

The Impact of Pedestrian Experience on the Legibility of the City. -A Case Study of Kurunegala.

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Abstract

Many Sri Lankan cities are expanding rapidly, yet their spatial structures often fail to support intuitive navigation and user-friendly walkability. In Kurunegala, despite its rich cultural heritage and iconic landmarks, the disconnection between built form and pedestrian movement has led to fragmented urban experiences. The core problem lies in the lack of visual and spatial legibility that enables people to easily read, interpret, and move through the city. Urban legibility is an important factor in determining how pedestrians make sense of and navigate through urban environments. Drawing upon Kevin Lynch's writing on imageability of cities and Leon Krier's theories on city planning, this study identifies critical elements that facilitate urban legibility: that is, street patterns, districts, edges, and landmarks, and their synergistic effect on navigating and orienting within the urban space. Based on Lynch's theories of mental mapping, this research emphasizes the importance of recognizing the inherent urban features, both natural and cultural, that shape the imageability of Kurunegala. This study investigates how pedestrian experiences shape the legibility of Kurunegala city by analyzing the interplay between urban design elements, spatial organization, and wayfinding behavior. Using Kevin Lynch's imageability framework, five elements — paths, edges, districts, nodes, and landmarks — were analyzed. Data collection involved 40 cognitive map sketches, interviews, field observations, and photographic documentation along key pedestrian routes. Data analysis included thematic coding, sketch interpretation, and mapping to compare perceived and actual spatial features. Findings revealed that major landmarks such as Athugala and Kurunegala Lake are underutilized in wayfinding. Instead, people rely on commercial signage and junction forms. The study highlights the importance of improving landmark visibility and incorporating clearer directional cues using inherent natural and cultural features at decision points for an enriched legibility of a city.

Keywords: Urban Mobility, Public Space, Cultural Continuity, Context-Sensitive Design, Main Street Revitalization, Sri Lanka

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Introduction

The ability of people to easily navigate and understand a city's spatial arrangement, or urban legibility, is a critical component of urban design. Legibility in urban environments refers to how easily individuals can navigate and understand the layout of a city. As per Lynch (1960), a city's legibility achieved through its inherent urban features enhances its imageability and makes it memorable. Kurunegala, a prominent city in Sri Lanka, has a unique blend of historical significance, cultural richness, and modern development. The research questions, if its inherent historical and cultural richness contributes to the city's legibility. To understand that, this study investigates the impact of pedestrian experience on the legibility of Kurunegala, a city that balances historical significance with modern development. It analyzes whether Kurunegala can be classified as a "wayfinding city" which means a system that helps people in orienting and navigating in an urban setting. Visual cues such as, signs, landmarks, and other prominent elements are used in cities to let people know where they are, where they're heading, how to get there, how to know when they are there, and how to find their way out. Some examples of wayfinding systems are, visual signals, multimodal information, pedestrian viewpoints, maps and signs, and inclusive signage. The aim of this paper is to investigate how walking experience impacts the legibility of the city of Kurunegala. It attempts to identify influential urban components that contribute towards wayfinding to gain insights that can be transferred to other Sri Lankan cities.

Traditional theories of urban planning, for an example Kevin Lynch (1960), highlight the value of landmarks and precise spatial organization for better readability of a city. But the rapidly increasing rate of urbanization sometimes disregards such concepts. Therefore, it is important to understand the effectiveness of such theories in today's urban context and how that affects the pedestrian experience of a city. To explore the above, this study;

- Identifies the factors that affect the legibility in urban environments.
- Analyzes the physical elements contributing to the legibility of Kurunegala city.
- Examine how pedestrian experience is influenced by urban design elements.
- Identifies the relationship between pedestrian behavior and the readability of urban spaces.
- Explores the factors of landmarks that contribute towards the legibility of the city.

The findings will contribute towards designing more legible mid-sized cities in Sri Lanka with enhanced imageability.

Spatial knowledge and Human mind

Cognition involves different experiences like observing, feeling, memorizing, perceiving, deciding and any other mental actions (Gold, 1980, p. 20). These cognitive processes together influence how people perceive, interpret, and respond to their environment. Observing refers to taking in sensory information, whereas experiencing refers to the emotional responses associated with those observations. Memorizing and seeing enables people to store and interpret spatial data, resulting in mental maps that facilitate navigation. Decision-making allows for action based on these cognitive inputs, which guides wayfinding and navigation behaviors. This multifaceted approach of cognition is critical to understanding how people construct mental representations of urban settings and use them for navigating.

In general terms, cognition can be viewed as a shared system among humans, animals, and intelligent machines, encompassing abilities such as thinking, perception, imagination, sense-making, and problem-solving. For humans specifically, the brain and the body's nervous system work together to interpret and understand the surrounding social and physical environments (Montello, 2001, p. 14771)

Maps serve as wayfinding tools that assist individuals in understanding and recalling their surroundings. Without these navigational aids, humans and other animals rely on their stored environmental knowledge—referred to as their 'cognitive map'—to navigate (Golledge, 1999, p. xi)

Urban Context and Legibility

Lynch, 1960 explained that the place which is vivid and integrated with physical environment can be identified, organized and navigated by people with ease. In an urban context, it can be regarded as an important indicator of city quality. Legibility can be detected and developed in an urban context through activity patterns and physical form. According to that, it is critical to generate a clear form in a context as well as maintain a good user pattern because both the physical form and the user pattern together serve to establish legibility in a context (Bentley, 1985).

Additionally, Bentley (1985) cited the nature of typical urban landscapes in the pre-twentieth-century period and emphasized how urban design was done in such a manner that legibility was upheld. He advocated that this principle was paramount while designing coherent and orderly cities.

With time, cities change in ways that affect how users perceive movement within cities. Thus, mobility design patterns need to reflect architectural language and style of structures as well, while maintaining certain basics such as identity and human-city relationship (Behzadfar & Saneei, 2012).

Legibility through Building Language

In "Townscape," Cullen (1961) explores the notion that the arrangement, design, and visual characteristics of buildings collectively communicate a language that shapes the urban experience. His investigations extend into ways buildings and additional components of the built environment convey details regarding a place's history, function and character, emphasizing the visual cues and architectural aspects that are integral to a city's overall look and identity.

Wayfinding

Wayfinding is defined as the process by which individuals find their way to a target without experiencing undue worry. It is closely associated with spatial orientation, which allows people to place themselves within mental representations of the environment. (Peponis et al., 1990)

Wayfinding is a complex process that involves the interplay of various factors such as the spatial structure of the built environment, the cognitive maps that users construct, and the strategies and spatial abilities of the building's users (Carlson et al., 2010).

For way finders to properly navigate without getting lost, they must be able to recognize locations and scenarios as well as identify environmental elements. Place identification might be based on spoken instructions or maps, or it can be based on prior experience. Geographical cues, like the

arrangement of buildings or the form of a road grid, or feature cues, such as unique landmarks or clusters of landmarks, can be used to identify scenes or locations. Numerous investigations have shown the importance of landmarks in navigating, particularly around choice points like crossroads

Legibility as a Foundation for Wayfinding

In "The image of the city," Lynch (1960) explores the role of environmental psychology in understanding how people interact with and interpret their surroundings for navigation.

The elements Lynch defines create spatial information for direction finding and legibility. Legibility is designed with spatial guidance tools that are integrated into the perception and definition process of cities. Spatial direction tools: with the elements Kevin Lynch has defined, can be listed as follows:

- Legibility of circulating arteries
- Focal points
- Definable areas, squares
- Accessories, materials, colors, textures, lighting
- Creating spaces with identity.

Rapoport (1982) critiques Lynch's elements and their universal applicability. He argues that legibility and wayfinding are also influenced by the individual's cultural background, personal experience and social meaning and not only the built form. For example, what is legible for a local may not be the same for a tourist.

When individuals re-enact past wayfinding experiences, they use a hierarchical decision structure to organize behaviors and specific environmental information into a sequential, route-based format. Although this hierarchical structure ideally supports memory, various factors—such as an individual's attitude towards the destination, known as valence, can introduce metric distortions (Briggs, 1973; Golledge and Zannaras, 1973).

Direction-finding enables individuals to reach their destinations efficiently, without unnecessary delays or stress. This concept relies on "spatial orientation," where individuals mentally position themselves within their internal representations of the environment (Sönmez & Önder, 2015).

Readable Environments and Legibility

One of the most influential concepts in advancing direction-finding and related research is legibility. Direction-finding is viewed as a characteristic of readable environments that offer essential environmental information to facilitate direction-finding behavior and allow individuals to comprehend and interpret this knowledge effectively.

It is simpler to move about and find your way around the environment when it is created with distinct and well-defined elements. People can more effectively reach their targets if they understand these specified components. (Sönmez & Önder, 2015, cited from Passini, 1984, 1996). We perceive our surroundings and position ourselves by asking questions such as "Where am I,

where am I going, and how do I get there?” Consequently, legibility and direction-finding are interrelated concepts.

The Role of Urban Quarters in Enhancing Legibility and Wayfinding

By reducing the need for lengthy travel, urban areas created using ecological urban planning principles intend to lessen the environmental impact of city living. This strategy aims to incorporate necessary daily tasks within walking distances, improving the quality of life for locals and promoting sustainability. By looking at important elements including size and layout, shape and organization, street network, and boundaries, Lyon Krier (2009) investigates the form and structure of urban quarters under four different factors.

1. Size and Layout

By concentrating on residential, commercial, educational, and recreational areas within a short walking distance of one another, ecological urban planning aims to reduce the number of kilometers of travel per person. An ideal urban quarter, according to research, should be a small area that is 500–600 meters in circumference, spans 75–100 acres, and is capable of hosting up to 10,000 people. This small size encourages physical activity and lessens dependency on cars by making all daily necessities within a 10-minute walk. Researchers contend that by creating a tight-knit community structure, these size restrictions not only increase accessibility but also promote social cohesiveness (Krier, L. 2009).

2. Form and Structure

The layout and design of urban quarters have a significant impact on their usability and sense of place. Compact, rounded layouts, often based on grid patterns or variations, are ideal for increasing visual coherence and walkability. A hierarchical roadway and square structure with more development toward the center fosters a sense of centrality. Smaller blocks and more street corners encourage interaction, directions, and a range of uses, creating a vibrant urban fabric. Additionally, research indicates that this type of structure fosters both urban density and a sense of community by striking a balance between public and private spaces for useful social interaction. (Krier, L. 2009).

3. Network of Streets

Navigability and urban legibility depend on a well-connected street network. The neighborhood is easier for locals to navigate thanks to street designs that include T-junctions, crossroads, and few cul-de-sacs. In certain topographical circumstances, one-way streets and cul-de-sacs are incorporated into ecological designs; nevertheless, these are the exception rather than the rule. According to studies, minimizing cul-de-sacs and dead ends creates a more permeable, walkable urban environment, which is essential for accessibility and cutting down on travel times. (Krier, L. 2009).

4. Boundaries

Defined borders, whether man-made or natural, are essential for defining urban areas and strengthening their sense of identity. Boulevards, rivers, parks, and promenades are examples of elements that serve as both practical and aesthetic borders, encouraging linkages to the surrounding environment while offering green space and recreational options. The distinctive character of the area is emphasized, and a memorable skyline is produced by preserving and integrating the natural topography into the urban form. According to research, clearly defined boundaries provide each quarter with a unique identity within the broader urban setting and support people's feelings of belonging and participation. (Krier, L. 2009).

The literature highlights the important role of urban legibility in pedestrian experience, particularly for wayfinding. Kevin Lynch (1960) introduces five key elements, paths, edges, districts, nodes and landmarks that contribute to a city's imageability and navigability. Further to this, the Lyon Krier's (2009) 10-minute approach emphasizes accessibility and movement within urban areas. Rapoport (1982) on the other hand, emphasizes that legibility of a city could differ based on personal experiences. Building on the existing literature, this research considers street networks, sectors, edges and landmarks as main contributing factors that contribute towards pedestrian navigation and urban engagement. For a more in-depth understanding of the legibility, it explores the pedestrian experience using two user categories: local and visitor.

Understanding which type of built elements contribute most to wayfinding could help urban designers and architects create effective visual cues, enhance landmark visibility and highlight inherent natural and cultural elements at key decision points to improve city's legibility.

Methodology

The study focuses on identifying and assessing urban elements such as landmarks, paths, edges, districts, and nodes. These components, as outlined in Kevin Lynch's theory of urban legibility, will be studied to understand how they define the city's layout and assist pedestrians in navigating through the urban environment. Based on the outcomes, the physical elements contributing to the legibility of Kurunegala city will be analyzed.

This research aims to explore how design factors like the availability of walkable pathways, street connectivity, accessibility, safety, and the overall aesthetic appeal of public spaces affect the way pedestrians experience and interact with the city. This involves observing and analyzing pedestrian patterns including their movement, decision-making processes, and how they interpret visual cues in the urban fabric. The goal is to understand how these behaviors impact or are impacted by the city's legibility.

Three primary methods are used to gather data: cognitive mapping, interviews, and participant photography. These methods are carefully chosen to explore how pedestrians experience and interpret the legibility of Kurunegala city, providing a mix of visual, verbal, and spatial insights.

Selecting participants is a fundamental aspect of this study, as their experiences and perceptions are critical for understanding the impact of pedestrian experience on the legibility of Kurunegala city. Since legibility and pedestrian experience are influenced by both short-term interactions and long-term emotional connections with the urban environment, it is essential to involve a diverse group of participants.

In qualitative research, the sample size depends on factors such as the study's objectives, the depth of information required, and the resources available. For this study, achieving data saturation point at which no new themes or insights emerges, is taken as a key determinant of the sample size. For example, after conducting surveys and cognitive mapping with 20 participants, if no new viewpoints or themes are identified, it will be considered that data saturation has been reached.

A theoretical framework is created taking into consideration Kevin Lynch's and Lyon Keier's concepts about legibility of a city. The following framework is used in the analysis and discussion of cognitive maps, interviews and photographs (figure no.1 & table no.1)

This research considers three main pedestrian routes in the city centre of Kurunegala connecting three main public nodes to the primary public node, which is the city bus stand. These three routes were selected as the most commonly and regularly used pedestrian routes by a large number of pedestrians. The three routes also had a significant length and went across the city, thus making them best examples to evaluate the wayfinding through the city. However, the results could be affected by temporal variations, sample size, and limited variety of routes. It could be extended in further research to include varying times and larger variety of routes.

Methodological framework

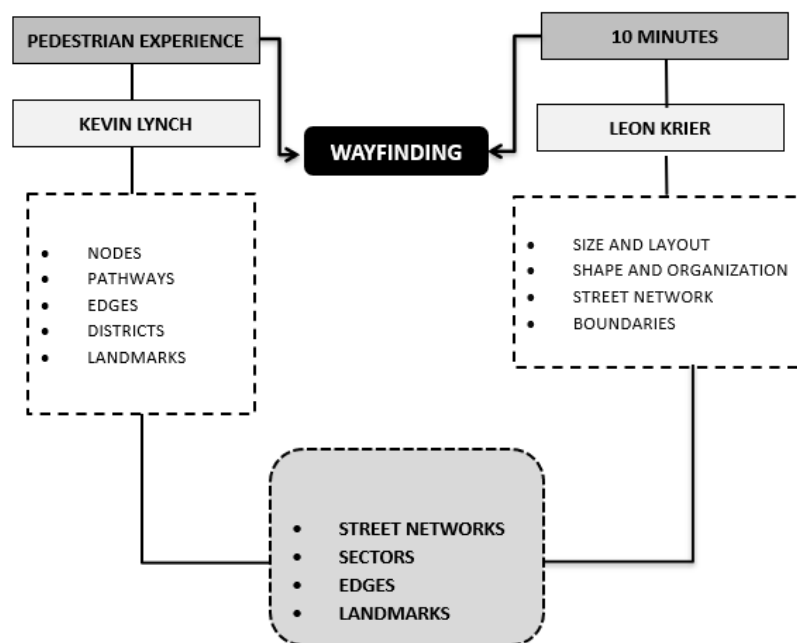


Fig. 1: Theoretical Framework-Source: author

Table 3: Leon Krier's and Lynch's wayfinding parameters by author

<u>Parameter</u>	<u>Criteria</u>	<u>Description</u>
Street networks	Pathways	• Main pedestrian roots that link the most key areas of the city
	By roads	• Minor roads that function as alternative routes
	Short cuts	• Unofficial ways that offer faster access
	Nodes	• Points where several ways intersect
Sectors	Commercial types	• Active commercial districts with shops and markets
	Residential	• Residential neighborhoods that add character to the city.
Edges	Boundaries	• Dividing lines between zones, like walls or fences.
	Natural forms	• Features such as lakes or hills, which guide movement.
	Physical forms	• Man-made barriers like railways or bridges
Landmarks	Scale	• The size and prominent <u>a landmark</u> is in visibility.
	Natural elements	• Distinctive features like rocks or lakes
	Signage	• Boards and signs that assist navigation
	Shape	• Forms that make up a landmark recognizable

Selection of the study area



Fig.2: Kurunegala District

Source: UDA development plan

Kurunegala is a fast-growing urban city in Sri Lanka, representing a combination of historical, cultural, and modern urban elements, making this location very suitable for studying the relationship between pedestrian experience and urban legibility. The place is surrounded by prominent natural landmarks as Athugala (Elephant Rock) to the south, the large Kurunegala Lake to the east, and fertile agricultural areas to the north and west. Known for its historical and cultural value, Kurunegala also acts as a gateway to old capitals such as Yapahuwa and Dambadeniya.

Conducting the study

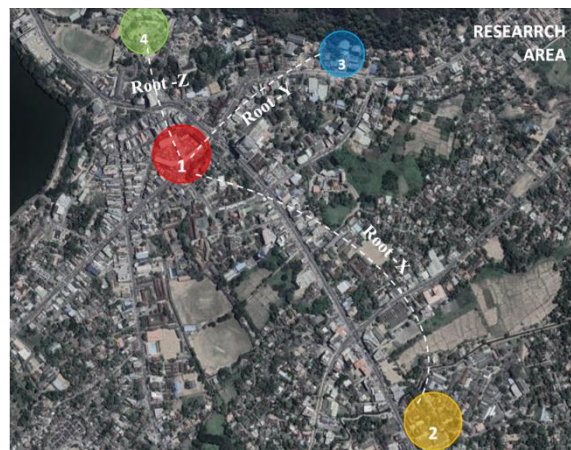


Fig. 3: Research area -Reference places

Source: author

The study area mainly focuses on the city center. Four main service areas were selected to identify the main routes that are frequently used by pedestrians in the city. The selected areas are, Bus stand (1), Hospital (2), Administrative center (4) and Tution class hub (3), since all these 4 are prominent services provided by the Kurunegala town as a District center. Furthermore, these service nodes are located near the 4 main arteries in Kurunegala town. For the study, three main routes are identified as below.

- Root X-Bus stand to Hospital
- Root Y-Bus stand to Tution classes
- Root Z-Bus stand to Administrative area (Fig.3)

For each route, 20 participants were used which included 10 familiar (local) and 10 unfamiliar (visitor). Familiar participants are the ones who are residents of Kurunegala and/or frequently visit the city and familiar with the city's context. Unfamiliar participants are the visitors to Kurunegala city and unfamiliar with its context.

At the beginning of the study, several questions were asked from the participants regarding their age, gender, occupation, and the amount of time they spent in connection with the Kurunegala town. Then all participants were instructed to select the place they want to go starting from the bus stand. They were instructed to find the root for selected places without using google maps. In addition, they can ask about the root from anyone for wayfinding. When they walk along that chosen route, they were instructed to capture photos of the most memorable and attractive elements during

their journey. At the end of the journey, they were asked to draw a cognitive map or narrate the road from their perspective.

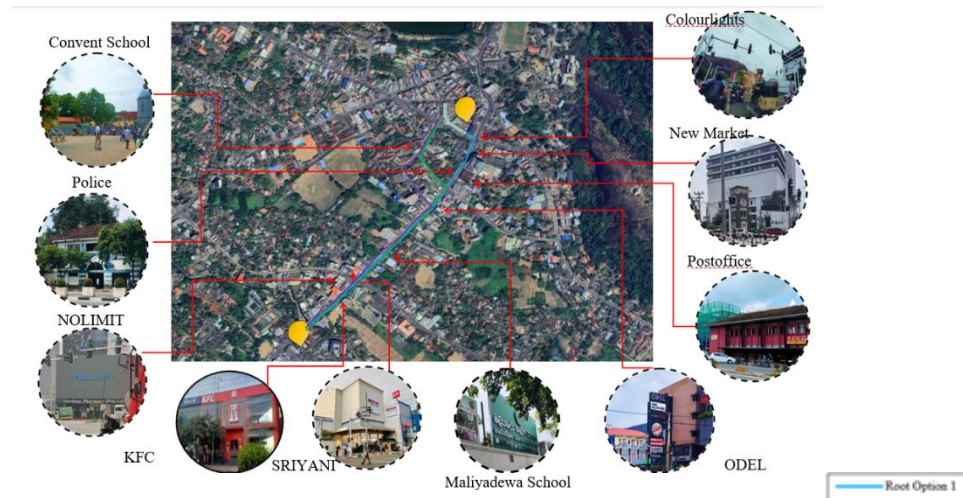


Fig. 4: Most captured elements in Root X by Unfamiliar group, Google Earth image, Edited by Author

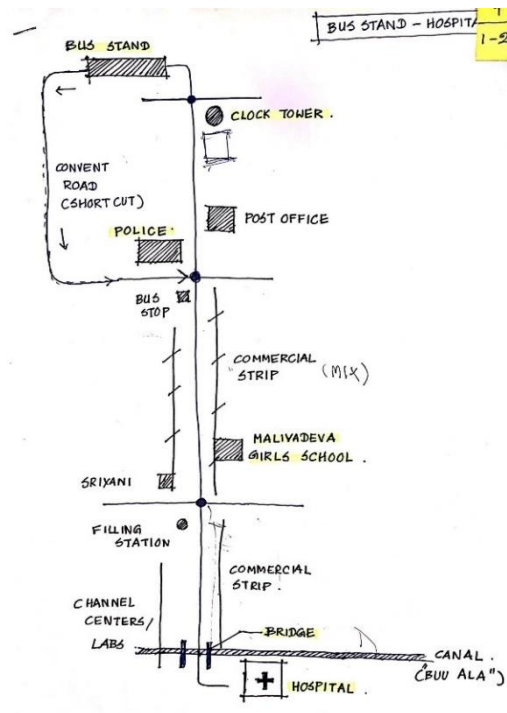


Fig. 5: Sample Cognitive Map of Participant A (Unfamiliar participant)

Source: author

Regular commuters on the Route X (Bus Stand to Hospital) named some of the easily recognizable features like Clock Tower, BOC Building, and St. Anne's Church. These are landmarks that are visually different and are historically or functionally relevant in the environment and are central to their mental representations. Commercial areas such as KFC, Nolimit, and ODEL were often recorded, showing that these were not only important commercial areas but also distinct features which can be easily remembered when looking for directions. These observations demonstrate that well-traveled participants rely on landmarks, commercial areas, and structures as the means of developing a more complex knowledge of the route in the city where they regularly travel. This finding underlines the need to make decisions in urban planning with respect to maximizing visibility for easily recognizable objects, such as landmarks, and functionality regarding infrastructure and commercially active areas that would enhance legibility in the city.

Sample of Root X-Bus stand to Hospital by familiar & unfamiliar participants- (Findings of Cognitive Mapping and Photo Elicitation)

Table 2.1: Root X (1-2) -Bus stand to Hospital by Unfamiliar participants

Participant	Street Networks										Sectors			
	Pathways	Mind map	Photo E:	Byroads	Mind map	Photo E:	Shortcuts	Nodes	Mind map	Photo E:	Commercial	Mind map	Photo E:	Residential
A				✓	✓			✓	✓		✓	✓		
B				✓	✓			✓	✓		✓	✓		
C				✓	✓			✓	✓					
D				✓	✓		✓	✓	✓		✓	✓		
E				✓		✓	✓	✓	✓	✓				
F	✓	✓	✓	✓	✓			✓	✓					
G				✓	✓			✓	✓	✓				
H				✓	✓			✓	✓					
I				✓	✓			✓	✓					
J				✓	✓			✓	✓	✓				
Total	1			10			2	10			3			0

Table 2.2: Root X (1-2) -Bus stand to Hospital by Unfamiliar participants

Participant	Edges										Landmarks									
	Boundaries	Natural features	Mind map	Photo E:	Physical features	Mind map	Photo E:	Scale	Mind map	Photo E:	Natural elements	Mind map	Photo E:	Signage	Mind map	Photo E:	Shape	Mind map	Photo E:	
A		✓	✓					✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
B		✓	✓					✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
C					✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
D											✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
E								✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
F								✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
G					✓	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
H								✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
I		✓	✓	✓				✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
J					✓	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Total	0	3			3			6			8			10			7			

Table 3.1: Root X (1-2) -Bus stand to Hospital by Familiar participants

Participant	Street Networks												Sectors			
	Pathways	Mind map	Photo E:	Byroads	Mind map	Photo E:	Shortcuts	Mind map	Photo E:	Nodes	Mind map	Photo E:	Commercial	Mind map	Photo E:	Residential
A	✓	✓		✓	✓					✓	✓		✓	✓		
B	✓	✓	✓				✓	✓		✓	✓		✓	✓		
C	✓	✓		✓	✓	✓				✓	✓	✓				
D	✓	✓		✓	✓		✓	✓		✓	✓	✓	✓	✓	✓	
E	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓				
F				✓	✓					✓	✓					
G	✓	✓		✓	✓		✓	✓		✓	✓	✓				
H	✓	✓		✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	
I	✓	✓	✓	✓	✓		✓	✓		✓	✓		✓	✓		
J	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓				
Total	9			9			8			10			7			0

Table 3.2: Root X (1-2) -Bus stand to Hospital by Familiar participants

Participants	Edges							Landmarks									
	Boundaries	Mind map	Photo E:	Natural forms	Physical forms	Mind map	Photo E:	Scale	Mind map	Photo E:	Natural elements	Signage	Mind map	Photo E:	Shape	Mind map	Photo E:
A								✓			✓	✓	✓	✓	✓		
B					✓	✓		✓		✓	✓	✓	✓	✓	✓		
C								✓		✓		✓	✓	✓	✓		
D					✓	✓	✓					✓	✓	✓	✓	✓	
E								✓		✓	✓	✓	✓	✓	✓		✓
F	✓	✓						✓		✓	✓	✓	✓	✓	✓		✓
G								✓		✓		✓	✓	✓	✓		✓
H	✓	✓						✓		✓		✓	✓	✓	✓		✓
I								✓		✓		✓	✓	✓	✓		✓
J					✓	✓		✓		✓		✓	✓	✓	✓		✓
Total	2			0	3	✓		9			3	10			8		

These Root X tables emphasize how the familiar participants and the unfamiliar participants responded to different parameters. Under the street network parameter, most of the familiar participants identified the shortcuts, pathways and the by-roads and the nodes as well. Most of them marked those criteria in the cognitive maps. But most of the unfamiliar participants could identify only the main by-roads and the nodes. As an example, most of them mentioned the color lights. In the sectors group, both participants identified the commercial sector. Because most of the shops are located along the hospital road and they noted that.

In this root, edges as physical and natural boundaries are minimal, indicating weaker edge definitions. This could contribute to a lack of spatial containment or distinct urban zones. Under the landmark parameter, they identified signages and the shapes as the most influential landmarks. Unfamiliar participants mostly caught the natural elements under the landmark category. These elements act as vital visual anchors, enhancing wayfinding and reinforcing the city's identity.

Radar Chart: Familiar Participant Identification Across Routes.

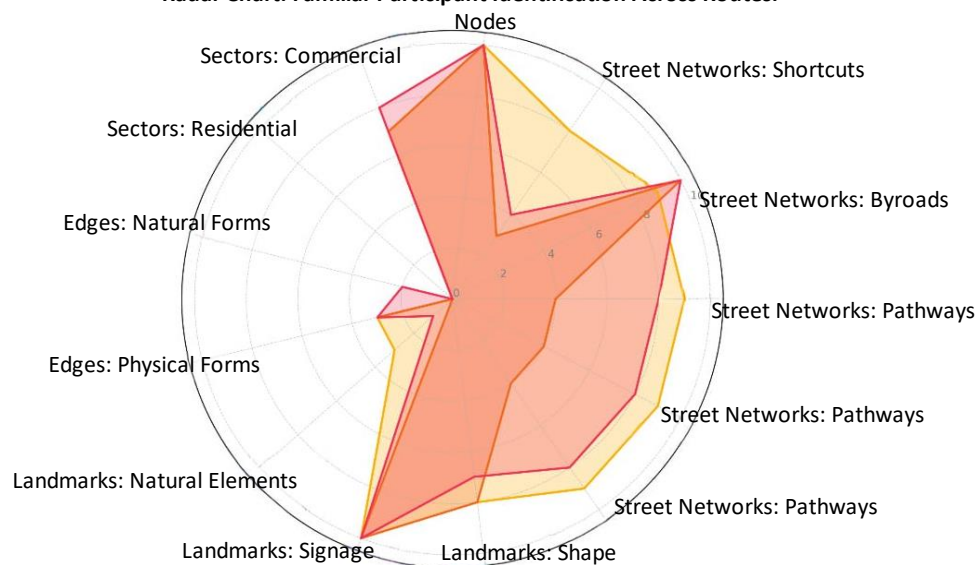


Fig. 6: Familiar Participant identification Across Roots

Source: author

This radar graph summarizes all the diverse city features that affect the feel and orientation of Kurunegala when approaching from three different directions. This chart shows the results of roots identification of familiar participants. Pathways and byroads were cited most frequently as street networks were identified as the most frequently mentioned features in relation to the legibility of urban space. The nodes' contribution to the well-known routes was uniform across all the networks, although the shortcuts' prominence varied with the routes. The commercial areas

mentioned most often were very low in identification, suggesting little contact with these sectors in residential areas. Regarding edges, physical forms were recognized at a moderate level, and Natural forms were almost absent. Signages and shapes were more important in navigation compared to the limited use of natural features for direction. Some of these aspects identified in this study provide a basis for designing, a less complex and more legible street pattern, improved landmark recognition and physical boundaries for the street network of cities.

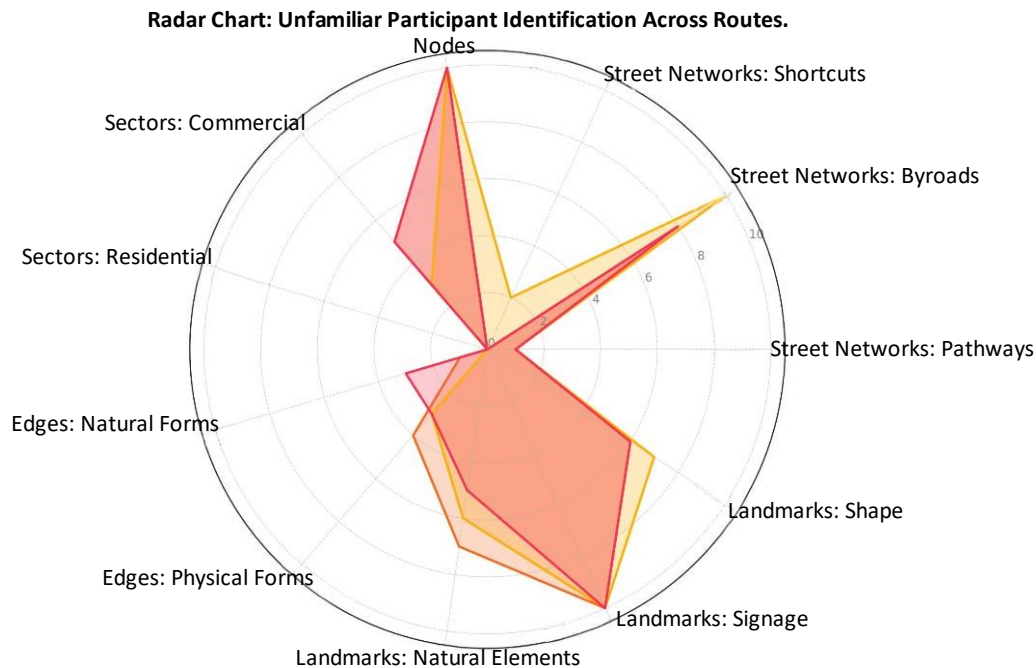


Fig. 7: Unfamiliar Participant identification Across Routes

Source: author

This is supported by the radar chart that depicts the urban elements that were mentioned by unfamiliar participants along the three routes (the network analysis also reveals that travelers depend on well-developed signaling tools). The Byroads and Nodes emerged as the most identified features of the city, implying the centrality of their function in improving the spatial awareness for people who are less familiar with the city. In contrast, Pathways and Shortcuts were less often identified, which indicates that these features are not being used by strangers and new users. Commercial was moderately familiar while Residential was almost unknown, which suggested that it was not useful to them in navigating the site. The Physical forms (walls, boundaries) were identified moderately while Natural forms were identified rarely. Specific features, particularly Signage and Shapes were acknowledged multiple times to a greater extent, highlighting their importance as reference points. This implies that new participants give much attention to organized waterfronts and structured road layouts that are used as landmarks rather than natural features.

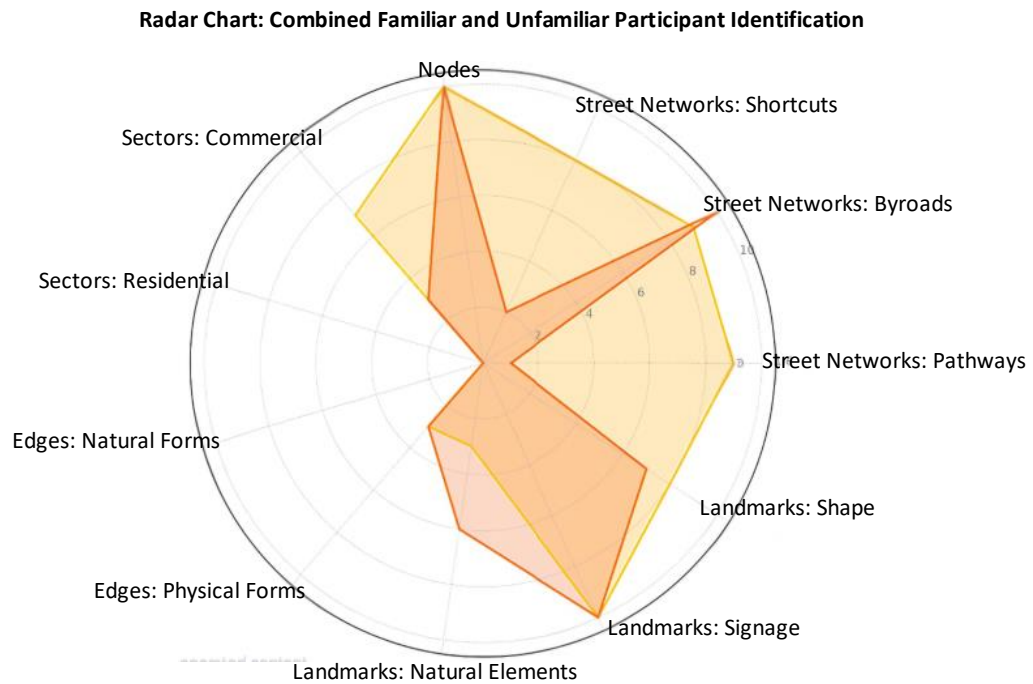


Fig. 8: Combined participants identification of the city

Source: author

The radar chart shows important differences and similarities between the performances of familiar and unfamiliar participants in identifying urban elements. Byroads, Nodes, and Signage were strongly identified by both groups, reflecting a general commonality in the importance of these urban elements for navigation. More Pathways, Shortcuts, and Commercial sectors were identified by the familiar participant, illustrating an important depth of engagement and familiarity with the urban space. Unfamiliar participants only had a limited identification of these features, relying on more striking and structured elements. For both groups, Residential sectors and Natural forms garnered very little recognition, with familiar participants generally having higher recognition of Shapes and Natural elements as features they used to navigate with. This comparison underlines how experience shapes spatial cognition and reinforces that clear, accessible, and prominent features are required at the urban scale to support navigation by all users.

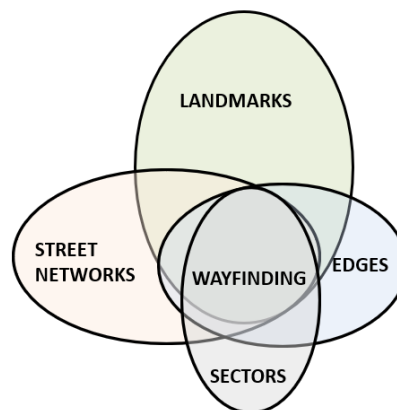


Fig. 9: Conclusion Diagram

Source: author

This data analysis summarized chart details interlinkages between landmarks, street networks, edges, and sectors, with wayfinding at the center of the diagram. The following Venn diagram is a visual representation of the interlinkages among these components of the city in terms of the experiences of pedestrians and the legibility of the city of Kurunegala.

Wayfinding has been described as a dynamic process of interpretation of various physical cues to navigate through urban environments successfully. Literature underlines that effective wayfinding systems rely on smooth integration of these elements to achieve an intuitive and cohesive urban environment. Analysis of the data confirms that the experience of pedestrians in Kurunegala is heavily influenced by the interaction of diverse urban elements supporting the theoretical framework developed in literature.

Wayfinding in Kurunegala is an interactive process that incorporates all the identified urban components. Landmarks are reference points, and street networks enable routes of navigation; edges mark the boundaries, while sectors present identifiable zones. Main role was played by the landmarks and the street network for the wayfinding in the Kurunegala city area.

The findings highlight that landmarks play the major role in legibility of a city which in turn contributes towards city's imageability. This brings up the important point of what a landmark should be to highlight its inherent identity. The street network also plays an important role in wayfinding, which means that urban designers and planners could use the street pattern to create a positive experience of the city.

Conclusion

The analysis emphasizes the importance of physical features such as, major landmarks, pathways, nodes, edges, and districts in establishing urban legibility in Kurunegala. Distinctive landmarks, including the Colourlights, the New market building, the BOC Building, and local shops serve as crucial navigational anchors for residents and visitors to build cognitive maps of the city. The study found that the arrangement and visibility of these elements significantly influence the user perception and navigation of urban spaces.

The study also highlights the significant role of spatial and directional orientation in supporting wayfinding in Kurunegala. Spatial orientation is primarily facilitated by a number of landmarks, such as, the Clock Tower and Athugala, which help users identify their location in the city. However, without linking paths, signage, and other supportive design elements, the effectiveness of these landmarks is severely limited. For familiar users, subtle mental maps will suffice, while for those unfamiliar, highly visible and striking landmarks will be more effective.

The study reveals that the pedestrian experience in Kurunegala is failing to recognize its unique natural and cultural characteristics, such as Kurunegala Lake and Athugala, due to their poor integration into the urban road network. Thus, pedestrians tend to orient themselves with the help of commercial sites like the Bank of Ceylon and P&S Supermarket. Although this may be a practical solution, these landmarks carry a generalized urban image that does not reflect the identified uniqueness of Kurunegala.

Key factors that enhance the role of landmarks in making Kurunegala more legible include visibility, proximity to walking routes, and distinctiveness in terms of size, color, and historical significance. Landmark structures such as Athugala and the Clock Tower help people orient themselves within the city. These cognitive reference points significantly contribute towards identifying city's cultural and symbolic significance. However, modern developments that block

visibility can undermine the effectiveness of landmarks. Improving visual relationships, integrating routes, and raising public awareness can help strengthen the role of landmarks in enhancing legibility in the city.

This study underlines the importance of including natural and cultural landmarks in wayfinding systems to increase urban clarity and reinforce the identity of the city. By integrating fundamental elements like the lake and “Athugala” into the urban structure, Kurunegala can develop a more meaningful pedestrian experience, enhance navigation aids, and foster a stronger sense of identity in the area. This approach will ensure that the city is easily navigable and impactful, retaining its unique character for both residents and tourists.

These research findings provide recommendations toward improved urban legibility for the city of Kurunegala and beyond. Improvements in the visibility of principal landmarks, optimization of connectivity and access in streets, integration of intuitive way-finding systems into the public's psyche-all these elements go to enhance the degree of urban readability. The study shows that, the preservation of cultural and historical aspects with modern city design principles will yield a vibrant, inclusive cityscape for any mid-size city. By considering these factors, the urban designers and planners can aim to make the city spaces more navigable, inclusive, and memorable for everyone, thus contributing to their quality of life as well as the imageability of the city.

Future research could investigate the effects of technological innovations, like augmented reality-based navigation enhancements, to the pedestrian experience and spatial perception. How would these technological advancements affect the legibility and memorability of a city? What would be the role of landmarks when technology is used for wayfinding? Introducing information technologies, for example, digital signage-wayfinding programs or AI directions, can support wayfinding but how would it support the legibility? Future research can explore these information technologies' interventions and make cross-city comparisons of results.

Finally, urban designers and planners can use these findings in policy making level for planning and design guidelines of a city to strengthen its legibility and enhance the pedestrian experience.

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