

**ASSESSING IMPROVEMENTS FOR A WALK-ABLE
ENVIRONMENT THAT ENCOURAGES PEOPLE’S MOBILITY IN
BISHOFTU TOWN:
“The Case of Hora Har-sadi Lake”**



By Adam Aman Hasen

A Thesis Submitted to
The Department of Architecture
School of Civil Engineering and Architecture
Presented in Partial Fulfillment of the Requirement for the Degree of Master’s
in
Urban Planning and Design

Office of Graduate Studies
Adama Science and Technology University

March 2023
Adama, Ethiopia

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APPROVAL PAGE OF MASTER OF SCIENCE THESIS

I/we, the advisors of the thesis entitled “ASSESSING IMPROVEMENTS FOR WALK-ABLE ENVIRONMENT THAT ENCOURAGES PEOPLE’S MOBILITY IN BISHOFTU TOWN: The Case of Hora Har-sadi Lake” developed by **Adam Aman Hasen**, hereby certify that the recommendation and suggestions made by the board of examiners are appropriately incorporated into the final version of the thesis.

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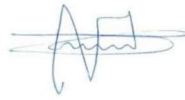
DECLARATION AND RECOMMENDATION

DECLARATION

I hereby declare that this Master's Thesis entitled "ASSESSING IMPROVEMENTS FOR WALK-ABLE ENVIRONMENT THAT ENCOURAGES PEOPLE'S MOBILITY IN BISHOFTU TOWN: The Case of Hora Har-sadi Lake" is my original work. That is, it has not been submitted for the award of any academic degree, diploma, or certificate in any other university. All sources of materials that are used for this thesis have been duly acknowledged through citation.

Adam Aman Hasen

Name of Student



Signature

Date

RECOMMENDATION

I/we, the advisors of the thesis entitled I/we, the advisor(s) of this thesis, hereby certify that I/we have read the revised version of the thesis entitled “ASSESSING IMPROVEMENTS FOR WALK-ABLE ENVIRONMENT THAT ENCOURAGES PEOPLE’S MOBILITY IN BISHOFTU TOWN: The Case of Hora Har-sadi Lake” prepared under my/our guidance by Adam Aman Hasen submitted in partial fulfillment of the requirements for the degree of Master’s of Science in Urban Design and Planning. Therefore, I/we recommend the submission of a revised version of the thesis to the department following the applicable procedures.

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LIST OF ACRONYMS AND ABBREVIATIONS

ADA	Americas with Disability Act
BMI	Body Mass Index
CAD	Computer-Aided Design
CSA	Central Statics Agency
CBD	Central Business District
FHWA	Federal Highways Walk-ability Administration
FBC	Form-Based Codes
GIS	Geographic Information System
GWJ	Global Walk-ability Index
HDB	Housing Development Board
IPT	Intermediate Public Transport
LOS	Level of Service
MAPS	Microscale Audit of Pedestrian Streetscape
NEWS	Neighborhood Environment Walk-ability
NMVs	Non-Motorized Vehicles
PAPI	Pen and Paper Interview
PAS	Proposed Accessibility Guideline
POS	Public Open Spaces
PEF	Pedestrian Environment Factor
PERS	Pedestrian Environment Review System
SPSS	Statistical Package for Social Science
TAZ	Traffic Analysis Zone
TIGER	Topologically Integrated Geographic Encoding and Referencing

ABSTRACT

At present, with the increase in the proportion of the worldwide urban population, cities, and towns are becoming congested that calls walking spaces. Particularly historical places and commercial areas need walk-able environments. The Bishoftu's historical place Hora Har-sadi Lake was extensively used by many people's meetings to celebrate the Irrecha's Festival and for other activities like recreation and fishing. Irrecha celebrations have been expanded both in content as well as geographical and demographic representations. The accident faced on Irrecha Festival day, 2nd October 2016; around the Lake was a recent memory in which many people lose their life, due to crowdedness. These situations initiated the researcher to focus on researching on assessing improvements for a walk-able environment in the study area. The main objective of the study is to analyze the current walk-able environment and provide design approaches that help to encourage people's mobility, to Hora Har-sadi Lake. The research address research questions to achieve the objectives of the study. To conduct this study, some of the articles were reviewed on the topic as a globe, to provide a theoretical context and empirical experience reviews. The primary data were collected using interviews with governmental officials, a site survey using a prepared checklist, and questionnaires; from tourists and residents of Bishoftu town, as well as by site observation, while secondary data were collected from different published and unpublished sources. The research was employing mixed research methodologies which integrate qualitative and quantitative approaches. The major findings of the thesis were the study area was not well planned, poor road networks, street escape design problems, and dead-end roads, the walkways were not properly constructed considering the Irrecha festival, the lake is blocked at different points surrounding the site; thus every person was walking long distance, existing development and natural relief of the site need redevelopment and design, as improvements for the walk-able environment to enhance the walk-ability of the site. Based on these findings the researcher has forwarded detailed recommendations that fit the public place context and encourage the mobility of people to the site. Hence, the study proposed design solutions for improvements of the walk-able environment around Hora Har-sadi Lake, to enhance mobility, and alleviate major problems and findings that discourage the proper functioning of the study area. The major planning and design solutions forwarded are planning to pedestrian walkways, public open spaces, road networks, and land use integrated into the planning area.

Keywords: Built-Environment, Hora Har-sadi, Mobility, Open space, Pedestrian-friendly, Road-networks, Walk-ability, Walk-able Environment

CHAPTER ONE

1. INTRODUCTION

This research is intended to assess improvements for a walk-able environment in Bishoftu town. A walk-able environment is safe, interesting, and easy to walk around. It incorporates travel routes and destinations that are lively and attractive. Bishoftu town is the one experienced in holding cultural and religious holy days, and serves a huge number of visitors and local communities, during the activities. In the town, Hora Har-sadi Lake open space was the Irrecha festival historical place since the 6th century, when many people used to meet the celebration the festival (Geda. T, 2019). The researcher was motivated to study the improvements for a walk-able environment; firstly, the Hora Har-sadi Lake is a historic and tourist attraction area for the town but it is not walk-able. Secondly, the accident faced at Irrecha Festival on 2nd October 2016; on the site, was the moment in which many people lost their life. This situation motivates the researcher to give attention to assessing the problems in the site to suggest a walk-able environment. Lastly, to get the Master's degree fulfillment along with the study's consequential benefit.

Walk-ability, safe streets, parks, less traffic volume, and comfort are important factors in determining urban life that contribute to encouraging people's mobility to such historical public open spaces (POS). The street that was not planned well and automobile-oriented street networks have led to impacts in terms of transportation congestion, air pollution, inactive lifestyle, pedestrian safety, poor pedestrian environment, and other built environment issues. To overcome these problems, the assessment of improvements for a walk-able environment, such as road facilities that make neighborhoods more walk-able, healthy, and livable are necessary for the study area.

Therefore, the purpose of this paper is to develop a set of detailed recommendations of design approaches and planning strategies that could enable the walk-able pedestrian system to play a major role in improving safe, comfortable, sustainable, and equitable mobility in the site. Using such detailed regulations and planning strategies a uniform understanding can be reached within the different municipal divisions and residents by public stakeholder involvement and the walk-ability quality can be increased both for residents and visitors.

1.1. Background of Study

Cities and towns are both big controversial and interesting centers, which offer a large range of products to their visitors, namely activities and magnetism of urban spaces (Jelena. F et al., 2015). Present-day, the actuality reveals that with the increase in the proportion of the global urban population, cities and towns are becoming congested which calls walking spaces. Walkway spaces are an essential element of livable towns and cities in which people want to live in. Particularly historical places and commercial areas need walk-able environments which are safe, interesting, and easy to walk around (Nigusse. G, 2015). In developing countries, pedestrian safety is affected by existing conditions such as lack of crossings, the lack of separation between pedestrians and vehicles on busy roads, the presence of roadside vendors, and the combination of poor street lighting and high proportions of pedestrians walking at night (Tulu. G, 2013). Safety-security in public spaces has become a central concern in cities around the world, specifically with the rise of ethnic, religious, race, and immigration conflicts. If safety needs are not met properly, then fear comes to the forefront (Tandogan O. & Ilhan B., 2016). Therefore, the need of selecting and designing an environmentally friendly walk-able route had been a great issue in developing and developed countries. Bishoftu town is a historical place of the Irrecha festival, which takes place at Hora Har-sadi Lake in September, since the 6th century (Geda. T, 2019).

1.2. Statement of the Problem

Among the Ethiopian towns and cities, Bishoftu town is the one that is experienced in holding cultural and religious holy days, and serves a huge number of visitors and local communities, during the activities. The Hora Har-sadi was widely used by many people meeting to celebrate Irrecha's festival, to show their unity, and sometimes to express their political stand of view. In a few past decades, the population of the festival participants rises to about 3 million in 2017/18 GC. (Geda. T, 2019). Even though, the area cannot get prominence to attain a sustainable, enjoyable, and comfortable public spirit. Currently, the existing site area is not adequate for the festival attendee's population. The accident faced on 2nd October 2016; at Hora Har-sadi was a recent memory in which many people lose their life, due to crowdedness. These situations initiated the researcher to focus on researching the assessing improvements for walk-able environments, to encourage people's mobility since people are suffering from mobility safety during the time of the Irrecha festival and in their daily life around the Lake. Assessing improvements for walk-ability in the study area was to fill the research gap.

1.3. Research Objectives

1.3.1. General Objective

The main objective of the study was to analyze the current walk-able environment and provide design approaches that help to encourage people's mobility to Hora Har-sadi.

1.3.2. Specific Objective

The specific objectives of this research are:

1. To analyze the existing conditions of streets and POS around the Hora Har-sadi area.
2. To evaluate the existing street and walkway connectivity of the site, with the enhancement of a pedestrian-friendly environment.
3. To provide the design approaches and planning strategies of a walk-able environment.

1.4. Research Questions

1. What are the existing conditions of streets and POS of the Hora Har-sadi Lake area?
2. How was the existing street and walkway connectivity of the site, with the enhancement of a pedestrian-friendly environment?
3. Which are the design approaches and planning strategies of a walk-able environment?

1.5. Scope of the Research

The scope of the research was limited to the study of assessing improvements for a walk-able environment to encourage mobility of people, and its geographic scope is confined to Hora Har-sadi Lake particularly, and to Bishoftu town in general. Spatially the study was limited to the Lake's surrounding areas, because the site is a historical place that was used by a huge number of peoples in other surrounding areas and lakes, as well the problems of walk-ability was considered in higher magnitude than other lakes found in the Bishoftu town. Its thematic issue is focused on the existing conditions of streets and POS, pedestrian walkway connectivity, the appropriate design approaches, and planning strategies for a walk-able environment. The paper greatly focused on the discussions about the assessment of a walk-able environment to encourage safe, equitable, comfortable, and sustainable people's mobility. However, the study has limited itself to suggesting recommendations that will help to make this sector functional more efficiently.

1.6. Significance of the Study

The outcomes of the study were very important to:

- Determine the walkways along the study areas are safe for pedestrians to walk on.
- Advanced knowledge, the finding could be a significant input for plans in the town regarding the provision of a walk-able urban environment.

- Analyzing the existing walkway facilities, POS, and the safety of the walkways would greatly help plans for the entire town.
- Insight the concerned government body and the community, that walking is the best transportation mode to create livable and walk-able urban environments, so that, they pay great emphasis on the provision of safe pedestrian walkways in their plan.
- Generally, the study helped to motivate further exploration by any stakeholder for complementary proceedings, provide contributions for policy and strategy development and decision-making in the planning process, could be a supplementary source of documentation for those studying related subjects, can be used for educational purposes, and foremost contributes on how to improve the walk-able environment in a given urban areas.

1.7. Limitations of the Study

As key informants are among attendees of the Irrecha festival which holds in September month; at the specific day of the festival, the people mobility observation was not conducted, since the study's time frame did not include the Festival's month. Thus the study was executed, instead based on the questionnaire for pedestrian protection of residents and checklists for the physical walking environments of the street.

1.8. Organization of the Thesis

The thesis is categorized into five chapters.

Chapter One: Introduction to the study introducing the thesis's main topic of the study, research problems, objectives, questions, significance, scope, and research limitations.

Chapter Two: Literature Review is a chapter that discusses key definitions relating to walk-ability, walk-ability elements, theories, and the appropriate strategies to improve walk-ability, literature on the factors and built walk-ability features, and the literature gap.

Chapter Three: Research Methodology: The chapter explains the methods used for the study and the process of data collection and analysis in detail. Chapter Four: Results and Discussions is a chapter that discusses the results of qualitative and quantitative data findings. Conclusion and Recommendation: this is the concluding part of the thesis. The chapter made a conclusion based on the findings from the literature review, the case study site's street, and the results of the discussions. Finally, the study recommends the best development of a walk-ability system, based on the appropriate strategies for a walk-able environment, and the actual street condition analysis of Bishoftu town.

CHAPTER TWO

2. LITERATURE REVIEW

In this chapter, some of the published and unpublished kinds of literature were reviewed on the topic of “Assessing of improvement for Walk-able Environment to Encourage People’s Mobility, in the case of Hora Har-sadi Lake” as a globe, to provide a theoretical context for the research. The literature reviewed are discussing: -the existing public open spaces and pedestrian walkways within the site and their connectivity, and provides appropriate design strategies to improve a walk-able environment in the study area.

2.1. The Core Concepts of Terminologies

a. What is Walk-ability and Walk-able Environment?

There is currently much talk about creating walk-able environments and improving walk-ability. Such strategies are meant to solve several problems from the obesity crisis and a lack of central city vibrancy to traffic congestion, environmental injustice, and social isolation. However, what exactly is meant by “walk-ability” and the related idea of the walk-able environment? The literature reviewed walk-ability; from research, practice, and popular discussions, the term is used to refer to numerous quite different kinds of phenomena. Some discussions of walk-ability focus on the means or conditions by which walking is enabled, including areas being traversable, compact, physically enticing, or safe. Others propose that walk-ability is about the outcomes or performance of such walk-able environments, such as making places lively and sociable, attractive transportation options, or inducing exercise. A final set of discussions uses the term walk-ability as a proxy for better urban places; with some paying attention to walk-ability being multidimensional and measurable and others proposing that enhancing walk-ability provides a holistic solution to a variety of urban problems (Forsyth A., 2015).

The meaning of walk-ability can be described in many ways. It depends on the structure and scale of the area, which is the human scale, where every resident has the opportunity to walk to the nearby shop, park, or access facilities; like public transportation within an adequate walking distance. This can be considered as a walk-able area. A distance of 400 meters is generally accepted as the maximum to foster regular pedestrian movement and regular transit use according to Ewing, 1999, as cited in (Southworth. M, 2005). Walk-ability is the extent to which the built environment supports and encourages walking by providing pedestrian comfort and safety, connecting people with varied destinations within a sensible amount of time and effort, and offering visual interest in journeys throughout the system.

Walk-ability is more intimately related to the attributes of the physical environment. The five attributes of walk-ability help promote a city as a walk-able community towards safety, sustainability, vitality, public health, and equity (Nigusse. G, 2015).

b. Factors Influencing Walking

Motivation to walk depends on personal and household characteristics, such as age, health standing, profession, education, and life cycle, as well as from habits, attitudes, and preferences. Although these can advance over one's life span, they may also be modified by targeted interference and education programs. Only in the presence of opportunity do the motivational factors become relevant. Both opportunity and motivation are important to understand in promoting walking activity; a critical threshold of each is necessary to support a socially and independently beneficial level of walking among the general public. This division is inexact and the line separating opportunity and motivation is necessarily fluid, as a factor, one person views it as an external barrier to walking (e.g., child care duties) another may view it as a motivator that prompts new trips to playgrounds or, if the environment and other personal circumstances permit (Elizabeth S. et.al, 2003,). Pedestrian built environment factors contain land use patterns, street connectivity, adequate pedestrian amenities, and sidewalk design, all of which are shaped and affected by development policies and public investments over time. Socio-economic factors are also playing an important role in influencing the enthusiasm and desire of an individual to walk, such as poverty level, medium income, car ownership, and the community attitude towards walking, (Handy S. 1996). The factors affecting walking are illustrated in Figure 2.1 below.

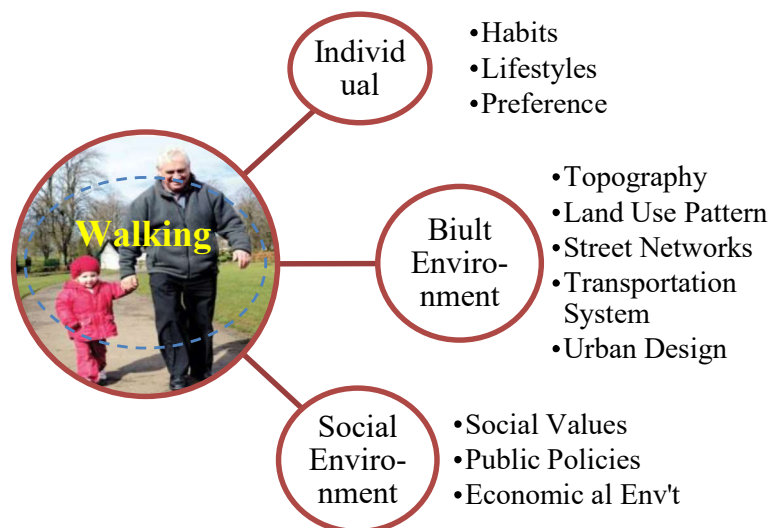


Figure 2.1: Factors Affecting Walking Paradigm

The key factors to consider toward the goal of increasing walking and other non-motorized travel among the general population can be split broadly into the two realms of opportunity and motivation (Table 2.1).

Factors	Description	
Opportunity (external)	✓ Distance ✓ Weather ✓ Topography ✓ Cost:- time and money to travel ✓ Traffic volume and speed ✓ Other factors (dogs, crime)	✓ Infrastructure •Pedestrian facilities (presence, condition) •Access:- proximity to destinations •Access:- Connectivity •Transportation alternatives - Street lighting
Motivation (Personal)	✓ Physical condition (age, health) ✓ Family circumstances (life cycle) ✓ Cultural (ethnic, social, peer group) ✓ Education (formal and informal) ✓ Profession	❖ Habits, attitudes, and values •Personal value of time •Personal value of money •The Personal value of exercise and health •The Personal value of independence •A Personal appreciation of nature

Table 2.1: Factors influencing walking activity; Source (Elizabeth S. et.al, 2003,)

c. Walk-able community

According to, Wisconsin Pedestrian Policy Plan 2020 “Ultimately, the goal of any effort to facilitate pedestrian travel is walk-able communities. A walk-able community is considerably planned, designed, or otherwise retrofitted to integrate pedestrian travel into the community’s fabric. In a walk-able community, walking is considered a normal transportation choice and is not an interruption or obstacle to motor vehicle traffic”.

d. Pedestrian

A pedestrian is any person that is a foot or who is using a means of conveyance propelled by human power. A pedestrian includes any person that is operating a self-propelled wheelchair, invalid tricycle, or motorized quad cycle and, because of physical disability, is otherwise unable to move about as a pedestrian. A Pedestrian is a person walking rather than traveling through a vehicle. Pedestrian behavior is mainly defined as the transportation mode compared to vehicles, public transit, or bicycles according to, (Dunmore, Charles; et al., 2008), as cited in (Itefa. E, 2021). Oxford English Dictionary, 2006 defines a pedestrian as any person traveling on foot and the mobility-impaired person using a wheelchair, not only for transportation purposes but also for social interaction, shopping, leisure, recreation, exercise, protest, etc.

e. Walk-ability Networks

As (Southworth. M, 2005) States simple measures of distance to destinations are not ample forecasters of walk-ability. The quality of the path network is the key. To encourage walking it is necessary to go beyond functional access. Several qualities of the path network affect the opportunity for walking and can be improved through design. A walk-able network has several of the following important attributes: Connectivity of path network, both locally and in the larger urban setting; Linkage with other modes: bus, streetcar, subway, train; Fine-grained and varied land use patterns, especially for local serving uses; Safety, both from traffic and social crime; Quality of path, including width, paving, landscaping, signing, and lighting; and Path context, including street design, visual interest of the built environment, transparency, spatial definition, landscape, and overall employability.



Figure 2.2: The Walk-ability Networks.

f. Walk-ability and Tourism

Walk-ability is a magnet for tourists” to experience places. The cities that accommodate most tourists are large multifunctional entities into which tourists can be effortlessly absorbed and experience, largely on foot the spaces within the city’s quality (Ewing R., 2011). A place is walk-able when the built environment supports and encourages walking by providing pedestrian comfort and safety, connecting people with varied destinations within a reasonable amount of time and effort, and offering visual interest in the journey all over the network (Southworth. M, 2005). The physical features, urban design qualities, and individual psychological and physical reactions are interrelated and influence the pedestrian’s choice to walk (Handy, S. L. 1996). Compared to other street users, tourists are those who travel at lower speeds which makes both distance and streetscape texture more relevant (Nasser N., 2003) as cited in (Nigusse. G, 2015).

2.2. The Definition of Terminologies

Accessibility: - is the degree of ease with which people can access the full range of urban facility spaces, shops, employment, and leisure (Fantaye, 2015). It is the extent to which land use and transport systems enable individuals to reach activities or destinations using a transport mode.

A pedestrian: is a person walking rather than traveling in a vehicle. Pedestrian behavior is mainly defined as the transportation mode compared to vehicles, public transit, or bicycles (Oxford English Dictionary, 2006).

Mobility: is defined as the ability to move from place to place and is measured by the number of trips made by a person per day. Personal mobility refers to the use of personal transport; a car or a motorcycle or other non-motorized (Violoncellos, 2011).

Public open spaces: are the places where peoples connect to others, they are the users of the places (Jing. H, 2012). It is also a space in a city or any other publicly accessible physical place, in the context of social, political, relations, and interpersonal contacts, developed through inclusive processes (Madanipour, 2013).

Open space: Green space (land that is partly or completely covered with grass, trees, shrubs, or other vegetation, but also parks, community gardens, and cemeteries), Schoolyards, Playgrounds, Public seating areas, Public plazas and Plantations along the streets and sidewalks (Mohamed. T, 2019).

Walk-able neighborhood: it is a safe, well-serviced neighborhood, imbued with qualities that make walking a positive experience. A positive walking experience means that streets, sidewalks, and paths are comfortable and interesting to use (Emily T. and Julia K., 2013).

2.3. The Existing Conditions of Streets and Open Spaces in the Study Area

Bishoftu's lakes were formed by a volcanic eruption that shaped the land surrounding the lake as a steep slope. Hora Har-sadi Lake is one of the crater Lakes. The road access from the center of the town to the Lake is the only asphalt road that circulates to Lake like a ring, starting from the town's first roundabout, running between the Irrecha site and Chalaleka Lake, and closing to the first round. The main roads to the town are from three directions; these are from Finfinne, Adama, and Chafe Donsa. Most partakers are from the direction of Finfinne and Adama, these Vehicle station is at the center of the town, which makes the main traffic flow to the site from the center of the town. The road from the center of the town to the site is 13 m wide and 3m pedestrian walk (Asmara. G, 2020). The third entrance is from the direction of Chafe Donsa, the participants use horse, car, and foot transportation modes.

This direction has a lower traffic flow than others. Hora Har-sadi water body is surrounded by hills in all directions, this land feature prevents adequate access to the place. On the other side, in the south and southeast, it is fenced by residential buildings and an Agricultural research center (Governmental service). This is another challenge for the site to gate enough road access to the area. Now a time, the Open space left for Irrecha is used as the main access for the Lake celebration (Geda. T, 2019). The previous Irrecha celebration site's area is 4.55-ha. This includes the Abba Gada blessing and youth (Folle) singing place on the lakeside. The study area does not have any connection to other modes of transportation within a short walk-able distance (Asmara. G, 2020). On the other hand, the study area has good views in all directions, because the area is surrounded by mountains which are covered by vegetation (Geda. T, 2019).

2.3.1. Walk-ability Elements

Walk-ability elements	Elements	Details
	Pathway	Properties, design, quality, alleys, shade, lighting, user-friendly, landscaping, maintenance, environment.
	Zebra crossing	Type, location, condition, access, time at traffic lights, safety.
	Street furniture and signage	Street furniture and shade, placement of lamppost, board information, signage.
	Personal safety	Personal safety (day, and night), comfortable social space, and fear of crime, fear of motorized vehicles, fear of stray animals.
	Adjacent to traffic flow	Traffic flow along the pedestrian walkway, traffic conditions at a pedestrian crossing, and traffic control by authorities.
	Aesthetic and amenities	Aesthetic, availability of amenities, dustbin, public toilet, public phone, a place to rest (bench).

Table 2.2: Elements of walk-ability; Source: (Babu E., July 2020)

2.3.2. Elements of the Built Environment that Encourage Walking

Elements steadily found to be positively linked with walking for recreation or exercise include; the attractiveness or aesthetics of the neighborhood environment and the convenience of facilities. They exist at different geographical scales. Some elements, such as land use mix, exist at a large scale, while others, such as pedestrian amenities, are at street level. There are some general rules of thumb that we can follow to consider the area as walk-able (Roberts, P. 2000). In an area where the automobile was not the only option to move, Pedestrian facilities are present to offer the dwellers a fair choice to move, Area with sufficiently designed sidewalks that allow disabled access, Area with safe walks in terms of pedestrian safety, Crosswalks are adequately marked and people can easily cross the streets, and Area with few instances of crime (Nigusse. G, 2015).

2.3.3. Components of Walk-ability

The built environment has a strong influence on whether people prefer to walk, for walking to become a competitive or favored mode in a City. The necessary elements for a walk-able community have been grouped into four overarching components: Quality of the journey, urban form, pedestrian infrastructure, and policies and programs according to Smart Growth Planning, 2006, as cited in (Nigusse. G, 2015).

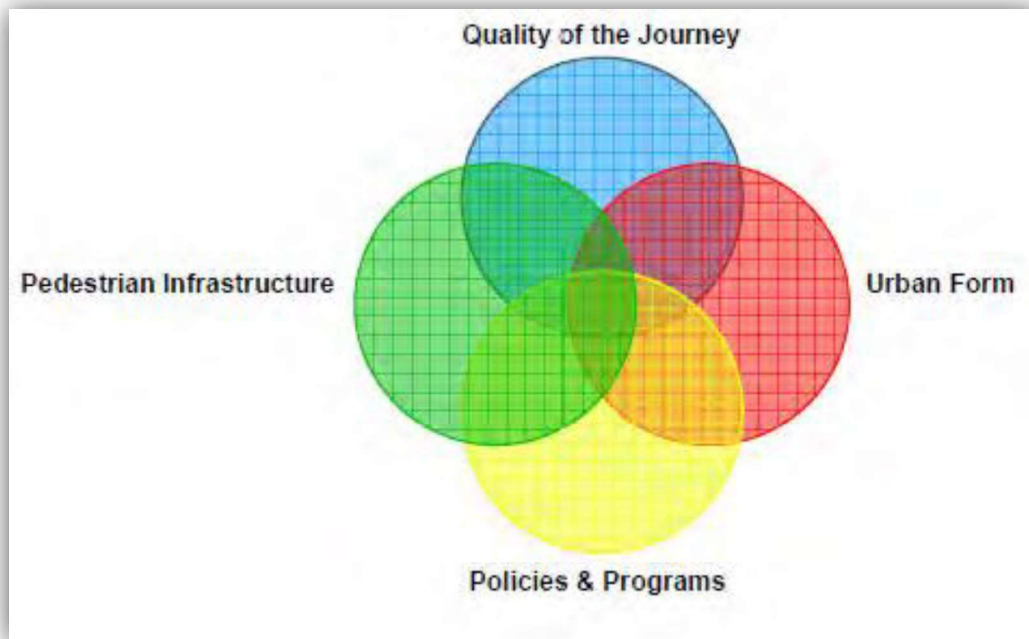


Figure 2.3: Components of walk-ability

A. Quality of the Journey

Security: A feeling of security is created through building placement, population density, window transparency, street connectivity, and aesthetics. Safety: Real and perceived pedestrian safety threats such as tripping or pedestrian-vehicle collisions are influenced by vehicle speeds and volumes, sight lines, the distance between pedestrians and automobiles, and lighting for visibility (Nigusse. G, 2015). Convenience & Efficiency: the placement of multiple complementary destinations within walking distance of a home or office allows pedestrians to perform many errands at once. Comfort: The provision of seating, temporary wind or sun shelter, and public restrooms are attractive to individuals and families, and are especially important to seniors. Complexity: Color, texture, and building articulation create a high level of complexity which encourages pedestrians to continually return to a place (Nigusse. G, 2015).

B. Urban Form

Block Size: Ideal block size is 350 to 500 meters in circumference. **Connectivity:** High connectivity leads to more dispersed motor vehicle traffic, reduced walking distances, and easier access to transit and pedestrian attractions. **Streets:** Streets internal to neighborhoods should be narrow enough to encourage low vehicle speeds and be comfortable and safe for walking. **Destinations:** Mix of Uses, Mixed-use neighborhoods' has a variety of land uses, such as offices, retail, and a mix of residence types. **Density:** High residential and commercial densities increase the number of pedestrians. **Legibility:** is a term used to describe the ease with which people can understand the layout of a place. Lynch defined a method of analyzing legibility based on five elements: paths, edges, districts, nodes, and landmarks (Babu E., 2020).

C. Pedestrian Infrastructure

Sidewalks: A minimum width of 1.5 meters, regular maintenance, and buffers from traffic are important factors in making walking comfortable (Babu E., 2020). **Accessibility:** Sidewalks must provide support for seniors and people with disabilities. This includes the use of curb ramps, level sidewalks, and accessible buildings. **Street Crossings:** Factors include intersection geometry and controls, crossing width, and providing pedestrian refuge to break up wide crossings. **Street Amenities:** These include benches, garbage receptacles, newspaper racks, outdoor cafes, signs, and other amenities for people to rest, find their way, and otherwise feel invited to the street (Babu E., 2020). **Adequate Street Lighting:** is essential for both safety and security and may require additional pedestrian-level lighting to provide adequate illumination of the sidewalk.

D. Policies and Programs

Design Standards and Guidelines: Standards and guidelines should ensure that adequate facilities are provided for pedestrians including sidewalks, curb ramps, and bus shelters. **Roadway Operation Standards:** should balance the needs of all users (motorists, transit users, cyclists, and pedestrians) as cited in (Nigusse. G, 2015). **Zoning By-law:** Zoning legislation should support land uses and development patterns that encourage walk-able communities. **Area and Neighborhood Plans:** Land use and transportation plans should establish the urban form elements that allow walking to be a convenient travel option for residents. **Administration Support and Funding:** the support of local government and investment in pedestrian-oriented infrastructure is crucial to create more walk-able communities. **Implementation:** requires the support of decision-makers and stakeholders, as well as funding to execute plans and programs (Nigusse. G, 2015)

2.4. The Design Approaches of a Walk-able Environment

Systemic measures of a walk-able city require a multi-disciplinary approach. Jeff Speck (2018) in his Walk-able City Rules identified the following disciplinary approaches to designing walk-able cities: Health, transportation, and ecology, in addition to economic (such as walk-ability and home value) and social equity.

a. Health value of walk-able cities

Modern lifestyle and the workforce put very little demand for physical activity, and to achieve the minimum recommended levels of physical activity, we consciously need to make time to include exercise as part of our daily routine. One way to achieve this level of fitness at the population level is to design our cities in such a way that would make walking and cycling a natural choice. For this reason, the concept of walk-ability and walk-able cities has gained considerable attention in public health communities (Jackson et al, 2013), and walk-ability has been incorporated into the health assessment framework.

b. Transportation and walk-able cities

There has been an increasing awareness that auto-mobility is a serious problem that contributed to the current obesity epidemic. An active form of transport constitutes an important element of designing a walk-able city. Yet, there is a problem of incorporating active transportation in many cities. Better designing of urban and transport systems can lead to more cycling, walking, and transit use; however, it can inevitably increase exposure to harmful emissions by placing people closer to traffic (Hanky and Marshall, 2019).

c. Ecological value of walk-able cities

Forman (2014) in his book Urban Ecology; Science of Cities provided plausible solutions to increase walk-ability and preserve ecological values in an urban environment. These solutions can be summarized into urban ecological principles that promote the design and planning of walk-able cities.

2.5. Measuring Walk-ability

Walk-ability is a measurement that takes into account the built environment and is defined as a measure of how friendly an area is to walking (Vale. D, 2016). Three urban-space constituents of walk-ability analysis: density (household and job density), diversity (land-use mix), and design (intersection and street density), which was later expanded to also include destination (job accessibility) and distance (to transit) (Ewing et al., 2009) as cited in (Pauline E. et al, 2020). Walk-ability is a concept and it may not be realized till the system is designed. To design the appropriate system over the existing condition, there must be a tool for measuring walk-ability in cities or neighborhoods.

One way of assessing and measuring walk-ability is to assume a walking audit. An established and widely used walking audit tool is PERS (Pedestrian Environment Review System) which has been used extensively in the UK. Another tool is the Walk Score which is an algorithmically derived Walk-ability index based on the distance to the closest amenity in each of several categories, but does not consider factors such as sidewalk availability, safety of the neighborhood, and topography. Related Transit Score and Bike Score measures have also been developed (Dibyendu. B & Soumen. M, 2013). Park in his thesis identified 52 walk-ability indicators divided into 7 broad segments. These are (i) curb-to-curb roadways (ii) pedestrian crossings (iii) buffer zones (iv) sidewalks (v) sidewalk facilities (vi) street scale and enclosure and (vii) nearby buildings and properties.

2.5.1. Subjective measurement of walk-ability

Subjective approaches use individuals' perception of the degree of walk-ability of their environment as a starting point, usually measured through a questionnaire. Scales have been developed to measure the protections. The Neighborhood Environment Walk-ability Scale (NEWS), a 68-item questionnaire, is the most commonly used method to evaluate walk-ability (Saelens et al., 2003). The NEWS methods consider the environmental characteristics: a) residential density; b) proximity to nonresidential land uses; c) Ease of access to nonresidential uses; (d) street connectivity; (e) walking/ cycling facilities; (f) Aesthetics; (g) pedestrian traffic safety and (h) crime safety (Cerin et al., 2006).

2.5.2. Objective measurement of walk-ability

Several empirical studies have used objective approaches to measure walk-ability. The built environment is described by several variables like; land use mix, intersection, and density in these approaches, which are then combined into an index of walk-ability (Vale. D, 2016). Objective methods generally involve a linear combination of a selection of environmental variables to compute a walk-ability score. Concerning the development of the measures, data-driven and theory-driven approaches can be distinguished (Pauline E. et al, 2020).

2.6. The positive impacts of walk-able environments

Walk-able areas can encourage social interaction and greater community involvement, which in turn leads to greater social capital within the community. Various claims have been made about the benefits of walk-able neighborhoods. The literature was reviewed on three of the most prevalent claims (Durand. P, 2011): That walk-able neighborhood have a positive impact on; physical condition and health, economic value, and social connection.

2.6.1. Physical condition (travel behavior) and health

The notion that the walk-able neighborhood promotes physical condition, and therefore health, has generated a vast literature exploring and testing the relationship. Health is assessed by looking at body mass index (BMI), and travel behavior that is walking and transit use versus car use. The consistency between “smart growth urban planning” is, walk-able neighborhoods, and travel behavior, particularly the dimensions of “diverse housing types, mixed land use, housing density, compact development patterns and levels of open space” (Durand. P, 2011).

2.6.2. Economic Value

A property value on correlates of the walk-able neighborhood found that density, mix, and walkway infrastructure contributed to higher property values (Sohn et al. 2012). Another approach is to evaluate the economic impact of particular aspects of the walk-able neighborhood, such as facilities, mixed-use, or mixed housing type. If subsidized housing is overly concentrated-and located in struggling neighborhoods, the effects might be negative, but in other locations, or combined with other strategies, the housing mix can have a positive effect on housing (Emily T. and Julia K., 2013).

2.6.3. Social Connection

The walk-able neighborhood is connected with trust and social engagement (Leyden 2003) as well as sociability (Brown & Cropper 2001). Social benefits might involve, first, resident interaction and neighboring, in turn leading to social connection, a sense of community, or collective efficacy. Researchers have found higher rates of social interaction, a “substantially greater sense of community”, and stronger place attachment in walk-able neighborhoods (Kim & Kaplan, 2004). A well-designed public space, a key component of the walk-able neighborhood, was shown to encourage social interaction, especially in mixed-income areas (Robert 2007). The walk-able neighborhood may simply be attracting residents with similar interests and characteristics, so this homogeneity may increase resident interaction (Keane, 1991; Plas and Lewis, 1996). Although there are consistent findings that the walk-able neighborhood is capable of influencing neighboring and local social ties positively (Lund 2003), self-selection also likely determines the type of social interface affected.

2.7. Empirical Experiences in Improving Walk-able Environments

2.7.1. Walk-ability in Historic Urban Spaces: Martyrs' Square in Tripoli

Tripoli has been rapidly growing and its population has tripled in less than 20 years, from 0.5 million in 1993 to 1.5 million in 2013 (Bureau of Statistics and Census-Libya, 2010), as well as most Libyan people wanting to visit historical places in Tripoli. moreover, some of Tripoli's main public open spaces, such as Martyrs' Square, were extensively used by many people meeting to show their political support for and/or objections against the former regime during the conflict in 2011. Protests, prayers, celebrations, political debates, and the sharing of moments of joy and mourning have all been experienced in these historically symbolic urban public centers (El-Allous, 2016). Many open spaces and streets which were for pedestrians have been destroyed under these regulations (Lakhder. A and Dugeny. F, 2010). In addition, the lack of clear pedestrian pathways from Martyrs' Square to Omer Al-Mukhtar Street, and the mix between motor traffic and pedestrian movement, do not improve the comfort or aesthetic enjoyment of the central area (Alzkla. N, 2016). Martyrs' Square (MS) is a public open space located in the center of Tripoli, founded in the 20th century in the time of Italian colonialism, where it was named "Piazza Italia". The square is the center of the city, bordered by the Al-Saraya Al-Hamra and the seaport columns, and the old city in the North: it is one of the monuments of Tripoli. Several main streets branch out from it. The square has served as a central stage for key political events: from the Italian occupation to Libyan independence, and during the rule of Gaddafi, to the violent conflicts in post-Gaddafi Libya. Similar to other historic cities in the Middle East, especially the neighboring Cairo, public spaces in traditional and historic quarters are the venues where social gatherings are the blood of everyday life (Abdelmonem. M.G, 2016). The open space must be accessible for all classes of people, democratic, and reflect the local culture and tradition by providing safety and security requirements (Selim. G, 2017). The reality of the Libyan city today shows something missing in the interconnection between user requirements and urban open spaces within the city, which is the most important part of the city center. Rahely N. et al. 2013, state that safety is one of the most influential factors in attracting people to POS. (Abdulla. K et al., 2016), determined four main factors of safety and security that affect walk-ability in Libyan public spaces, which were the risk of crimes taking place, road traffic safety, street lighting, police presence in the street, and people of carrying weapons. The research confirmed that walk-ability is no longer associated with the physical environment only, but safety and security also play an important role in attracting people to public spaces for walking.

The high level of traffic flow in combination with mobility problems in pedestrian infrastructure and preservation incites pedestrians to walk in the street or cross outside designated crossings, thus undermining their safety. In conclusion, it is proposed that an increase in pedestrian safety can be achieved by controlling vehicle speed at unprotected mid-block marked crossing; creating footpaths; creating and maintaining traffic signals; and controlling all the junctions around MS and pedestrian crossings by traffic signals. Also, to reduce offense within POS in cities with armed disputes, there are several elements needed, such as setting up activities and heartening people to walk in groups, installing CCTV, and the police intensifying foot patrols.

2.7.2. Making Siliguri a walk-able city

Siliguri is one of the fastest-rising cities of West Bengal State, in India. It is located in the narrow corridor stretching between Bangladesh in the South, Bhutan, and China in the North, and Nepal in North West and is the gateway to the whole northeastern part of India. This strategic location is the train for rapid growth not only in population but also in economy and which is reflected by the high level of motorization when this research was done. In the last few decades, Siliguri has grown hastily in terms of area, density, and population. Population growth has been extraordinary, increasing from 6067 in 1931, being 4.72 lakhs in 2001 and more than 7 lakhs as per 2011 census data. The planners assess the population of Siliguri may reach up to 2 million by 2021 (Dibyendu. B & Soumen. M, 2013). Apart from the travels of city dwellers, a significant load of the tourist population traveling to the northeastern region is observed for many decades. The pressure has created an uncontrollable situation for many major trunks like Hill Cart Road, Sevoke Road, Burdwan Road, and Bidhan Road. Y-shaped intersections, an unorganized public transport system, mixing of slow & fast-moving vehicles create severe jamming along major road stretches. The safety of travel has been lost by increasing numbers of two-wheelers and cars, the use of extensive intermediate public transport, the absence of city bus service, and abundant cycle-rickshaws for short journeys. Such an inefficient transport system causes social, economic & financial wastages (Dibyendu. B & Soumen. M, 2013). To improve the situation, an appropriate development strategy for transport infrastructure is essentially needed in Siliguri. Walking and bicycling connected with a suitable public transport system were essential ingredients in an integrated, intermodal transportation system to give travelers transportation options and bring sustainability. The possibilities of walk-ability in Siliguri have been discussed and analyzed based on five criteria (Dibyendu. B & Soumen. M, 2013). These are:

1. The Connectivity of the path network is determined by the presence of sidewalks, and other paths and by the degree of its continuity and absence of significant barriers.
2. Linkage with other modes: The local streets are closely linked with the second category of roads, and fully become pedestrian with specific infrastructure to ensure intermodal linkages with pedestrians.
3. Fine-grained and varied land use pattern: should have high-quality social and physical infrastructure, effective public transport, and a safe and livable urban environment.
4. Safety: Passenger-vehicular conflict cannot be avoided on congested road sections.
5. Path quality: The quality of the path is an essential element of walk-ability.

The development of a walk-ability plan for Siliguri is earnestly required to guarantee a positive march towards sustainability and make Siliguri efficient, live-able, and an engine of growth for the entire region in the future days. The walking plan should include the views of professionals from a variety of fields including transport planning, transport engineering, health, tourism, social inclusion, crime prevention, and urban design. Redesigning existing arterial and sub-arterial roads to create segregated public transport lanes, separate motorized & non-motorized lanes, and wide footpaths and spaces for vendors will benefit all road users. A walk-ability index may be developed in this context to quantify the present scenario and possibilities of future development. As Siliguri acts as a major transport hub for lakhs of tourists in the region, hence, their movements may be separated suitably resolving conflicts with the city travelers and therefore improving mobility for both the users.

2.8. Lesson Learned From Literature Review

- Walking has lately been one of the most popular forms of mobility anticipated in many urban plans and in the new concept of sustainable mobility.
- The realization of some actions, strategies, and policies that can be considered tactical urbanism and the planning of a walk-able environment within the urban context allows for improving the usability of spaces for pedestrians.
- The planning and the design of spaces in which pedestrians can be moving as they do in streets and squares must be well thought-out as certain parameters to increase the awareness of safety in users and therefore to make them more usable.
- Some examples of pedestrian or mixed infrastructure are presented in the literature: sidewalks or pedestrian lanes within the same road superstructure, but often refer to the use of communal space within urban areas to familiarize pedestrians.

- A range of methodologies are used to assess improving walk-able environment. These include the use of tools or checklists to assess the walk-ability of a particular route, stated preference techniques to determine pedestrians' value of specific aspects of their walking environments, and in recent time's mobile methods.
- Most of the research has shown that appropriate design can increase the quality and quantity of walking, by stipulation of crossing facilities or in terms of overall design.

2.9. Summary and Gaps of the Literature

According to (Dannenberg A. & Wendel, 2011), walk-ability has become an ever more important issue in the fields of urban planning, public health, and transportation, and researchers have been mounting ways to evaluate it quantifiably. Many walk-ability audit tools now exist, but there is no consensus as to which tool is best for measuring walk-ability. Investigating the Human-Environment Behavioral studies is very important in walk-ability analysis due to their convenience for interdisciplinary investigations (Babu E., 2020). Additionally, to promote walk-able neighborhoods; pedestrian infrastructure planning and design are required. Literature concerning improvements in the walk-able environment for Hora Har-sadi Lake is mainly examined, indicating a scarcity of theories, lack of a systematic approach, and walk-ability guidelines, policies, and strategies to apply for improving the walk-able environment, particularly for cultural-historical use in Ethiopia, especially when compared with the research done in the developed countries. Given Ethiopia's specific political and economic system and relatively mature improvements of walk-able environment theories in the Western world, there exists a slight opportunity to apply what has been experienced in other parts of the world to the Ethiopian context. Hence it is not recommended to apply directly the principles and context worked in some country to another one, since it is not similar worldwide as to the culture, context, and characteristics of sites and ceremonies like along Hora Har-sadi Lake historical place. Therefore, conducting a study of the specific characteristics and context of the site were filling the gap. Moreover, even though there have been various types of researches undertaken on urbanization, urban growth and development, and urban rural-linkages, the studies conducted on the improvement of walk-able environment are limited. Hence, it is believed that there is a gap to explain and clarify the positive effects of an improved walk-able environment on the local communities and tourists. The study is therefore hoped to fill this gap too.

CHAPTER THREE

3. MATERIALS AND METHODOLOGY

3.1. Introduction

The research is carried out by introducing a phase of data gathering according to face-to-face interviews using a survey format and then processing the data through qualitative and quantitative methods. The interviews were conducted through the PAPI method (pen and paper interview). The paper questionnaire interview is the most classic of the survey techniques. The interviews were completed by recording the respondent's answers on a paper questionnaire. Then, the data are entered into a database and analyzed. The database was formed in an Excel sheet in which the quantitative data have previously been collected to be quantified and normalized via equations. The interview approach allows the direct exploration of the perceived feelings through a bottom-up approach. This strategy was also useful to spread democratic urban planning that can stimulate different population groups to cooperate with the local government. The questionnaire was given to the residents of Bishoftu town who have a good knowledge of the town. The PAPI method was applied to attain the sensations perceived by pedestrians as they travel through the various selected routes. The survey was administered considering the same environmental conditions for all users, i.e., the same period of the day with similar sunlight and similar traffic conditions near the study area. Therefore, the sample was limited precisely because of the finding of the same external conditions during the administration of the questionnaire. Among the different sensations experienced by the users during the walk, scrupulous attention was paid to the feeling of safety, comfort, and confusion. The study units or population used as a reference in this study were mainly the local community, tourists, and officials of Bishoftu town.

3.2. Methodological Research Design

The study would employ mixed research methodologies which integrate qualitative and quantitative approaches. The methods are sequentially employed and used in this study because qualitative findings help to interpret or contextualize quantitative results. The qualitative method was chosen because of its flexibility to gravely identify the social and environmental development problems of under standard walk-able environments, as walk-able towns and congested towns in a comparative manner. Additionally, the qualitative approach allows the detailed communication of the researcher and the institutional and residents based awareness on assessing improvement for a walk-able environment by allowing the in-depth clarification of the research problem.

The quantitative method is preferred to other methods since it allows the implementation of descriptive and numerical data for the study. This method is also chosen to evaluate and illustrate the current practice of the walk-able environment among institutional and local community-based understanding. The research design is a strategic framework for action that serves as a bridge between research questions and the execution, or implementation of the research strategy. The schematic diagram of the research was shown in Figure 3.1.

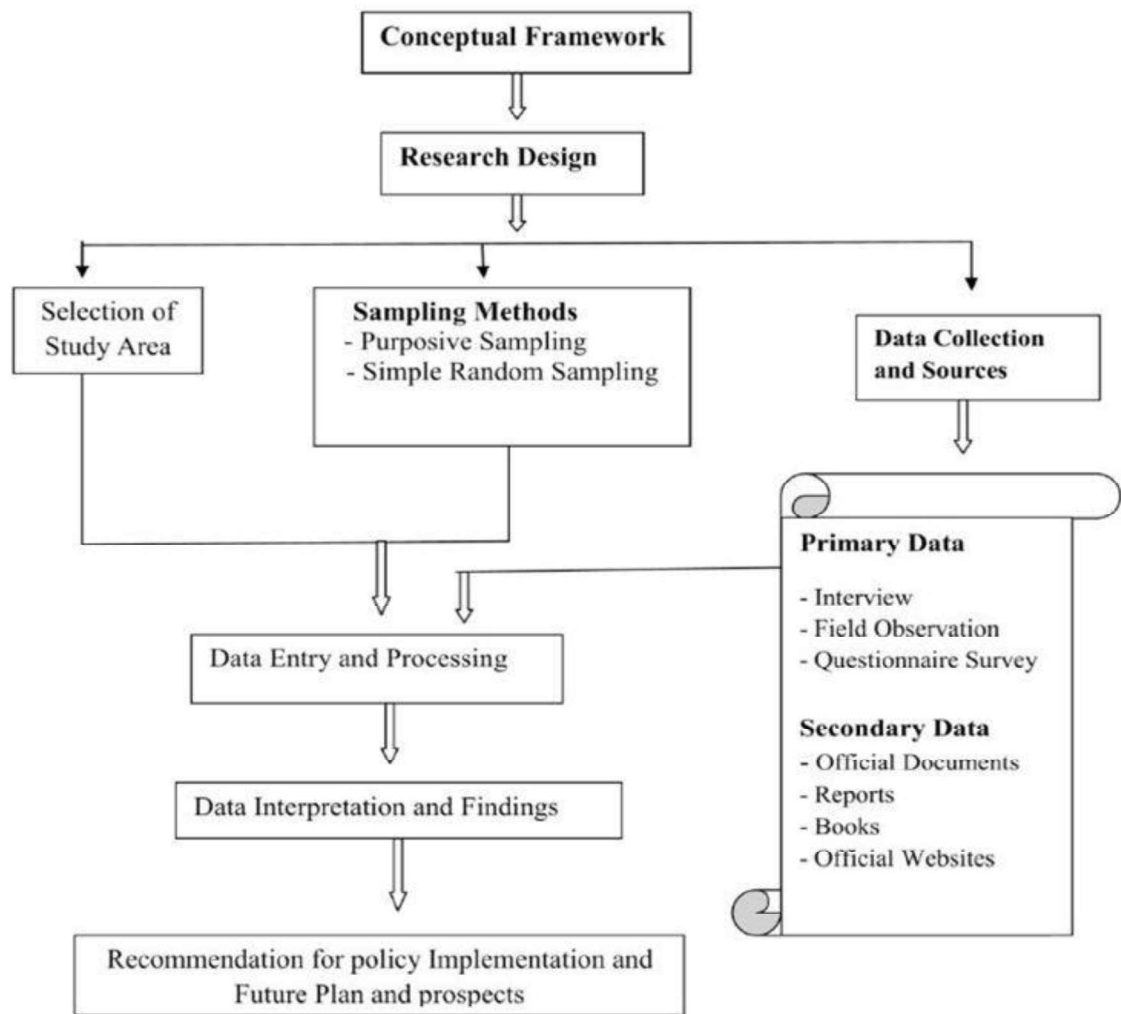


Figure 3.1: Methodological research design; Source: (Researcher, 2022)

3.3. Case Study (Selection of the study area)

Bishoftu Town is one of the rapidly growing towns of its well-heeled topography, weather condition, and attractive natural beauty of the town to invest, work, and settle. Due to the tourism resources, beautiful surroundings and topography, attractive natural and historical lakes, and its strategic location; the town was selected, as it provides an ideal example to investigate the walk-ability of people, and assess improvement for the walk-able environment to encourage local communities and tourist's mobility.

The selected site is the most crowded area of the town, during Irrecha Festival by pedestrians due to the historical Irrecha Festival place; Hora Har-sadi Lake, tourist attractions, and the commercial and tertiary activities present. The analysis was conducted in the town of Bishoftu where about 213,000 inhabitants live. Over 1 million populations were tourists attend for Irrecha Festival once a year which is moving on foot. Because of these reasons, the Hora Har-sadi Lake was taken as a case study in the town.

3.3.1. General Description of the Case Study Area

According to the Bishoftu town Administration, 2017 Geographical location of the town is approximately located between 7°12' to 9°14' North latitude and 38°32'to 39°32' East longitudes. It covers about 14,000 hectares area. It is found in the Oromia Region, North Shewa Zone of Ada'a Wereda. It is situated at a distance 47 km south East of Addis Ababa, and 52 Km from Adama town (Figure 2.3), and the climate of the town, in general, belongs to the weina dega (Agro-climatic zone) as cited by (Geda. T, 2019). The Maximum annual temperature is 26.25 °C and the Minimum is 11.18. The annual average rainfall of the city is 762 mm. April is the hottest month of the year (31.1°C), while December is the coldest month (7.6 °C). December is the driest month, while August is the rainy month (209.9 mm) of the year. The highest wind speed is registered in March (2.24 m/s) and the most common wind direction seen in the city is easterlies. Bishoftu town is among the largest urban center in Oromia Region in its population size, and indeed one of few towns in the country with a threshold population of over 100,000 (OUP, 2009). According to the Bishoftu town administration office, the number of registered population of the town as of 2017 is 213,689 which was 100, 114 as reported by the population and housing census of 2007 (CSA, 2007).

The town administrative area currently encompasses 9 urban Kebeles and 6 sub-urban Kebeles (Dejene B., 2018). Bishoftu town is one of the so-called railway towns of Ethiopia established following the construction of the Ethio-Djibouti railway in 1917, and the town can be visited at any time of the year, as cited by (Genet. A and Engdawork. A., 2020). Its tourist attractions are characterized by a cluster of volcanic crater lakes and popular spiritual sites that are found in and around the town. The town is surrounded by eight (8) crater lakes namely: Hora Har-sadi, Babogaya, Bishoftu, Kuriftu, Chalaleka, Kilole, Green, and Balbala Lake. Most of the lakes are well-developed with lodges, resorts, and spas all becoming tourist attractions. Endemic birds and plants in, a chain of mountains are also a good tourist attraction site of the city (Fenet, 2015).

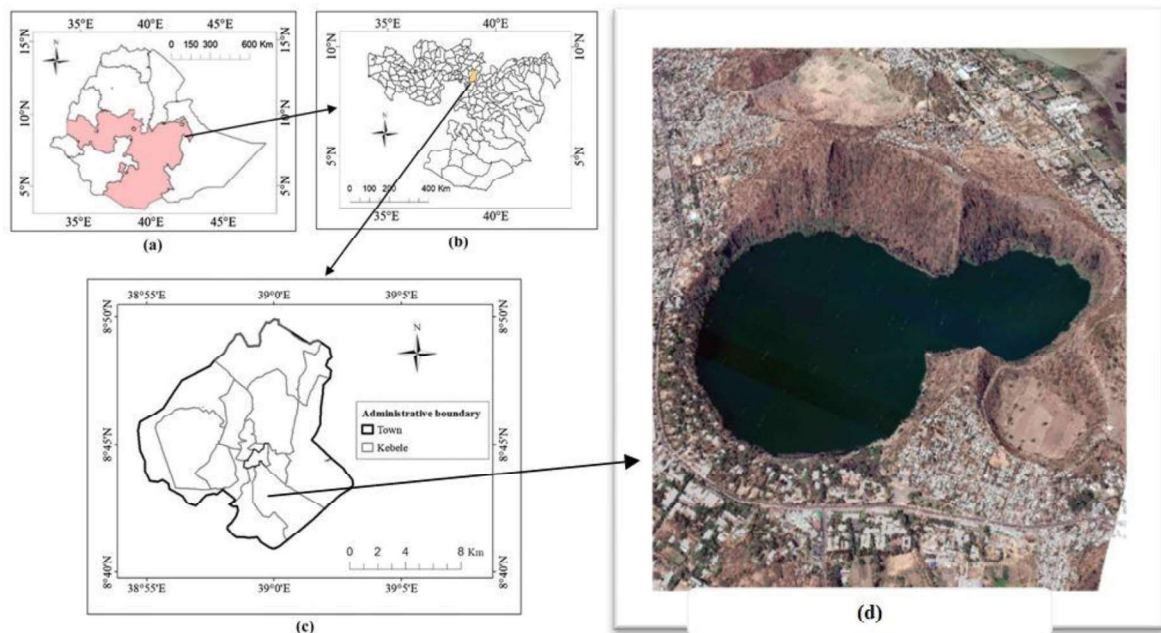


Figure 3.2: Location map of Hora Har-sadi Lake; Source: (Researcher Own, 2022)
 (a) Ethiopia, (b) Oromia Region (c) Bishoftu Town (d) Hora Har-sadi Lake

Irrecha is the other tourist attraction festival for the country in general and the town in particular (Geda. T, 2019). The ceremony, about Millions of People from different corners of the country and abroad, has been taking part in different cultural dresses on the ceremonial occasion of Irrecha “thanksgiving day. Irrecha is celebrating as an occasion for reciprocating Waqa’s past generosity in the form of providing praise, and also for offering communal prayer for the future. To celebrate the Irrecha rituals, the Oromo peoples gather in places with symbolic meanings such as a hilltop, a riverside, and under the shades of a big sacred tree (Bedassa. G, 2016). At the Thanksgiving Day celebration, Oromo people from different parts and other religious sects (non-Waqefana, Christianity and Muslims) come together, and celebrate with joy and happiness (Bedassa. G, 2016).



Figure 3.3: Ceremony of Irrecha prayers and praise, Source: (Researcher Own, 2022)

3.4. Population and Sampling Procedures

The case study covered a general investigation of pedestrian walkways and public open spaces, within the surrounding environment of Hora Har-sadi Lake, which were one of the cultural and tourist attraction sites of the town. Primary sources of information and data on the subject had been selected by purposive sampling and simple random sampling methods from residents, tourists, municipal officials, and experts. The Interview was undertaken with key informants of cultural community leaders like; Abba Gada and municipality officials. The researcher categorized the sample population into local communities of the town and key tourism stakeholders. To make the perception of residents more representative, a random sampling technique was employed to select the required total respondents from the nine kebeles, and close-ended questionnaires were distributed and analyzed by quantitative research method. Using purposive sampling, this work also examined the perception of tourists, the town's culture and tourism office workers, and municipal office professionals.

According to the Bishoftu town administration, of population of the town in 2017, was 213,689 which was 100, 114 as reported by CSA, 2007 as cited in (Adem K., June 2010). The town administrative area currently encompasses nine (9) urban Kebeles and six (6) sub-urban Kebeles (Dejene B., 2018). A sample size of randomly selected residents was calculated using a formula that Yamane (1967) as cited in (Singh and Masuku, 2014) provides a simplified formula to estimate sample sizes. By formula: $n = N / [1 + N (e)^2]$ residents in Bishoftu town who were directly or indirectly affected. Where n is the sample size, N is the population size, which was projected from the Ethiopian statistical population, and 'e' is the level of precision or confidence interval (0.05) (95% confidence level). Therefore, since it was difficult to conduct the whole census of population, according to the formula the sample size (n_0) was, $213,689 / [1 + 213,689(.05)^2] = 399.25 \approx 400$, from 213,689 population of the city to generalize from sample to population opinion.

3.5. Sources of data

The data was collected from primary and secondary sources. The primary data sources are combined from selected respondents by the questionnaire and interview methods. The researcher used both the questionnaire and the interview to check the validity of data will obtain from the respondents and clarify the data obtained by the questioner and through the interview. The secondary data was collected from different Scholar Articles, and published and unpublished documents. The data collected was qualitative, quantitative, or both at a time.

3.6. Data Collection Techniques and Tools

The study employed both qualitative and quantitative data collection methods. This study tried to demonstrate facts and findings by using primary and secondary sources regarding assessing improvement for the walk-able environment of the Hora Har-sadi Lake's surrounding area. The primary data related to the study area (spatial and non-spatial) was conducted by making physical observations, questionnaires conducted on users, and interviewing key stakeholders. The secondary data was obtained from published and unpublished sources of documents.

3.6.1. In-depth Interviews

In depth-interview was about informal discussions made with key stakeholders, key professionals, and people moving around the study area. This data source was collected in aiming to know the attitudes and reflections of the citizens on the functions, plans, and application of the pedestrian walkway system and public open spaces.

3.6.2. Questionnaire surveys

The questionnaire survey is intended to collect primary data on Pedestrians in the study area. It aims to collect data to assess the current safety problems to identify the main causes of sidewalk safety and POS problems and enhance the safety of sidewalks and emphasize proper public open spaces. The questionnaire used a closed-ended questionnaire; which are Sex, Age, Frequency, unsafe time (Irrecha festival day), Location of living place, and a change in the daily life/routine of the respondent's family. These had been conducted on subjects, by simple random sampling. Here special emphasis was given to the particular times of the day when the sample was taken, i.e. surveys have been conducted both on peak and off time. Furthermore, the deliberate focus was given to Hora Har-sadi Lake historical place areas.

3.6.3. Observation

Observation assumes that people's behavior is purposeful and can express deeper values and beliefs. Observation is useful for the researcher to get first-hand information on the participants and to record information as it is revealed (Creswell, 2011). Based on this the researcher used on-site evaluation by observation of selected sites within principles of improvements for walk-able environments to get firsthand information and record them as revealed. Some of the information collected through site observation includes areas and structures which show the identity of the lake concerning the cultural use and practice, existing public open spaces around the lake and type of access to the lake, and street-connectivity system, based on a prepared checklist.

There are different ways of conducting observation; participant and non-participant and overt and covert. Overt non-participant observation will be used in this study, because of the limited time frame.

3.7. Method of Data Analysis

Human factors related to walking are the subject of numerous studies in the literature. In general, the functional geometrical characteristic of infrastructure was related only to a small part of the pedestrians' behavior in urban areas. Understanding pedestrians' behavior in urban areas can lead to significant improvements in the design and planning of pedestrian roads and the traffic environment, and consequently in the comfort and safety of pedestrians (Tiziana C. et.al, 2020). The questionnaire was designed aiming to acquire socio-demographic data, walking aptitude data, and data related to the perception of the risk from the point of view of safety, comfort, and satisfaction. Each question allowed only one answer expressed through Rating scales or multivariate choice. Qualitative and quantitative methods of data analysis were administered to analyze the data that was collected from the field. The quantitative data analysis, descriptive statistics were used to describe the characteristics of the population group under study to describe the data in terms of mean and standard deviation.

Data gathered through field surveys, questionnaires, and interviews was interpreted and analyzed using software like MS-excel, and ArchGIS 10.5, AutoCAD, ArchiCad, MS-Excel, and Remote sensing software are used to analyze documents, digital images, mapping, and other data sources. In doing qualitative analysis based on evidence from data sources, theoretical and empirical literature review efforts were made to understand and correctly interpret the contents of the data. Interview made with government officials, concerning their opinions was analyzed using principles gained from literature.

Types	Description	Software's used
Content analysis	The data was processed and categorized into verbal data to classify, summarize, and organize it.	SPSS, Excel and Word 2016, GIS 10.5, AutoCAD 2016, were used to analyzing interviews, surveys, and videos).
Narrative analysis	The combined primary qualitative data was revised for the validity and quality of the information.	
Discourse analysis	The interviews and all forms of text data were analyzed.	
Frame-work analysis	Finally, formalization, identifying a thematic framework, coding, charting, mapping, and interpretation was employed.	

Table 3.1: Qualitative data analysis techniques; Source (Researcher Own, 2022)

The data like measurements, statics, and numerical data collected through census, questionnaires, and surveys have been analyzed quantitatively using SPSS, and Excel software to analyze and describe the data from; maps, diagrams, charts, graphs, text, Figures, and tables. Furthermore, the study used GIS 10.5 and AutoCAD 2007 software for working on the general spatial analysis of the study area. Moreover, Revit 2020 was used for 3D designs, and Microsoft Word Office 2016, PowerPoint 2016, and Lumion are used for documentation and presentation.

3.8. Data Presentation

The data collected from primary sources was presented through text, maps, tables, graphs, photographs, and charts. And the data collected from secondary sources is presented in graphics, texts, and maps. The results of those data were presented using software like ArchiCad 2018, AutoCAD 2016, ArchGIS 10.5, Lumion, and other software. The design proposal is also presented as a 2D map and 3D animation video and drawings.

3.9. Ethical Consideration

Research ethics is “concerned to which extent the researcher is ethically and morally responsible to research’s participants, the research sponsor, the general public and researcher’s own beliefs” (Kitchen and Tate, 2000). Anonymity and confidentiality are important issues here. When it comes to children and the disabled, the ethical and moral aspects are especially important to bear in mind (Scott, and James, 2000).

3.10. Validity and Reliability of the Data

For the validity and reliability of the information, the questionnaire was filled out by the respondents in front of the researcher and five additional data collectors. Since the study was conducted with different ideas from the interviews and field observations, the outcome of the study would reflect the actual situation of the study areas, thus the result of the study would be valid and reliable.

CHAPTER FOUR

4. RESULTS AND DISCUSSIONS

4.1. Results

4.1.1. Background of the Respondents

The principal walk-ability problems around the Hora Har-sadi area that the study has identified were listed in the literature review. Human factors related to walking are the subject of numerous studies in the literature and are increased compared with other studies on other road users. Understanding pedestrian behavior in urban areas can lead to significant improvements in the design and planning of pedestrian roads and traffic environment, and consequently in the comfort and safety of pedestrians. These points are used as a framework to analyze the existing site conditions. The Questionnaires and interviews are addressed to explore the historical background and walk-ability of urban elements in the area. Questionnaire survey was to explore, how society has perceived the walk-ability problems and the other was to enhance the society's need and culture in the desired development. A Judgmental survey sampling technique has been adopted for this study. It is based on familiarity with the festival activity, especially the current condition at the place. For the survey sample, four hundred (400) questionnaire respondents were examined. The questionnaire has nine (9) questions, which was designed aiming to acquire socio-demographic data, walking aptitude data, and data related to the perception of the risk from the point of view of safety, comfort, confusion (chaos), POS, side walkways, mode of the transport system, and type of development to assure publicness and cultural identity as the walk-able environment around the site. A sample of the questionnaire survey is found in the Appendix part.

Observation and field surveys focus on walk-ability activity regarding pedestrian walkways, public open spaces, and street connectivity around this historic lake. The other data was from the Bishoftu town's Administration; it was about the plan of the site, participators and stakeholders of the developmental plan, and appropriate planning strategies in the improvement of a walk-able environment for the site. Each question allowed only one answer expressed through Rate scales or multivariate choice. In particular, the Rate scale made it possible to express a judgment instead of the multivariate choice of selecting between two or more options. Section 1 of the survey focused on the evaluation of socio-demographic data i.e., gender, age, living area, and education status.

The investigated sample shows a higher percentage of men than women. Among the total number of 400 participants, 256 (64%) males and 144 (36%) females was participate in the questionnaire survey Table 4.1.

No	Sex	Frequency	Percent
1	Female	144	36%
2	Male	256	64%
	Total	400	100%

Table 4.1: Respondents' coverage with sex distribution; Source: Survey data

As shown below in Figure 4.1, among 400 respondents of the selected sample 38 % of them fall under the age group /20-30/ and the second highest coverage are 30-40 and 10-20 age groups and its coverage is 34 % and 13 % respectively out of the total respondent. The rest 12 % and 2% are 40-50, and above 50 years of age group respectively.

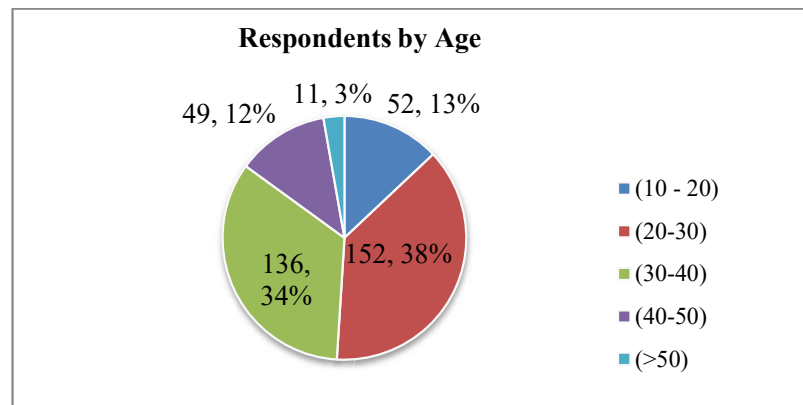


Figure 4.1: Age distribution of the sample; Source: Researcher survey data

Finding as per Figure 4.2 indicates looking into the place where the respondents live from the point of view of the area, which are from the selected samples 91% or 364 respondents were in Bishoftu town resident in which 15% or 62 respondents were living near Hora Har-sadi. It shows that responding to the current study was not difficult for them.

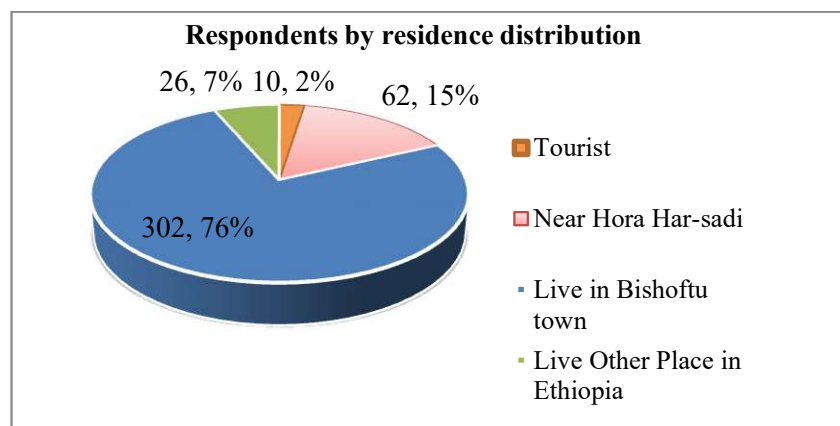


Figure 4.2: Respondents based on residence distribution; Source: Researcher survey data

Among the total selected sample respondents presented in Figure 4.3 below, 45 % was first-degree holder; respondent with diploma holder was 27%, and high school students and illiterate were 21% and 5% respectively. The rest 2% are above first-degree holders. The Figure shows that most respondents in the current study were not difficult for them to respond to since 95% of them are educated.

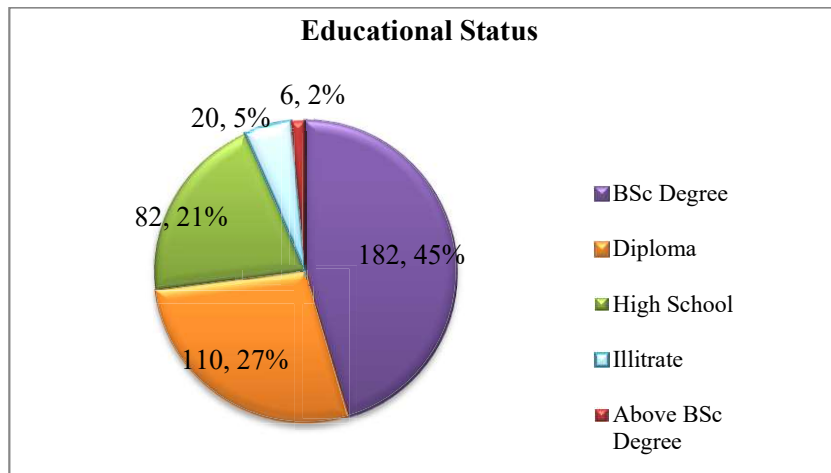


Figure 4.3: Education status distribution of the sample; Source: Researcher survey data

4.2. Existing Conditions of Streets and POS of Hora Har-sadi Area

4.2.1. Historical Background of the Lake

Hora Har-sadi lakeside is known as the Irrecha Festival place. The respondent discussed the detailed background of the Hora Har-sadi and Irrecha ceremony and mentioned Hora from Hora (Afan Oromo word to equivalent to the lake but not equal meaning). According to the interviewee, Hora is the type of water body that cattle drink at least annually for healing purposes and Oromo celebrate Irrecha once a year and is known for its property to heal the cattle because of its salty property. Bishoftu town, Oromia region including the country gets many benefits from the Irrecha festival which large people celebrate at Hora Har-sadi and source of income for tourists. Besides there may be a big challenge if no appropriate concern for the identity at the town level, as a society, and as well as government level on behalf of greeneries and plants planted around the lake area shall comply with the site and sustainability as respondent perception. The respondent criticizes the private and public sectors that were using the lakeside with proper handling and use of the water body while flourishing economically they didn't consider the identity as they were closed to the accessibility and publicness of to the water body. As discussed in the literature review there are a variety of stakeholders involved in the lakeside development process, playing different roles. They include provincial, regional, and local governments, as well as local communities, recreationists, and environmentalists

The selected study area is about 327.20 hectares, and out of this, the lake covers about 120.48 hectares. The site topography has steep slopes surrounding the lake, and there is a naturally depressed and hilly feature area. Hora Har-sadi is a volcanic crater lake that does not have a river or other source of water flow in it. It gates only rainwater and a small amount of flood from the surrounding land surface. As an interviewee replied, relatively the volume of the lake is decreasing than earlier. The existing conditions of the site are shown in Figure 4.4. Most of the site coverage is grassland, shrubs, forests, and agricultural land. This natural environment is rich in flora and fauna with attractive natural land features. The existing land use map is illustrated in Fig 4.5 and Table 4.2.

No	Name of Service	Area (Hectare)	Percent (%)
1	Residential	61.84	18.9
2	Urban Sprawl	30.92	9.45
3	Irrecha site	4.55	1.39
4	Governmental service	23.07	7.05
5	Protected construction site	16.69	5.1
6	Agricultural land	31.57	9.65
7	Grass and Forest land	38.09	11.64
9	Water body	120.48	36.82
	Total area	327.20	100.00

Table 4.2: Current land use; Source: (Researcher Survey Data, 2022)

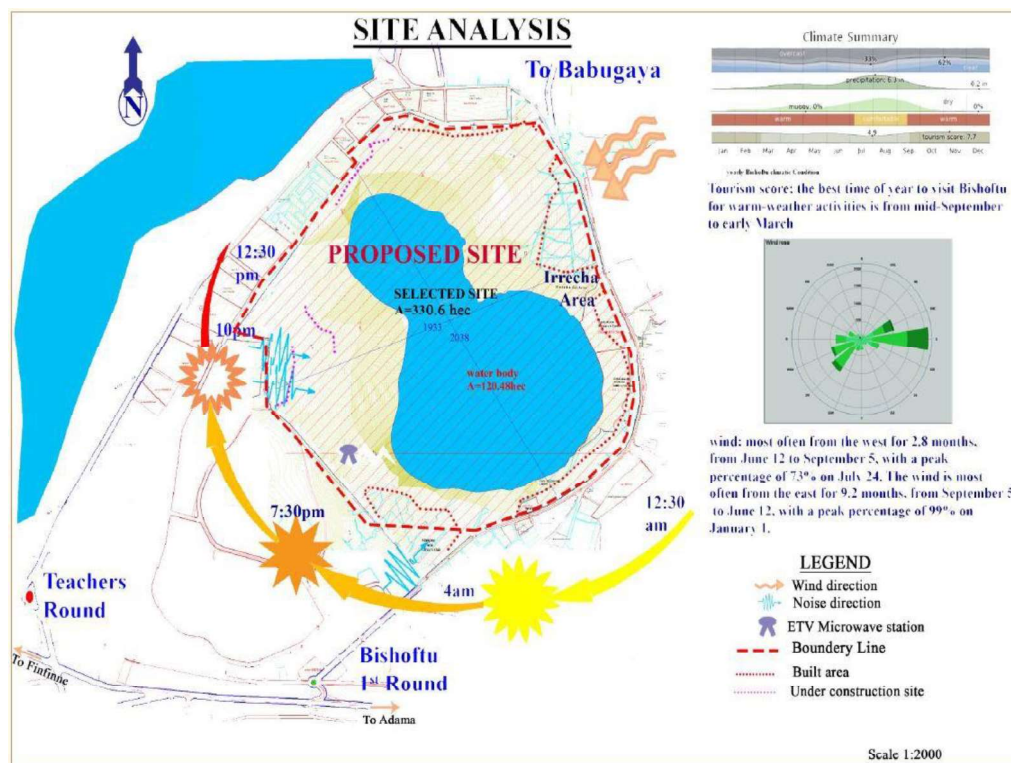


Figure 4.4: Existing site condition analysis; Source: (Researcher Own, 2022)

As shown in Fig. 4.5, from the existing Land use map, the letter R demonstrates residential land use, and it is more of a development beside the festival area. The other is at the entrance of the lake which is reserved for the Agricultural research center.



Figure 4.5: Existing land use map; Source: Google Earth image

Letter (P) - signifies investors started resort construction surrounding the lake, but now the town administration is protected in case of the land is proposed for the Oromo cultural development center at the regional level. The town starts preventing some under construction on the site such as resorts, real estate, and other recreational structures. Letter F- is farmer agricultural land and letter I is a substitutes for Irrecha celebration place. The area stated in table 4.2 is calculated online from Google Earth 2022. The detailed road area and other functions are accounts in enclosure land use.

4.2.2.The Existing Conditions of Streets

The asphalt road from the center of the town to the site is the only road, which circulates about the Lake like a ring; it starts from 1st roundabout and passes through the path beside Irrecha site and runs between Chalaleka Lake to teacher's square, then returned to the first roundabout. Fig. 4.3, the pink dot line shows asphalt road circulates to the Lake and the red dash line demonstrates footpaths. The main roads to the town are from three directions; these are from Finfinne, Adama, and Chafe Donsa. The second entrance is from Adama and it is not well-designed for pedestrians. The third entrance is from the direction of Chafe Donsa, the participants use horse, car, and foot transportation modes. This direction has a lower traffic flow than others.

The width of the main asphalt road from the First roundabout to Hora Har-sadi are 13m-23m, and the pedestrian walkways to both sides of the main road is 3m-5m wide accordingly, this implies that the width of the road and the side walkways are not consistent from beginning to the endpoint. There is narrow foot access to the lake, which is inadequate for the service. So it needs expansion and redesign to meet the features of a walk-able environment. On festival day vehicles are not permitted to the site, even so, the festival attendees do not follow their left side road while walking for celebration; this consequence creates a crowded and disorganized traffic flow. There is some footpath to the water body as illustrated in Fig. 4.3, red dot line, but it is not safe and comfortable for such a great festival ceremony. This condition needs to expand the width of the main road and side walkways, separating walking directions, and it needs road signs.

In Oromo culture, all-natural features have their value; also Irrecha is integrated with water bodies, seasons, hilltops, and different natural conditions. In the Irrecha celebration soak the bunch of grass into the water while celebrating. Therefore, access to the water body is needed for the celebration according to cultural activity. The area of access to the water body is small in length regarding the ratio of population to the area. The current distance along the lake access for celebration purposes is about 835.32 m long, fig. 4.3. To maximize the accessibility to the water body it needs both site expansion along the water periphery and proposing Alternative Street or a different street for an inlet and outlet for the Irrecha festival purpose as a walk-able street design.

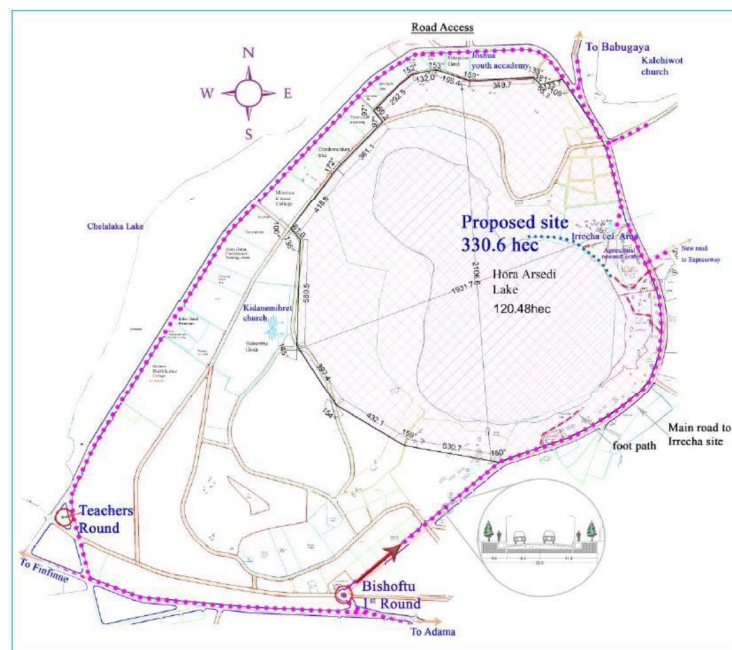


Figure 4.6: Existing street condition analysis; Source: (Own researcher, 2022)



Figure 4.7: Existing Streets (1, 2); walkways surrounding the lake (3, 4)

4.2.3. The Existing Public Open Spaces and Site Topography

Hora Har-sadi lakes were created by a volcanic eruption that formed land surrounding the lake on a steep slope (shown in Fig. 4.5,) which is extracted from the Ethiopian Digital Elevation Model (DEM) and shows the slope surrounding the area. The lake is surrounded by hills in all directions rather than south and southeast; this land feature prevents adequate access to the place. The Figure illustrates the site slope in percentage, which indicates topography of the site is not suitable for construction. Even though; to the southeast of the lake, at the top of the hill and beside the Irrecha site, it is suitable for resort development. This condition makes the investors start construction surrounding the lake, and now all construction condition is paused at the site. On the other side, in the south and southeast, the lake is fenced by residential buildings and an Agricultural research center (Governmental service). This is another challenge for the site to gate ample road access to the area. Now a time, the open space used for the Irrecha festival is used as the main access for the Lake celebration. According to Oromo culture, the entrance and exit of the cultural festival place should differ; even if you travel somewhere they say “change the way while you back to your home”. Consequently, according to the interview, they say it needs to propose well adequate entrance and exit or different inlet and outlet roads for the site.

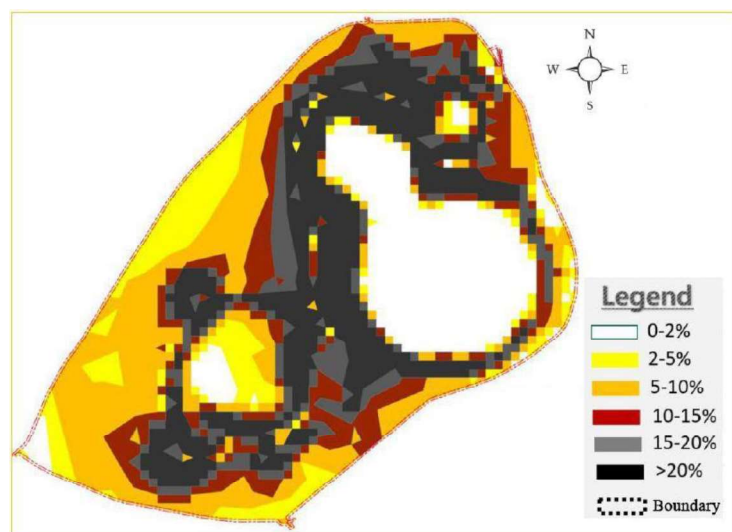


Figure 4.8: Site topography; Source: (Researcher Own, 2022)

The previous Irrecha celebration site is a 4.55-ha area. This includes the water celebration area, Abba Gada blessing, and Folle singing place. The existing open space is too small regarding the current population space occupancy, Figure 4.9 shows that, the current participant population is estimated to be about three to four million, but the space in use is 4.55 hectares. Especially while blessing time high traffic congestion occurs. At a blessing time, all participants came together in front of Abba Gada's stage. The existing space for the blessing is too small, which accounts for 1.03 hectares (Fig. 4.9, B).



Figure 4.9: Existing open space and road access; Source: Google Earth 2022 (edit own)

The Irrecha celebration site, in the revised 2019, Land Development Plan proposed additional space for the festival; the site has been given for resorts, although now a moment it changed to a public area, for the reason of preservation of the Irrecha historic site. The topography of the site is characterized by a steep slope that is difficult to serve for the desired function. That means it needs Landscape treatment to create a comfortable site. The total area in the new proposal for development accounts for 11 hectares, even though the site is extended it is not well enough for the Irrecha festival activities. The blessing is taken once around the Lake after the society congregates together and soaks the grass into the water. The conflict between the former government state and the protestor, on 2nd October 2016 at the Irrecha site, causes many life losses, because the site's pedestrian walkways were not constructed well and not wide enough, and as well there are no ample open spaces around the lake. This implies the site topography and the site area are not safe for the Irrecha festival activity. In addition, the form of the land is not comfortable for such a social congregation; its slope is too difficult for the disabled, elders, children, and women to walk.



Figure 4.10: Photo illustrating existing open spaces; Source; (Own researcher, 2022)

The pedestrian walkways around Abba Gada's stage and youth (Folle) singing place is somehow now constructed, although it is still not wide enough for such a huge number of Irrecha festival attendees since the width of the pedestrian side walkways is 2 m or less.



Figure 4.11: Existing walkways around Abba Gada stage; Source: (Own researcher, 2022)

The new town Land use map was revised in 2019 G.C, and it planned forest buffer, park and recreational, public service, and residential zone in the proposed site. The previous Land Use Map proposed residential at the south and southeast of the lake. As shown in Figure 4.12 number 4 is anticipated for park and recreational. In the revised land use map Irrecha festival site area is projected from 4.55 hectares to about 11 hectares, even though, the extended site slope is difficult to access for the festival activity (Figure 4.12).



Figure 4.12: Land use maps of the study area; Source: (Bishoftu town LUM, 2019 G.C)

As shown in Figure 4.12, number 3 indicates the residential zone. The typology of the residential building is about 90% a ground story made of wood and mud. Number 2 represents governmental service (Agricultural research center), as proposed in the new land-use map it is preserved under governmental service.

4.2.4. Walk-ability Assessment

The study area elements were examined with the walking environments, with the support of the results from the questionnaire surveys; to able to see whether this study area is suitable to develop in the future in improvement for a walk-able and sustainable area. Both the subjective studies of pedestrian protections about the infrastructures of the walking environment and the objective studies of the walking built environment results are analyzed as follows.

A. Subjective Dimensions of Pedestrian Protections on the Walk-ability

Subjective studies were executed to capture the pedestrian protections about infrastructures of the built environment by conducting a questionnaire survey.

The pedestrian's choice of transport mode

Sex	Frequency								Grand Total
	Yes				No				
	Health benefit	To save money	No safe taxi service	Total	High tempe rature	Not safe to walk	To save time	Total	
Female	21	37	28	86	15	22	21	58	144
Male	50	83	54	187	21	28	20	69	256
Total	71	120	82	273	36	50	41	127	400
	Percentage								
Female	5.25%	9.25%	7.0%	21.5%	3.75%	5.5%	5.25%	14.5%	36.0%
Male	12.5%	20.75%	13.5%	46.75%	5.25%	7.0%	5.0%	17.25%	64.0%
Total	17.75%	30.0%	20.5%	68.25%	9.0%	12.5%	10.25%	31.75%	100%

Table 4.3: Pedestrian's choice of transport mode by sex; Source: Researcher Survey data.

Table 4.3 describes the pedestrian choice of transport mode by sex. Among the conducted survey, 68.25.0% (46.75% men and 21.5% women) respondents chose walking as a transport mode. Thus, 273 (187 men and 86 women) are performing their day-to-day activities through walking. However, 31.750% (17.25% men and 14.5% women) respond that walking is not their choice of transport mode due to different reasons. Among these, 12.5% of them due to the walkways not safe to walk on, 10.25% of them using other transportmodes to save time and 9.0% of them due to high temperatures.

Age group	Frequency								Grand Total
	Yes				No				
	Health benefit	To save money	No safe taxi service	Total	High temperature	Not safe to walk	To save time	Total	
10-20	8	18	7	33	9	6	4	19	52
20-30	20	46	42	108	10	15	19	44	152
30-40	27	39	27	93	11	18	14	43	136
40-50	11	15	5	28	5	9	4	18	49
> 50	5	2	1	8	1	2	0	3	11
Total	71	120	82	273	49	46	32	127	400
	Percentage								
10-20	2.0%	4.5%	1.75%	8.25%	2.25%	1.5%	1%	4.75%	13.0%
20-30	5.0%	11.5%	10.5%	27.0%	2.5%	3.75%	4.75%	11.0%	38.0%
30-40	6.75%	9.75%	6.75%	23.25%	2.75%	4.5%	3.5%	10.75%	34.0%
40-50	2.75%	3.75%	1.25%	7.75%	1.25%	2.25%	1.0%	4.5%	12.25%
> 50	1.25%	0.5%	0.25%	2.0%	0.25%	0.5%	0%	0.75%	2.75%
Total	17.75%	30.0%	20.5%	68.25%	9.0%	12.5%	10.25%	31.75%	100%

Table 4.4: Pedestrian choice of transport mode by age group; Source: Survey data.

Table 4.4 describes that, among the conducted survey, 68.25% of respondents from each age group are using walking as a transport mode. Thus, respondents between age groups 20-30 (27.0%), 30-40 (23.25%), 10-20 (8.25%), 40-50 (7.75%), and above 50 (2.0%) years have a high percentage of commuting by walking respectively. However, 31.75% of respondents from each age group are not commuting through walking because of different reasons concerning the condition of the walking environment. Among the respondents, age groups 20-30 (11.0%), 30-40 (10.75%), 40-50 (4.5%), 10-20 (4.75%), and above 50 (0.75%) years have a high percentage of using other transport modes respectively.

Respondents walking behaviors by sex

Sex	Always	Frequently	Sometimes	Rarely	Never	Total
Female	35 (8.75%)	33 (8.25%)	43 (10.75%)	27 (6.75%)	6 (1.50%)	144 (36.0%)
Male	53 (13.25%)	71 (17.75%)	73 (18.25%)	56 (14.0%)	3 (0.75%)	256 (64.0%)
Total	88 (22.00%)	104(26.0%)	116 (29.0%)	83(20.75%)	9(2.25%)	400 (100%)

Table 4.5: Respondents walking behavior by sex; Source: Survey data.

Table 4.5 describes from a total of 64.00% male and 36.00% female respondents, male pedestrians have a high percentage of walking experiences. Among 64.00% of male respondents, 18.25% of them walk sometimes, 17.75% of them walk frequently, 14.00% of commute by walking rarely 13.25% of them commutes walking always, and 0.75% of them never commute walking in descending order respectively.

Among 34.00% of female respondents, 10.75% of them commute by walking sometimes, 8.75% of them use walking always, 8.25% of the walk frequently, 6.75% of them commute by walking rarely and 0.75% of them never commute walking in descending order respectively.

Respondent's walking behaviors by Age group

Age group	Always	Frequently	Sometimes	Rarely	Never	Total
10-20	16 (4.0%)	15 (3.75%)	11 (2.75%)	10 (2.5%)	0(0.0%)	52 (13.0%)
20 -30	29 (7.25%)	37 (9.25%)	53 (13.25%)	32 (8.0%)	1 (0.25%)	152(38.0%)
30 -40	31 (7.25%)	41 (10.25%)	28 (7.0%)	34 (8.5%)	2 (0.5%)	136(34.0%)
40 -50	11 (2.75%)	8 (2.0%)	22 (5.5%)	6 (1.50%)	2(0.5%)	49 (12.25%)
>50	1 (0.25%)	3 (0.75%)	2 (0.50%)	1 (0.25%)	4 (1.00%)	11(2.75%)
Total	88 (22.0%)	104 (26.0%)	116 (29.0%)	83(20.75%)	9(2.25%)	400(100%)

Table 4.6: Respondents walking behavior by age group; Source: Survey data.

Table 4.6 describes that, respondents were composed of different age groups ranging between the 10-20 age group 13.0% respondents, the 20-30 age group 38.0% respondents, the 30-40 age group 34.0% respondents, and the 40-50 age group 12.25% respondents and above 50 age group 2.75% pedestrians protections conducted. Among the total of 400 respondents from each age group, pedestrians between age groups 30 -40, 20-40, 10-20, 40-50, and above 50 years have a high percentage of walking behavior in descending order respectively.

Respondent's protections on safety and comfort about the walkways amenities

Sex	No						Total
	Lack of considerations to disables	Lack of green infra-structure and shading trees	Lack of properly installed poles and streetsigns	Lack of buffer	On sidewalk parking and street vendors	Unpleasant open ditch	
Female	12 (3.0%)	51 (12.75%)	16 (4.0%)	32 (8.0%)	24 (6.0%)	9 (2.25%)	144(36.0%)
Male	20 (5.0%)	87 (21.75%)	25 (6.25%)	63(15.75%)	39(9.75%)	22(5.75%)	256(64.0%)
Total	32 (8.0%)	138 (34.5%)	41 (10.25%)	95(23.75%)	63(15.75%)	31(7.75%)	400(100%)

Table 4.7: Respondent's protections on walkway facilities by sex; Source: Survey data.

Table 4.7 shows that, among the 64% male and 36% female respondents, they all stated that they are not feeling safe and comfortable while walking due to different reasons for the walkway facilities. Of 64% of male respondents, 21.75% of them due to lack of green infrastructures and shading trees, 15.75% of them due to lack of buffer from the vehicle way, and 9.75% of them due to on-street parking and street vendors were the majors among the reasons respectively.

Correspondingly, from 36% of female respondents, 12.75% of them were due to lack of green infrastructures and shading trees, 8.0% of them due to lack of buffer from the vehicle way and 6.0% of them due to on-street parking and street vendors were the majors among the reasons respectively.

Age group	No						Total
	Lack of considerations to pedestrians with disables	Lack of green infrastructure sand shading trees	Lack of properly installed poles and street signs	Lack of buffer	On sidewalk parking and street vendors	Unpleasant open ditch	
10-20	7 (1.75%)	20(5.0%)	4(1.0%)	6(1.5%)	10(2.5%)	5(1.25%)	52 (13.0%)
20-30	12 (3.0%)	40 (10.0%)	13(3.25%)	48(12.0%)	24(6.0%)	15(3.75%)	152 (38.0%)
30-40	8 (2.0%)	60 (15.0%)	16(4.0%)	24(6.0%)	21(5.25%)	7 (1.75%)	136 (34.0%)
40-50	3 (0.75%)	16 (4.0%)	6(1.5%)	14(3.5%)	7(1.75%)	3(0.75%)	49 (12.25%)
> 50	2 (0.5%)	1 (0.3%)	2(0.5%)	4(1%)	0 (0%)	1(0.3%)	11 (2.75%)
Total	32 (8.0%)	138 (34.5%)	41(10.25%)	95(23.75)	63(15.75%)	31(7.75%)	400(100%)

Table 4.8: Respondent's protections about the walkway facilities by age group

Table 4.8 illustrates, among 400 respondents from all age groups, they all stated that they are not feeling safe and comfortable while walking due to different reasons for the walkway amenities. Respondents from the 20-30 age group 38.0%, from 30-40 age group 34.0%, from 10-20 age group 13.0%, from 40-50 age group 12.25% and above 50 age group 2.75% respondents had stated that lack of green infrastructures and shading trees, lack of buffer from the vehicle away and on-street parking and street vendors were the major's reasons respectively.

Respondent's Protections on the Safety of road crossing

Sex	No				Total
	High speed of cars	Lack of traffic light	Not safe for crossing	Parked cars block the view of traffic	
Female	37 (9.25%)	28 (7.0%)	44 (11.0%)	35 (8.75%)	144 (36.0%)
Male	59 (14.75%)	63 (15.75%)	83 (20.75%)	51 (12.75%)	256 (64.0%)
Total	96 (24.0%)	91 (22.75%)	127 (31.75%)	86 (21.5%)	400 (100%)

Table 4.9: Respondent's protections on the safety of the street crossing by sex;

Source: (Researcher survey data)

Table 4.9 describes, all the respondents stated that they do not feel safe crossing the streets due to different reasons for the street crossing facilities. Among 64.0% of male, 20.75% of them due to they do not feel safe crossing the street, 15.75% of them due to lack of traffic lights, 14.75% of them due to the high speed of cars at the crossing, and 12.75% of them due to the parked cars blocks the traffic view where the major's reasons respectively.

Correspondingly, of 36.0% of female respondents, 11.0% of them due to they do not feel safe crossing the street, 9.25% of them due to the high speed of cars at the crossing, 8.75% of them due to the parked cars blocking the traffic view, and 7.0% of them due to lack of traffic light where the major reasons respectively.

Age group	No				Total
	High speed of cars at the crossing	Lack of traffic lights	Not safe for crossing	Parked cars block the view of traffic	
10-20	12 (3.0%)	9 (2.25%)	22 (5.5%)	9 (2.25%)	52 (13.0%)
20-30	34 (8.5%)	32 (8.0%)	53 (13.25%)	33 (8.25%)	152 (38.0%)
30-40	31 (7.75%)	38 (9.5%)	36 (9.0%)	31 (7.75%)	136 (34.0%)
40-50	16 (4.0%)	9 (2.25%)	6 (1.6%)	13 (3.4%)	49 (12.25%)
Above 50	3 (0.75%)	3 (0.75%)	3 (0.75%)	2 (0.5%)	11 (2.75%)
Total	96 (24.0%)	91 (22.75%)	127 (31.75%)	86 (21.5%)	400 (100%)

Table 4.10: Respondent's protections on the safety of the crossing by age group

Table 4.10 describes that, among 400 respondents from all age groups, they all stated that they are not feeling safe crossing the streets due to different reasons for the road crossing amenities. Respondents from the 20-30, 30-40, 10-20, 40-50, and above 50 age groups specified that 31.75% of them due to the crossing are not safe to cross, 24.0% of them due to a high speed of cars at the crossing, 22.75% of them due to lack of traffic light, and 21.5% of them due to parked cars blocks the traffic view are the major reasons regarding the street crossing respectively.

Respondent's walking behavior on traffic rule

Sex	Frequency									Grand Total
	Yes					No				
	Cross at the crossing	Stoop & look left and right before crossing	To keep me from danger	To respect the rule	Total	Lack of safe crossing	Lack of street signs	Lack of traffic light	Total	
Female	9	25	29	21	84	22	26	12	60	144
Male	19	45	74	33	171	58	27	20	105	256
Total	28	70	83	54	235	80	53	32	165	400
	Percentage									
Female	2.25%	6.25%	7.25%	5.25%	21.0%	5.5%	6.5%	3.0%	15.0%	36.0%
Male	4.75%	11.25%	13.5%	8.25%	37.75%	14.5%	6.75%	5.0%	26.25%	64.0%
Total	7.0%	17.5%	20.75%	13.5%	58.75%	20.0%	13.25%	8.0%	41.25%	100%

Table 4.11: Respondents walking behavior on traffic rule by sex

Table 4.11 describes the respondents walking behavior on traffic rules by sex. From a total of 400 respondents, 58.75% of the 37.75% male and 21.0% of females are commuting walking by obeying the traffic rules for different reasons. Thus, 20.75% of them to keep from danger, 17.5% of them stop and look left and right before crossing, 13.5% of them respect the traffic rule and 7.0% of the cross the road crossing are the major reasons for both sex categories respectively. But, 41.25% of respondents 26.25% male and 15.0% females commute without obeying the traffic rule because of different reasons. So, 13.25% them lack street signs, 8.0% of them lack traffic lights and 20.0% of them unsafe street crossing are the major reasons respectively for box sex categories to not follow the traffic rules.

Age group	Frequency									Grand Total
	Yes					No				
	Cross at the crossing	Stoop & look left and right before crossing	To keep me from danger	To respect the rule	Total	Lack of safe crossing	Lack of street signs	Lack of traffic light	Total	
10-20	3	11	8	6	28	12	7	5	24	52
20-30	14	20	34	21	89	25	23	15	63	152
30-40	5	29	27	17	78	30	17	11	58	136
40-50	4	9	11	8	32	11	5	1	17	49
Above 50	2	1	3	2	8	2	1	0	3	11
Total	28	70	83	54	235	80	53	32	165	400
	Percentage									
10-20	0.75%	2.75%	2.0%	1.5%	7.0%	3.0%	1.75%	1.25%	6.0%	13.0%
20-30	3.5%	5.0%	8.5%	5.25%	22.25%	6.25%	5.75%	3.75%	15.75%	38.0%
30-40	1.25%	7.25%	6.75%	4.25%	19.5%	7.5%	4.25%	2.75%	14.5%	34.0%
40-50	1.0%	2.25%	2.75%	2.0%	8.0%	2.75%	1.25%	0.25%	4.25%	12.25%
Above 50	0.5%	0.25%	0.75%	0.5%	2.0%	0.5%	0.25%	0%	0.75%	2.75%
Total	7.0%	17.5%	20.75%	13.5%	58.75%	20.0%	13.25%	8.0%	41.25%	100%

Table 4.12: Respondent walking behavior on traffic rule by age group

Table 4.12 shows, among the conducted survey, 58.75% of respondents from each age group are commuting walking by obeying the traffic rules. Thus, respondents between 20-30, 30-40, 40-50, 10-20, and above 50 age groups have a high percentage of commuting by obeying traffic rules respectively.

However, 41.25% of respondents from each age group are not commuting by obeying the traffic rules. Thus, respondents between; 20-30, 30-40, 10- 20, 40-50, and >50 age groups are not commuting by obeying the rules respectively.

Respondent's recommendations for the sidewalk to be created

	Frequency								
Sex	Buffering sidewalks	Improving surface material	Providing green infra-structures	Providing separated parking	Providing shading trees	Providing sitting areas	Providing street lights	Widening width of the sidewalks	Total
Female	32	13	17	14	24	8	14	22	144
Male	59	25	33	23	58	12	11	35	256
Total	91	38	50	37	82	20	25	57	400
	Percentage								
Female	8.0%	3.25%	4.25%	3.5%	6.0%	2.0%	3.5%	5.5%	36%
Male	14.75%	6.25%	8.25%	5.75%	14.5%	3.0%	2.75%	8.75%	64%
Total	22.75%	9.5%	12.5%	9.25%	20.5%	5.0%	6.25%	14.25%	100%

Table 4.13: Respondent's recommendations for the sidewalks by sex;
As Table 4.13 illustrates a total of 68% of male and 36% of female respondents stated their point of view for the sidewalks to be created. Among the forwarded recommendations with a high percentage from both sexes, categories are: 22.75% of them buffering the sidewalks, 20.5% of them providing shading trees, 14.25% of them widening the width of the sidewalks and 12.5% of them providing green infrastructures are the major pedestrian improvement ideas for the sidewalks respectively.

	Frequency								
Age group	Buffering the sidewalks	Improving the surface material	Providing green infra-structures	Providin separated parking	Providing shading trees	Providing sitting areas	Providing streetlights	Widening the width of the sidewalks	Total
10-20	17	4	5	4	10	4	3	5	52
20-30	31	15	20	17	29	5	9	26	152
30 -40	33	12	14	12	28	8	10	19	136
40 -50	8	6	9	4	13	2	2	5	49
>50	2	1	2	0	2	1	1	2	11
Total	91	38	50	37	82	20	25	57	400
	Percentage								
10-20	4.25%	1.0%	1.25%	1%	2.5%	1.0%	0.75%	1.25%	13.0%
20-30	7.75%	3.75%	5.0%	4.25%	7.25%	1.25%	2.25%	6.5%	38.0%
30-40	8.25%	3.0%	3.5%	3.0%	7.0%	2.0%	2.5%	4.75%	34.0%
40-50	2.0%	1.5%	2.25%	1.0%	3.25%	0.5%	0.5%	1.25%	12.25%
Above 50	0.5%	0.25%	0.5%	0.0%	0.5%	0.25%	0.25%	0.5%	2.75%
Total	22.75%	9.5%	12.5%	9.25%	20.5%	5.0%	6.25%	14.25%	100%

Table 4.14: Respondent's recommendations for the sidewalks by age; Source: survey data.

As Table 4.14 illustrates; the respondents from each age group have forwarded recommendations for the sidewalks to be created. Buffering the sidewalks 22.75%, providing shading trees 20.5%, Widening the width of the sidewalks 14.25%, Providing green infrastructures 12.5%, and improving surface material 9.5% is the major recommendation for respondents between, 20-30, 30-40, and 10- 20 age groups respectively in descending order. But for 40-50 and above 50 age group respondents, providing shading trees, green infrastructures, and sitting areas are the most forwarded recommendations respectively.

B. Objective Dimension Analysis of the Walk-able Environment

Objective studies were executed to audit the built walking environment by conducting a field survey through checklists and observations. The walk-ability of the built environment of the Hora Har-sadi Lake area sidewalks analysis was executed by adopting the walk-ability checklist guidance of the ‘Pedestrian and Bicycle Safety Team, Washington, DC’. Thus, the Rating Scale for the attributes is the average score of each walking environment element that describes the situation of the Hora Har-sadi walkway. The average score from the roundabout to the AASTU Veterinary Collage is okay but needs a lot of work, from the collage to Lake; the sidewalk is a disaster to walk.

Element	Features to Check	Context								Grand Average Score
		Right side			Rating Scale	Left side			Rating Scale	
		Yes	No	Need Repa		Yes	No	Need Repa		
Sidewalks	Have no street furniture (sittings, traffic lights, street lights, dustbins)	✓			2	✓			2	2.42
	Sidewalks are blocked by overgrown landscaping, poles, signs, plants, vehicles, etc.	✓		✓	2	✓		✓	3	
	The sidewalk is not continuous	✓			2	✓			3	
	The sidewalk is not wide enough (people cannot easily walk together side-by-side)	✓			2		✓	✓	3	
	Have no buffer between pedestrian and vehicle roadway that separate sidewalks from the street	✓			2		✓		2	
	Have no planted shade street trees	✓			3	✓			3	
Total Score					13				16	
Average Score					14.5					

Table 4.15: Sidewalks condition analysis; Source: Researcher survey data.

Table 4.15 and Figure 4.13 shows the condition of the Hora Har-sadi sidewalks by examining the walking environment features in rating scores. Hence, both the right and left side walkways have scored 13 and 16 points respectively, both sides of the walkways have an average score of 2.42 points which implies that the sidewalks are a disaster for walking.



Figure 4.13: Site pictures of the sidewalk conditions; Source: (Own Researcher, 2022)

Element	Features to Check	Context				Average Score
		Yes	No	Need Repair	Rating Scale	
Street Crossing	The road is too wide to cross easily		✓		4	2.43
	Traffic signals do not give enough time to cross the street.	✓			2	
	There is no crosswalk or it is poorly marked.	✓		✓	3	
	I have to walk too far to find a safe, marked crosswalk.	✓			2	
	The intersection does not have a curb ramp for carts, wheelchairs, strollers, walkers, etc.	✓			2	
	Parked cars block the view of traffic	✓			2	
	Does the street have pedestrian crossing signals?	✓		✓	2	
Total Score					17	

Table 4.16: The street crossing features condition; Source: Researcher survey data.



Figure 4.14: Pictures illustrate the street crossings conditions;

Table 4.16 and Figure 4.14 illustrate the pedestrian crossing condition of Hora Har-sadi Lake Street. The crossing is poorly marked, has no curb ramp for wheelchairs, parked cars block the traffic view, and lacks pedestrian crossing signals. Hence, the street crossing features from both sides have scored 17 points an average score of 2.43, which implies that the pedestrian crossing needs some work for crossing.

Element	Features to Check	Context				Average Score
		Yes	No	Need Repair	Score	
Safety and Comfort	Vehicle speeds are too fast		✓		4	3
	There is too much traffic	✓		✓	3	
	Street lights are few or not present	✓		✓	3	
	Unleashed dogs or other loose intimidating animals are present		✓	✓	4	
	There is not enough shade from trees	✓			3	
	There are few or no street trees or other landscaping	✓			3	
	There are vacant lots or rundown buildings	✓			2	
	The street has benches and places to rest		✓		2	
Total Score					24	

Table 4.17: Safety and comfort of the street for pedestrians; Source: survey data



Figure 4.15: Pictures describe the safety of the street;
Source (Own Researcher, 2022)

Table 4.17 and Figure 4.15 illustrate the safety and comfort of the pedestrian crossing situation of Street to Hora Har-sadi Lake. The walkways from both sides are not safe and comfortable for pedestrians due to; the lack of shade trees, poor surface material, the level of the sidewalks being below the level of the vehicle way, lack of a buffer between the sidewalks and vehicle way, parking on the sideways, lack of traffic signal and high speed of cars. Thus, the safety and comfort of the street for pedestrians from both sides have scored 24 points, with an average score of 3 which implies that the walkways need some work for walking.

Element	Features to Check	Context				Average Score
		Yes	No	Need Repair	Score	
Utilities	Good drainage, away from entrances and walkways		✓	✓	3	3
	Do utilities have visual and environmental quality?		✓	✓	3	
	Do utility lines installed appropriately?		✓	✓	3	
Total Score					9	

Table 4.18: Utility analysis of Hora Har-sadi area streets; Source: (Researcher survey data)



Figure 4.16: Pictures describe the utility of the site; Source (Own Researcher, 2022)

Table 4.18 and Figure 4.16 illustrate the situation of utilities along both sides of Hora Har-sadi Lake Street. Thus, the utilities from both sides of the street are not pedestrian-friendly due to; open and unpleasant smell ditches, improperly installed utilities, lack of visual and environmental qualities, and physically obsolete electric power. Hence, the utility condition of the street from both sides has scored 9 points; with an average score of 3 points which implies that the utilities need some work for pedestrians for walking.

Element	Features to Check	Context								Grand Average Score
		Right side			Score	Left side			Score	
		Yes	No	Need Repair		Yes	No	Need Repair		
On-street and Off-street parking	Does the roadway have on-street parking?	✓			2		✓		2	2
	Have a buffer between on-street parking and the roadway?		✓		2		✓		2	
	Do they park cars on the sidewalks?	✓			2	✓			2	
	Do the off-street parking hindering the continuity of sidewalks?	✓			2	✓			2	
Total Score					8				8	
Average Score					8					

Table 4.19: On-street and off-street parking analysis; Source: (Survey data)



Figure 4.17: Site pictures describe the situation of parking; Source (Own Researcher, 2022)

Table 4.19 and Figure 4.17 illustrate the parking condition of the site that, the street lacks proper on-street and off-street parking, hence, vehicles are parked on sidewalks along both sides of the street. However, both the right and left side parking situations have scored 8 points, and both sides of the walkways have an average score of 2 points which implies that the sidewalks are blocked by vehicles and it is a disaster for walking.

Element	Features to Check	Context										Grand Average Score
		Right side				Score	Left side				Score	
		Yes	No	Need Repair	Yes		No	Need Repair				
Street Amenities	Do the sidewalks have green elements?	✓		✓	3		✓		3	2.5		
	Do the available plants complement the built environment?		✓		2				2			
	Does the street have street lights?	✓		✓	3	✓		✓	3			
	Do the sidewalks have sittings and dust bins?		✓		2		✓		2			
Total Score					10					10		
Average Score					10							

Table 4.20: The site street amenity analysis; Source: (Researcher survey data)

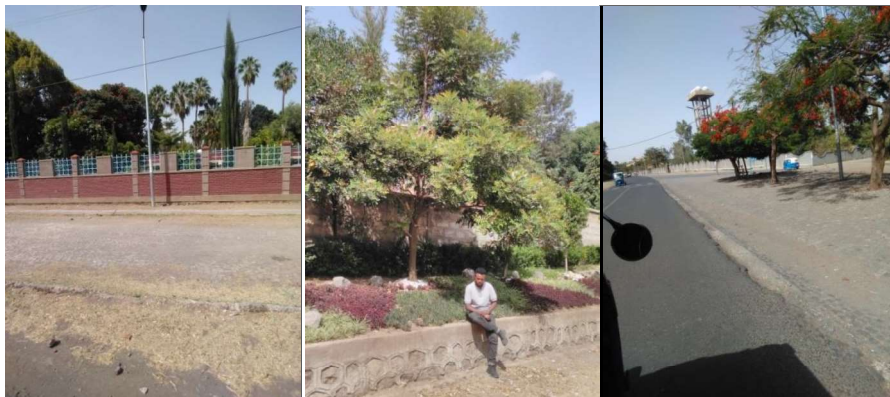


Figure 4.18: The situation of street amenities; Source (Researcher, 2022)

Table 4.20 and Figure 4.18 illustrate the street amenity situation of Hora Har-sadi Lake Street. The walkways are not pedestrian and environmentally friendly due to; a lack of green elements, street lights, shading trees, sitting areas, dust bins, signage, and buffers. However, both the right and left side street amenity situations have scored 10 points, both sides of the walkways have an average score of 2.5 points which implies that the sidewalks lack street amenities and it is a disaster to pedestrians for walking.

Element	Features to Check	Context				Average Score
		Yes	No	Need Repair	Score	
Land Use	• Are there Hotels, POS or public buildings to activate the site?		✓		2	2
	• Does the land use and the community's culture linked within each other?		✓		2	
	• Is it active and attractive area for publicness?		✓		2	
Total Score					6	

Table 4.21: Land use along the site; Source: (Researcher survey data)

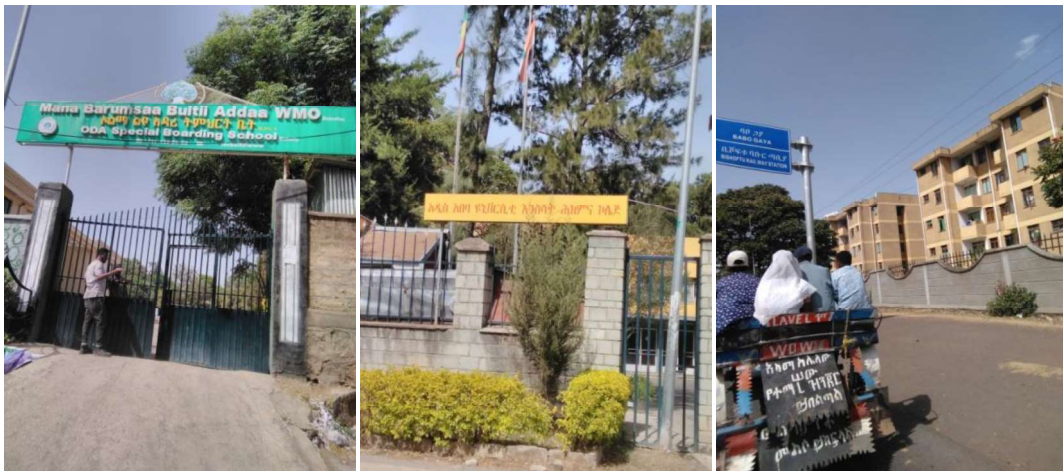


Figure 4.19: The situation land use; Source: (Field Survey data, 2022)

Table 4.21 and Figure 4.19 describe the land use conditions along both sides the street to Hora Har-sadi Lake. Thus, the land use from both side of the street are not pedestrian-friendly due to; site has not got any development for the festival services like; hotels, guest houses, cultural public buildings, public open spaces and other recreational area. Hence, the land use along both side have scored 6 points, with average 2 points, which implies that the site have not properly planned land use for such public area and it is not active and attractive area, so it is a disaster to pedestrians for walking.

Element	Features to Check	Context				Average Score
		Yes	No	Need Repair	Score	
Building along the site	Do buildings create a sense of human scale?		✓		2	2
	Do the buildings interact with the sidewalks?		✓		2	
	Support accessibility to buildings?		✓		2	
	Do the buildings cast shadow to the sidewalks?	✓		✓	2	
Total Score					8	

Table 4.22: Building orientation along the site; Source: (Researcher survey data)

Table 4.22 and Figure 4.20 illustrate the building orientation along both sides of Hora Har-sadi Lake Street. Thus, the orientation of the building from both side of the street are not pedestrian- friendly due to; lack to create sense of human scale, the building does not interact with sidewalks and cast shadow away to the sidewalks. Hence, the building orientation along both side have scored 8 points, with average 2 points, which implies that the buildings are not on the right orientation and it is a disaster to pedestrians for walking.



Figure 4.20: Site pictures that describe the building orientation; Source: (Survey data, 2022)

4.2.5. The functional purpose of Hora Har-sadi Lake

Besides the field observation tried to identify characteristics of the site, except Oda tree no structures show the identity of the site concerning Irrecha as the site is the place of the Irrecha Festival. Field observation found a tree called “Oda”, as per Figure 4.15 below which is one of the trees that show the identity of Oromo and exotic. The Oda tree is big and functionally characterized by its shade and is where Oromo elders have met and celebrate the Irrecha festival. The tree is somehow protected by the small retaining wall. This indicates further structures and plants are needed to enhance the identity of the site.



Figure 4.21: Functional characteristics of the lake; Source: (Own Researcher, 2022)

According to the questionnaire surveyed sample shown in Figure 4.16, 47% uses the site for the Irrecha festival only while 16% use it for fishing purpose. The second highest percentage (35%) uses it for recreational. 2% of the respondent only use it as cattle's drinking water. This Figure shows almost half of the city residences use only for the Irrecha festival and recreational purposes or 98% are used for cultural and other purposes.

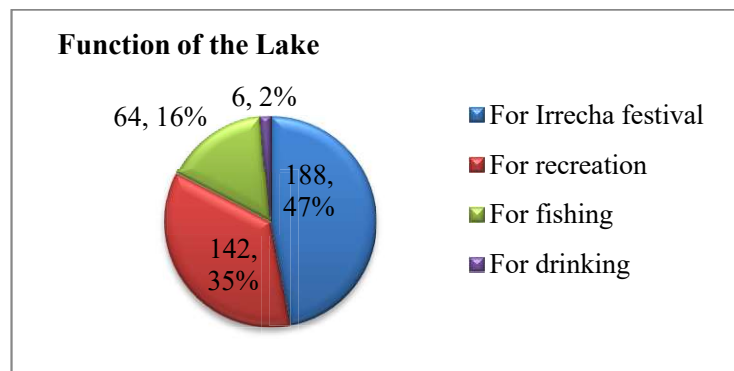


Figure 4.22: Sample response about the usage of the lake; Source: (survey data, 2022)

4.2.6. The future development to be along the Lakeside

From previous sections and the questionnaire survey, noticed that the lakeside may face a big challenge if proper land use with a clear identity and clear buffer zone is not planned. Based on different scholars discussed in the literature review Land use planning is an important tool to guide development and to bring social, economic, and environmental development. But, lakeside development varies based on the characteristics of the site and cities (Dong, 2004). As Cliff (2003) advises it is dangerous to try to transfer design concepts that worked at one place or time or one culture to a different place and culture through time. Based on identified characteristics and identified problems planning and design responses needed are analyzed as follows.

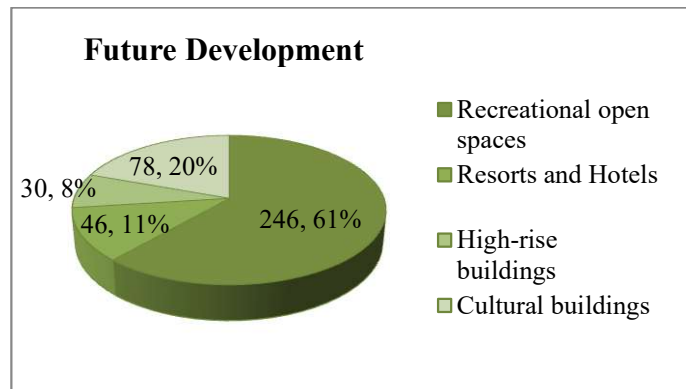


Figure 4.23: Opinions for future development along the lake;
Source: (Researcher Survey Data, 2022)

Development Preference respondents in Figure 4.23 above, out of the total respondents 61% preferred that the kind of development along the lake should be well if the land is allocated for open recreational centers. The second digit 20% is those who gave their opinion about the lakeside development being cultural buildings, thirdly 11% of residents hope that if the site is developed with buildings like resorts and hotels reflecting cultural use have importance for ecotourism of the city. Contrary 8% preferred the kind of development to be high-rise buildings reflecting the cultural identity of the city for tourism and others. From graphical analysis, Fig. 4.23 the study find out, the current land allocation for high raising buildings is not supported by the resident respondents, since they gave their opinions and preferences as evaluated above.

4.3. The existing pedestrian walkways-connectivity system

From the questionnaire surveys, more than half of the interviewees in the study area feel no satisfaction concerning the connection of the pedestrian network to the surrounding environment. They think that there is not enough pedestrian access connecting Hora Har-sadi Lake to the surrounding community. Positively correlating with the degree of connectivity, small block sizes usually produce compact urban forms. Smaller and shorter blocks fit the scale of walking. The study area clearly shows that the street segments that are in poor condition are forming a pattern of network. Most of the roads are full of constraints. From the Field surveys, more than half of the interviewees in the study area feel unsatisfactory with the connection of the pedestrian network to the surrounding environment. The use of pedestrian paths in the area was not well supported by the people since nearly all of the interviewees in the surveys will use the pedestrian path in the area to travel within the Hora Har-sadi and to the surrounding area. However, these areas are in size and need to have interesting activities along them to enhance the walking experience.

4.4. The Design Guideline Strategies in Improvement for Walk-able Environment

The study tried to gather data regarding the accessibility of walk-able environments of urban land allocation strategies and policies but Ethiopia did not prepare a special investment policy, strategies, and guidelines concerning walk-able environments until this study were conducted. The data obtained from the shores of land of Bishoftu town, was allocated based on the regional and national land policy and investment policy. According to the Land Administration and Preparation Work Process of Bishoftu municipality the lakefront land was allocated in previous regimes. Some of the interviewers respond that Hora Har-sadi Lake surrounding was largely allocated to governmental institutions, and there was no policy regarding the lakeside development and how to use the lakeside for cultural use or open to the public. The others of them respond that there was no local development plan prepared particularly for the Hora Har-sadi area. Some responded that the city administration is highly concerned to retain the lakeside for cultural use, and opening it to society by defining the buffer zone of the lakeside. Since there was no clear boundary, proper land use, zoning, and clear buffer zone of the Lake; only the water body and natural landscape show the identity of the site and along the waterfront, some area is now not accessible for cattle to drink the Lake.

4.4.1. Stakeholder's Involvement in the Development of Hora Har-sadi Area

According to one of the interviewees, no public participation in the developmental plan before, but now a day the municipality planned new development near the lakefront for cultural use, and different stakeholders participate in the design and implementation. But during the planning and design process, the role of government is critical for success in an improvement of a walk-able environment context where “top-down” approaches are prevalent. Moreover, there are different stakeholders in the decision-making process like Abba Gada-traditional leaders as they are the owners of the Irrecha festivals. The municipality discussed with Abba Gada what they proposed to develop along Hora Har-sadi. The interviewees responded that the role of traditional leaders, like Abba Gada should participate in decision-making and suitability of development proposed. The relationship between community groups and government agencies involves a multi-directional process of interaction and understanding. Nevertheless, since some offices are federal governmental institutions there was some problem while implementation as in the other area.

4.4.2. The Role of Stakeholders in the Decision-making Process to the Development

As discussed in the literature review there are a variety of stakeholders involved in the lakeside development process, playing different roles. They include provincial, regional, and governments, as well as local residents, recreationists, and environmentalists. The town benefits from a sustainable improved walk-able environment not only in ecological and economic terms but also socially. Furthermore, based on one of the interviewers discussed in the analysis part, the government is waiting for people, and people also waiting for the government to develop Hora Har-sadi Lake. This indicates is expected governmental official participation of the public as the people are waiting for the start of government officials to develop the lake. Moreover, there are different stakeholders in the decision-making process like Abba Gadaa as they are the owners of the Irrecha festivals and they expect the development needed from the municipality ought to be constructed for the time of the Irrecha ceremony as the interviewers. Besides this, the municipality will discuss with Abba Gadaa what they proposed to develop along the Hora Har-sadi Lake area. As discussed in an empirical literature review, genuine public participation is mainly advised at different levels to address equitability for the natural resource and the blocked public spaces should be opened (Jantirar, 2012). As a result, cities should benefit from sustainable lakeside development not only in ecological and economic terms but also socially as discussed above and from interviews response; when the concerned body of the development plays their role, in the design and planning process by proposing design idea, discussing the functionality of the lake, and aware its identity, the Bishoftu town, Oromia region and in turn, the country will get benefit from ecotourism of the cultural lakeside landscape and while Irrecha festival since people celebrate at the site in mass.

4.5. Discussion

The discussion is based on the problem listed in the introduction and goes through environmentally sustainable principles of a walk-able environment. Additionally, the solution is the integration of sustainable development of a walk-able environment to the site, with the community's cultural value. Mobility on foot within urban centers is being increasingly used by students and workers who want to move from home to their destination at distances of less than a kilometer. The results obtained in this research are in line with the results obtained in another recent research. Following the analysis done, there was a decrease in the use of walking with age. The perception of the pedestrian safety level was not entirely negative because the infrastructure is somehow maintained, and local policies tend to promote strategies in favor of walking.

The quantitative analysis has revealed the perceptions of pedestrians concerning the route around the lake and from the town's roundabout to the lake, in the same environmental conditions. However, this assessment is carried out on a small sample, which highlights the need to know not only the geometrical-functional characteristics of infrastructure but also the judgment of the people who habitually use the roads. This fact is of fundamental importance if participatory planning of the town is to be implemented. The overall satisfaction regarding the infrastructure was average, a fact that indicates that this aspect could be analyzed further. The greatly positive assessment of the walk-ability of the infrastructure by the participants indicates that the lower satisfaction regarding the level of service has some complex motives.

4.5.1. Pedestrian Protections of the Walkways along Hora Har-sadi Lake

Among 400 respondents, 291 of them were using walking for transportation, of these, 29.0% of them were using walking sometimes, 26.0% of them were walking frequently, 22.0% of them were using walking always, 20.75% of them were using walking rarely, and the rest 2.25% of the respondents in all age group use another mode of transportation due to different reasons. According to the respondent's perceptions about the walkway amenities; lack of green infrastructures and shading trees (35.5%), lack of buffer from the vehicle way (23.75%), on sidewalk parking (15.75%), improperly installed poles and street lights (10.25%), lack of considerations people with disabilities (8.0%), and unpleasant open ditches (7.75%) were the major problems for all age group respondents respectively. Correspondingly, the pedestrians were not feel safe at the street crossing due to not safe street crossing, the high speed of cars, lack of traffic lights, and parked cars blocking the view of traffic the major among the problems. About 58.75% of the respondents from all age groups commute walking following the traffic rule, but 41.25% of them were not due to the sidewalk's lack of safe crossing, street signs, lights, and traffic lights in descending order.

4.5.2. Pedestrians Walkway Concepts for Improvements

Stating all the above subjective protections about the sidewalks along both sides of the street, respondents have forwarded their recommendations about the walkways to be improved were; buffering the sidewalks (22.75%), providing shading street trees (20.5%), widening the width of the sidewalks (14.25%), providing green infrastructures (12.5%), improving the surface material of the sidewalks (9.5%), providing separated parking and taxi stations (9.25), providing street light (6.25%) and providing sitting areas (5.0%) were the pedestrian's point of view for improvements respectively.

The paper is project-based research, and the design is based on four points; the street road access over the site, the public open space requirement for 2 - 3 million population attendees for the Irrecha festival celebration, the pedestrian walkways planning, and the proposed building development, which illustrates conceptual rather than detail drawing. Thus, the pedestrian's priority walkway concept for improvement of the sidewalks is illustrated in Figures 4.24 to 4.26. On another hand, the plan provided wide enough pedestrian walkways on the site. It is mainly to reduce the traffic load flow to the Irrecha festival site. This distributes traffic flow over the site that has been happening on the main asphalt road. Pedestrian walkways to the lake in all directions are to make this historic place walk-able and safe for the activity and enhance the mobility of people to the site.



Figure 4.24: Pedestrian recommendation (buffering);
Source: (Own design, 2022)



Figure 4.25: Pedestrian recommendation (shading trees);
Source: (Own design, 2022)



Figure 4.26: Pedestrian recommendation (widening sidewalks);
Source: (Researcher Own design, 2022)

4.5.3. The Road Access Conditions

This study segregates the road access into two parts these are road access from all directions to the site and the other is pedestrian walkways surrounding the Lake for access to the water body of the lake for celebration. The study analysis result indicates the width and the plan of the road was not appropriate for the Irrecha festival. The desired plan solution proposed widening the main road's width and planning for a wide enough sidewalks to the right and left of the road and proposing a buffer between them, to control traffic flow. It needs the separation of the main road from the pedestrian walkway by the buffer, and as well as proposing a median to the road center by a plant to separate the vehicle traffic flow in two directions. The other is clearing of building a front fence and ditch cover for a pedestrian walk. The detailed road design is illustrated in Figure 4.27; the detail section is taken from the main road demonstrated in Figure 4.24, above.

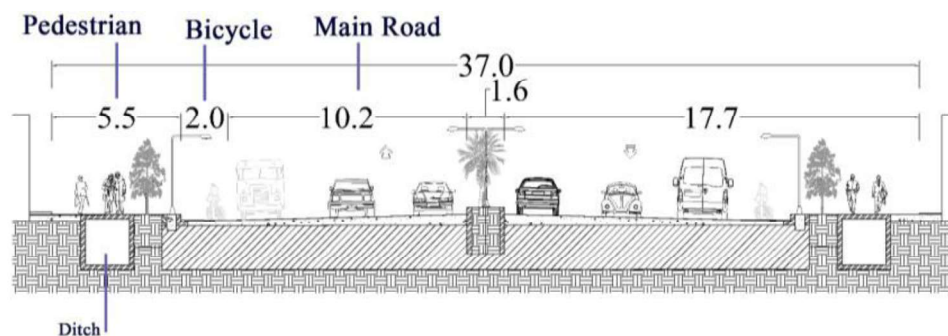


Figure 4.27: Proposed main street detail section; Source: (Researcher Own design, 2022)

4.5.4. The Built Environment of the Walkways of Hora Har-sadi Lake Area

Physical walking environment elements; sidewalk conditions, street crossings, safety and comfort of the sidewalks, utilities, on-street, and off-street parking, street amenities, land use, and building orientations, were assessed using a walk-ability checklist and the features under each element had rated an average score of 2.42, 2.43, 3, 3, 2, 2.5, 2, and 2 points respectively resulting in a total average score of 2.42 points. Thus, the physical walking environment of the street to Hora Har-sadi Lake has scored an average of 2.42 points which implies that the environment is a disaster for walking and needs a lot of work.

4.5.5. Public open spaces

Public open space enhances the entrance and exit, celebration site, Abba Gada stage, stand, and sitting place. According to the space requirement specified in table 4.19 number 3, it needs 0.6 square meters per person, while sitting. On stage, the space requirement is 0.84 square meters with consideration of the space between the sitting chair and table as 0.2m. In the Gada System, everyone wanted to sit on the ground.

Accordingly, the proposed site has no proven sitting chair rather than slope treatment for women, children, elders, and disabled people. The shade location is proposed on some criteria. One of them is east and west orientation, this orientation is also applicable for burial. As interviewed by the previous Abba Gada, the location orientation should follow an east-west direction, visible for the celebrators. Also, the site topography has many effects on on-site organization. The design allocates based on these criteria.

Space Requirement for Public Open Spaces

Based on the international standard human dimension (ergonomics) taken from a book, Architects' Data (Neufert, 1999), Timesaver standards for building types (Calendar, 1983), and Metric handbook planning and design data (By, Adler, & Edition, 1999), based on the activities performed on Irrecha ceremony the space occupancy is described in table 4.23

Activities	Space requirement				Remark
	Ways	Length (m)	Width (m)	Area / person (m ²)	
1.Walking to celebrate	Single	0.62	0.62	0.38	No space
	Group	0.60	1.25	$0.75 + 0.08 = 0.83$	10% space
2.Celebrating the water	Single	0.62	1.01	0.63	No space
	Group	0.62	1.01	$0.62 + 0.06 = 0.68$	10% space
3. Blessing	Standing	2.25	2.12	4.79 / 16 person	No space
	Sitting	0.63	0.87	$0.55 + 0.05 = 0.60$	10% space
	Stage	0.68	0.94	$0.64 + 0.20 = 0.84$	30% space
4.Folle's Area	Group	0.56	1.25	$0.70 + 0.21 = 0.91$	30% space

Table 4.23: Space occupancy in Irrecha activities; Source; (Geda T, 2019)

Based on standard human dimension space requirement is the list in table 4.19 in four main activities groups, which are while they going to the celebration, when celebrating the water, while they attending the Abba Gadaa blessing and Folle song after the program. Accordingly, the space requirement per person on walking is 0.38 square meters. The next is when celebrating the lake; it is measured by distance along the waterside space occupancy for a single person in a group activity is 0.84 square meters. The other is while Abba Gadaa blessing, at this activity the festival participators collected together and perform celebration on the ground following the cultural value. That means it doesn't need chair installation, it is sitting on the ground and handing the land then performing the blessing. So, the area requirement estimated for an attendant and Abba Gadaa is 0.84 and 0.91 square meters respectively. After the blessing is over youth start to sing together within the Gadaa age-grade system. At this time most of the participants are segregated and walk to their homes, so the traffic load is become reduced for Folle playing space.

The space requirement desired is 0.91 square meters. Figure 4.28 is available to easily understand the activity for area estimation. The other point is the time requirement while celebrating. In the Irrecha celebration soaking the wet grass into the water, is considered a vital issue for the followers. This soaking bench of grass in water needs length alongside the lake, in such great Hora Har-sadi Irrecha, it is difficult to perform Celebration at the same time because of the high population congregation of the society. Participants perform quickly in a minute; some of them do not celebrate the water.

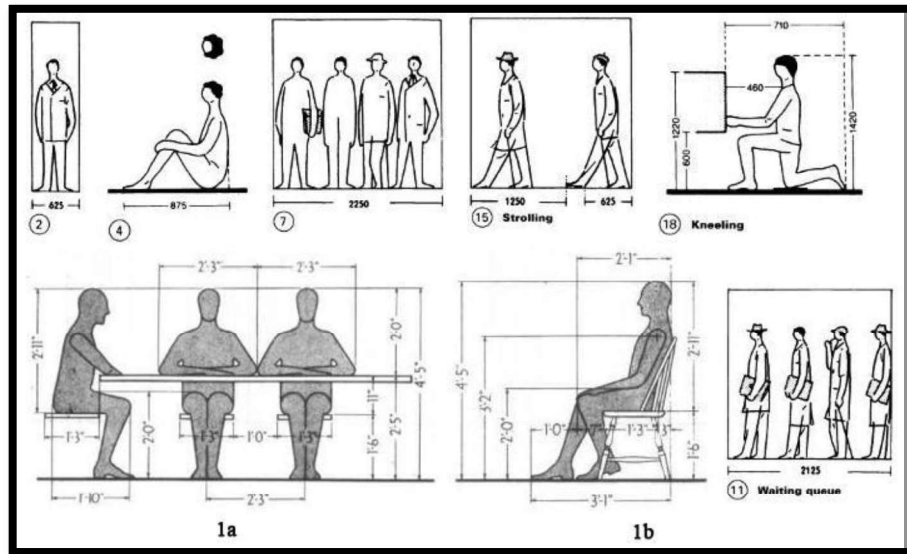


Figure 4.28: Human body size; Source: (Neufert 1999)

From observation analyses, the average water celebration time for a single person is estimated to be a minute. In a new proposed Bishoftu town in 2019, the land development plan extends the open space from 4.55 hectares to 11.7 hectares. As discussed in the last session the extended site is not suitable for the activity with the current blessing shade location and site topography. The action focuses on extending open space along the lake; it is to create an organized and multifunction space. That is based on the topography of the site and the space created is to serve for celebration, attending the blessing area (as a sitting), and for folle's singing area. The development offers about 45 hectares of open spaces. The site plan has some mixed-use and cultural structures that serve the community's cultural development throughout the year, as illustrated in Table 4.24.

Open space	Area (hectare)	Area in sit (m ²)	Area in stand (m ²)
Existing	4.55	75,833	119,736
New proposed	45	750,000	1,184,210

Table 4.24: Occupancy of the planned pos customization; Source; (Researcher Own,2022)

As stated earlier the anticipated open space is about 11 hectares, when site occupancy is estimated it serves 183,333 people. This indicates it is not adequate for the millions of festival attendants. In addition, the absence of sitting furniture, allows the participants to follow the program by standing rather than sit. This minimizes space requirement to 0.3 square meters per person rise 45-hectare accommodation to 1.2 million people. The structural developments have no fence to block the activity; it maximizes the site area for the service. Functional services assigned at the site are Resorts and Hotels, Cultural buildings, Recreational open spaces, and High-rise buildings are provided. On the other hand, this open space assists as a youth's recreational place, and cultural practice, and is used as a recreational center for the town. Even though the new plan extends the customization potential, it doesn't perform for 1 to 2 million. So, the paper proposed in four directions different inlet and outlet road access in addition to improving existing road access to meet walk-able street criteria, and public open spaces surrounds the lake with info display desks and security camera (CCTV) fixed in. The proposed 45-hectare open space is engaged with cultural playing areas and different public services. The 3D sample to describe the way of organizing the festival Open space is shown in Fig. 4.29, as follows.

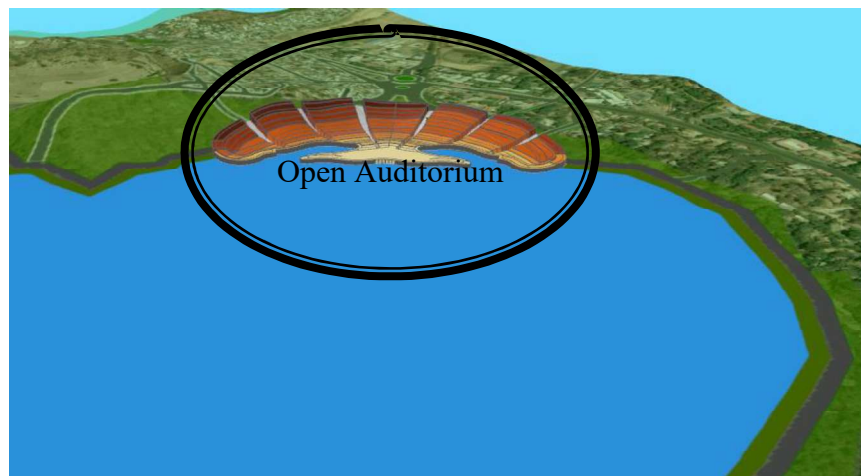


Figure 4.29: proposed Irrecha celebration site; Source: (Researcher Own Design, 2022)

5.1. Major Findings

Hora Har-sadi Lake is used by the local communities and tourists because the site is cultural, recreational, lakeside, and has good sights, although the site was not well planned. The existing development and natural relief of the site need adjustment to enhance the identity of the site and design for open spaces, walkways, and streets of the site as per respondents, and spatial Analysis.

Streets and Road Accesses

The streets or road access and pedestrian walkways towards and along the lakeside are blocked at different points along the lake, as the integration of the lakeside into the town is needed. The pedestrian walkways are not properly constructed, especially at the time of the Irrecha festival; two-thirds of respondents believe in the need for further redevelopment along the lakeside, to make the lakeside accessible to the public. From the opinions of the interviewees in the study, generally, they feel the pedestrian paths are not safe to walk on. One of the possible reasons for the study area having a low degree of sense of safety for the pedestrians are due to the pedestrian paths on the site being not smooth and well-constructed according to the expected standard. To walk along these roads requires pedestrian walkway improvements like upgrading and widening sidewalks to ensure an easy flow, and reinforcing visual protections and views of entrance points to the pedestrian paths and tourist attraction sites. Previous land allocation along Hora Har-sadi gave the chance for the lakeside to be blocked and not accessible.

Public open spaces

As Akker (2005) reviewed in the literature, public spaces should be open to all, accessible to or shared by all members of the community. According to the data collected from the interviewers as well as respondents of the selected sample, analyzed in the field observation part, the public spaces of the lakeside of Hora Har-sadi currently are not easily accessible due to being directly allocated for private and governmental institutions. However, since private and governmental institutions are closing the access as indicated in the analysis part, the municipality is trying to reopen the waterfront by paying back compensation to investors per interviewers in this study discussed in the analysis part.

The result of the study shows that the physical character of Hora Har-sadi's surrounding area is low-scale in nature both along the commercial corridors and in the recreational as well. The land use map shows that the majority of the study area is comprised of residential uses and governmental services. There are no Hotels, resorts, public open spaces, parking, playground, and commercial centers, to enhance the vibrancy of the public area and there are no activities to attract pedestrians to walk around. Most land allocation was done through negotiation and some by previous regimes of federal government officials with no policies, standards, and guidelines set by the city administration particularly from the road access perspective along the lakeside for the public as the interviewers. No planned as well as existing parking area for cars near Hora Har-sadi at the time of the Irrecha festival and every person will walk a long distance.

Pedestrian walkway-connectivity

The respondents do not feel satisfaction concerning the connection of the pedestrian network to the surrounding environment in the study area. They think that there are not enough pedestrian accesses connecting the lakefront to the surrounding community. Poor road networks, roundabout and street landscape design problems, and dead end-roads. Positively correlating with the degree of connectivity, small block sizes usually produce compact urban forms. Smaller and shorter blocks fit the scale of walking. The study area clearly shows that the street segments that are in poor condition are forming a pattern of network. So this historical area is not walk-able and accessible as it is a tourist attraction site. Lack of sidewalks and surface pavements, the inadequacy of drainage lines, and a poor walkway network are witnessed within the site. Satisfying attributes of successful pedestrian tourism such as continuity orientations and safety and security and finding interesting routes between the identified major attractions enhance the pedestrian tourism experiences. The major issue affecting continuity is the pedestrian network which is not furnished or not well improved. It is difficult to reach destinations directly and there is no provided numerous route choices that make walking to the historical lake, interesting and enjoyable. Large block sizes were found in the study area, regardless of their land use functions. Large blocks are out of standard and most of the block sizes shown in the study area are more than 2.5 hectares, which contributes to making an environment less walk-able. The site topography affects Irrecha festival activities. In large social congregation suitability of space to escape from emergency accidents and safety condition gives to not feel free to participate in activities. On the other hand, adequate road access and open space are primary in developing a sustainable site for festival activities.

Integrating local with international walk-able environment principles helps to improve walk-able lakeside environment and redevelopment. In redeveloping a cultural festival site, primary consideration should give to the historical site and the activities performed on-site. Additionally, according to the survey, recreational areas like; public open spaces, resorts and hotels, parks, libraries, cinemas, and Auditoriums, are not developed sustainably, as the site needs for the activity. Finally, no proper use of Natural terrain, land allocation, and design for surrounding farmers' cattle which use the lake for drinking purposes as per found from analysis. The tourist-oriented road network depends mostly on the existing backbone of the pedestrian walkways network in the study area by identifying the major landmarks to specify origins, destinations, and attractions in between.

The Design Guideline Strategies

In the study area in particular and Bishoftu town in general it is found that there are no possible strategies and approaches for a walk-able environment system that plays a major role in planning and developing this historical place and improving walk-able environment, to make it a tourist attraction site. There is no clear pedestrian walkway map in the study area; this makes it challenging, in designing a walk-able environment, for tourists and the local community to walk on foot to reach their destination.

As shown in Figure 4.24 below, in the proposed Bishoftu town structural plan of 2019, the general and specific land use was allocated for recreational and social services, while the road is only 1% of the total area. But as Peking (2008) identified mixed use is a priority next to recreational and social services as historic identity gives character to lakeside development while public access is a prerequisite. The strategy needs targets that can be measured during implementation. It is as simple as assigning start and completion dates for specific actions. Linking this to regular municipal reporting processes were help to ensure timely implementation. The targets should be SMART (specific, measurable, achievable, relevant, and timely) and can be a mix of outcomes and processes, depending on your capacity to collect and analyze data for evaluation.

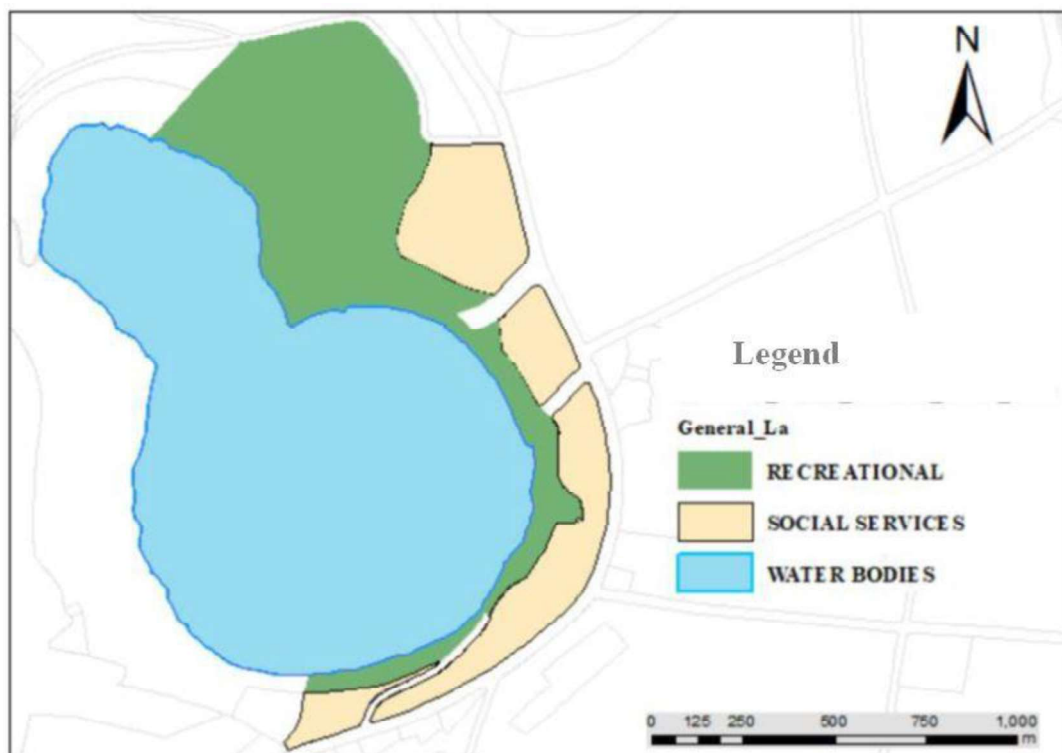


Figure 4.30: Bishoftu city land use of 2019 of Hora Har-sadi Lake's area;
Source: (Edited by Researcher. 2022)

5. CONCLUSION AND RECOMMENDATIONS

5.1. Conclusions

The broad scope of this study was to assess improvements in the walk-ability of the built urban environment in which pedestrian walking behavior is influenced by environmental features, and perception of the walking environment. Survey results described in Chapter Four show that the specific objectives outlined in Chapter One have been achieved. This research demonstrated that walk-ability is no longer associated with the physical environment only, but safety and security also play an important role in attracting people to public spaces for walking. On the other hand, to promote walk-ability in POS, there are several elements needed to support improving a walk-able environment. The conclusions are made based on the following observations: Pedestrian protections that significantly influenced walking frequency were lack of green infrastructures, buffers from the vehicle way, on-sidewalk parking, improperly installed utilities, lack of consideration for people with disabilities, and poor sidewalks surface material. Besides, pedestrians are not feeling safe at the street crossing due to the high speed of cars, parked cars block the traffic views and motorists turned into people walking and crossing, and also they drove fast and do not give priority to pedestrians. To improve pedestrian safety protections, safety-related infrastructures along with directness of the built environment features that limit safety hazards can be implemented.

Street amenities and aesthetics perception was influenced by the condition of walking environment infrastructures including directness, continuity, and a pleasing environment. Completeness of the physical walking environment is indistinguishable from safety, such that pedestrians don't have to move around obstructions putting them in danger from traffic. Pedestrian way concepts for the sidewalks to be improved are buffering the sidewalks, providing street amenities and shading trees, widening the width of the sidewalks and separating parking, improving the sidewalk's surface material and street lights, and also providing sitting areas along the sidewalks are among the majors. Built urban walking environments that significantly influenced the walk-ability of the sidewalks were poor sidewalk conditions, unsafe and uncomfortable environmental features, on-walkway parking, lack of street amenities and buffers, building and street orientations, unpleasant and inappropriately installed utilities are the major assessed and identified problems through checklist survey, resulting the sidewalks are a disaster for walking and need a lot of work to make the sidewalks walk-able.

Generally, the pedestrian paths are not safe to walk on. One of the possible reasons for the study area having a low degree of sense of safety for the pedestrians is due to the pedestrian paths in the area being not smooth and well-constructed according to the expected quality of the pedestrian paths to be not satisfactory and also there is no enough pedestrian access connecting the lake to the surrounding community. Large block sizes which are out of standard were found in the study area regardless of their land use functions. Lack of sidewalks and furnished pavements, the inadequacy of drainage line, and poor drainage network are witnessed within the site, and there is no sufficient signage to locate the direction showing this Historic Lake which is a tourism-attracting site. There are no well-defined policies and regulations to improve a walk-able environment on the site, to protect the safety of users, and encourage mobility to the site.

5.1.1. The Conditions of Streets and Open Spaces

A. The Streets Conditions

Since the existing streets are not ample for the attendees, planning additional optional road access to the site with adequate width from the town center to the Irrecha site, and proposing pedestrian walkways to the lake from different directions minimizes traffic conjunction at the main entrance and exit. Secondly, differentiating the inlet road to the site and outlet road from the site can improve the walk-ability. Providing different inlet and outlet roads gives another solution for traffic congestion and crowdedness, though these encourage mobility of pedestrians' peoples to the Irrecha site. The other pedestrian walkway surrounding the lake for the Irrecha celebration, along the water's edge, needs pedestrian walkways expansion and providing open spaces adjacent to the lake, to handle the crowdedness of the attendee's population for the Irrecha celebration. The streetscapes do not have many attractive physical and visual interests for pedestrians. Hence, in the result of the questionnaire survey, there are only 10% of people satisfied with the current situation of the paths, while there are 20% feel that it is in an average condition and 50% of people think paths are an unsatisfactory walking environment. So it needs sustainable and participatory improvement for the developments of a walk-able environment on the site.

B. The Public Open Spaces Conditions

The existing open space that serves as a blessing is too small concerning to the population attendees, as assessed from the literature review, the number of attendees is about 3 million. In the case of topography and the form of the site, the place is disorganized for the blessing activity. The anticipated solution is planning organized public open space and sitting place by treating the natural existing land feature that enhances the cultural value.

Simultaneously it needs to plan additional public open spaces at some target places to distribute population in many places to reduce traffic congestion and to enhance mobility freely. From a safety point of view, such social gathering space needs to secure the safety of the attendees; otherwise, it causes risk by the crowdedness of traffic. To manage activities on the site, slope difference design and info-display stands, providing (CCTV) cameras around the lake, planning walk-able streets considering children, women, elders, and disabled. The other is emergency access road has to be provided for security. From the opinions of the interviewees in the study, generally, they feel the pedestrian paths are not safe to walk on. One of the possible reasons for the study area having a low degree of sense of safety for the pedestrians is due to the pedestrian paths in the area being not smooth and well-constructed according to the expected standard. People cannot walk freely in a safe condition, especially the disabled, children, and elderly tending to have less concentration on the condition of traffic and slow motion of walking practice.

5.1.2.The Streets and Pedestrian walkways-connectivity

A sense of continuity and connection is vital to ensure easy flow and direct accessibility from one segment to the other. Disconnection can often occur due to intersections with major traffic routes cutting through the pedestrian network, and obstructing structures. Identifying entrance points to the pedestrian network can strengthen the tourist's and local community's visual perception of where to go. From the field survey results, more than half of the interviewees in the study area feel there are some problems with the connection between the street and walkways network to the surrounding environment. The respondents think that there was no access and some of them think that there is inappropriate pedestrian access connecting the Hora Har-sadi Lake to the surrounding neighborhood community and the housing unit. The action plans need to widen and extend the existing road access to the lake and propose additional pedestrian walkways surrounding the lake and to the lake, minimizing the large blocks to the standard, to increase the connectivity and continuity of the walkways.

5.1.3.The Design Guideline Strategies in Improvement for Walk-able Environment

A good walking strategy were help to create an environment where all types of walking are supported, allowing the municipality to meet transport, health, and planning objectives. It were coordinate the municipality's work to support walking, ensuring it is prioritized in transport and strategic planning, increasing its integration with other modes of transport, improving the safety of walking, and raising its profile within your municipality. It was include objectives that reflect an overall vision for walking within the municipality.

Strategic objectives should be accompanied by actions to ensure their delivery. These were a mix of short and long-term actions, staggered so that there is a clear logic as to when different infrastructure and support programs are delivered (Victoria Walks & UrbanTrans, 15 July 2013,). The relationships developed in preparing the plan across municipalities were also important in developing an effective implementation plan for actions.

Consider the potential to implement a walking strategy through the planning scheme, such as an amendment to the Municipal Strategic Statement or introduction of a local policy. A walking strategy is unlikely to have a significant influence on land-use planning decisions unless it results in a change to the planning scheme. To solidify executive and senior management support gained, ensuring that the actions are recognized in the municipal plan.

5.2. Recommendations

5.2.1. General Recommendations for Improvements of Walk-able Environment

The research has shown that Bishoftu town has many assets and opportunities for developing a walk-able area. These assets are to make the environment more attractive and to encourage pedestrian-friendly environment development. Pedestrian protections about the walking environment through questionnaire survey and auditing the physical built environment through field survey checklists were executed in this study to assess the improvements for walk-ability of the walkways. Lake around public space development helps to activate the dead site for social activities. It is preferable publicness to harmonious recreational and tourism attraction space with a cultural historic place. The following lists are the recommendations for Hora Har-sadi Lake walk-able environment improvements and future related research. These are:

- The town should develop policies and strategies that support funding and resource devoted to pedestrian planning to make the Lake area a pedestrian-friendly environment.
- Sustainable lake-side public building development help to conserve the environment; economically, socially, and culturally development. The increment of tourist activity increases the town's commercial activities which create job opportunity for the Town society. Designing multifunctional space beside the festival place helps to provide a suitable area for practicing Irrecha festivals. Additionally, creating public open space at the site makes the place center of weddings, different ceremonies, and a youth recreational center. Creating a street environment that strives to ensure pedestrian safety sidewalks, pathways, and crossings should be designed and built in the study area to be free of barriers to minimize conflicts with external factors.

- Implement pedestrian scale lighting on the street and buildings, to not focus on only lighting the road for the automobile. Provides ample buffering or screening throughout the area to protect the pedestrian physically and psychologically from vehicles. This can be in the form of landscaping, trees, and planting strips, so the implementation of landscaping can provide shade and other benefits to the pedestrian.
- Provide pedestrian amenities and promote land uses that enhance walk-ability. Walk-ability can be improved through land use planning. Utility covers should be located outside the pedestrian travel zone. If this is not possible the walkway should have a surface texture, with a slightly raised pattern. The recommended minimum sidewalk width should be 1.5m exclusive of curb and obstructions. This width allows two pedestrians (including a wheelchair user) to walk side by side, or to pass each other comfortably. It also allows two pedestrians to pass a third pedestrian without leaving the sidewalk. The open space should propose to facilitate its commercial activities and support the shopping areas around it with open outdoor services and recreational functions. Parking areas should be sufficiently buffered from view at the major site-seeing areas; the main parking area should be situated at the street from sub-urban to Hora Har-sadi Lake point at the open area to North East of the lake. The pavement material suggested for the area should be durable and aesthetic in all possible areas. Unique and attributing allocations of paving materials are used to assist in the characterization of the overall mobility system. The plantation along streets and pedestrian pathways must be carried out by the cross-section illustrated in the road and access circulation network map. The pedestrian pathways should have footpaths interconnected with themselves and with other streets to provide exclusively for pedestrians and emergency cars and trucks. Administrative, Educational, and other governmental large blocks that make the area subject to inaccessibility should relocate from the surrounding of the lake. Restoring the Hora Har-sadi site should mainly solve the Irrecha festival traffic conjunction at festival day. Lastly the study uses as a reference for such a project going to develop in the town and as well for anywhere.

5.2.2. The Conditions & Considerations for Developing Strategic Design Guidelines

- Walk-able Area: represents the basic built environment block for a town that is more sustainable socially, environmentally, and economically. Pedestrian Connections: The town should encourage pedestrian circulation networks that provide relatively direct connections between homes and Hora Har-sadi Lake, jobs area, the retail, civic, or other facilities that can serve them.

- **Street Standards, Design, and Networks:** Street standards should adopt to balance the needs of vehicles and pedestrians, and support adjacent land uses through their design.
- **Tree Planting:** The town should pursue a town-wide program of tree planting. Street trees should be placed between the curb and sidewalk. **Street Lights:** street lighting should implement from the perspective of pedestrian comfort and safety, and identify ways that street lighting can attain a more traditional form and scale, especially in the study area.

5.2.3. Detail Recommendations and Appropriate Design Guideline Strategies

Walk-ability is strongly influenced by elements of the built environment. Based on the urban design elements found through the literature review to increase walk-ability, and the findings of the study from the analysis and discussion section, this part proposes a set of design guideline strategies for walk-ability. These guideline strategies are intended to guide development toward a more walk-able corridor. Good pedestrian facility design must certainly be applied to future building projects but design features must also be implemented in retrofitting existing infrastructure. Pedestrian needs and facilities should be considered at the inception of all public and private projects and addressed as part of the total design solution. The following are the general proposed strategic guideline for pedestrian design:

A. Providing safety from traffic to improve a walk-able environment

- The designated pedestrian crossings should be marked for greater visibility, and the crosswalks should be located at intersections to provide maximum connectivity for the pedestrian and intersections are the best place for pedestrian crossing. The midblock crossings should be used when blocks are greater than 130m in length to keep pedestrians from going too far out of their way to cross the street. The pedestrian network should provide continuous direct routes and convenient connections between destinations, including homes, schools, shopping areas, public services, recreational opportunities, and transit. The pedestrian environment should include open spaces such as plazas, courtyards, and squares, as well as building facades that give shape to the space of the street.

B. Defining the street edge

- **The ratio of building height to street width:** When buildings are in scale with the width of the street, a pleasant, enclosed pedestrian space can be achieved. **Spacing between buildings:** Buildings along the street should be built as closely together as possible to create a perceptible street edge.

- **Building orientation:** Buildings oriented to the street help create an inviting, pedestrian-oriented space. A building should be oriented so that its main facade looks toward the street and its main entrance opens onto the street. **Building setback:** Buildings should be a setback as little as possible from the right of way.
- **The off-street parking** should be located in the back of buildings; it should never be located between the building and the street. **Sidewalk width:** The sidewalk helps to provide a pedestrian realm (the area from the back-of-curb to the front of a building on the lot or tract). When wider, it can accommodate pedestrians of varying speeds and give more room for leisurely walking.
- The sidewalk should be as wide as possible to comfortably accommodate pedestrians and related uses without making the street realm too wide for the scale of the buildings. Sidewalk widths can vary, but typically it should be a minimum of 1.5m wide (clear width) on local residential streets and can be 2-5m on collector and arterial streets, or sometimes wider in special districts.
- **Street trees:** Trees along the street can make walking an enjoyable experience by providing visual stimulation as well as protection from the elements. They can also act as a buffer between pedestrians and traffic. Trees should be located at a span of no more than 8 to 16 m to define along the street. An area of at least 1.5 by 1.5m per tree should be provided for trees to be successful.
- **Benches:** should be provided in locations that experience heavy pedestrian traffic to provide a respite for weary travelers, a meeting place, or a place to wait for others.
- **Signage:** should be oriented to the pedestrian; text should be large enough to be read by the pedestrian. The bottom of a sign should be at least 2.5m above the roadway or sidewalk. Parking signs should locate in the road area approximately 0.5m from the curb.
- **Lighting:** Lighting of streets and the adjacent sidewalks, walkways, and shoulder increases pedestrians' safety, and comfort, and encourages walking. The street lighting system includes; Under Ground Distribution Network, distribution transformers selection, design of manholes, and other related activities.
- **Site Amenities:** include trash receptacles, dumpsters, ash urns, benches, tables, fountains, telephone booths, bus shelters, kiosks, walls, fences, monuments, memorials, flag poles, gazebos, bike racks, and picnic shelters.

5.3. The Design Proposal

5.3.1. Conceptual Development for the Design

The design was proposed for the improvement of a walk-able environment to encourage people's mobility. The concept of the proposal is expressing the rule of the Gada System for the Irrecha ceremony that is, after a celebration or Thanksgiving participants who come to the Irrecha site by inlet roadways and ought to turn back to home in outlet roadways. This concept leads to opening the Irrecha site so that every attendee expected to turn back by another different road or use the outlet road after the celebration, which enhances publicness, one-way traffic flow, and integrity through designing along the lake with suitable amenities composed of pedestrian responsive designing esplanade and lakeside public open spaces which enhancing the celebrity, by improving walk-ability of the site.

5.3.2. The Main Program of the Design Proposal

The program of the design proposal is integrating Hora Har-sadi Lake with its surrounding; improving the walk-ability of the lake by proposing pedestrian walkways; considering the disabled, elders, and women to the site, proposing an auditorium, cultural use buildings (cultural retail, restaurant, public toilet, and resorts), playground, museum, parking area for bicycle and car users, children play ground, and interlocking accesses to each other, and the street. Widening the existing walkways along the lake and designing public amenities along the street for the public. These proposals were to make the Lake accessible and attractive to its neighborhoods. Improving existing too attractive ways and creating new POSs and developing further road accesses toward the lake based on the analysis in this study according to urban design and planning is one of the strategies of the proposal. Opening the road access to the Irrecha site which is blocked by governmental institutions and private investors is another proposal assignment. Proposing the road accesses to Hora Har-sadi Lake is to reinforce visual contact with the public, and reduce traffic congestion and crowdedness on the way. Furthermore, the proposal makes environmental-friendly pedestrian walk-way, greenery open spaces, and planting road medians along the street towards the lake and the buffer between pedestrian and vehicle road. Designing access for physically disabled and elder persons and designing separate lanes for bicycle users, proposing dust bins, and mobile toilets. Finally, the study proposes a design that interconnects the urban areas with the countryside neighborhoods, which is making a marriage between urban and countryside, that gives enjoys of users, by such improved safety and comfort of pedestrians, reduced traffic congestion, and mitigated crowdedness, and then makes the Hora Har-sadi lake's surrounding a livable area.

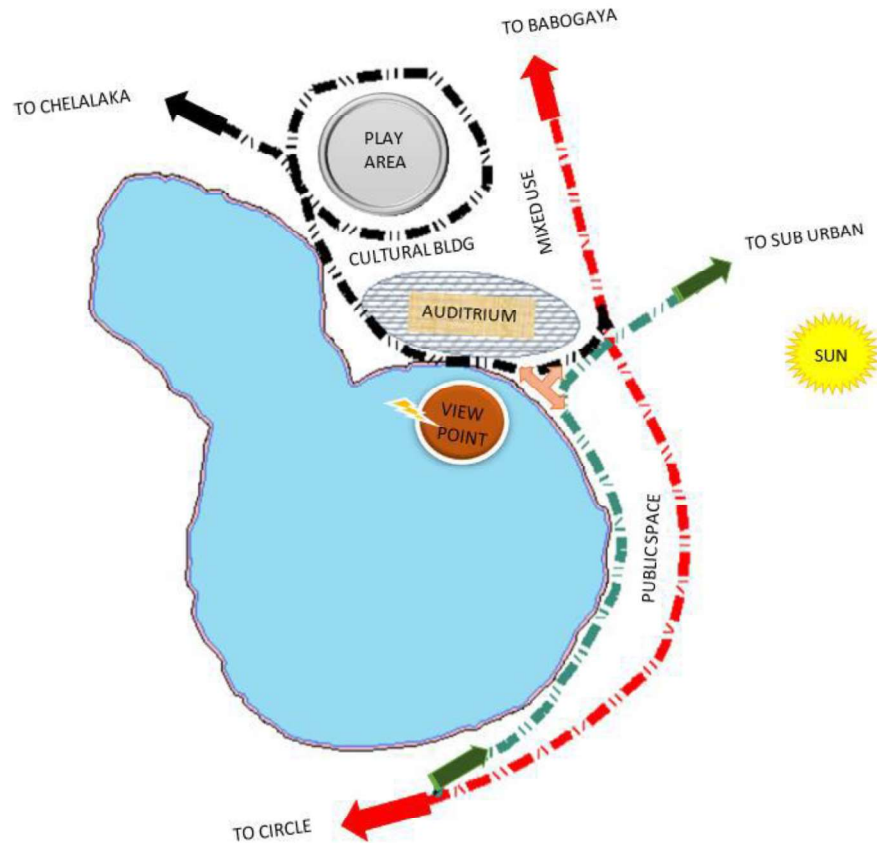


Figure 5.1: Conceptual map of the study area; Source: (Researcher Own Design, 2022)

5.3.3. Proposed Land Use

In this proposal, significant changes in mixed land use have been made. It is done based on the land use requirements of each component. Among the type of land uses present, mixed-use development, POS, social services and public recreational centers have shown a remarkable increase in the land use area share, because of the type of service intended to be used on the project site. To increase the recreational activity of the area and to accommodate the annual Irrecha festival, commercial land use and public buildings have been proposed to increase the commonalities activities of the site effectively. The proposal for the land use plan is strongly linked with the town's structural plans, walk-ability strategies, policies, developmental trends of the area, the surrounding kebeles Local Development Plans, and with Integrated Infrastructure Plan. Thus, the land use plan should be interlinked with the surrounding neighborhood's existing development trend and the future proposed developmental prospects. The proposed land use map is shown in Figure 5.2 as follows.

Proposed Land Use Map

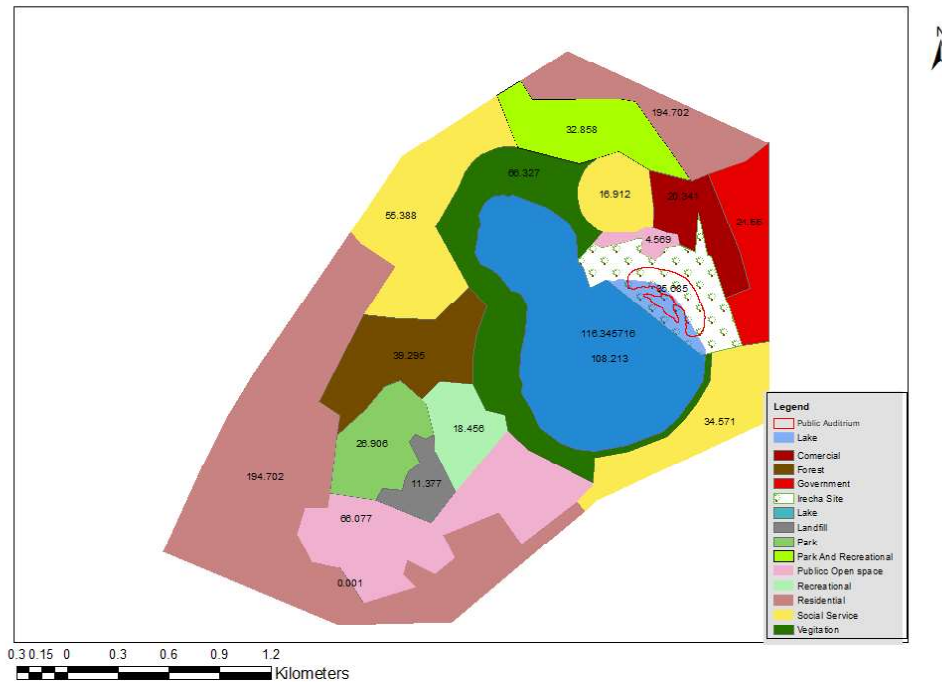


Figure 5.2: Proposed land use map; Source: (Researcher Own Design, 2022)

5.3.4. Proposed Road Network

The issues considered in proposing road networks are linkage, linear expansion, topography, densification of uses and activities, traffic flow from nearby neighborhoods, through traffic, permeability and accessibility, junctions, parking facilities, and hierarchal integration. The proposal uses two appropriate approaches, which are; New Provision and Upgrading approaches. The new provision (road and parking) are Bicycle Lanes, Collector Streets which adjust street hierarchy, Parking (off-street parking and on-street parking), and while Upgrading Approach is surface material treatment, Realignment of width and spacing, improving utility lines, pedestrian walkways, street plantation along pedestrian walkways.



Figure 5.3: Proposed road network; Source: (edited own using ArchGIS pro, 2022)

5.3.5. Proposed Morphology

The morphology of the study area is proposed to bring a proportional built-up area with a solid void ratio (25% and 75%) and characterized by irregular geometry of blocks by creating enclosure space in the inner part of buildings. The computed solid void ratio does not consider setbacks and redline spaces of 60% built-up area which enhance the solid void ratio from 10% to 90%.



Figure 5.4: Proposed morphology of the study area; Source: (Own Design, 2022)

5.3.6. Different Detail Design

A. Auditorium and Multipurpose stage

At the time of the Irrecha festival, while the cultural leader of the community Abba Gada performs the opening speech of the festival the audience is expected to follow the speech and they will take blessing from Abba Gada and give thanks for almighty Waqa. Therefore, the stage and auditorium which do not disturb the natural terrain and physical characteristics of the site will need. Based on this condition the proposed stage has different purposes other than the Irrecha festival, like as a recreational area, tourist destination, and as boating station. Besides this, the auditorium will be the place where people sit and enjoy even their daily life near the lake.

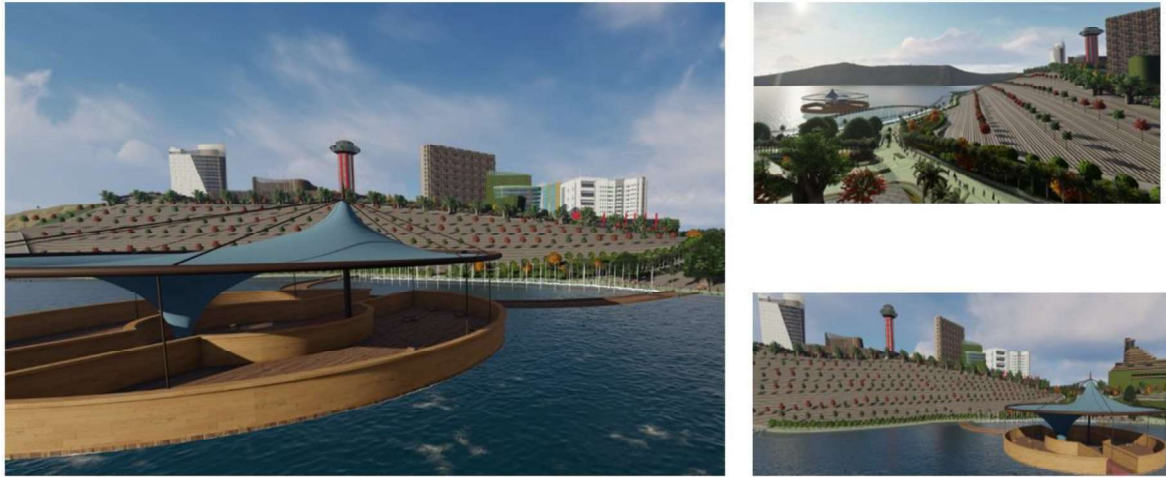


Figure 5.5: Auditorium and multipurpose stage; Source: (Researcher Own Design, 2022)

B. Cultural Museum

After people celebrate the Irrecha festival some tourists and people expected to visit cultural arts, and historical materials used by the local community. Hence the Museum is serving the purpose of a cultural display place and building it is proposed for this type of purpose. This place is used for a public plaza, library, cinema, public cafeterias, and theatre stage.



Figure 5.6: Cultural museum; Source: (Researcher Own Design, 2022)

C. Pedestrian walkways along the lakeside and main street

The wide waterside and Main Street have many purposes in this proposed design. These are: the lake is a place where the Irrecha festival is celebrated, the street is where people walk on and cattle's used as access to drink the lake's natural water. Therefore, the proposed lakeside walkway and main street are designed considering these purposes. The road material is a permeable lattice type of material comfortable for people and other animals so that structurally stable to sustain motor-free walkways, considered for disabled persons and people of any age as shown in Figure 5.7 below.



Figure 5.7: Pedestrian walkways along the lakeside and Main Street;
Source: (Researcher Own Design, 2022)

D. Public open spaces and Amenities

The proposed public open spaces are designed to integrate with other land use of the study area. Besides the proposed public open spaces are expected to have permeable and interconnected with other public destinations. Since the study is based on principles of improvement of the walk-able environment, public open spaces are a prerequisite; and the water body is open to the public in many directions. For those places, public amenities are considered so that people enjoy the waterfront at any time of allowed activities.



Figure 5.8: Public open space and amenities; Source: (Researcher Design, 2022)

E. Mixed-use building around the lake area

As in the literature review, in the principles of improvement of a walk-able environment around the lake area, mixed-use buildings are a priority. Lake Surround should develop the water body by offering a diversity of cultural, commercial, and public building uses. Those that require access to the lake should have priority. Housing neighborhoods should be mixed both functionally and physically. Based on the principle both horizontal and vertical permeable mixed-use buildings are proposed.



Figure 5.9: Mixed-use building around the lake area;
Source: (Researcher Design, 2022)

F. Plant type

The proposed design recommends developing open spaces and greenery at every interior part of blocks, in road medians, at the frontage of building blocks, and the top of buildings as much as possible. Street plantations along both side pedestrian walkways and median plantations are selected based on considerations of appropriate plant species in their ornamental, foliage, shade, and Aesthetic value and keeping the standard spacing between plants. Furthermore, the proposal has recommended using a vertically developed forest on top of building parts and hanging crawling type of plants on the sides of walls to achieve a maximum ratio of green space area and decrease greenhouse gas effects, and improve walk-ability. In addition to the Oda tree, the recommended plant species are Senegal date palm; Acacia, and Flame tree (Dire Dawa zaf), which are some selected species. Besides this some plants may be food for organisms in water, therefore, it is better to conserve them and select them as proper plants (Figure 5.10).



Figure 5.10: Plant type along the street and lakeside; Source: (Researcher Design, 2022)

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APPENDICES

QUESTIONNAIRS FORMATS

Part I: Self and the research topic introduction

Dear Sir, thank you for taking the time to do this interview with me. I am a postgraduate student from the Adama Science and Technology University. I am doing my master's thesis on **“Assessing Improvements for Walk-able Environment for Bishoftu Town to Encourage People's Mobility; *The Case of Hora Har-sadi Lake*”**. The Bishoftu's historical place, Hora Har-sadi Lake, was extensively used by many people's meetings to celebrate Irrecha's festival and to show their unity. Since 2nd October 2016, when many people lose their life on Irrecha festival, were the recent memory, due the site lacks proper pedestrian walkways, lacks wide enough open spaces and no traffic rule at all. The existing road access and gathering places are too, not enough to accommodate the celebrator's population. The other problem is that the place is historical place where great festival is held in, but the site has not got any development for the festival services like; hotels, guest houses, public open spaces and other recreational area. Although, Irrecha festival have been expanded both in content, geographical and demographic representations. Since the above-mentioned problems and challenges are common in the town, and especially in Hora Har-sadi Lake area, the situation initiated the researcher to focus on conducting the research on Assessing Improvements for Walk-able Environment in the study area. So the purpose of this questionnaire is to obtain data for this research project.

Part II: Questionnaires for local communities and tourists

• Please answer all questions by ticking (✓) in the space provided.

1. How old are you? (10-20) ☐ (20-40) ☐ (40-50) ☐ Above 50 ☐
2. You are? Male ☐ Female ☐
3. What is your Educational status?
Illiterate ☐ High school ☐ Diploma ☐ 1st Degree ☐ Masters ☐
4. You are Residence of; Near Lake ☐ Other kebele ☐ Other town ☐ Tourist ☐
5. Is walking your favorite mode of transport? Yes ☐ No ☐ Why?
6. How many times per week do you commute by walking from place to place?
Always ☐ Frequently ☐ Sometimes ☐ Rarely ☐ Never ☐ Why?
7. Do you think the walkways and its amenities are safe and comfortable here for all peoples (disabled, children, and elders)? Yes ☐ No ☐ Why?
8. Do you think it is easy to cross the streets? Yes ☐ No ☐ Why?
9. What do you recommend for the walk walks to be created?

Thank you very much for your cooperation

INTERVIEWS FORMATS

Part I: Self and the research topic introduction

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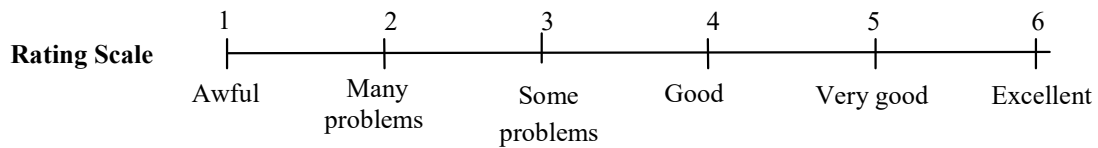
Part II: Document Review and Interviews for Key Informants

1. Historical background of Hora Har-sadi Lake concerning cultural use?
2. What is the functional purpose of Har-sadi Lake?
3. What type of development do you think is good to assure publicness and cultural identity around the Lake?
4. Does the development of the Lake area is inclusive and participatory to be sustainable?
5. The role of Communities, traditional leaders, and government officials in the development?
6. What are the strategies to improve a walk-able environment that encourages mobility?

Thank you very much for your cooperation

AUDITING THE PHYSICAL WALKING ENVIRONMENT

(FIELD SURVEY CHECKLIST)



Elements to Check	Features to Check	Yes	No	Need Correction	Rating Scale
1. Side-walks	• Have no street furniture (sittings, street lights...)				
	• Sidewalks are blocked by poles, signs, and plants...)				
	• The sidewalk is not continuous				
	• The sidewalk is not wide enough to walk together				
	• Have no buffer between pedestrian and vehicle				
	• Do walkways for disabled, children and elders?				
2. Streets	• There is no crosswalk or it is poorly marked				
	• Are there different streets to inlet and outlet for the case of the rule of Irrecha's festival?				
	• The intersection does not have a curb ramp for carts, wheelchairs, and walkers.				
3. Pedestrians Behavior	• Do pedestrians walk on the Sidewalks?				
	• Do pedestrians cross at the Crosswalks?				
	• Do pedestrians obey all traffic rules?				
4. Safety	• Are pedestrian walkways constructed properly?				
	• There's too much traffic				
	• Streetlights are few or not present				
5. Comfort	• The street segment is visually attractive for walk				
	• Are there strong odors anywhere on this street segment (urine stench, rotting garbage...?)				
	• Do you find this street segment noisy?				
6. Utilities	• Good drainage, away from entrances and walkways				
	• Do utilities have visual and environmental quality?				
	• Do utility lines install appropriately?				
7. On/off street parking	• Does the roadway have on-street parking?				
	• Do they park cars on the sidewalks?				
	• Does the off-street parking hinder the continuity of sidewalks?				
8. Land-Use	• Are there Hotels, POS, or public buildings to activate the site?				
	• Do the land use and the community's culture linked with each other?				
9. Buildings along the site	• Do buildings create a sense of human scale?				
	• Does the building's design express the community's culture and customs?				
	• Does the building's façade attract views?				

Table Format for Field Survey Check List