Framework for assessing Perceived Safety and Comfort in Urban Public Realm: A Study on Colombo, Sri Lanka

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Abstract

The feeling of safety and comfort is of vital importance in the use of urban public realm as it assures the mental and physical well-being of the users. The literature suggests that the psychological dimensions of safety and comfort can vary with numerous factors. Thus, this paper intends develop a framework for assessing the perceived safety and comfort in urban public realm of Sri Lanka through exploring the objective variables in the immediate surrounding which impacts on the experience of the users of urban public areas. The character of the urban context of Sri Lanka complemented with the literature survey has categorised the urban public realm of the country into streets, parks, civic spaces, and nature sensitive spaces. A five-step methodology (comprehensive literature survey, stakeholder meetings, content analysis, expert focus group discussion and a survey) have concluded seven main attributes visual qualities, spatial configurations, pleasurability (attractiveness), inclusiveness, convenience, activities and imageability) as the outline of the framework to assess the sense of safety and comfort. The explored attributes were later surveyed for their respective importance in the urban realm elements. A total of 85 respondents (35 experts and 50 public) were selected for this exercise. The results exposed spatial configuration as the most important attribute in streets and parks while convenience and pleasurability were recorded as the most important attributes for the civic spaces and nature sensitive spaces respectively. This proves that the focus should be different with each urban public space to provide better conditions for the safety and comfort of the users. The statistical analysis forecasted significant differences between the responds of experts and public in the attributes under nature sensitive spaces. The use of explored results in designing and improving the urban realm can enhance the quality of urban public spaces with the assurance of perceived safety and comfort for the users.

Keywords: *Perceived safety, comfort, urban, public, attributes,*

Introduction

The term 'public' is derived from a Latin word which refers to the relationship between people, society and the environment (Madanipour, 2010). The new notion of public space has been defined considering many different aspects ranging from small scale of neighbourhoods to large scale in global context. When considering the different media, the public space can be a physical entity like a neighbourhood park or virtual spaces like world wide web (Mehta, 2014). A public space creates social life which generates the value for the surrounding environment and enhances sense of place (Haas & Olsson, 2014). The urban public realm mainly relates to the built and natural environment in the urban context where people can access without any sort of restriction (Carmona et al., 2008; Heffernan et al., 2014). Similarly, the public realm is defined as a space which is not controlled by any private individual or organizations (Madanipour, 1996). Public space can be both outdoor and indoor where free use of the space is provided to the user. Accordingly, streets, open spaces, parks, squares, plazas, forecourts, public buildings like libraries, townhalls, shopping malls, religious buildings and many more can be considered as public spaces (Karacor & Akcam, 2016). These public spaces in the urban context are being recognized as a key component in the sustainable urban development (UN-Habitat, 2015).

Mehta (2014) develops a public space index which is designed to measure the inclusiveness of a public space. Here the index is designed especially for streets, plaza, square and parks (Mehta, 2014). Similarly, streets and squares are said to be playing an important role in communication, identity and defining the character of the urban realm (Santamouris et al., 2017; Thomas, 2002). It is also mentioned that the urban public realm consists of spaces like streets, square, parks, plaza which are predominantly used for commercial, residential and civic spaces (Moughtin, 2003). Streets are further documented as important within the framework of public realm as a space with highest usage by the urbanites for various purposes ranging from movements to gathering spaces. Streets are a major component where safety and comfort are assured in terms of non-verbal conversations with the other users. This can be with small gestures, facial expressions and other non-verbal signals (Rashid et al., 2017). Parks are more associated with the mental well-being of the urban users with the abundance of trees and other landscape elements. Presence of the trees

in urban contexts contributes to the aesthetic quality, thermal comfortability and enhances the physical and psychological health of the users (Gerstenberg & Hofmann, 2016). Apart from the parks, squares and plaza, are also considered as important elements in the urban context (Hashim et al., 2016; Lis et al., 2019; Santamouris et al., 2017). These squares and plazas are frequently seen in temperate countries where trees are not essential for a comfortable experience. In tropical countries the squares and plazas have trees for a comfortable use. Apart from all these, at present people tend to create resting and waiting spaces in all the available small spaces in the urban context in between buildings or other leftover spaces. Pocket parks and mini parks has been emerging as viable solutions for the scarcity of space within the urban context (Nordh & Østby, 2013; Zhang & Han, 2021).

These open public spaces are often catered for the free use of the urban users irrespective of their societal status, perceptions, and economic status. As a result of this mixed use of the space, reported crimes and many other factors, the users often experience risks and threats while utilizing these spaces (Arefi & Nasser, 2021; Hale, 1996). It is mentioned that this sense of discomfort or risk is mainly due to the psychology of an individual (Askari & Soltani, 2019; Dillon, 2005; Hashim et al., 2016). There can be instances, where users feel anxious and discomfort even without cues of any risk or threat from the surrounding environment. Direct crime victimization is the most obvious reason for this sense of danger and discomfort, but it is not the main reason when considering the majority of population in the world (L. Kawshalya et al., 2020). Thus, it is documented that many reasons ranging from physical, social and economic factors can affect the sense of safety and comfort in urban public spaces (Dillon, 2005).

Research Objectives

This paper aims to develop a framework to assess the sense of safety and comfort of urban public realm of Sri Lanka. To achieve the aim the following objectives are followed.

- Identify and examine the objective factors (which can be physically altered/ modified) in the immediate environment which contribute towards the perceived safety and comfort for the users of urban public spaces of Sri Lanka
- Develop a framework to assess psychological safety and comfort assessment of Sri Lanka based on the identified factors.

Research Problems

The study is carried out to investigate the following research problems.

- What are the objective factors which impacts on the sense of safety and comfort in urban public spaces.
- Is there any difference in the impact on the identified factors in different types of urban public spaces (streets, parks, civic spaces and nature sensitive spaces)
- Is there any difference in the responses from experts and general public.

Significance of the study

The awkward feeling of discomfort and unsafely will eventually create some spaces to be under-used as the users tend to avoid such spaces (Mak & Jim, 2017; Morgan et al., 2018). The development of an urban public spaces is a time consuming and an expensive process which impacts on the sustainable development of an area. Thus, proper identification of the factors which leads to the psychological safety is important to create sustainable urban public spaces. Thus, this study focuses on the factors related to the psychology of the users, which is considered as highly significant for the success of any public spaces conveys the importance of this study. Furthermore, although criminology related disciplines have studied comprehensively on the sense of safety; the attention on this in the urban design related disciplines are limited (Blöbaum & Hunecke, 2016). Specially the focus on the psychological aspects of users in the tropical context of Sri Lanka is very limited according to the literature. This study is an attempt to address this gap in the literature and provide the knowledge on the discipline for major causes.

Study Area

The study area considered for this study is Colombo Municipal Council (CMC) area which is the business capital of Sri Lanka. Being the executive and judicial capital of the country and the largest city by population, Colombo shows a rapid urban expansion of 6.42 percent per year in the period of 1995 – 2017; which is a remarkably high figure compared with the global standards (UN Habitat, 2018). As a result of this urbanization, Colombo is considered to be the most urban city in the Sri Lanka. Thus, this study has also focussed on Colombo as

the core study area. Increasing crime rates with the economic crisis in the country creates a need for the assurance of the safety and comfort of the users, specially in the urban public realm. Colombo experiences a tropical monsoon climate which is hot throughout the year. But within the monsoon seasons (April to June and September to November) heavy rains are expected (De Costa, 2008). The geography of urban Colombo is a mix of land and water where sea covers the eastern boundary of the city. The heart of the city is a lake (Beira Lake) which covers 65 ha (160 acre) of land.

The city of Colombo is also identified as a wetland complex which covers 2000 ha (4942 acre) and declared as a wetland city in the Ramsar convention on wetlands held in 2018 (Piyumani, 2018). With all these, the unique city withholds many open public spaces which are historically, culturally, and environmentally important for Sri Lankans. Although many developed countries have paid special attention to the public spaces in the midst of urban context, developing countries like Sri Lanka needs to pay more focus on this aspect (Lankadhikara & Ratnayake, 2022). Moreover, the urban public spaces in the Colombo urgently needs proper planning as a result of the unplanned settlements, accelerating population, land encroachment, environmental and air degradation etc. (Senanayake et al., 2013). CMC area has open public spaces which caters for the movements, enjoyment and relaxation. Well designed and managed public spaces arouse the users' sense of place, identity and sense of belongingness. Some of these public spaces would be the Viharamahadevi park, Beira Lake linear park, Galle face green, Diyatha Uyana, Arcade Independence square etc. Along with considering the literature and the open public spaces in Sri Lanka, four distinctive categories were identified in the urban public realm of Sri Lanka for this study. The open public spaces which are accessible by the urbanites freely in Sri Lankan context were considered in categorizing the urban public realm of Sri Lanka. Concluding to the fact, the streets, parks, civic spaces, and nature sensitive spaces were selected as the categories of urban public realm of Sri Lanka. The nature sensitive spaces were selected as one major category due to the abundance of marshes, wetlands, and the location of ocean in one stretch of urban Colombo. Unlike the other urban contexts, these natural areas have a major impact on the perception of the users in the context of Sri Lanka.

Method

This study is carried out for a long time (more than one year) with comprehensive steps to assure the best outcome of the developed framework. A series of qualitative data collections were done following a quantitative survey as the validation. The steps followed is shown below (Table 1) with objectives covered in each step.

Step 1	**Comprehensive Literature survey**	**Identification of the factors which leads to psychological safety and comfort of the urban users.**
Step 2	Stakeholder Meeting	Confirmation and verification of the identified factors. Exploration of additional knowledge on the issues related to perceived safety and comfort in the urban public realm of Sri Lanka.
Step 3	Identifying the attributes	Classification of the identified factors (in step 01 and 02) into codes (themes/ attributes) using comprehensive content analysis
Step 4	Expert focus group Discussion	Validation of the explored attributes
Step 5	Survey	Checking the practicality and importance of the developed attributes. Secondary validation through both experts and public

Table 1 –The steps followed in the exploration and validation of the attributes which impacts on the sense of safety and comfort of urban public spaces

Step 1 – Comprehensive Literature Survey

The relevant literature under the factors leading to the psychological safety and comfort of the urban users were referred and the data was recorded. This was done referring journal papers, reports, conference papers and many other relevant documents of trusted databases in the research domain in the discipline related to urban design, landscape architecture, Architecture, urban planning etc.

Step 2 – Stakeholder Meeting

The stakeholders of the reputed government/ non-government organizations gathered and discuss the current situation of the urban

public spaces of Sri Lanka. The explored factors in the step 1 were discussed with these stakeholders. The relevance of the explored factors to the Sri Lankan context were discussed comprehensively with these stakeholders. Apart from the explored factors, the stakeholders provided insights to the current condition in the country with respect to the safe use of the urbanites. Mainly practical aspects were discussed, and all the points were recorded, and these were used as raw data for step 03.

Step 3 – Identifying the main Attributes
The factors listed in the step 1 and step 2 were then categorized into themes/ attributes in this step. This was done following the process of content analysis. The factors were identified and then the initial coding was done with close reading of the data. Some factors with the similar meaning (from step 01 and 02) were combined whenever possible. The identified factors were assigned into themes. Later the themes were renamed as the main attributes and these attributes were then used for the assessment.

Step 4 – Expert focus group discussion
The finalised attributes were then presented to a panel of experts. This expert panel included architects, urban designers, landscape architects and many other with experience in working in Sri Lanka and many other countries. With the comments from this panel, the explored attributes were then modified and altered accordingly.

Step 5 – Survey
This is considered as the secondary validation of the developed attributes. The developed attributes were scored based on their importance with both the experts and the public for all four elements (streets, parks, civic spaces, and nature sensitive spaces) of the urban public realm. The experts in the fields of architecture, landscape architecture, urban designing, and urban planning of Sri Lanka are selected for the study through the snowball sampling method. Experts working in the field with more than 5 years of experience are considered for this exercise. The general public (mostly undergraduates related to design-based degrees) were selected through the convenience sampling. The data collection was conducted through a series of online focus group discussions. The authors

represented the explored attributes through a presentation and the attendees were asked to respond with the scores. A real time responses were obtained (based on the preference of the participants) or they were asked to submit the sheets within a particular time-period (2 weeks). The data collection was done through a customized excel sheet where all the necessary steps to be followed was comprehensively explained to the respondents in case the respondents couldn't make it to the online discussions. A total of 100 marks were asked to distribute to the seven attributes (discussed under results) under streets. The same procedure was repeated for the parks, civic spaces, and nature sensitive spaces. The differences between the parks, civic spaces and nature sensitive spaces were explained comprehensively along with the literature findings, to the respondents to have a better understanding of the context of urban public realm. The participants (both experts and general public) were asked to provide the scores for different urban public realm element considering the following aspects.

Streets – Assume an average street with both the built infrastructure and vegetation in the visual frames. Any typical segment of street as Galle Road or Baseline Road. Do not imagine areas with high percentage of vegetation or buildings. Assume a typical and well balanced (with both built mass and natural elements) street which is familiar to the participant.

Parks – Assume parks which are used for the recreational use of the urban users. Viharamahadevi, Crow island beach park, Beira Lake linear park, Diyatha uyana and other recreational based parks in the CMC area and nearby areas.

Civic Spaces – Although there are limited number of civic spaces in the country, this element should be considered as this is an vital element in the urban contexts. Existing Arcade independence square, Echelon square etc. should be considered in this aspect.

Nature sensitive spaces – Wellawatta beach, Galle face front, developed jogging tracks with marshes and wetland boundaries and other spaces catered for passive recreational functions.

The above description was communicated to the respondents to have a better insight of what is expected by the exercise.
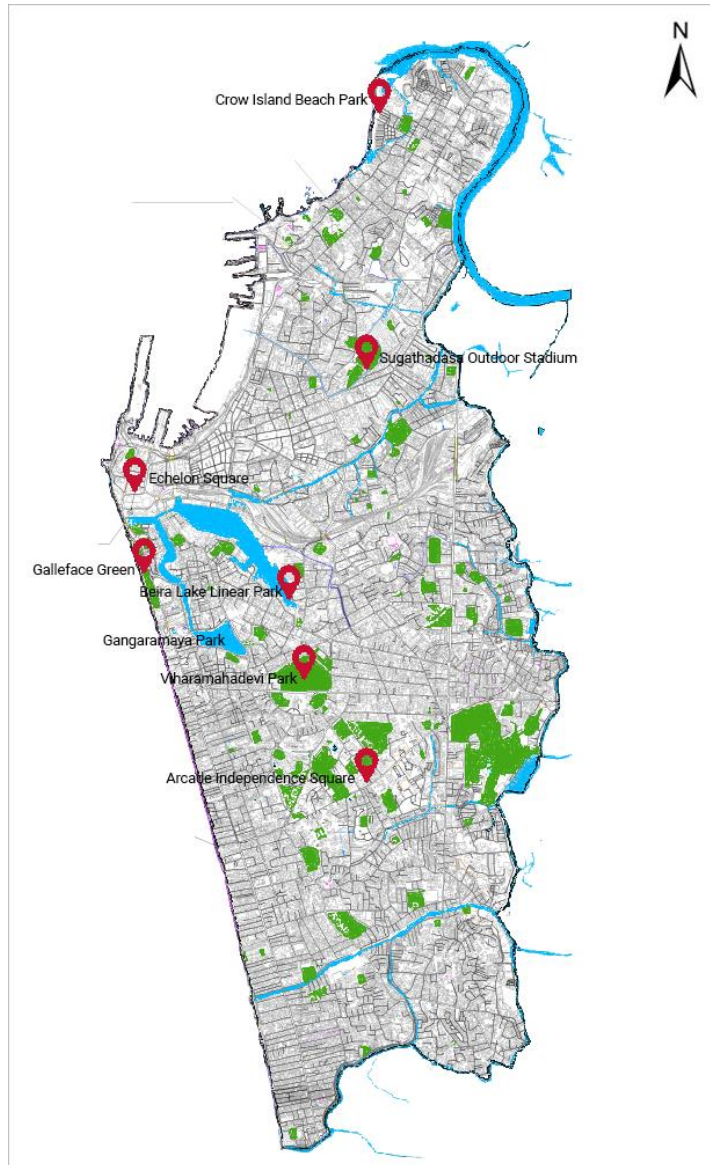
Figure 1: Some examples for the urban public realms in Colombo Municipal council area

Results and Discussion

The primary aim of this study is to compile a assessment framework with the explored variables which impacts on the sense of safety and comfort of the urban users. After a meticulous observation of the outputs of the literature survey and stakeholder meeting, the factors were finalised for the four selected urban realm elements (streets, parks, civic spaces and nature sensitive spaces). Under parks a

total of 58 factors were included, for streets and civic spaces 51 factors respectively were recorded while there were 48 factors under nature sensitive spaces. In the third step of the study these factors under each urban realm element were taken separately and categorized into the themes (later renamed as main attributes) using the process of content analysis. After carrying out this for all the selected urban public realm elements 7 main attributes were identified under each element. These seven attributes are namely, visual qualities, Spatial configurations, pleasurability/ attractiveness, inclusiveness, activities and imageability **(Figure 1).**
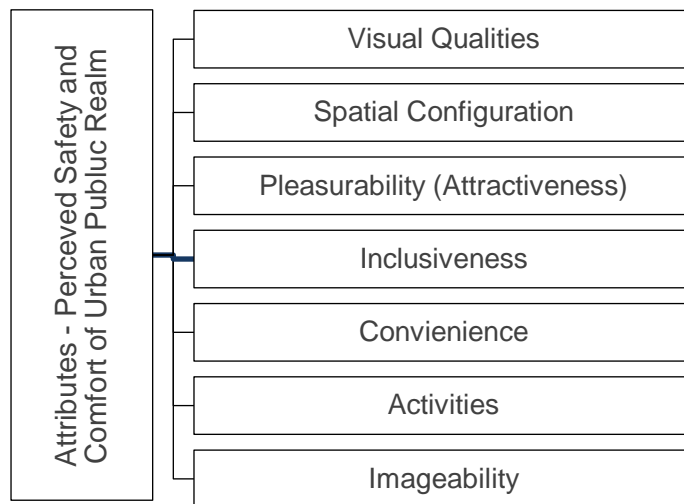

Figure 2: Developed attributes which impacts on the psychological safety and comfort in urban public realm

Visual Qualities

The attribute visual qualities assess the relationship between the human perception of safety with the qualities and aesthetics of the surrounding environment. Mostly the visual appeal of the space, patterns, rhythmic arrangements, visual density of the space, diversity of the visual frames and responsiveness of the elements to the context are mainly discussed and assessed under this attribute. The main basis for the factors listed under this main attribute is the 'Gestalt Psychology'. The Gestalt psychology proves that the unconscious human mind perceives visuals are a whole not as separate elements (Behrens, 1998). The basis of Gestalt Psychology has been used in many disciplines which mainly connects with the human as this theory summarizes the psychological aspects of the human. The repetition,

proportion, symmetry, colour, and contrast are being used by the designers like Architects, Landscape Architects, planners to enhance the quality of their design while making the spaces more user-friendly (O'Connor, 2013).

This pattern recognition is crucial in the perception of the environment as the process leads to detecting possible hazards enhancing the chance of survival (Mattson, 2014). Kaplan and Kaplan (1989) elaborates that the visual complexity of a landscape increases the opportunity of exploration for the users (R. Kaplan & Kaplan, 1989; Orzechowska-Szajda, 2014). More comprehensive studies on this aspect have explored that there is an inverted U shape with the preference and the complexity levels where the users preferred medium levels of complexity (Day, 1967; L. W. G. Kawshalya et al., 2022; Ode et al., 2008). The diversity of shapes of buildings as well as the softscape features like the diversity of vegetation were assessed in studies claiming the importance of these aspects in the perceived safety and comfort (Nasar, 1982; Stamps, 2003; Talbot & Kaplan, 1984). The rhythmic arrangements and order in the spaces using elements in the context which increases the readability of the spaces enhancing the safety and comfort (Sanoff, 1991). Similarly Berlyn (1974) forwards his theory of aesthetics and claims that human are happy with the medium levels of uncertainty and associated the visual complexity to the levels of uncertainty (Berlyne, 1974). Although these visual qualities are not directly experienced by the users, the unconscious mind of the urban users responds to these specific arrangements and the overall experience of a space has a great impact on these qualities.

Spatial configuration

The attribute spatial configuration assesses the sections of the visual and physical conditions of the spaces. The visual and physical connection between the spaces, the lighting levels of the spaces allowing the clear visual frames, the degree of visibility, openness and enclosure of the spaces and scale of the elements present in the surrounding. The factors under the attribute 'spatial configuration' is associated with many theories like Gestalt psychology, Information processing theory, permeability theory and prospect and refuge theory etc. (Appleton, 1984; Behrens, 1998; R. Kaplan & Kaplan, 1989; Stamps, 2005). The prospect and refuge theory and the permeability theory assess the perceptions of openness, enclosure and the spaciousness of

the spaces with respect to perceived safety of an individual (Ramanujam, 2007; Stamps, 2005). It is further documented that the spaces which allows to observe the surrounding environment without being noticed by the others is a crucial factor to perceive the surrounding with no anxiety or fear of danger (Dosen & Ostwald, 2016; Ramanujam, 2007).

Too much visibility to the surrounding will not be favourable for the user as the individual is exposed to the eyes of a possible perpetrator (Mahrous et al., 2018; van Rijswijk & Haans, 2018). Similarly, being too enclosed from the surrounding eyes will also be a risk as there will be no help in case of any possible danger (Jorgensen et al., 2007; Madge, 1997; Maruthaveeran & van den Bosh, 2015). Similarly, many studies have presented the importance of extended views and the enclosure, but the correct balance of prospect and refuge should be present for the ideal levels of sense of safety and comfort (L. W. G. Kawshalya & Dharmasena, 2019). The combinations and configurations of the elements in the urban context controls the view distance. This view depth is important as this provides more information on what is ahead of the walkway. With these information, the user can adjust themselves and take appropriate decisions, as whether to continue ahead or not (Anderson & Stokes, 1989; Schroeder & Anderson, 1984). The accessibility of the spaces is also considered to be of vital importance as this provides the escape routes in case of an emergency (Schroeder, 1982). This is important in the parks, civic spaces and other spaces catered for gathering. The users feel more secure when there is limited access (Andrews & Gatersleben, 2010). If any space is isolated without adequate level of visual access and lighting, then such spaces tend to be used for uncivilized activities causing sense of fear in the users (Yokohari et al., 2006). Unlike the daytime, the night-time lighting should be exclusively provided at the public gathering spaces. Inadequate lighting levels causes anxiety and increase possibility to encounter danger (Ratnayake, 2017). Furthermore, the scale or the proportion of the surrounding elements impacts directly on the perception of the users (Nasar, 1997). The relative scale is also important in psychological comfort in voids or open spaces. People feel more secure in relatively smaller areas with a cover overhead. Human feel more secure and comfortable in spaces where the surrounding elements are in a similar scale as of the size of

the human (Mehta, 2014). Many of these factors are vital in the perception as these factors determines the arrangement of a space.

Pleasurability/ attractiveness

The attribute pleasurability and attractiveness is based on the characteristics of the environment which provides happiness and pleasing visual frames to the users. The main attribute considers the presence of vegetation, water features, sky view, scenic backgrounds, pleasant scents and sounds along with the additional aesthetic elements. This attribute mainly considers aesthetic appeal to the sensory receptors while utilizing the urban public realm (Kaymaz, 2012). Some of the theories interwoven with the idea discussed under this attribute are place making theory, attention restoration theory, Biophilia hypothesis and sense of place (Burgess, 1979; S. Kaplan, 1995; Kellert & Wilson, 1993; Relph, 1976). The concept of Biophilia claims that human genetically is meant to be attracted towards the natural and living components. Similarly, the sense of place refers to the bond and the attachment of people in particular locations. The quality of urban green spaces or blue-green elements to restore the fatigue of the urbanites is being explained under the attention restoration theory (Tang et al., 2015). These all sums up the idea that the stimuli perceived through various elements of the surrounding environment provides the sensory experience of pleasure and attractiveness (Elsheshtawy, 1997; Porteous, 1996; Stamps, 1999).

The natural attraction of the human is being assessed with the presence of water features and the greenery in the considered urban public realm element. Similar to the open spaces, the presence of these blue-green components in the urban streets are of utmost importance to provide better environmental conditions and to enhance mental and physical health of the users (Kuo et al., 1998; Li & Yin, 2018). Similar to blue-green components, the visibility of the sky in the urban context is considered as an important spatial indicator in terms of outdoor thermal comfort perception (Zeng et al., 2018). The backgrounds of the visual frames across the urban areas are importance as the scenic and orderly backgrounds are pleasing to the eye of the user (Tveit et al., 2006; , 2021). Irrespective of the fact that, more than eighty percent of information of the surrounding space is grabbed through the visual senses, the auditory and olfactory senses are also of importance in perceiving the space. The stimuli are received mainly through these

three senses in the perception of space which ameliorates the perceived pleasure and interestingness of the urban public space (Kaymaz, 2012; Porteous, 1996).

Inclusiveness

The attribute inclusiveness implies the belongingness of an individual in a considered space assuring the safety and the comfortable uses of the space. The factors which assure the safety and comfort of the users with related to other users using the same space is assessed under this attribute. Surveillance in terms of natural and artificial aspects and other characteristics of the other users utilizing the space leading to the free use of public space is examined. The main concept or theory based in developing this is the concept of co-presence or 'eyes on street' first mentioned by Jane Jacobs in her influential book 'the death and life of American cities' (Jacobs, 1961). This concept illustrates that, more people in the same space will eventually lead to informal natural surveillance creating help in case of any danger (Ceccato, 2019).

Public spaces are a shared space for participation where people can express themselves regardless of their differences in age, gender, culture or societal status (Arefi & Nasser, 2021). The same intention of the public spaces has led to different conflicts and disparities between the groups of users. Incivilized behaviours like alcohol and drug use, mugging, sexual attacks, racial attacks and many more are witnessed by the users results in public spaces being perceived as unsafe spaces (Hung & Crompton, 2006; Madge, 1997; Mak & Jim, 2017). Due to these various reasons the natural surveillance is the best solution where there are a variety of users and there is help in case any incivility happens. The recent changes in the urban context related studies, proves that too much people in the space also causes unsafe surroundings (Hung & Crompton, 2006; Mak & Jim, 2017). This concept is more viable and practical in the urban streets. The 'eyes on the street' will be the vendors who frequent the space or shop owners in the adjacent façade of the sidewalk, three-wheel drivers, balconies open to street side and many more. Having more people is not sufficient to ensure the safety, the social trust is also needed to establish the safety and free use of the space. Presence of diverse users and presence of perceived trustworthiness with the co-users are essential in establishing the social trust (Hung & Crompton, 2006;

Westover, 1985). Apart from the natural surveillance, the presence of actual surveillance is also important in establishing the safety and comfort. This mainly applies for designated spaces like parks, plazas and squares where recreational based uses are implied (Fisher & May, 2009; Özgüner, 2011).

Convenience

This attribute considers the physiological and visual comfort in terms of the infrastructure present in the urban realm to provide the comfortable use of the space. The physiological comfort of the users directly impacts on the cognitive and physical conditions (Maslow, 1954). The presence of facilities for resting and enjoying the space are basically assessed under this attribute. The main theoretical foundation for this attribute is the concept of place making and sense of place (Burgess, 1979; Relph, 1976). The above theories defined in terms of urban designing and psychological aspects can described as 'a collection of feelings like attachment and satisfaction with a spatial setting' (Boros & Mahmoud, 2021; Stedman, 2002). Both these concepts are centred around the idea of making public spaces convenient, sociable and healthy for the use of the people. Human beings living in different climatic zones have been thriving to live through many challenging environmental conditions. Satisfying basic physiological needs against the environmental conditions, protection from natural elements and need for shelter. The satisfaction of these needs results in the accomplishment of cognitive and aesthetic needs (Maslow, 1954). The thermal and psychological comfort are entwined with each other in the experience of urban outdoor spaces (Peng et al., 2021).

Similar to the provision of comfort against the microclimate conditions, it is also important to provide physiologically comfortable setting for the convenience use of the space. The settings and infrastructure to rest, engage in activities, and to enjoy should also be provided to the users (Muderrisoglu & Demir, 2004; Schroeder & Anderson, 1984; Talbot & Kaplan, 1984). Similarly, cleanliness of the space is of utmost importance for the convenient use. With the diverse uses of these urban public spaces, it is more likely to be littered. But the proper cleaning of these spaces daily and the long term maintenance is important in psychological safety and comfort of the users (Kuo et al., 1998; Mahrous et al., 2018).

Activities

The attribute 'activities' primarily assess the behaviours of the people using the urban public realm which impacts directly on the sense of safety and comfort of the users. Presence of unique activities which promotes the gathering of people which does not imply any threats, visual access to these activities, the character of the adjacent building façade with respect to their activities are some factors assessed under this attribute. The safety and comfort from the incivility/ crime in daylight and night-time is also assessed under this attribute. The theoretical basis for the attribute 'activities' is constructed on the place making theory and the concept of 'eyes on street' by Jane Jacobs (Burgess, 1979; Jacobs, 1961). Both these constructs imply the importance of meaningful activities to create better urban public spaces.

Meaningful activities as a collective experience for a group of users will create the place meaning leading to the intended safety and comfort levels (Mehta, 2014). When compared with the deserted spaces, having activities intend the copresence or the 'eyes on street'. The presence of more people and their civilized behaviours engaging in meaningful activities will imply the presence of trustworthy individuals in case of an emergency (Burgess, 1979; Mehta, 2014). Similarly, the meaningfulness of the activities intends the level of sociability where the users can participate in the activities with no anxiety (Whyte, 1980). Permanent shop owners, temporary street vendors, balconies open to the street is listed as the strongest 'eyes on street' compared with a strangers gaze (Jacobs, 1961). Oldenburg (1989) suggests that the coffee shops, book stores, cafes, hair salons and other hangout spaces which are named as 'third place' are essential for the healthy existence of the urbanites (Oldenburg, 1989). This is the same concept of active facades where adjacent façades of the street are active with movements and activities. Studies in the discipline of phenomenology and behavioural sciences suggest that, the activities which fulfils daily needs for shopping, eating, entertainment and many more will encourage repeated visits to the environment creating sense of place and enhancing place attachment (Buttimer & Seamon, 1980). Streets, sidewalks, store fronts, alleys, parks and other 'public and ambiguously owned private spaces' tend to create 'collective-symbolic ownership' (Hester, 1984). The sociable aspects of the urban public spaces are the main aspects concerned under this attribute.

Imageability

The last attribute of Imageability assess the ability of a public space to create strong visual images making the space more distinguishable and memorable to the user. The visual weight of the visual frames, the contrast and focal points in the visual frames, the perceived image of the space are assessed with this attribute. The foundation to this attribute is with the theories, spirit of place, genius loci and vividness (Bell, 1999; Litton, 1969; Lynch, 1960). These can be a collective product of the whole landscape considered or its elements individually. The image of the city by Kevin Lynch (1960) is considered one of the most influential theories in spatial cognition and behavioural sciences (Filomena et al., 2019). Lynch states that people perceive and represent a city with external infrastructure and the quality of these provides a strong image to the observer. Lynch further argues that the level of imageability directly affects the psychologically satisfying cities (Sundilson, 2002).

The visual weight of a scenery is the collective perception of the scenery where certain elements presents high level of importance in terms of mass or contrast (Hansen, 2019). Composition of these elements to create high visual weight will result in chaotic looks making the eye bounce from element to element. These sceneries are perceived as uncomfortable by the users. High visual weight is a result of characteristics like high variety of colours, unusual forms and shapes, bright colours etc. where low visual weight is created through dull colours similar sizes, forms and shapes etc. (Hansen, 2019; Ode et al., 2008). The overall visual weight of a scenery is important in creating a coherent image of the space. Similarly, the presence of landmarks and special features are also important in providing a legible and coherent image of the city. Presemce pf iconic, unique or spectacular built features, softscape features are assessed as the landmarks (Coeterier, 2002; Hammitt et al., 2006). The overall perceived image of the space is also important in the assessment of level of imageability of the space. The perceived image of the spaces is profoundly bound with the nature or the character of the space (Westover, 1985).

Survey Results

The expert and public survey was carried out for the streets, parks, civic spaces, and nature sensitive spaces to assess the

importance of each attribute. A comprehensive course of focus group discussions with experts and the general public were arranged and the responses were collected for two more weeks after the sessions. A total of 88 responses were obtained from both the user groups. 35 Experts and 53 general-public responses were collected. When comprehensively analysing the responses, three numbers of responses from public were discarded due to incomplete scores and neglectful scores etc.

The overall scores of the experts and public were analysed as a whole for the four urban public spaces namely streets, parks, civic spaces and nature sensitive spaces. The results are presented in the figure 2.
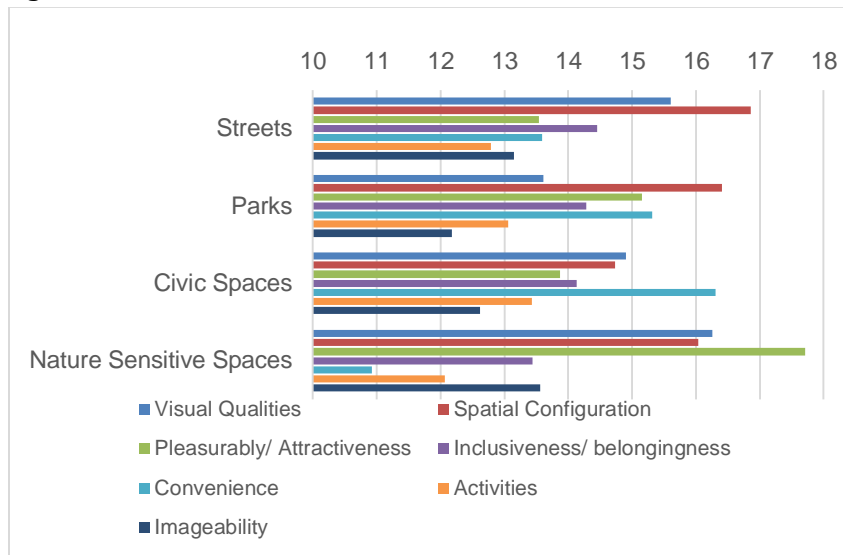

Fig. 3 – Importance of the explored attributes in each public realm element

The overall results for streets and parks depict that the spatial configuration is the most important in providing the sense of safety and comfort in streets and parks while convenience has been important in the civic spaces and the attractiveness in nature sensitive spaces. Spatial configuration, pleasurability, inclusiveness and convenience has been scored comparatively high illustrating the recreational use and the intended physical and mental comfort of the parks. Civic spaces are more of the convenience where people seek resting, gathering, and other sociable activities in the midst of the urban context. The convenience and activities were remarkably low in the case of nature sensitive spaces while the attractiveness, spatial configuration and

visual qualities has been scored high. This depicts that the nature sensitive spaces are more of the emotional bonding with the natural environment than the physical comfort or the different activities.

Further statistical analysis was carried out to inquire the differences of opinions between the experts and the public. SPSS statistical software was used for this exercise and the following results were produced **(Table 2)**. A series of independent sample t – tests were conducted to examine the difference between the responses of experts and the public for the importance of the explored attributes under the four different public realm elements in Sri Lanka. Equality of variance were assumed (p>0.05) or not (p<0.05) depending on the Levene's test and the results were annotated appropriately. The significance values of the t-test results (p<0.05) rejected the null hypothesis; there is no significance difference between the mean scores of experts and public. Hence concluded as there is a statistically significant difference between the scores of two groups and illustrated as a 'disagreement' between the groups.

	Streets	Parks	Civic Spaces	Nature Sensitive Spaces
Visual Qualities	Agree	Agree	Agree	Agree
Spatial Configuration	Agree	Agree	Disagree	Disagree
Pleasurably/ Attractiveness	Agree	Agree	Agree	Disagree
Inclusiveness/ belongingness	Disagree	Agree	Disagree	Disagree
Convenience	Agree	Disagree	Agree	Disagree
Activities	Agree	Agree	Agree	Agree
Imageability	Agree	Disagree	Disagree	Disagree
Agree – There is no statistically significant difference between the scores of experts and the public *Disagree – There is a statistically significant difference between the scores of experts and the public*				

Table 2 – Summary of the independent t-test results (the difference in the scores between experts and public)

In the case of streets public claims, a high importance for the attribute inclusiveness is demonstrated by public scores compared with the experts in the psychological safety and comfort. In the assessment of urban parks, public expresses a high importance for the convenience when compared with the experts and experts claim a high

importance in the imageability than the public. The public expresses high importance than experts for spatial configuration and inclusiveness in the assurance of perceived safety and comfort in urban civic spaces. Under the imageability of civic spaces, experts assert a high importance than the public. The scores under the nature sensitive spaces shows a significant difference between the two groups of experts and public. The public expresses high importance than experts in the impact from spatial configuration, pleasurability and inclusiveness of nature sensitive spaces where experts denote more importance in the convenience and imageability of nature sensitive areas for the assurance of perceived safety and comfort.

Conclusion

The concepts sense of belongingness, psychological safety and comfort are being retrofitting to the contemporary basic needs of a human being (Maslow, 1954; Steele, 1973). The congested city lifestyles, deterioration of urban greens and other factors have ameliorated the need for a safer and comfortable spaces in the urban areas. A significant proportion of these needs are being covered by the urban public spaces which are providing physical and mental relaxation for the urbanites (Francis, 2009). The common use of these urban public spaces has created many opportunities for shared facilities among the urban users from various status (Arefi & Nasser, 2021). This same reason has resulted in the anxiety and discomfort in the public usage with the tendency of uncivilized acts and movements (Fisher & May, 2009; Madge, 1997; Mak & Jim, 2017). This has resulted in many disadvantageous situations where the designed public spaces does not perform the intended enhancement in the quality of urban living (Mehta, 2014). The presence of actual threats and crimes directly impacts on this insecure feeling in the use of public spaces. But there are instances, where people feel nervous and anxious without a definite cause. This feeling of insecurity impacts for a range of reasons from the subjective exposures to many other impressions from the immediate environment (Maas et al., 2009). The subjective factors explore a vast range from the demographic features to the style of living of an individual. This huge variety of the factors has lead to many discoveries and comprehensive studies around the world (Cobbina et al., 2008; Fisher & May, 2009; Foster et al., 2012; Fox et al., 2009). However, these results are very context specific and can be repeated only in a

specific region or a group of users. In contrary, this study intends to develop a set of attributes which impacts directly on the sense of safety and comfort of the users of urban public spaces in Sri Lanka focusing on the tropical context.

The most urbanized city of Sri Lanka and the central business district of the country has been selected as the base study area. The features and characteristics of Colombo along with the comprehensive literature on the classification of urban public realm identified four main elements in the urban realm of Sri Lanka. These four elements are namely streets, parks, civic spaces and nature sensitive spaces. A five-step methodology was followed to develop the attributes which impacts on the psychological safety and comfort of the users of Sri Lanka. A comprehensive literature study explored the factors frequently discussed in the studies from all over the world. A stakeholder meeting confirmed and verified these factors in the context of Sri Lanka and many more modifications were made to the list in this step. Then through a detailed content analysis, 7 attributes were developed. These were reconfirmed for the applicability in the general and context specific applications with an expert focus group discussions. A final survey was carried out for the further validation of the explored attributes for the four urban realm elements (streets, parks, civic spaces, and nature sensitive spaces). The first four steps of the study concluded seven main attributes under the assessment of perceived safety and comfort of urban public realm of Sri Lanka namely, visual qualities, spatial configurations, pleasurability/ attractiveness, inclusiveness, convenience, activities and imageability. The visual qualities assess the visual aesthetics of the space in terms of arrangements, patterns, and diversity. The spatial configuration asses the connectivity between the spaces and the other characteristics like scale, visibility, openness and enclosure etc. Pleasurability and attractiveness focus on the elements and qualities of the environment which pleases the senses of the users. The inclusiveness in mainly catered for the concept 'eyes on street' where the presence and the inherent characteristics of the co-users of the space are assessed. Convenience assesses the physical factors which assures the comfortable use in terms of the comfort from thermal conditions, maintenance and other facilities. Activities assures the safety and comfort from the appropriateness of activities and behaviours of the co-users in the vicinity of the urban space. The final attribute of

imageability assess the ability of the urban public spaces to create strong visual images to make the space memorable to the user. The framework developed based on these explored attributes summarized the objective factors which impacts on the sense of safety and comfort of the users in Sri Lankan context. These seven attributes were later surveyed for its practicality with the experts and the general public. A total of 85 responses were selected for the analysis. The comparison of the mean scores presented different perspectives for the four different urban realm elements. The visual and spatial qualities are of major importance in streets following the inclusiveness. The parks oriented for the spatial configurations, pleasurability and the convenience of the users when assuring the sense of safety. In contrast the civic spaces were more focussed on convenience along with visual and spatial qualities. Nature sensitive spaces cared more about attractiveness and pleasurability with its lush green and blues following the assurance of perceived safety with spatial and visual qualities. The independent sample t-test carried out for the seven attributes across the urban realm elements showed that; the importance scores for nature sensitive attributes had a significant difference across the two groups experts and public when compared with the other urban realm elements. The attributes explored through this exercise were analysed as important across all four public realm elements depicting the importance of the attributes in assuring the psychological safety and comfort for the users. The importance of each attribute in different urban realm element (streets, parks, civic spaces and nature sensitive spaces) is different based on the overall scores.

The current literature has explored a limited number of studies in the perception of feelings of the users in urban contexts. Although the facts are there the scientific exploration is limited in the disciplines of social sciences, perception, and behaviour-based studies. The users of urban public realm should assure their safety and comfort for these spaces to be liveable and convivial. Thus, further exploration of these facts based on the contexts are advised for the evolution of more refined frameworks. The outcomes can be utilized in the present modifications and the future designing of the urban public spaces.

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