Continuity determines a direction for behavioural patterns of people. Continuity attaches all the components throughout its linear direction. (Schulz, 1971, p. 22) When one consider the urban alleys, continuity links the differences of the physical environment, from the beginning to the end of the linear pathway. City dwellers follow the rhythmic patterns what they detect through their eyes and found with the psychological continuity throughout the linear arrangement.

3.5.2 Physical dimensions

“A vivid and integrated physical setting, capable of producing a sharp image, plays a social role as well. It can furnish the raw materials, for the symbol and collective memories of group communication.” (Lynch, 1962, p. 4)

Human psychological attributes directly link with their sensation towards the physical environment. Because psychological sensation comes after the detection of the picture through the eyes. Dimensions of the physical environment of the urban alleyways determine the visual wellbeing of the city and also the psychological wellbeing of the people. Therefore, basic physical attributes are addressed with respect to the urban alleyways.

a. Scale

“Urban climatologists see the urban street canyon, defined as the space above the street and between the buildings, as the basic urban unit.” (F.Bourbia, F.Boucheriba, 2010)

Physical dimensions of the alleyways regarding the urban canyon relates to the scale. Volumetric relationship of the space can be identified through different spatial arrangement with respect to the height, width and the length. Most significant geometric scale related to street canyon can be identified as aspect ratio of the alley.

Aspect ratio of alley= (Canyon height(H)) / (Canyon width(W))

b. Order

“First thing first and everything in place.” (Antoniades, 1980, p. 42)

If the components of the space are arranged properly according to “First thing first”, it is accepted that space is “orderly” arranged. Order of the place plays a significant role in making livable cities. When concern with urban alleyways, order means the arrangement of elements along the linear pathway, in a rhythmic, non-conflicting manner while supporting the psychological continuity and the enclosure of the space.

c. Light and shade

“Architecture is the masterly, correct and magnificent play of masses brought together in light. Our eyes are made to see forms in light and shade reveals these forms.” (Corbusier, 1927)

Light and shade plays a vital role in liveable city as they blend with the physical formation and its visual appearance in human. Light changes make different moods in the environment which create senses

with respect to the colours, textures, materials and whole spatial progression. Public routine and gathering spaces like urban alleyways highly demand the positive lighting effects as it directly effect on safety of the people and their psychological attributes.

d. Texture and colour

Colour is a sensitive physical attribute which bring meanings and variety to the city. It is more complicated composing colours and textures in urban public places due it should preferable for the whole public realm. Textures and colours define zones of territorial space by communicating. (Porter, 1997, p. 66) It directly effects the positive spatial progression and mingle firmly with sensation of people. Light and shade also influence the textures and colours in reflecting visual quality.

4. Methodology

The study was carried out according to a deductive approach. Preliminary data were gathered from the literature survey. Theoretical framework was derived through the literature and related theories regarding the subjective area. Physical, psychological attributes and factors addressing spatial configuration regarding human behavioural patterns in alleyways were included in the theoretical framework.

Case studies were selected according to a criterion consists of three supportive fundamentals; Urban canyon of the alley, Street activities priority and Travel mode priority. Two urban alleyways in Kandy city were selected for the scope.

Data collection methodology was completed with several stages. Direct field observation, questionnaire, activity maps and space syntax were the tools used in data gathering process. Randomly selected 15 city dwellers were considered as the sample for questionnaire and interviews from each case study. Physical and psychological attributes were observed in each alley.

Activity maps were used to evaluate detailed description about the relationship among the location, physical environment and behavioural patterns of people. Space syntax was used to analyse the spatial configuration of the alleyways regarding integration and connectivity factors. Space syntax maps and content analysis were compared with activity maps, with respect to evaluate the causal factors for the different kind of behavioural patterns of city dwellers. Conclusions were derived through the findings and discussion of the study.

5. Case studies

Two urban alleyways of the heritage city, Kandy are selected for case studies in consequence basis of case study selection. Case studies were conducted with respect to determining the two hypotheses derived from the research issue.

Hypothesis 01: There is a significant co-relation among physical attributes, psychological attributes and behavioural patterns of people in the alleyway.

Hypothesis 02: There is a significant impact of spatial configuration of alleyways on human behavioural pattern.

4.1 CASE STUDY 01- STUDY OF CASTLE LANE

Castle lane is a leading commercial street laid, dividing a block of the grid city. It is a pedestrian dominant linear pathway, mostly acts as a connecting linkage between 2 major streets of the city. The lane can be identified as a clear urban void in the middle of a solid urban block. When we consider the morphological characteristics of the Castle lane with respect to the configuration, there are several public places, landmarks are surrounded.



Figure 39: Castle lane

Castle lane is a wide alley mostly used as a shortcut. Shopping also can be considered as a main activity in the lane. City dwellers also use the alley to get a release from traffic congested main roads. Three-wheelers and motorbikes are allowed through the Castle lane and they make a low speed movement within this pedestrian dominant alley. Some three-wheelers and motorbikes are parked along sides of the alleyway.

Castle lane is always a busy alleyway during the day time throughout the week, except at night time.

4.1.1 Physical and psychological attributes

Scale- Mostly three-storied and four-storied buildings are flanked on either side of the lane which has approximately a width of four meters. Therefore, approximately it is considered as a deep canyon with an approximate aspect ratio of 2.25. Entrances from both ends of the alley are provided with visual and physical access through a void on the continuous building façade. There seem to be a sense of scale even from the entry of alley. As the Castle lane is a comparatively wide alley, people are rarely discomforted due to the façade height. Temporary shades and structures erected by vendors that accommodate human scale also add and synchronize the with the sense of urban canyon.

Order- Castle lane is a linear alley which is bent in several places. Continuous building facades make a balanced arrangement of built fabric. Temporary shades on either side of the street also add to an orderly arrangement. Entrance area of the alley from the Kotugodella Veediya present a somewhat an imbalanced facade character compared to the other areas. Drains are laid along the sides of the paved street. Some disorderly elements are seen in some places such as scattered cables, pipes, wires, street lamp posts and dilapidated walls. Such elements tend to add to unpleasant characters. Street light posts cannot be identified as repeating elements and are scattered through the alley in a somewhat disorderly manner.

Light and shade- When one considers the orientation of the Castle lane, it is an East-West oriented street that is exposed to the sun throughout the year. Therefore, it is always provided with a pleasing, well-lighted, safe and comfortable environment. Colours, textures, materials of the physical setting are clearly visible during the whole entire day. Canopies and temporary shades of shops provide the much-needed shade.

These alleys become dysfunctional and dead during the night. No lights are provided by shops in the night except for the three street lamp posts provided in the lane.

Colour and Texture- Colour is a sensitive physical attribute in the Castle lane that brings variety to the otherwise a boring setting. Building facades on both sides of the alley are flanked with variety of colours as these shops are full of fancy items. Differently coloured sign boards, fancy items in the shops,

temporary shades of the shops, colourful claddings of buildings create the Castle lane a colourful alleyway. However, the somewhat dull walls that exist make a negative impression in the alley.

Floor of the street is identified with a regular texture of its paving material. It is created a pleasant visual quality and a boundary demarcation of the alleyway at the entrances by demarcating the separation from the main roads.

Centre- Within the community pockets near shops and through linear pedestrian path are perceived with centralized sensation due to their physical appearance specifically, comfortable human scale, linear arrangement, continuous and vivid character of facades. Movement of three-wheelers and motorbikes also effects the psychological disturbance for the “centre” mostly at the bent areas.

Enclosure- Enclosure is experienced through the defined boundary demarcations by the building facades of the alley, within its territory. Height of the canyon, textures and colours, paving edge demarcations are expressed the territorial physical demarcations which affect the psychological enclosure of the city dwellers.

Continuity- In the Castle lane, continuity is linked the different components of the physical environment, from the beginning to the end of the linear pathway providing a direction. Composition of the elements along continuous pathway is highly recognized. Rhythmic patterns in the arrangement of these components, their linkage in creating orderly arrangement is affected by the psychological continuity throughout the linear alleyway.

4.1.2 Spatial configuration

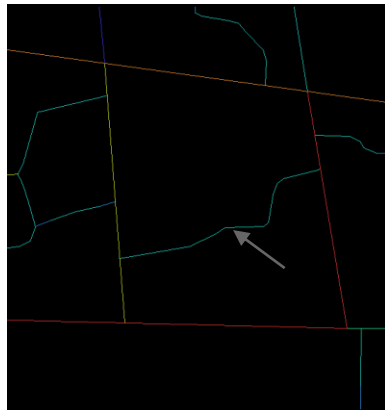


Figure 2: Space syntax

Connectivity- As a directly connected spatial unit of the road network, Castle lane is analysed regarding the number of paths, nodes which connects the road network. According to the syntax map, connectivity of Castle lane is rated with a middle value of the range while expressing light blue in colour. Main streets which are connected to the Castle lane are occupied high values in connectivity. Therefore, Castle lane is recognized as a good contribution to the city circulation system.

Integration- Integration is also recognized in a good level as it is a short path which integrates the city public spaces, main streets and many landmarks in the grid city formation. Mostly the Castle lane is recognized as a contribution to the integration of city fabric instead of contributing to the fragmentation.



Figure 3: Activity map

4.1.3 Activity map analysis

Activity map is expressed at the peak time of 5.30 pm which is recognized with highest number of people in the alley.

Accordingly, activity patterns of the Castle lane are observed by dividing into two user categories. People who walking through the street and waiting in activity pockets near shops are expressed in the activity map. 310 people used the alley within 10 minutes. 110 of them waited in some places through the alley while approximately 200 of them used the alleyway as a thoroughfare street.

Movement speed of city dwellers through alleyway is recognized as very smooth and indulgent behaviour which is expressed through yellow colour. People used to wait for some time in the lane while seeing fancy items.

4.2 CASE STUDY 02- GOOD SHED ALLEYWAY

Good shed alleyway is connected between Peradeniya road and Good shed bus stand confronted S.W.R,D Bandaranaike Mawatha, one of the busiest areas in the city. It is a narrow alleyway with a slope and a stairway next to the good shed Bo tree. Thus, it is identified as a pedestrian alleyway which is constrained the movement of any vehicle due to its natural setting. The area is surrounded by several public spaces and landmarks when considering the physical setting. This is one of the narrowest alleyways in comparison to other alleyways in Kandy. As the street is located connecting the central bus stand of the city and a main road, most of all the city dwellers use the alleyway as a short cut. Otherwise people have to walk a long way to cross between the bus stand and Peradeniya road.



Figure 4: Goodshed alleyway-stairway



Figure 5: Goodshed alleyway

Very fewer commercial activities are found in the alleyway such as, small tea shops, food, small retail shops and one communication centre. People who came for tea shops are recognized as workers of good shed area such as, bus drivers, small shop owners etc. except pedestrians. During the night it is getting less active and dead and dysfunctional. People rarely use the alley in night time.

4.2.1 Physical and psychological attributes

Scale- Good shed alleyway is mostly flanked with two or three-storied building façade and walls. With the slope of the alleyway it tends to appear very tall in façade line and compacted alleyway. Width is recognized as approximately 1.5 meters. Therefore, it is considered as a deep canyon with an approximate aspect ratio of 4.00. Scale factor is recognized which provided with negative physical environment for city dwellers and out of human friendly scale.

Order- Good shed alleyway is a linear alley with less elements. Messy electric cables, pipes, dilapidated walls create a messy, disorderly environment. Floor of the pathway is cement finished with very low or no maintenance. In some places, pathway has become the top cover of a drain. Stairway of the alley is with uneven steps which are broken in most places. Generally, it is recognized as a poorly maintained, neglected alleyway.

Light and shade- Orientation of the Good shed alleyway lane is along North-West, South-East direction. Thus, it does not receive natural sunlight Due to the shade of the blank façade; mostly the narrow alleyway is a dull environment with poor light. Therefore, the Good shed alleyway provides a dull environment even during the noon and one that encouraged crime.

Colour and Texture- A simple variation of colours is seen in the alley due to almost dull and worn away facade. Sign boards and posters of the wall added some colour to the alley. There were none that emphasized the texture of this alley.

Centre- Narrowness of the alley and compacted feeling due to high walls has made the people out of human scale. Surrounding views are blocked and a dull environment prevails therein. Therefore, “centre” attribute is recognized as a negative dimension in Good shed alleyway which discourage the centralized sensation.

Enclosure- Enclosure is experienced through the defined boundary demarcations by the building facades of the narrow alley, within its territory. Fragmentation of continuous path is occurred with the stairway. Uncomfortable scale of the alley, descended pathway, broken stairway is negatively affected on psychological enclosure.

Continuity- In the Good shed alley, continuity of the physical environment, from the beginning to the end of the pathway is provided a direction.

As the alleyway is occupied with a dull, disarranged environment and poor physical setting, rhythmic continuity of human psychology is bit harmed. But as the Good shed alleyway is short in length and narrow in width, mostly the view is focused on the Bo tree which confronted the alleyway from the direction of Good shed. Its directive quality affect positively on human psychology.

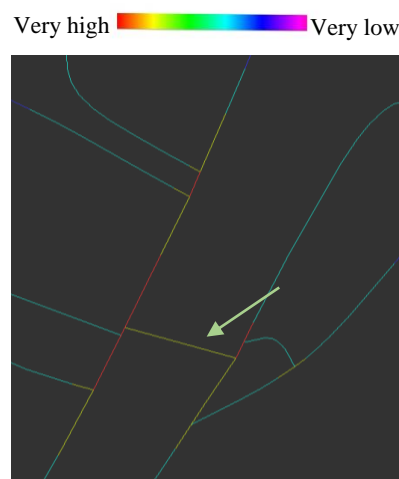


Figure 6: Space syntax

4.2.2 Spatial configuration

Connectivity- According to the syntax map, connectivity of Good shed alleyway is rated with a higher value of the range while expressing yellow in colour. Both ends of the alleyway segment is met with higher connectivity detected roads. In one side the alley is connected to the Peradeniya road which consist of highest connectivity and expressed in red colour. On the other side alleyway is connected to the good shed inner road which also expressed with higher connectivity in yellow colour. Therefore,

Good shed alleyway is recognized as a good contribution to the city circulation system as it consists of higher level of connectivity.



Figure 7: Activity map

Integration- Integration is also recognized in a good level as it is a very short path which integrates the city public spaces, main streets and many landmarks in Kandy city. Mostly Good shed alleyway contributes to the city circulation system through higher integration while emphasizing the connectivity between Peradeniya road and Good shed. Thus, Good shed alleyway is measured as a contribution to the integration of city fabric and less due to its fragmentation.

4.2.3 Activity map analysis of Good shed lane

Activity map is expressed at the peak time of 5.30 pm which is recognized with highest number of people in the alley.

Accordingly, activity patterns of the Good shed lane are observed by dividing into two user categories. People who walk through the street and waiting in activity pockets near shops are expressed in the activity map. 320 people use the alley within 10 minutes. Approximately 25 of them waited in some places through the alley while approximately 295 of them are crossed through the street.

Movement speed of city dwellers through alleyway is recognized as comparatively fast and continuous movement which is expressed through red colour. People do not usually wait for tea or short eats in shops. They do not take time to take a look around while passing through the alleyway.

5. Findings and discussion

Hypothesis 01: There is a significant co-relation among physical attributes, psychological attributes and behavioral patterns of people in the alleyway.

a. Comparison of physical and psychological attributes

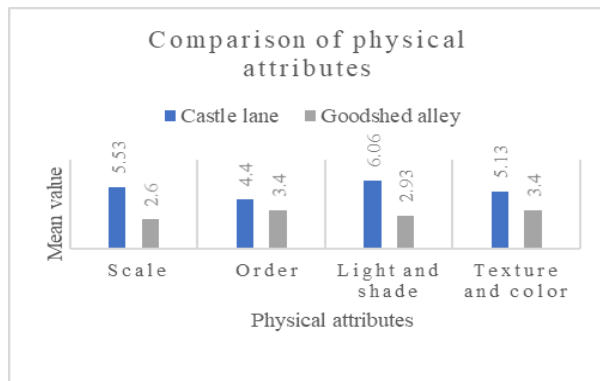


Figure 8: Physical attributes

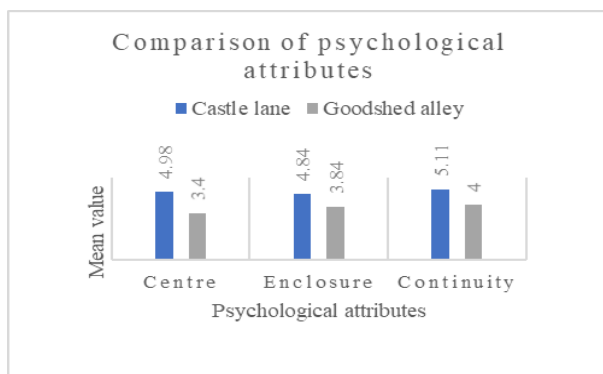


Figure 9: Psychological attributes

Calculated mean value for each physical and psychological attribute taken from the questionnaires of sample city dwellers is expressed through the graphs.

Castle lane is recognized with comparatively higher values in every physical and psychological attribute while Good shed alleyway is rated with lowest values.

According to city dwellers' answers for open ended questions and according to above data, physical attributes of alleyways are recognized as directly affecting on psychological sensation of people. Therefore, positive physical attributes tend to generate positive psychological attributes.

b. Comparison of activity maps

In both alleyways, 5.30pm observation session were identified as busiest time and recorded with approximately same number of people. According to speed of movement, large variations were identified.

Good shed alleyway expresses a continuous fast movement of pedestrians while Castle lane expresses a smooth indulgent behaviour. Significant point derived that with the same count of people in the same time period, the behavioural patterns occur with a considerable difference.

Thus, alleyways with positive physical attributes tend to have smooth, indulgent behaviour while alleyways with negative physical attributes create an expedite, continuous behaviour of city dwellers.

Thus, findings of the study derived that, positive physical and psychological attributes deeply influence the smooth, indulgent behavioural pattern of city dwellers through urban alleyways. Hypothesis 1 is proved through this.

Hypothesis 2: There is a significant impact of spatial configuration of alleyways on human behavioural pattern.

Spatial configuration is measured by connectivity and integration. Space syntax maps were evaluated through the software. Highest integration and connectivity were recognized in good shed alleyway and surrounded Main Street rather than the Castle lane.

Activity maps were compared with space syntax maps to evaluate the co-relation between spatial configuration and behavioural pattern of people. In the good shed alleyway people are used to move fast. In the Castle lane movement of people were recognized as smooth behaviour compared to Good shed alley.

Directly connected spatial units of the street system encourage the connectivity and synthesis of road segments strengthen the integration of the alleyways and the whole street system. Thus, higher degree of connectivity and integration levels directly effect on positive spatial progression.

It emphasizes the linkage among city spaces and expedite the continuous movement of pedestrians through the alleyways. Thus, Hypothesis 2 is proved.

6. Conclusion

Liveable city life evokes through the fascination of public realm of the city. City dwellers become a part of the city by means of confederate moments of public spaces. Amalgamation of both macro and micro contextual public realm bring forth a positive city entity which determine living satisfactory of people.

Urban alleyways are distinguished as micro contextual public spaces with a unique appearance. They are spread throughout the city fabric and create a linking network among city spaces. They have become functional commercial devices, gathering pockets for people. It turns a severe threat to the liveable city functionalism when such micro contextual element become neglected lost space, due to its micro scale and hidden magnitudes.

In the framework of this research, Figure-ground theory is used to explain the relationship between built fabric and the spaces in between the built. Layer of the built and layer of the voids is clearly recognized with regard to the reviewed city, Kandy. As the study focuses on a grid city, the linkage theory is applied in evaluating the circulation space and streets' spatial linkages. As urban space configuration expresses the quality of urban life and living satisfactory, spatial configuration paradigms are derived from theories and applied in the study. Integration and connectivity are measured by space syntax software in analysing the spatial configuration of the alleyways and street system as a whole.

Place theory is addressed to evaluate the behavioural patterns of people within a physical space. A well-established physical setting of the city public spaces leads to satisfaction of psychological desires of city dwellers. Thus, positive physical and psychological dimensions are derived from related theories and literature in regards to determine the behavioural patterns of people.

Four physical attributes are selected as scale, order, texture and colour, light and shade. Psychological satisfactory is evaluated with respect to the fulfilment of physical attributes. Thus, three psychological attributes are formulated as centre, enclosure and continuity as to investigate the co-relation among physical, psychological and behavioural patterns of people. The analysis of the physical and psychological attributes which affect the human behaviour was entirely carried out with the statistical analysis. Michelson's Participant and non-participant method of direct field observation is used to gather accurate data supportive to statistical data gathered from the city dwellers. Activity mapping is used in recording the behavioural patterns and movement of the city dwellers through alleyways. Activity maps are done for each case study separately and they are expressed the observed frequency of specific activities and movements.

The study attempted to investigate two hypotheses based on research issues.

Hypothesis 01: There is a significant co-relation among physical attributes, psychological attributes and behavioural patterns of people in the alleyway.

Scale, order, colour and texture, light and shade attributes are observed and statistically analysed. Volume of the space which synchronized with human scale, orderly arrangement of components, variety of colours and textures and well-lit environment are evaluated as positive dimensions of physical nature by means of five physical attributes. Existence of positive physical attributes of alleyways are recognized as directly affected on psychological satisfaction of people. Centre, enclosure and continuity factors which means centralized sensation, psychological territoriality and directive linear arrangement are evaluated as positive psychological attributes directly affected by physical attributes.

According to concluded activity maps, Positive psychological attributes are deeply influenced the smooth, indulgent behavioural pattern of city dwellers through urban alleyways. This proves the hypothesis 1.

Hypothesis 2: There is a significant impact of spatial configuration of alleyways on human behavioural pattern.

Directly connected spatial units of the street system encourage the connectivity and synthesis of road segments strengthen the integration of the alleyways and the whole street system. Thus, higher degree of connectivity and integration levels directly effect on positive spatial progression.

It emphasizes the linkage among city spaces and expedite the continuous movement of pedestrians through the alleyways. This proves the hypothesis 2.

Behavioural patterns of people in urban alleyways is a consequence pertaining to two paradigms. Specifically, effect of spatial configuration in alleyways and effect of physical and psychological dimensions. Hence, the equilibrium of both paradigms is influential the living satisfaction of people, any tendency of negativity makes severe impact to the people. Thus, the study concludes that positive spatial configuration is in equilibrium with positive physical and psychological attributes of alleyways, deeply effect the satisfactory living of people which tend to create a liveable city.

Bibliography

- A.Casselati. (1997). The Nature of Livability. *Making Cities Livable. International Making Cities Livable Conferences*. California, USA: Godolier Press.
- Amber Farhana Ferdous, Keith Diaz Moore, Jeffrey M. Burns. (2015, January-December). Neighborhood Integration and Connectivity Predict Cognitive Performance and Decline. *Gerontology & Geriatric Medicine*.
- Antoniades, A. C. (1980). *Architecture and Allied Design: An Environmental Design Perspective*. Kendall/Hunt Publishing Company.
- Asyra Ramadanta, Endang Titi Sunarti B. Darjosanjoto. (2012). Application of Space Syntax as Presentation and Analysis Technique in the Study of Spatial Integration in Contoured Landform . *Journal of Basic and Applied Scientific Research* .
- Christopher Alexander, Sara Ishikawa, Murray Silverstein. (1977). *A Pattern Language: Towns, Buildings, Construction*. California: Oxford University Press.
- Corbusier, L. (1927). *Towards a New Architecture (Vers une Architecture)*. London: John Rodker Publisher.
- F.Bourbia, F.Boucheriba. (2010, February). Impact of street design on urban microclimate for semi arid climate (Constantine). *Renewable Energy*, 35.
- Hahlweg, D. (1997). The City as a family. *17th, International making cities livable conference; 1995; Freiburg, Germany*. Carmel, CA: Gondolier Press.
- Jacobs, J. (1961). *The Death and Life of Great American Cities*. New York: Vintage Books.
- Kostof, S. (1991). *The City Shaped*. London: Thames & Hudson
- Krier, R. (1975). *Urban Space*. London: Rizzoli International Publications.
- Lynch, K. (1962). *The image of the city*. London: The MIT press, Cambridge.
- Moughtin, C. (1992). *Urban Design: Street and Square*. Oxford: Architectural press.
- Paul, S. (2013). *Handbook for Minnesota cities, City regulatory functions*. American Society of Composers, Authors and Publishers
- Porter, T. (1997). *The Architect's eye; Visualization and depiction of space in architecture*. London: Taylor & Francis
- Rahder.B. (2010). When rationality is unreasonable. *Bhúmi, The Planning Research Journal* .
- Salzano, E. (1997). Seven Aims for the Livable City. *Making Cities Livable. International Making Cities Livable Conferences*. California, USA: Godolier Press.
- Schulz, N. (1971). *Existence, space and Architecture*. London: Studio Vista.
- Tibbalds, F. (1992). *Making people-friendly towns: improving the public environment in towns and cities*. UK: Longman group.
- Trancik, R. (1986). *Finding Lost Space: Theories of Urban Design*. New York: Van Nostrand Reinhold Company.