



ADDIS ABABA UNIVERSITY
COLLEGE OF TECHNOLOGY
AND BUILT ENVIRONMENT
(CTBE)

Human-Centric Urban Mobility Solutions for High-Density Regional
Transportation Hub: The Case of Lamberet Long-distance Bus Station
and its Neighbourhood

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Master of Science Degree in Urban Design and Development

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Addis Ababa, Ethiopia

Declaration

I, Feben Ramish, the undersigned, declare that this research work entitled “**Human-Centric Urban Mobility Solutions for High-Density Regional Transportation Hub: The Case of Lamberet Long-distance Bus Station and its Neighbourhood**” is my own original work and has not been presented in any other university/institutions, and all the sources of materials used for the thesis work have been duly acknowledged following the scientific guidelines of the Addis Ababa University.

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Abstract

This master thesis is about human, centered urban mobility challenges at Lamberet Transport Hub, Addis Ababa, Ethiopia. Lamberet is a hub regional bus terminal serving northern Ethiopia. The research delves into aspects of how the bus station influences the efficiency, accessibility, safety, and daily experiences of different stakeholders such as commuters, drivers, vendors, and residents of the nearby areas.

The study points to main issues such as a lack of proper infrastructure, accessibility challenges, absence of safety features, poor environmental management, and the non, implementation of urban planning and zoning regulations. The movement of pedestrians around the place is a major struggle due to a lack of sidewalks, ramps, crosswalks, adequate lighting, and signage. Moreover, uncontrolled street vendors, and a mixture of pedestrian and vehicle movement have led to congestion and safety issues. Among the vulnerable, the elderly, persons with disabilities, and children are the most impacted.

Field observations, infrastructure inspections, pedestrian movement studies, land, use and mobility, pattern mapping, and ethnographic interviews with local inhabitants and commuters formed the study's core methodology. Besides, transport hub, related policies and regulations were also analyzed to pinpoint discrepancies between standards and field realities.

The study uncovers that, while the terminal is an engine of the local economy, its social and environmental costs overshadow the benefits, as evidenced by overcrowding, noise pollution, inadequate waste management, and inefficient spatial arrangement. The terminal is not yet integrated with world, class standards in accessibility, inclusive mobility, and community participation.

The study finds that by redesigning the Lamberet Transport Hub, the efficiency of the system as well as the experience of the users can be improved by clearly defining pedestrian, vehicular, and vendor areas; strictly applying existing regulations; upgrading accessibility infrastructure; making safety measures more effective; and involving the community. The use of human, centered and universal design approaches can help the hub to become a regional transport facility that is more inclusive, safe, and environmentally friendly.

Key words: Human-Centered Mobility, Urban Planning, Accessibility, Infrastructure

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List of Acronyms

A.A	Addis Ababa
AACRDA	Addis Ababa City Road Authority
AACPPO	Addis Ababa City Public Procurement Office
BELL	.....	Bureau of Ethiopian Land and Environment
C40	.....	C40 Cities Climate Leadership Group
CCTV	.....	Closed-Circuit Television
CSA	.....	Central Statistical Agency
CTBE	.....	College of Technology and Built Environment
EV	.....	Electric Vehicles
GSE	.....	Graduate School of Engineering
ITDP	.....	Institute for Transportation and Development Policy
LRT	.....	Light Rail Transit
MOT	.....	Ministry of Transport
NMT	.....	Non-Motorized Transport
PPP	.....	Public-Private Partnership
RTA	.....	Road Traffic Authority
SDGs	.....	Sustainable Development Goals
UN	.....	United Nations
UN HABITAT	...	United Nations Human Settlements Program
WHO	.....	World Health Organization

CHAPTER ONE: INTRODUCTION

1.1. Background of the Study

Addis Ababa is the capital city of Ethiopia, which is growing at an alarming rate. The city is under stress to improve its infrastructure, as there are over 5.7 million people residing in it in 2024, with a population of more than a quarter of a million annually (Macrotrends 2024). Such a growth pace is particularly difficult for the public transport to handle, and this is why smarter and people-oriented means of transport are necessary. There is a rapid increase in population and density across the urban parts of the world because this is a considerable test for the transportation infrastructure. Such conditions make the building and operation of efficient and extensive transit systems difficult. The transit hubs are an essential part of the intercity transport. They serve as an interchange point, which is important between the urban centers. However, despite the importance, most of the existing hubs have inappropriate designs and operational models to meet the diverse and complex needs of today's travelers. This mismatch creates a systemic inefficiency, congestion, and limitation of accessibility, especially when passengers need to pass through intercity and local transportation systems (Henry, 2020). Such transit places can be much more. Designed thoughtfully, the intercity bus terminals can turn into vibrant community places to enrich the world around them. These hubs already are the economic driving forces and crossroads within communities in Addis Ababa, where large flows of passengers pass through and connecting city, rural networks. According to Assefa (2023), in Addis Ababa, Lamberet Bus Terminal is a typical example of this potential and existing incompetence. Urbanization and an increase of people have led to unprecedented demands in public transport in the Ethiopian capital, Addis Ababa. Due to the expansion of the city, its transport network is not able to keep up with the increase in population, particularly in high-density locations (ITDP, 2019). Intercity bus terminals like Lamberet Bus Terminal are also essential in regional mobility, serving the city with links to its neighbors (cities and regions). Such terminals, though very vital, are in pitiable conditions, thus lowering their productivity, and this does not go well with the commuters who rely on them on a day to day basis. Inadequate functionality, design, and accessibility, not only damage the transport system, but also lead to inefficiencies in the city (Samson, 2016; Yeshitila, 2017). The design and planning of the transport station in Addis Ababa is one of the most pressing problems. The congestion,

delays and inefficiency caused by poor space management through poor space management are prevailing in most terminals, such as Lamberet. These designing defects prevent the free flow of passengers and cars and cause inconvenience and frustration to the passengers. Also, there is no use of intuitive signage and layout that leads to navigation issues, particularly among inexperienced users or those who are first time visitors to the terminals. This is making the work of the terminals complex and compromising their position as vital points of crucial significance in the city transport system (Samson, 2016). The issue of accessibility is one of the problems, which involves high percentages of the population in Addis Ababa. The majority of terminals do not have the facilities required to support individuals with disabilities, old age, and those who are disabled. These groups will not be able to use the transport facilities because of lack or absence of facilities like ramps, lifts, and reserved seats. This marginalization of the vulnerable groups does not just isolate the vulnerable population, but it also waters down the objective of inclusive urban mobility (Babinard et al., 2018). There is also lack of intermodal integration of various modes of transport in intercity bus stations. These terminals are usually silos instead of offering smooth interchange of traffic between the buses, taxis and other means of transport. The travel experience is fragmented with a lack of capacity to change the different mode of transportation to passengers. Lamberet Transportation Hub is a major facility and is typically known as the Lamberet Bus Terminal or Menahariay. It is situated right in the heart of Addis Ababa, Ethiopia. The hub is one of the main places for regional transportation in the city, and it especially connects Addis Ababa to the northern parts of the country. It's a very strategic spot along the major roads, so the terminal is a very important place for passengers coming from outside the city or the region.

The hub houses different kinds of transport including intercity buses, city public buses, minibuses, and various informal transport services. There is a mixture of both formal and informal transport systems in one place here, so the number of passengers is really very high, especially during rush hour, weekends, and at times of the holidays. Passenger movement within the terminal is largely unstructured, with limited guidance from formal signage or circulation planning, leading to congestion and inefficient passenger flow. The complex has had an organic growth over its entire existence, and its physical features are largely a product of unplanned expansion. There just isn't enough infrastructure to sustain the level of activity going on in the hub. There are few areas where people can wait, not enough seats, very little sun protection, and pedestrian paths are aerially just a little bit defined. There is hardly any

separation in terms of functionality between people walking, cars moving around, and market activities, which causes more operational inefficiencies and safety risks.

Pedestrian safety and accessibility represent major issues at Lamberet Transportation Hub. Because there are no clearly marked pedestrian walkways, crossing the roads is dangerous and only a few traffic control measures are in place, a high level of pedestrian, vehicle conflict is witnessed. Besides, the terminal is not equipped with universal accessibility features for vulnerable users such as the elderly, children, and persons with disabilities, while inadequate lighting and overcrowding further reduce perceived and actual safety, especially during night time. The hub has a dominant socio, economic importance to the immediate neighborhood by facilitating a diversified set of formal and informal economic activities. Informal vendors, small kiosks, and transport, related services have become daily incomes for many local residents. Although the hub improves accessibility and leads to an increase in local economic activity, it also deteriorates the residential environment in the vicinity through increased noise levels, air pollution, traffic congestion, and the intrusion of public spaces by informal activities. The environmental quality in and around the terminal is generally low. This situation is marked by a series of vehicle emission, dust, and noise pollution events, besides the widely scattered bumping of the ecological system due to the ineffective waste disposal practices. Green spaces, buffer zones, and climate, responsive design features are absent and the adverse effects of this scarcity on the environment, user's comfort, and overall resistance to climatic conditions are being further aggravated. Municipally Lamberet Transportation Hub is governed through transport authorities with a wide array of multiple stakeholders, including transport unions, private bus operators, and informal actors. Nevertheless, divided institutional collaboration and weak regulatory enforcement have permitted informal practices to rule daily operations, thus impeding the introduction of human, centric planning and design principles. On the whole, Lamberet Transportation Hub is a key example that helps to understand the issues of very high urban mobility density in cities of the developing world. It's operational, structural, social, and environmental inadequacies emphasize the pressing requirement for integrated, human, centric urban design and transport solutions that focus on pedestrian safety, accessibility, user experience, and neighborhood livability. Therefore, the hub serves as a highly relevant and representative case study for sustainable mobility interventions within Addis Ababa's urban scenario.

This inability to integrate multi-modes reduces the overall effectiveness of transport system and causes passengers to make informal fixes which more often than not are more time and money consuming (BELL, 1984). Moreover, these terminals do not have the amenities needed and this affects the commuter experience unfavorably. The seating, washrooms, information counters and covers of the elements are either absent or of low quality. The commuters tend to have to wait long and unpleasant and, in some cases, unsafe conditions, depriving them of that experience and deterring the desire to use the public transportation (C40 Cities Climate Leadership Group, 2019). The poor design and operation of such terminals also result in environmental concerns. Vehicles exacerbate air and noise pollution in and around the terminals by overusing them, and poor sustainability processes aggravate it. The quality of life of the people living around the hubs is not only lowered by these environmental problems but also causes greater ecological concerns in the city (Addis Fortune, 2024). Lastly, the social justice problems point out the disparities in quality of services and distribution of resources within transport hubs in Addis Ababa. Low-income communities are not able to receive good and affordable mobility, which leads to urban inequality. The absence of user-based technologies, including real-time information systems and mobile ticketing, also lowers the effectiveness and accessibility of these hubs depriving many commuters of the instruments that allow them to properly navigate the city (Gebeyew, 2019). Due to rapid development of Addis Ababa, transport hubs, which are central nodes in the mobility network of the city have increased in an uncoordinated manner. It is a fact that transport hubs such as Lamberet have brought a lot of advantage to communities surrounding them. They generate employment, stimulate small business by filling the streets with pedestrians, and make goods and services more accessible by connecting the neighborhoods to broader urban and regional systems. These terminals are commonly regional economic powerhouses, attracting commerce and activity that benefits both formal and informal economies (ITDP, 2019). The sustainability and the livability of these locations in the long-term are in danger without proper zoning rules and combined infrastructure planning (Yeshitila, 2017; UN-Habitat, 2020). In order to achieve the greatest benefit of transport hubs, there is an urgent need on the urban planning methodologies that would match the infrastructure development with the requirements of the city as well as the communities.

Lamberet area demonstrates the consequences of constructing transport hubs without taking into account the neighborhood. Although it forms a significant hub in the region, the streets are

crowded, public arenas are disregarded, and development does not seem to be organized. The terminal does not follow the ordinary life of the residents but is other than that. Careful hubs can be truly beneficial with the creation of new employment, improved services and enhancements of local enterprises. Transport hubs are instrumental in defining urban mobility, economic activity, and spatial development, especially in rapidly expanding cities in developing countries. As focal points in urban transportation networks, these hubs determine pedestrian movement, land use, accessibility, and the overall quality of urban life (UN, Habitat, 2020). Transport hubs, when correctly designed and integrated, can greatly improve connectivity, invigorate local economies, and facilitate access to jobs and services. But, if they are badly planned, they usually create traffic jams, safety hazards, pollution, and social inequalities. Addis Ababa has been rapidly urbanizing and its population has been growing fast over the last twenty years. This has put a lot of pressure on its transport infrastructure. Transport hubs like the Lamberet Transport Hub, which is the major regional terminal for northern Ethiopia, have been experiencing an increase in activity and intensity for some time now but without a matching level of infrastructure coordination and urban design improvements (Gebeyehu, 2019). While transport hubs are significantly contributing to employment opportunities as well as informal and formal economic activities, quite often, their advantages get overshadowed by a lack of strong spatial integration with the surrounding residential areas. The indirect assumption that these nodes evolve "without planning frameworks" is refuted by the fact that the Lamberet area is covered by a Local Development Plan (LDP) which has been drafted to regulate land use, circulation, and urban form. Nevertheless, the main problem is that the plan is not being followed. The absence of a coordinated implementation strategy has led to an increase of vehicles on the roads, worsening traffic conditions, environmental pollution, and a decline in the quality of life in the neighborhoods around the areas. Sidewalks and other public spaces meant for the free and safe movement of pedestrians are often used for informal trade or other activities, thus limiting access especially to the most vulnerable groups such as women, children, the elderly, and people with disabilities. These issues are a manifestation of the general situation in most fast, growing urban centers where the development of transport infrastructure is not properly synchronized with urban planning and regulatory enforcement (ITDP, 2019). The Lamberet neighborhood is a perfect example of what happens when transport hub development focuses mainly on maximizing movement at the expense of the human element. The terminal is a crucial regional access point; however, it is mostly detached from the daily lives of the local residents, causing social conflicts, security issues, and environmental degradation. Similar cases have been reported in other developing cities where

the lack of integration of new transport hubs with the city fabric results in increased traffic, pollution, and the pressure of forced evictions instead of improving urban quality (Zhang & Xu, 2022). Recently, there has been a lot of discussion in urban mobility literature about how human, centered, inclusive transport planning should be the first and foremost consideration particularly around major transit nodes. Designing principles that lead to efficient transitions and harmonious living have been the focus of many studies. Among these go a few such as the need for walkable urban design, defining space clearly, multimodal integration, provision of safe pedestrian infrastructure, and the creation of mixed, use environments that not only facilitate mobility but also enhance the local community life (Matt, 2023; UN, Habitat, 2013). Transport hubs once considered mere points of congestion can, therefore, be turned into inclusive and highly efficient urban spaces by the appropriate application of these principles. Set in the context of this discourse, investigation into the effects of the Lamberet Transport Hub on its neighboring urban environment is the main focus of this research. Accessibility, safety, pedestrian experience as well as spatial organization will be the major points of concern. The study, by scrutinizing the discrepancy between the planning intentions stated in the LDP and the actual conditions observed on, site, intends to determine human, centered design and planning approaches capable of enhancing mobility performance, social inclusion, and environmental quality in very dense transport hub settings.

Those strategies applied to Lamberet would make it a transportation bottleneck a model of effective, inclusive urban mobility. This study explores the effect of the occurrence of unplanned transportation hubs in terms of urban planning of their environment and how they influence the human-focused terminal design within the hubs that assist people in improved living in the city. Through researching this, the researcher offer a better insight into the issues and opportunities surrounding the development of transportation hubs and eventually led to more sustainable and mobility design within the environs of transportation hubs at Addis Ababa.

1.2. Problem statement

Lamberet Long-distance Bus Station is not the human scale regional transportation center as anticipated by previous observations and research works. The terminal encounters exigent issues that are presented by the nature of urban planning and design shortcomings. Even though regional transport hubs play a crucial role in supporting urban mobility and economic activities, it is still a big challenge to integrate them with the surrounding urban environment in rapidly

growing cities like Addis Ababa. A good example is the Lamberet Long, Distance Bus Terminal that serves as an important regional transportation node but has not yet reached the expected level of a human, centered transport facility in the city. On the one hand, there are planning frameworks such as the Local Development Plan (LDP) and national urban development policies to regulate land use, accessibility, and transport coordination. On the other hand, there is lack of empirical evidence especially in the case of high, density transport hub environments to demonstrate how effectively these planning intentions are put into practice.

Most of the research and planning work in Addis Ababa has so far been concentrating on the aspects related to transport efficiency, traffic flow, and economic contribution. However, there has not been enough emphasis on the human, scale aspect of the terminal such as pedestrian accessibility, safety, inclusiveness, and the daily interaction between the terminal and the local neighborhood. Besides that, understanding the effect of the divergence between urban planning regulations and the reality of operational conditions at transport hubs on mobility behavior, spatial quality, and community livability is a significant research gap waiting to be filled. With Lamberet, one of the reasons for the limitation of the policymakers' and designers' capacity to develop targeted, context, sensitive interventions is the lack of detailed, place, based assessments that relate human, centered mobility principles to local planning instruments. Unsurprisingly, there is a lack of integrated analysis that limits the transformation of transport hubs from movement, focused infrastructures to inclusive urban places that meet the needs of diverse users and surrounding communities. Thus, research is required that thoroughly investigates the interplay of planning frameworks, spatial conditions, and human, centered mobility outcomes within the Lamberet Transport Hub setting.

This paper tries to fill the gap by examining the potential of urban planning practices and human, centered mobility principles to be synchronized for the purpose of enhancing accessibility, safety, and inclusiveness in high, density regional transport hubs. The results will be a reference for policymakers and designers to come up with solutions that improve the functioning of transport hubs as people, friendly, sustainable, and socially responsive urban environments.

1.3. Objectives of the Research

1.3.1. General Objective of the study

The general objective of this research is to assess urban planning effectiveness, examine the impacts of transportation hubs on surrounding neighborhoods, identify human-centric mobility challenges and opportunities, and recommend best practices for implementing human-centric urban mobility solutions in Addis Ababa.

1.3.2. Specific objectives of the study

- To assess the effectiveness of current urban planning and zoning regulations.
- To identify the challenges and opportunities related to a human-centric mobility
- To examine how transportation hubs affect the economic, social, and environmental sustainability of surrounding urban neighborhoods in Lambert transport hub.
- To compare the current practices with international best practices in human-centric urban mobility and their surrounding neighborhoods, like Lamberet transport hub.

1.4. Research questions

- How effective are the current urban planning and zoning regulations around transportation hubs and their surrounding urban neighbourhoods in Lamberet transport hub?
- What challenges and opportunities exist in adopting a human-centric mobility approach around transportation hubs in Lamberet transport hub?
- How do transportation hubs affect the economic, social, and environmental sustainability of their surrounding urban neighbourhoods in Lamberet transport hub?
- What are the best practices for implementing human-centric urban mobility solutions in high-density regional transportation hubs and their surrounding neighbourhoods in Lamberet transport hub?

1.5 Research Gap

Intercity bus terminals for instance, Lambert and Kality in Addis Ababa are the key pivot points for regional mobility systems, quite literally turning the wheels of the long, distance passenger flows in these areas; besides, they also act as facilitators of commerce, conveyor of the employment opportunities, and connectors of the social webs. Yet, in spite of the fact that they are very much essential, there is still a dearth of empirical research in what

concerns the investigation of their spatial layout, the assessment of their operational efficiency, and the evaluation of their impact on the user experience and on the urban development. Studies that are already in existence seem to be concerned with general issues of the transport system rather than with troubles specific to the terminal such as the adequacy of the facilities, the integration of various modes, and the planning of human, centric infrastructure.

Several transport planning and urban mobility studies, which have included the bus systems in Addis Ababa among their topics, have mainly concentrated on the general level of service or on the choice of mode of transport without thoroughly examining the actual functioning of terminals, the behavior of commuters in these spaces, and the role of design and management inefficiencies in the generation of problems such as congestion, inequality, and informality. Just to give an example, the research on the public transport system in Addis Ababa has helped to identify the nature of the operational problems and the limited quality of the service, yet it has not go any further in analyzing the terminal infrastructure in a critical way.

A recent thesis has looked at Kality and Lamberet terminals, yet there are hardly any comprehensive published findings that deeply reveal the design flaws, service gaps, and lack of spatial integration at these hubs. Most of the other research papers on transport in Addis Ababa focus on land, use planning and integration and terminal performance or user satisfaction at intercity bus hubs is not a carved, out subject. On top of that, comparative literature from different contexts indicates that poorly planned bus terminals can lack accessibility, safety, and intermodal connectivity features, thus becoming a big obstacle to transport effectiveness. Significantly, papers on bus transit network planning still have room for improvement in terms of combining theoretical frameworks with practical terminal assessment, especially in low, income cities. Thus, context, specific case studies are a must that will look into: Physical and service design deficiencies of major intercity bus terminals in Addis Ababa. Impacts of these deficiencies on commuters' experiences, choices of mobility, and access equity. How the lack of multimodal integration and absence of human, centric design principles are intensifying the transport inefficiencies. Closing these loopholes would not only deepen the scholarly discussion but also equip policymakers with research, based advice on upgrading terminal planning, improving user experience, and paving the way for sustainable urban mobility.

1.6 Scope of the study

1.6.1 Thematic Scope

The area of this research is on the design and functionality of overcrowded public transport centers and the surrounding cities. It explores the physical layout and business efficiency of terminals, determines the major problems concerning accessibility, sustainability and social effects, and assesses the psychology and social dynamics of customers. Another important goal of the study is the development of human centered strategies of a city mobility to tackle the aspect of efficiency of such transport hubs, however with emphasis on the issue of enhancing user experience, environmental sustainability and accessibility. The research offers a viable suggestion of how the terminal design and the general mobility experiences in urban settings can be enhanced.

1.6.2 Spatial Scope

The research scope (location) is limited to Lambert Intercity Bus Terminal and its immediate urban surroundings in Addis Ababa. Immediate surrounding urban area is the built environment within roughly 500 meters of the terminal boundary, which is a distance standard in transport planning for analyzing pedestrian accessibility and multi, modal connections (e. g., buses, taxis, walking, cycling). The area is dedicated to the consideration of the design and functionality of densely populated transport hubs and the area around it in the example of Lambert bus terminal. It evaluates the spatial layout and the efficiency of terminals use, determines major problems of accessibility, sustainability and social effects, and appraises the psychological and social interactions of the users. The study area comprises: Terminal operational zones (boarding platforms, waiting areas, ticketing spaces). Adjacent public spaces and access routes, including pavements, informal transport stops, pedestrian crossings, and none, motorized movement spaces. Surrounding land, use zones influencing terminal activity (e. g., commercial strips, markets, informal vendor spaces). The study's spatial concentration provides the research with the capability to measure the extent to which the terminal's design and operation have an impact on the mobility patterns not only inside the terminal but also in its immediate vicinity, and how these components affect accessibility, comfort, user behavior, and transport sustainability through their interaction with the urban fabric which offers viable suggestions on how to better the design of terminals and general mobility experiences of urban settings.

1.6.3 Temporal Scope

The time scale of the presented study is mainly related to the present situation in Lamberet Bus Terminal and the city in general. This paper reviews the ongoing operational, design and functional procedures with an endeavor to appreciate the existing challenges and opportunities. However, for a more in-depth analysis, the research can also be extended to include the historical background of the terminal and the region since inception. Consequently, the research can also analyze the past in order to gain an insight into the evolution of the heritage and the way in which the past decisions have helped shape the current situation and can be improved in the future.

1.7 Significance of the Study

This study is of practical, academic, and policy importance, especially in the context of urban mobility and the intercity transportation infrastructure of Addis Ababa. By focusing on Lambert Intercity Bus Terminal major transport hub in a rapidly urbanizing city the research tackles significant issues that need to be addressed to understand better how the design and operation of a terminal can impact commuting experience, accessibility, and the overall efficiency of mobility.

Practically, the study gives a set of good insights that are based on evidence about the ways terminal spatial design, circulation patterns, and the provision of facilities can have an impact on operational efficiency, congestion levels, and user comfort. The results will facilitate upgraded terminal layout, smoother pedestrian flow, and better access to services, which in the end, will lead to more efficient and user, friendly urban transport networks.

Socially, the research mainly focuses on how terminal environments affect social interactions and influence people's feelings of safety, inclusiveness, and dignity, especially for the most vulnerable users like the elderly, women, children, and persons with disabilities. By looking at crowding, waiting conditions, and informal activities inside the terminal, the paper demonstrates how transport hubs that are badly designed can be a source of social inequality and exclusion, thus wisely designing human, centered spaces can be a means to granting equitable access and to the promotion of positive social behavior.

The paper explores the topic from physical and psychological aspects, showing that spatial conditions such as overcrowding, noise, less availability of seats, poor lighting, and lack of

clear directions have an impact on stress, comfort, and the overall sense of well, being of commuters. These physical effects need to be understood first as transport hubs are no different from everyday living spaces, which have a direct impact on the users' mind and body. Academically, the research connects urban design, human, centered planning, and mobility performance at the terminal scale to shed light on the intercity bus terminal facilities in developing cities, which is a quite neglected area in the literature. It is beneficial to understand how transport infrastructure affects both movement and the lived experience, and the study, therefore, offers a case, based contribution that is of interest to urban design, transport planning, and architecture. From a policy and planning perspective, the research provides a practical framework for urban planners, transport authorities, architects, and engineers to embed human, centered design principles in the construction of transport infrastructure. It also sets the road for planning and policy decisions that are in line with improved accessibility, decongestion, and sustainability, which, in turn, is consistent with the overall objective of urban transport systems.

1.8. Limitations of the study

The given research is prone to a number of limitations that can affect the breadth and validity of its results. To begin with, it might be rather restrictive since the participants of the survey might not want to provide some sensitive or personal information that could be analyzed. This may influence the general perception on the user experiences and issues on the Lamberet Bus Terminal. Also, although some sources of secondary data may be readily accessible, they may be cumbersome to work with since they may be scattered across a number of information sources. The absence of a unified system of working with statistical data usually leads to inconsistency, and data retrieved by various sources may even contradict each other. Such absence of coherent data management can be an obstacle to the possibility of reaching clear conclusions on the basis of the available information.

The fact that the same context might also hamper the potential applicability of some findings, but will not have a significant impact on the validity of the study as a whole. Another limiting aspect is the financial constraints. The fact that this research was limited in terms of budget does not allow this research to go deeper, limits the fieldwork and limits the scope of data collection, which may affect the quality of the analysis and part of the information collected. The study will also use a triangulation approach to cross-reference several data sources to make

it robust and reliable to counter such limitations. Where survey answers can be deemed as being incomplete or unreliable, they will endeavor to seek further qualitative data by way of interviews and observation. To overcome the problem of secondary data, the study will emphasize the most important and trusted sources and use the strict data validation methods, such as data comparison and consistency checks. This will assist in reducing the discrepancies and improve accuracy of analysis. Due to the gaps in data and lack of research in the situation of Addis Ababa, the study will use the information on similar urban environments, as well as applying the global best practices and contextualizing them in connection to the local setting. Finally, though the lack of finances might restrict the scope of the study, a good utilization of the resources at hand, such as letting the local expertise guide the research and making the best use of the available data, should serve to make the research study as thorough and productive as it could be regardless of the available financial constraints.

1.9 Organization of the Study

This paper is organized into five major sections. The introduction is the first section and it will include the objectives, research questions, and scope of research. It preconditions the following parts because it describes the most important topics of the research. The second section of the research is devoted to the literature review in which the topical issues and theoretical backgrounds of the study are discussed. This section is an amalgamation of sources and it determines a whole picture of the body of knowledge that exists.

The study has followed the literature review and given the methods and methodology that it used in answering the research questions. In this section, the research design is described with the particular methods and techniques of data collection and analysis alongside the rationale of the adopted methods to make sure that they coincide with the aims of the study. It also involves qualitative, quantitative or mixed methods techniques as respective and offers information on the sampling technique, data collection procedures, and data analysis tools used. Such a detailed description shows a clear structure of carrying out the research, which increases the credibility of the results obtained and makes it possible to repeat the study. The five part

presents the gathered information and analysis findings by giving a comprehensive description of the findings that were achieved through the research.

The section displays the data in a systematic fashion, pointing out the significant patterns, trends, and insights that came out during the analysis process. Lastly, the fifth section is a unification of conclusions that the study has achieved and summarizes the key findings of the research and presents the recommendations on the basis of an analysis. The recommendations will be helpful to make the future actions and conduct further research concerning the topic matter, making informed decisions and possible field improvements.

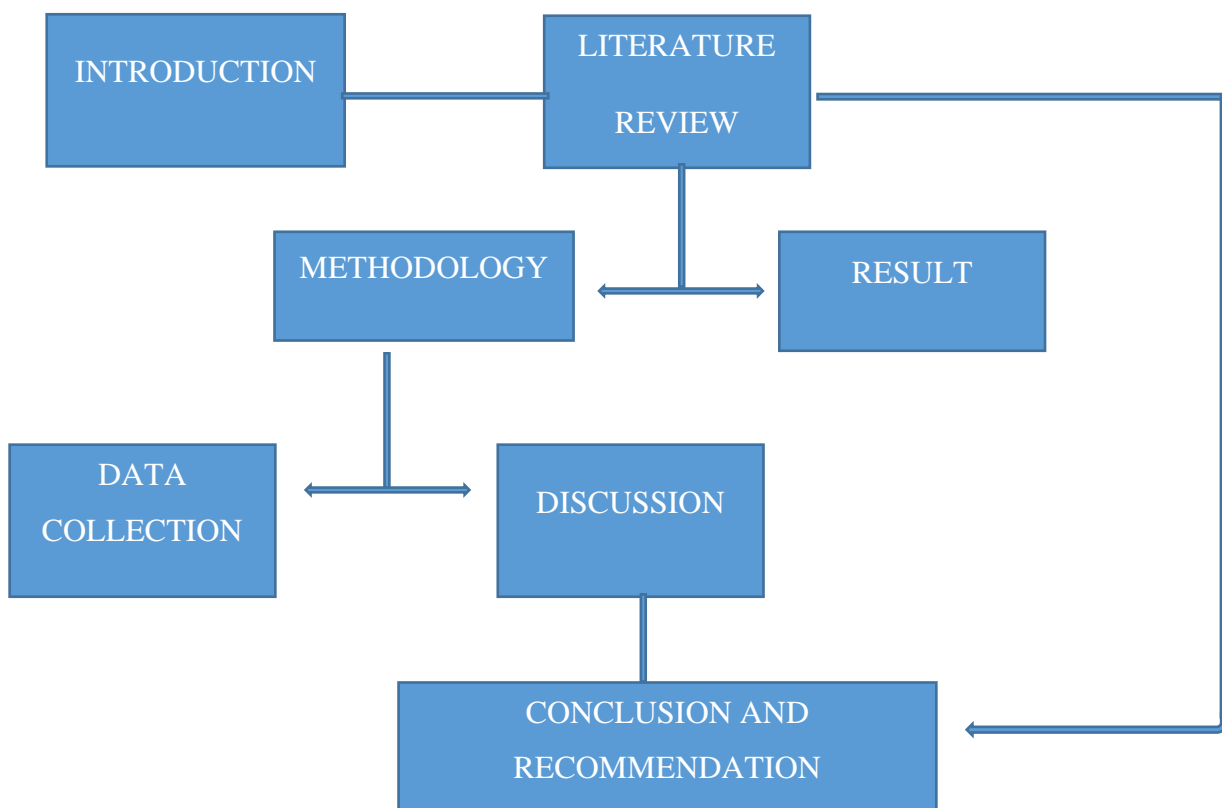


Figure 1.1 Organization of the Study

CHAPTER TWO: LITERATURE REVIEW

2.1. Meaning Definition and terminologies

Regional Bus Terminals:

The strategic planning for the transport centers happens through the regional bus terminals for the smooth movement of passengers and cargo between the urban regions and the surrounding regions. These transport centers act as vital points in the urban transport network and involve the different transport systems to increase the connectivity as much as needed (Hansson et al., 2018).

Human-centric:

Urban planning models are based on human needs with the accessibility of inclusive spaces that facilitate human socialization and security and comfort. (Pertanto, 2023).

Urban Mobility:

Refers to transportation systems and networks that offer efficient and sustainable movement of people and goods through urban areas. (Oszczypała et al., 2023).

High-density transportation hubs:

High-density transportation hubs are characterized by concentrated passenger flows, spatial constraints, and intense social and operational interactions (Bertolini, 1999; Currie et al., 2012; UN-Habitat, 2013).

Urban Mobility Planning:

Urban mobility planning is a process of urban mobility that concerns the formulation and implementation of an urban mobility plan to achieve efficient and safe and sustainable and equitable movement of people and goods over an urban area; while also increasing accessibility and reducing negative impacts on the environment for high-density transport nodes of a regional transport area. (Puget Sound Regional Council, 2015). (Puget Sound Regional Council, 2015).

2.2. Theoretical frame works

2.2.1. Importance of User-Centered Design in Regional Bus Terminals

The significance of user centered design in regional bus terminals is that it enhances the user satisfaction, efficiency in operations, accessibility and movement in general in the urban areas. In this section, the reasons behind why user centered design is necessary in these terminals are presented based on the available literature. One of the objectives of urban transportation is user satisfaction. In regional bus terminals, place-centered design is significant to the realization of this. Norman (2013) says that when the design solutions are designed to address the needs and expectations of the user, the overall experience would be enhanced and hence there will be increased satisfaction. In the case of bus terminals, it implies taking into account such aspects as navigability, comfort, safety, and the availability of essential services. A designed terminal enables people to flow well in spaces. This will eliminate the confusion and frustration that is usually associated with poorly planned transportation hubs. The user-centered design is a fundamental aspect of accessibility especially in the bus terminals which cover the wide regional area and have many users with varying mobility requirements. The studies by the World Health Organization (2015) indicate that the inclusion is promoted when spaces are designed with consideration of accessibility. This will enable the disabled, elderly and other vulnerable people to ride the transportation systems without any danger.

User centered design deals directly with these issues since important sections of the bus terminal can be easily accessed by all, which include entrances, seating, restrooms and ticketing mechanisms. The inclusion of options such as ramps, lifts, braille, and broader walkways is used to ensure that physically challenged individuals move around with ease. Moreover, the structures of terminals furnished with effective way finding systems, adequate lighting and seating that allow users of different categories to sit allows ease of access to the facility by all. This renders a transport mode of transportation to be a viable choice among the members of the community (Ilana, 2023). Security and safety are primary issues in any form of transportation infrastructure and the same is with the case of regional bus terminals. The user-centered design assists in solving such problems by establishing a safe interaction environment. Cammara (2024) writes that human-scale spaces with clarity of visibility and natural surveillance can tend to instill a sense of security among the users. This can include the provision of proper lighting even in the regional bus terminals, being able to be seen at the important locations like the waiting areas and the entrance doors, and installing security

systems like the surveillance cameras and emergency call buttons. Once the safety of users is established, the number of people who will use the public transport will increase, leading to the sustainability of the urban transport network (Ilana, 2023).

The regional bus terminals need user centered design since it enhances multimodal integration, community participation, and sustainability. Such terminals are able to improve connectivity between different modes of transportation by fulfilling the needs of the users, as well as ease of movement between them thereby minimizing traveling time (Litman, 1995). In addition, community participation is promoted by integrating socialization and retailing zones as well as green grounds that transforms the terminals into active social places (Jacobs, 1961). The support of environmental objectives is done through sustainable design practices such as energy efficient systems and green spaces that encourage people to use public transport instead of cars and minimize carbon emissions (Bongardt et al., 2011).

2.2.2. Impacts of Regional Bus Terminals on Their Neighborhoods.

The neighborhoods are mostly affected by regional bus terminals. They provide both the positive as well as the negative impact on the physical, social, economic, and the environmental aspects of cities. Such terminals will have the means to enhance accessibility, enhance local economies and promote social interaction. However, if planned and controlled improperly, it may also result in issues like congestion, environmental degradation, and societal inequalities. The anthropocentric approach is critical to ensure the overall maximization of benefits and minimizing of negative effects in such major urban agglomerations (Sayehvand et al., 2019; Tarilayefa et al., 2023).

2.2.2.1. Psychological Effects on Users: Stress, Comfort, and Mental Well-Being

One other field of research is the psychological aspect of bus terminals. The architectural aspect has a large influence on stress, comfort, and mental health of commuters. A well-designed environment, like transport terminals, has a capability to alleviate stress and improve mental health since they can be designed with higher priorities emphasizing comfort, security, and convenience (Scaletsky et al., 2016). Experiments have shown that physical environment of bus terminals has a significance in determining emotional and psychological outcomes resulting from these terminals for commuters. Gehl, J. (2010).strengthens this theory stating that human-oriented terminals like comfortable seating, clearly visible signs, simple directions, and other features can help in reducing anxiety and stress. In contrast, ill-designed terminals with a lack of comfort and confusing signs can lead commuters into frustration and increased

stress. At that, as Norman (Norman, 2013) notes, the environments that were not designed with the user in mind tend to have adverse psychological outcomes, decreasing the overall satisfaction and causing even more discomfort. Other design aspects that facilitate psychological comfort are ergonomic seating, noise abatement, proper crowd control and designated areas of rest. Cervero, R. (1998) notes that bus stations should be designed so that they have natural lights, greenery, and relaxing styles that would reduce the sense of overpopulation and make them more open. Mental health of users is also enhanced by access to facilities such as clean restrooms, food zones and covered seating. Planners are able to create spaces that are not only functional, but also therapeutic by considering the principles of user-centered design. The strategy can aid in enhancing the mental health of individuals using the public transport (Cervero and Dai, 2014). But when the bus terminals in the region fail to satisfy the needs of users particularly in the congested cities, then the consequences can be disastrous. Issues such as overcrowding, noise and disorderly layouts may add to the levels of stress and anxiety. Litman has conducted research indicating that psychological ill effects of ill-designed transportation spaces are especially devastating to other vulnerable populations like the elderly and the disabled. Feeling of discomfort in such groups can be increased by the lack of appropriate accessibility features in terminals or their excessive congestion (Litman, 1995). The architectural design of the bus terminals has a great influence on the mental well-being of the users. The needs of comfort, safety, and accessibility stand out as the core elements that can reduce stress and make way for better mental health outcomes for all the users of these bus terminals. By implementing the concept of user-centric design that would cater to the needs of both physical and mental requirements would make these bus terminals a location that would enhance the quality of living and make mental health thrive among all users.

2.2.2.2. Environmental Impact: Pollution, Sustainability, and Green Design Solutions

Bus stations are essential in the transport system of the urban areas but can cause environmental problems, particularly pollution. The congestion of these places may lead to an impact on human health and the ecosystem surrounding the environment, such as the increase in the number of emissions of particulate matter, noise pollution, and disruptive visuals (Ngoc et al., 2018). With the increasing number of urban populations, there has been increased attention on the environmental effect of bus terminals. These effects have to be curtailed through sustainable redesigns. The primary pollutants of bus terminal are particulate matter of diesel engine emissions, volatile organic compounds, nitrogen oxides, and sulfur dioxide. These form of pollutants may lead to significant health complications, including respiratory complications

and heart complications. As an example, it has been demonstrated that the inhalation of particulate matter, especially PM 2.5, is associated with increased hospitalization and an aggravation of chronic illnesses. Also, bus services contribute to pollution with noise that impacts the quality of life of residents living near the depot (Assessing Direct Community Impact from Proposed 250-Bus Depot, n.d.; Ngoc et al., 2018).

2.2.2.3. Economic and Social Development around Regional Bus Terminals

Investing in regional bus terminals can promote economic growth by improving transportation access. Transportation access attracts companies and helps grow local areas nearby. When designed well, Regional bus terminals create connectivity; this increased connectivity provides access to surrounding neighborhoods and attracts future retail & commercial development opportunities, residential projects, etc. Investment in transport infrastructure produces a positive effect on property value and helps redevelop 'undervalued locations,' thus having an active local economy, according to Cervero's findings that support this thesis. Also, these nodes provide job opportunities during construction and subsequent operation, thereby facilitating economic prosperity. Additionally, these regional bus terminals foster social equity by giving 'undeserved communities access to basic services such as health care and education.' Through an integrated transport system, residents with differing economic conditions can gain access to employment opportunities, health care, and education, according to Litman's findings supporting this statement on social mobility. Moreover, regional bus terminals can work as an 'assembly point for the community,' thus providing social interaction and bonding opportunities, an essential factor for the liveliness of an urban area, Jacobs unveiled evidence for this statement. However, poorly planned and poorly used regional bus terminals may give rise to negative social and economic influences. It may deter businesses away due to poor integration with other transport means and poor infrastructure, thereby hampering local development opportunities. Negative impacts such as 'accidents, personal safety risks,' or an 'informal sector agglomeration' as a consequence of these nodes may decrease the quality of life for the local residents. Therefore, concern for design and operation planning at regional bus terminals should be immediately treated with the utmost priority, since it is the way to make them act properly as a catalyst for economic development and social inclusion, benefiting the community at large.

2.3. Relationship between regional bus terminals and their urban neighborhood

In urban design the relationship between regional bus terminals and their adjacent urban neighborhoods plays a significant role; Regional bus terminals serve more than merely a function as public transit stations or 'hubs' they are an integral part of the urban landscape. Historically regional bus terminals were defined solely as a function of public transport, whereas more recently urban design has taken into consideration in order to design a better urban transit hub/terminal, the focus should also be on how to integrate the transit hubs/terminals into the urban environments that they serve. Engaging with the urban environment of a regional bus terminal provides opportunities to enhance accessibility to all users of the urban area, fosters social interactions between people from different communities, and improves the vitality of the surrounding urban neighborhood (Wang & Woo, 2017). An effective and efficient regional transit hub/terminal is one that strives to create user-friendly, safe and secure, and user-comfortable access to their respective transit systems, and at the same time, provides for the development of links to the surrounding areas. Bus terminals located within proximity of major types of land use such as residential, commercial and recreational land uses can foster pedestrian and cyclist activity, thus reduce the reliance on automotive transport, and promote more sustainable forms of transportation. For example bus terminals should be located in close proximity to other forms of public transportation systems (e.g., rail systems, transit systems), major roadways, dedicated bike paths, and pedestrian pathways, thereby providing opportunities to enhance the mobility of the areas surrounding the bus terminal. Also, terminals can also be well integrated into their environments to make accessibility to all types of means of transportation easier so as to facilitate commuting as well as encourage a higher number of people to use means of transportation (Wang & Woo, 2017). Also, the regional bus terminal can have a major impact on the overall economy as well as offer a sense of a social environment for the community at which the terminal serves to. When the overall design of the transit terminals is with a focus on the generation of a sense of a community with facilities such as resting places, shops, and parks, such terminals may provide a place of convergence for the community at which the residents may gather, interact, and conduct their day to day tasks (Kamtziridis et al., 2023; Litman, 1995). On the other hand, poorly designed terminals with poor integration into the surrounding environment may have a sense of adverse impacts on the overall environment of the community at which such terminals

are established so as to cause an increased sense of congestion, noise, as well as a sense of depreciation of properties in the overall environment. This may also act as a major constraint to the growth and overall prosperity of the community at which such terminals are established (Kamtziridis et al., 2023; Litman, 1995). By utilizing a user-centered approach to design, urban planners and designers can create terminals that enhance the community's overall quality of life and create a more connected, sustainable and vibrant urban fabric (Kamtziridis et al., 2023).

2.4. Characteristics and standards of Human-Centric Design in regional Transport terminal

2.4.1. Characteristics of Human-Centric Design in regional Transport terminal

Humans are the central theme to have a regional transport terminal be effective; not only do the design elements provide function but also, through the design of all physical space, convey warmth, and accessibility; furthermore, they create a welcoming atmosphere, allow for easy-to-use spaces and address the various user needs. An effective design has a primary focus on ensuring that the user is comfortable, safe and experiences ease of use while also supported to practice effective and sustainable transport practices. The key elements and standards that compose successful human-centric design in all regional transport terminals are defined in the following list (Mitchell et al, 2017).

2.4.1.1. User-Friendly Interfaces

Human-Centric Design focuses on creating systems that make it easy for users to interact with one another and the terminal itself. User-Friendliness of users' interfaces is an important foundational principle of human-centered design. Ticketing systems and informational kiosks are user-friendly examples of how systems should work to facilitate user interactions in busy transit hubs to help reduce user confusion and enhance the overall transit experience for users. User-friendly interfaces provide satisfaction to users by enabling them to utilize the services available to them, such as purchasing tickets, locating their platform, and receiving real-time information regarding transportation service schedules (Jo, 2020). Satisfaction for the passenger is improved through the use of modern technology, such as mobile phones and display systems with up-to-date information, helping to inform the user and reduce their dependence on frequent interaction with staff. Modern technology offers better services for passengers traveling overseas and for those who are not conversant with the location. Finally, aspects of public and private spaces in the terminal building will promote an effective flow of the terminal and alleviate congestion (Mitchell et al., 2017).

2.4.1.2. Clear signage and information systems that facilitate navigation.

One of the factors that must also be taken into consideration when designing a transportation system is the use of signs. This is because transportation terminals are utilized for a wide range of functions, particularly in instances where such terminals are established in major metropolitan cities where the traffic can at times be quite hectic. Signage should be in multiple languages, differ visually from each other, and should be located strategically at terminals; specifically, they should be located in confusing areas such as entrance ways, transfer points, and exit points (National Association of City Transportation Officials, 2016). By utilizing standardized symbols and color codes, users have a greater chance of deciphering what each sign means and finding what they are looking for quickly. Digital displays with live updates to transportation schedules, delays and platform assignments will help passengers navigate through terminals more effectively. Both experienced commuters and those visiting a terminal for the first time should find these systems to be helpful for navigating through the terminal. Tactile, auditory and visual cues must also be included for users who have a disability so that everyone has access to the information provided.

2.4.1.3. Comfortable Waiting Areas: Amenities that enhance the user experience, such as seating and shelter.

The necessity of waiting areas to create a people-centered design is very important. Long distance journeys on regional busses often mean that people are waiting in bus terminals for extended periods of time, so providing comfortable seating, shelter, and access to facilities such as restrooms and drinking fountains significantly improves the overall user experience. Different volume of passenger flow should have a corresponding waiting area with a wide range of seating options including, but not limited to, benches, individual seats, and family/group areas (Bogren et al., 2009). In addition to providing shelter from weather conditions, sheltered waiting areas allow passengers to wait comfortably through the use of adequate heating, cooling, and ventilation systems. To reduce the impact of growing numbers of passengers using regional bus terminals as a hub, designers should ensure that the design of the waiting areas allows for the use of a greater number of waiting areas without the creation of bottleneck areas within the terminal. The addition of aesthetic features such as plants and other decorative elements also adds to the experience of the passenger while waiting (Bogren et al., 2009).

2.4.1.4. Safety Measures: Well-lit areas and surveillance to ensure user safety.

The regional bus terminal must implement more effective security measures due to the high volumes of foot traffic. Visible security personnel and well-lit areas will help create an environment of safety for the passengers as well as the terminal employees by lowering the risk of accidents or injuries. Surveillance cameras must be strategically placed in order to monitor areas where such activities are most likely to occur (parking lots, pedestrian walkways, and waiting areas). As demonstrated by Ding et al. (2022), the perception of safety within a terminal leads to increased levels of use and greater loyalty to public transportation due to increased confidence in the system. Although physical security is an important factor in establishing a safe environment for users, it does not fully address safety issues. Other safety concerns include; slippery floors, blocked pedestrian walkways, and buildings not properly maintained. Directional signs such as emergency exits, first-aid stations, and evacuations also prepare users for accidents and emergencies.

2.4.1.5. Accessibility, Inclusivity, and Sustainability in High-Density Hubs

There must be a focus on accessible terminals for all levels of the communities around the high-density transport terminals for the elderly, the disabled, and those in the communities who experience mobility issues. The application of ramps, lifts, tactile paving surfaces, and hearing assistive systems gives a chance for all communities in society to freely learn about the terminal when they are present in the terminal. Drawing a path network for the special seating allocation for the disables would also improve the access levels of the terminal. Based on Westerheim et al. 2007, well-designed terminals provide a means that can enable a wide variety of terminal users to make their way through the terminal without having to seek specialized assistance. Furthermore, another aspect that should be incorporated in human-centered design of high-density transport terminals is sustainability. The building system of the terminal must apply environmentally sustainable design approaches that include but are not limited to energy-efficient lighting systems, solar panels, green roofs, rainwater recycling, and the application of sustainable building materials. This will ensure that the terminal does not have any adverse effect on the environment; instead, it will set the pace for sustainable developments in the urban construct. Furthermore, it can also be applied in the operations of the terminal through the elimination of wastage in the terminal, application of recycling processes in the terminal, and the facilitation of reduced carbon modes of travel such as cycling through the terminal or the application of electric buses (Muhammad, 2021). The ability to provide benefits to local bus terminals through the inclusion of these elements creates an environment where all users feel

welcome and comfortable while using transit. By focusing on this approach when developing transportation systems, cities will be able to create transportation hubs that promote the use of public transportation by reducing or eliminating the use of the automobile as a means to get around. This is a crucial step toward building sustainable and transit-oriented communities.

2.4.2. Standards of Human-Centric Design in regional Transport terminal and there urban neighborhood

Transport hubs within a region form an essential element of an urban transport network. They interconnect different forms of transit (bus, train and, where applicable, tram/metro) at a central point in the network. To adequately meet passenger needs, the design of the transport hub must also take into account its overall impact on the urban surroundings.

2.4.2.1. Connectivity and Integration

As per the recommendations of the European Commission, transport hubs that are particularly well designed need to allow for smooth intermodal connectivity with the least amount of required transfer time. Transport hub design should integrate a variety of transport services. There should be a maximum connection waiting time of five minutes or less (Andrew, 2024). This will lead to an improved experience for users.

2.4.2.2. Proximity to Residential and Commercial Zones

Having regional transport hubs located reasonably far away from populated places can minimize the necessity for excessive travelling time or distance to access terminals. The World Bank recommends that all Regional Transport Hubs be located less than 10 minutes walking distance from 60% of the surrounding populous areas (ITF, 2015).

Having a regional transportation hub integrated with Businesses and Commercial Establishments provides an opportunity to develop a vibrant atmosphere with continual access to goods and services through the establishment of a "24/7" environment. This environment promotes Economic Development and reduces traffic congestion in the adjacent streets (BELL, 1984).

2.4.2.3. Land Use and Zoning

Transit hubs should promote the use of multiple types of land so that they can be used to create a functional and dynamic community with a strong pedestrian environment that attracts a wide variety of business, cultural, and service activities. According to the International Transport Forum, integrating retail, office, and residential uses around transit hubs creates opportunities

for greater metropolitan area synergies using transit as a catalyst for the larger scale of urban development (ITF, 2015).

2.4.2.4. Urban Neighborhood Standards and Planning Issues

Regional transport hubs located within urban centers have a significant impact on the cities they serve and are typically more environmentally friendly than their rural counterparts. Urban transit hubs must address the needs of pedestrians and cyclists while providing adequate transportation infrastructure that balances environmental stewardship, quality of life, and economic viability. The following are key components of a successful urban transit hub design:

I. Pedestrian and Cyclist Access

A fundamental element of any urban transit hub design should be to provide adequate and safe access via pedestrian and cycle lanes and facilities. Safe and well-lit pedestrian paths, bicycle lanes, and an ample supply of bike parking should be included in the design of any urban transit hub to increase the use of alternative modes of transport. The U.S. Department of Transportation recommends (2013) that 15-20 percent of the area surrounding any transit hub be designated for pedestrian and bicycle infrastructure to support and promote active transportation (Ilana, 2023).

II. Noise and Air Pollution

Transit hubs and the associated urban areas often generate a significant amount of noise and air pollution that has a negative effect on the surrounding environment. To alleviate these problems many terminals incorporate noise-absorbing materials and incorporate green walls and trees along their main pathways. Use of emission-reduction technologies and transportation services can significantly improve air quality. One study conducted by the European Environment Agency in 2014 showed that if green transport solutions and noise mitigation measures are adopted, air pollution in cities can be reduced by as much as 15% (European Environment Agency, 2014).

III. Social Equity and Accessibility

Transit nodes and the regions around them should be designed in such a way that everyone living in the region is incorporated. For Transit to be accessible equally by all citizens, they should be providing an equitable level of service. According to Gehl, cities should be designed in the region in such a way that they are providing 'barrier-free' accessibility, especially to those groups who qualify as seniors, those with disabilities, or come from economically

disadvantaged regions. Accessibility devices such as ramps, elevators, or tactile should be an essential element in our designs and should be designed to handle at least 10% of the city's population (Cammara, 2024).

IV. Green Space and Environmental Design

Transport points and cities should be designed in conjunction with the concept of incorporating urban green space, which affects the peace and tranquility of the citizens and visitors. Urban green space has been known to reduce carbon emissions, lower the impact of heat islands in cities, as well as serve as areas of recreation. According to the American Society of Landscape Architects (American Society of Landscape Architects, 2015), an urban transportation hub should have between five and ten percent of its land area allocated to green space or parks to promote environmental sustainability and enhance the quality of life for urban residents (Services, 2022).

V. Safety and Crime Prevention

The safety of the surrounding areas is of the utmost importance as the floating population around the transportation hub continues to rise. The design and planning of the surrounding area should follow the crime prevention through environmental design principles that emphasize natural surveillance, spatial enhancement, and limited access. Research demonstrates that having the right amount of light in an area, combined with good visibility and a mixture of uses within the same space, reduces the risk of crime (Jeffery, 1971).

2.4.2.5 Planning Issues for Regional Transport Hubs and Urban Neighborhoods

There are several significant planning considerations involved in creating regional transport hub in urban neighborhoods such as:

I. Congestion and Traffic Management

How to manage congestion and manage traffic at urban transport hubs integrating an urban transport hub into an existing urban setting presents many difficulties. Congestion occurs mostly during peak periods and traffic management methods should also be employed to eliminate or reduce congestion caused by the hub. Traffic management solutions should incorporate dedicated bus lanes, modern traffic signal control systems, and real-time monitoring systems, as well as the use of other technology of vehicle tracking to assist with the management of heavy vehicular traffic around the transport hub (Litman, 1995).

II. Sustainable Urban Mobility

How to promote sustainability of urban mobility through the use of public transportation In addition to reducing carbon emissions via transportation, sustainable mobility initiatives should also encourage the development of electric vehicle (EV) charging stations and other forms of renewable energy. The Global Environment Facility recommends that Governments adopt policy initiatives supporting sustainable urban mobility with targets for reducing carbon emission from transportation networks in cities by 30% by the year 2030 (UN HABITAT, 2016).

III. Resilience to Climate Change

Adaptation of Urban Transportation Systems to Climate Change Designing urban transportation systems and the surrounding areas to be resistant to the effects of climate change (i.e., extreme weather) must take into consideration climate changes (floods, heat waves, and the effects of severe deterioration of urban climate) (Green Infrastructure Solutions for Urban Areas, 2015).

IV. Long-Term Planning and Adaptability

Regional transport hubs must be constructed to allow for future flexibility with regard to passenger growth and infrastructure development to match that growth. Planners need to plan for the continued growth in future demand and the introduction of technology (e.g., autonomous vehicles and intelligent transport systems) by developing a transport system that will endure over time (Pucher et al., 2010; Pucher & Buehler, 2017).

2.5 Principles of Effective Human-Centric High-Density regional Transport Hubs and their neighborhood Design.

When creating facilities for transporting lots of people in a small area, it is important to follow three guiding principles: efficiency, sustainability, and customer-orientation. It is not a theoretical basis, but these three principals have also been proven through empirical study and the experiences of planners across the world that employ urban mobility strategies as best practices with regards to planning for urban mobility. Commonly, the evaluation of implementing human, friendly, high, density regional transport hubs revolves around performance indicators that can be quantitatively compared in terms of efficiency, sustainability, and user, orientation. These three cornerstones are not just a set of theoretical

notions, but they are a part of urban mobility practice along with support from empirical studies and international planning guidelines. Efficiency, in fact, indicates how a transport hub can be able to move passengers and vehicles smoothly with the least amount of delay and congestion. Normally, it is gauged by such factors as passenger throughput, average waiting and transfer times, circulation clarity, capacity utilization, and the convenience of multimodal connections. A great hub provides for the straightforward movement of pedestrians, lessens the different hand, to, hand combat of users vs. vehicles, and facilitates the timely getting on and off a vehicle. Sustainability weighs the environmental and the urban long, term impacts of transport hubs and the neighborhoods where they are located. Besides, energy efficiency, use of skylight and natural ventilation, the integration of none, motorized transport modes, traffic congestion, and emissions reduction, and compatibility with the surrounding land uses are the main factors. Thus, sustainable transport hubs enable a compact urban development, lower car dependency, and foster environmentally sound mobility patterns. User, orientation (human, centric design) relates to a transport hub according to which the hub meets the physical, psychological, and social needs of the people. Efficiency in this aspect can be evaluated through user comfort, accessibility to all groups, perceived safety, legibility, availability of amenities, and overall user satisfaction. Human, centric hubs are those that have clear wayfinding, comfortable waiting areas, design that satisfies everyone, and they are such that they reduce the stress and anxiety of commuters. Each of these measurable dimensions constitute a thoroughly comprehensive framework for evaluating the effectiveness of high, density regional transport hubs and their neighborhoods. By using these standards, planners and designers can determine not only the functional performance but the social and environmental quality of transport infrastructure within urban mobility systems as well.

2.5.1. Stakeholder engagement and community involvement in urban mobility planning

To implement effective transportation hubs, we need to engage with the stakeholders' involvement in the community so that all users will benefit from its design. Stakeholder involvement is critical. Arnstein, 1969 and several other studies have shown through Participatory Planning, stakeholders develop greater trust, will have less opposition and create transportation hubs based upon priorities set forth by the community. An example of this would be Curitiba, Brazil's Bus Rapid Transit System which has flourished due to relationships formed with many different levels of government, businesses, and residents (Joseph et al., 2007).

2.5.1.1. Inclusive Approaches

Litman(1995), in his analysis of urban mobility planning, states that these plans should consider all members of the community, especially those with limited access or voice. Using methods such as workshops, focus groups and community consultation can provide a means to gather a variety of views in developing a fairer system (and) foster multiple perspectives. In addition, tools like social impact assessments, transportation accessibility audits etc. are beneficial to planners through their assessments of the effect of proposed changes to the community, thereby enhancing the level of transparency and accountability among the stakeholders involved in that process (Cammara, 2024).

Key Standards

The design phase of consultation will consist of 3–5 tiered levels of engagement with stakeholders. A minimum of 30% of residents will be engaged at each consultation level through a variety of participatory engagement methods, such as surveys and town hall meetings (City of London Transport Strategy Review Engagement Plan, 2022).

2.5.2. Modular Design

Flexibility to adapt to changing passenger volumes

Through the utilization of prefabricated components, construction facilities are able to realize greater expansion opportunities within shorter timeframes and with less waste produced. Modular facilities support economic and operational advantages through reduced capital investment and scalability based on expected growth in traffic. The Deloitte report indicates that using modular designs reduces construction time by up to 20% and results in maintenance costs that are 15% or more below traditional designs. In developing modular facilities, at least one of the following key criteria must be met: modular components must provide throughput increases of 30%, without severe structural changes (Deloitte 2018), and 40-50% of construction materials must be prefabricated to provide both cost and time savings compared to traditional construction.

2.5.3. Integrated Transport Solutions

I. Seamless connections with other transport modes

To facilitate smooth transport interchange, high-density transport hubs must enable multiple modes of transport to be integrated together; this includes but is not limited to buses, trains, trams & bicycles achieving maximum “Connect ability”. According to the European

Commission, multimodal connectivity is essential for improving travel time, enhancing comfort & convenience while functioning as an incentive for public transport usage. For example, to minimize transfer time between modes of transport, Zurich Central Station incorporates multiple modes (i.e., train, tram & bus). The integration of intelligent technology into the municipal transit system through the use of digitally enabled tools (i.e., real-time schedule updates & integrated ticketing systems) facilitates easy access between multiple modes (Carmo et al., 2020). Researchers (Zhang et al., 2020) indicate that people who have access to an integrated app and contactless payments have a 25 percent higher likelihood of using public transit in comparison to those without integrated access. High-quality/user-friendly design features, such as minimal distance between different modes and signage indicating how to get to different modes, are also important objectives of transit planners. Planners should design transit hubs so it takes less than five (5) minutes on average to travel from one type of mode to another type of mode (ITDP, 2019). These established design standards are the minimum design parameters for a high-density transfer hub. Transit hubs must accommodate at least three types of connected transport modes, and the maximum distance to reach any other connected transport mode from a transit hub cannot exceed 400m (UITP, 2020).

2.5.4. Environmental Considerations

- I. Incorporation of green technologies and sustainable practices.

The sustainable development of the environment is a major component of how we create new designs for transport hubs and ensures that those designs reduce overall impacts on the environment, while also creating an environment that is more resilient to the impacts of climate change in urban areas. "Green" Infrastructure: The use of "green" infrastructure features, such as green roofs on buildings, rainwater harvesting systems, and renewable energy systems, greatly reduce the carbon footprint of transport hubs and provide many other benefits, as well. As an example, the Hauptbahnhof in Vienna contains both photovoltaic panels and a geothermal heating system, which combined are reducing the amount of energy that those two systems use by about 30% (United Nations Environment Program, 2019). Low-Emission Mobility: The use of electric public transportation and charging stations to promote electric vehicles is one of the core elements of sustainable transport hubs. The Global EV Outlook (2022) suggests that at least 5-10% of all parking spaces should be designated for electric

vehicles. Climate Resiliency: Climate change has an impact on transport hubs and therefore they should be designed to mitigate the impacts of climate change, such as elevated platforms to avoid flooding and the use of heat resistant materials. According to a study by the Rockefeller Foundation (2016), climate-resilient infrastructure has been shown to reduce the long-term cost of repairs up to 25%.

Key Standards:

Transport hubs should be designed to reduce energy use by a minimum of 30% through renewable energy sources and measures. The area of the transport hub should be made up of at least 10%-15% of green space to mitigate the urban heat island effect (International Council for Local Environmental Initiatives, 2020).

2.6. Functional arrangement diagram for Intra-state bus terminal

Addis Ababa has many people and only one central bus station, so planning Local Bus Stations is very important for the cities within it to connect with each other. Good planning and design of Local Bus Stations will have at least the following three elements:

The key components of a well-designed terminal are

1. **Passenger:** friendly areas: Local bus stations need to be designed to ensure that each passenger is provided with a safe way to get in and out.
2. **Staff areas:** Local bus stations should have sufficient amount of areas for passengers waiting to board buses to make purchases (concession types of businesses).
3. **Bus staff facilities:** A local bus station with long, distance services must have facilities for both staff and passengers that are clearly delineated and well, equipped, so as to create a pleasant environment and ensure the smooth operation of the station. These facilities play a crucial role in cutting down the time spent on boarding, aiding the management of the terminal, and generally raising the level of passenger satisfaction. Passenger facilities could encompass Ticketing and information desks, offering complete and easily accessible information about schedules, fares, and other travel necessities. Comfortable waiting areas with sufficient seating, planned for longer stays and various passenger requirements. Toilet and personal hygiene areas, with special facilities for disabled persons. Luggage handling and storage facilities, geared towards the needs of long, distance travelers. Retail and concession areas, e. g. food kiosks and

small shops, thus turning the waiting time into a pleasant and productive experience. Staff facilities could be: Spaces for administration and control, designed to facilitate the work of the terminal and the coordination of activities. CCTV monitoring and security control rooms, which are vital in ensuring safety and providing a situation awareness coverage. Areas where staff may rest and change, thus allowing employees to have a greater sense of well, being and be more productive. Dispatch and operations rooms, the "nerve centers", from which bus movements, timetables, and the entire boarding process are directed and coordinated. Looking at it from a design viewpoint, the layout of these facilities must primarily focus on making the space easy to understand, providing straight circulation paths, and ensuring a clear functional division between the staff areas and passenger flow. This kind of organization not only eliminates confusion but also cuts down on the time for boarding and increases safety. Bringing in the elements of camera monitoring systems and secured entry points helps to maintain a safe terminal environment, on the other hand, shops and eateries make the passengers more comfortable during their wait.

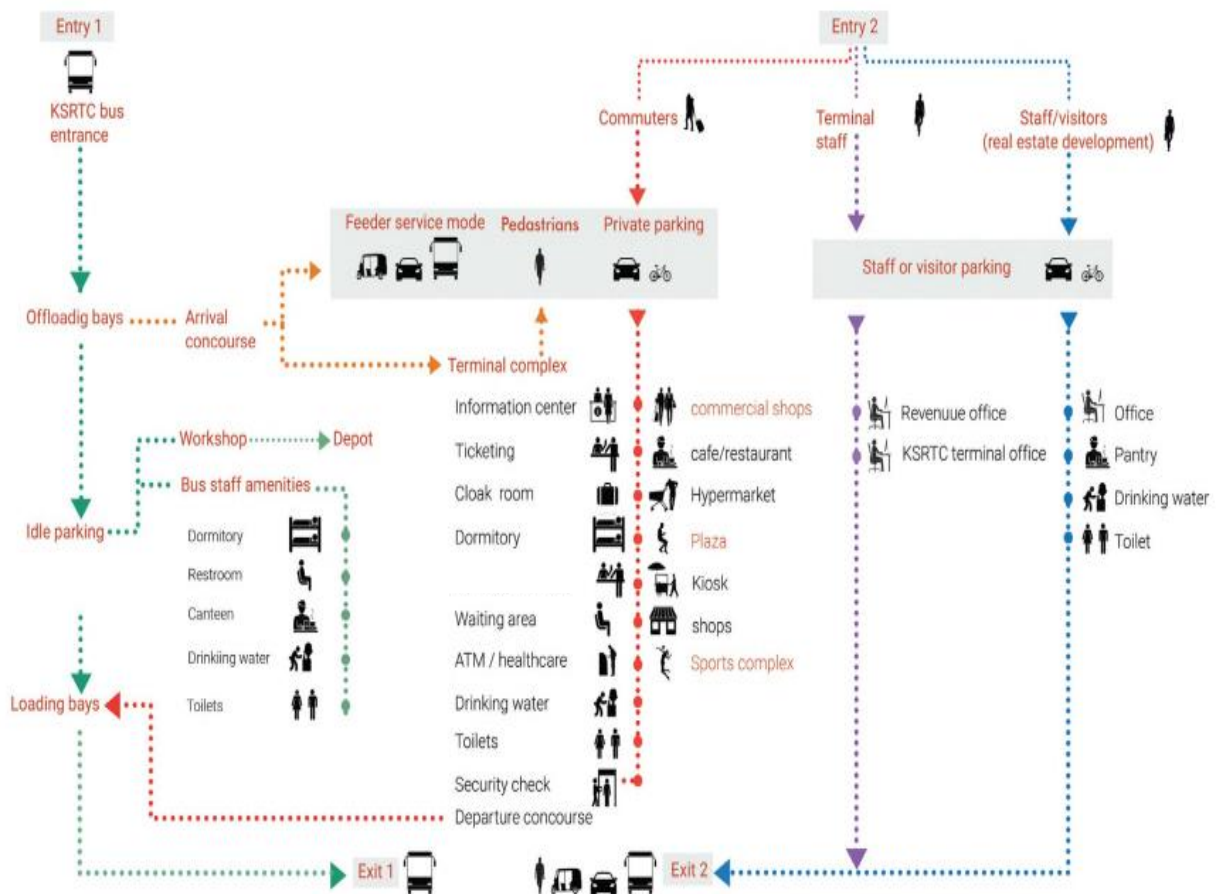


Figure 2.1 Architectural Functional arrangement diagram for regional bus terminal

Source:(Greewin, 2023)

The location, size and design of bus terminals have an immense impact on their surrounding urban communities. Good terminals can stimulate the retail and service industries, as well as determine how the adjacent area is to be developed. Terminals can also act as urban transit hubs and connect pedestrians to other transit modes, such as taxis and minibuses (ITDP, 2019; UN-HABITAT 2013). Badly designed terminals can contribute to increased traffic congestion, wider economic disparities and increased pollution levels. Strategic terminal siting must take into account the potential for access to, and from, a terminal, as well as the environmental effects of not doing so and promote more equitable urban development (Urban Habitat (a), 2013). For example, Kalitiy and Lamberet in Addis Ababa have been cited as regional terminals that act not only as transport routes, but also serve as anchors for community-based business (AACPPO, 2017).

2.7. Regional Transport Hubs Addis Ababa

Addis Ababa is Ethiopia's capital and center of all political, economic and cultural activity in the country with a population over five million people located strategically in the center of Ethiopia. Through its position Addis Ababa provides an essential link with the other regional cities in the country and makes it easier for people and goods to travel between Ethiopia and its neighbors. The development of Addis Ababa from its establishment by Emperor Menelik II to today is heavily dependent on the evolution of its transportation infrastructure. The early methods of transportation used in Addis Ababa included horse-drawn carriages and walking on sidewalks while people moved about the city (Pankhurst, 1961). With the expansion of urban areas and increases in business use, the transportation systems have grown to include large regional transit terminals to connect the good movement of the people throughout Addis Ababa and distribution points throughout Ethiopia (Pankhurst, 1961).

2.7.1. Historical Overview of Evolution of Regional Transport Hubs in Addis Ababa

The historical evolution of Addis Ababa's transport terminals reflects the city's growth and its transition from a localized urban center to a regional transportation hub.

2.7.1.1. 1886–1940s Founding and Early Development

Addis Ababa's establishment as Ethiopia's capital occurred in 1886, ordered by Emperor Menelik II (Tufa 2008). At that time, there was little in the way of transportation within the city: horses and carriages were commonly used while sidewalks weren't much more than dirt

paths. The majority of roads connecting various parts of the city were very poorly maintained; they were created strictly to connect palaces with various districts around the city. Because of the limited amount of roads connecting places within Addis Ababa, people often travelled using traditional caravan routes. As a result, there were very few structures built to support "modern" forms of transportation (Pankhurst 1961). The connections made between Addis Ababa and surrounding cities during the early years of the city's administration were purely for administrative purposes, establishing connections to provincial capitals such as Jimma and Harar. The absence of physical infrastructure for transportation around the city indicates the nascent phase of urbanization at which the city was at the time. While Addis Ababa served as a centralized capital for administrative purposes, it had not developed into a hub for trade or communication.

2.7.1.2. 1950s–1970s: Modernization and Regional Integration

The 1950s represented a major shift due to the introduction of automobiles and the organization of the road system through the construction of roads within Ethiopia. At the same time, Ethiopia began to join international agencies such as the UN, which provided funds to Modernize the country's transportation sector. Road Development: Addis Ababa was established as the primary center for the construction of Roads in Ethiopia under the Reign of Emperor Haile Selassie. The first Major highways constructed from Addis Ababa to major cities in addition to other Regions, allowed movement of Freight and Passengers at Much Higher Rates than previously possible.

The terminal/ Transfer System: As a result of the Transportation Modernization Movement, the first transfer terminals in Addis Ababa were created. These terminals were to facilitate a more efficient mass transit system for the Increased Population and demand for Service. In the late 1970s, Addis Ababa became known as the Gateway to the East and in the Mid-late 1990s, Addis Ababa became the Capital City of Ethiopia, (Giorgis, 1995).

2.7.1.3. 1980s–2000s: Urbanization and Demand Pressure

The late 20th Century through the early 21st Century, there was a rapid population growth and urbanization of Addis Ababa. As of 1993, the population had increased from 1 million in 1984 to over 2.1 million by the year 1994, which is an increase of nearly 1000%, according to CSA 1993. This tremendous demographic growth placed great demands on the existing transport infrastructure. As a result, new terminals have been constructed in order to handle the increased demands on these transport hubs. Recently established transport hubs such as Asko and Akaki

Kaliti have connected Addis Ababa with the ever-increasing number of roads throughout Ethiopia, each of which was developed to address the growing demand for transportation options. Despite their improved accessibility, many of these transport terminals were constructed without adequate integration into the surrounding urban environment. Consequently, many issues remain, including continued road congestion inside and immediately surrounding the terminal locations; lack of adequate pedestrian infrastructure and poor urban design; insufficient integration of and consideration for economic activities being generated in and around the areas adjacent to these terminals; and the increased emergence of informal transport systems, such as minibuses and taxis. As a consequence of the lack of formal regulations governing this industry, the emergence and unregulated growth of this sector has contributed to increased congestion of roadways and terminal locations. (Kassa 2014).

2.7.1.4. Post-2000s: Structured Urban Planning and Persistent Challenges

Beginning in the 21st century, Addis Ababa has seen extensive urban planning activity, which has attempted to modernize its physical environment; there has been rapid growth in the city's population and economic activities, making the new urban planning initiatives insufficient. The Addis Ababa City Administration (AACCA) and the Ethiopian Roads Authority (ERA) continue to invest heavily in their road development and expansion programs. The AACCA's Megenagna Transport Terminal has also been modernized in response to increased ridership (PLC, 2020; UN HABITAT, 2008).

2.7.2. Current Addis Ababa major regional transport terminals

There are six main bus stations in Addis Ababa as part of the public transport system. The bus stations are Addisu Gebeya, Asko, Ayer Tena, Kaliti, Lamberet and Merkato, which act as the key points of entry/exit for people travelling between different cities or regions of Ethiopia.

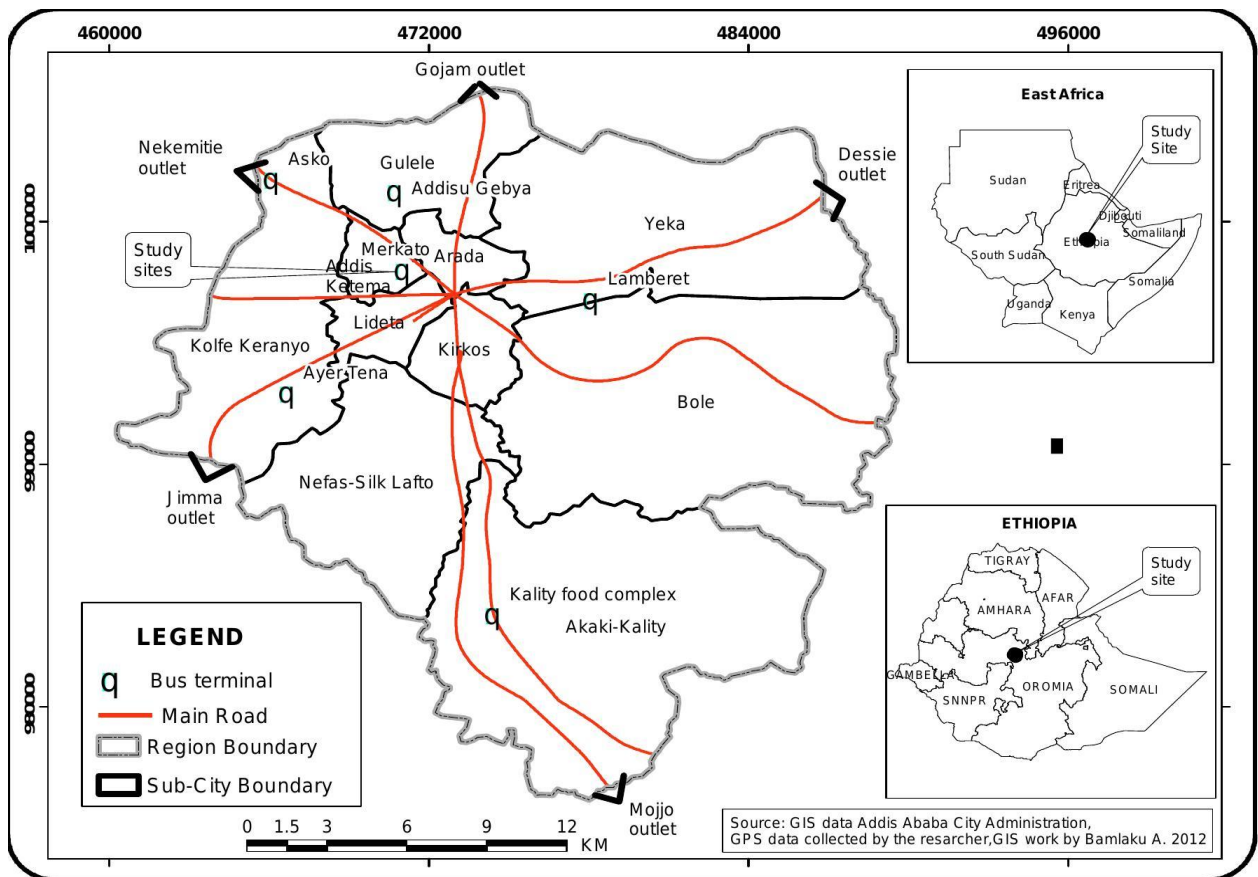


Figure 2.2 Addis Ababa regional transport terminals

Source: ((PDF) *Conurbation and Urban Sprawl in Africa: The Case of the City of Addis Ababa*, n.d.)

Kaliti Terminal is located in the south, Lamberet Terminal is in the northeast, and Ayer Tena Terminal can be found in the west and Askto Terminal located in the north-west, the Mercato (Atobis Tera) terminal is located in the central area and Adisu Gebeya Terminal is located to the north. Each terminal is an important travel hub for the surrounding areas and plays an important role in providing intercity transport services to the rest of Ethiopia.

2.7.3. Policy and regulatory frameworks for design regional Transport Hubs Addis Ababa.

Ethiopia’s national transport strategy aligns with the 30-year road map, known as the Integrated Transport Master Plan (ETMP 30), which was unveiled in 2022. This strategy seeks to upgrade the transportation sector with the integration of multimodal transportation infrastructure with an objective of improving both passenger and cargo movement. National strategy targets sustainability, safety, and efficiency, with consideration for economic sectors, which include

agriculture, industry, and tourism. There is a major emphasize on integration, with preference for infrastructure development like dry ports, railways, and cargo terminals. There is the use of public-private partnerships in the financing of transportation projects with consideration for Ethiopia’s long-term development strategy (MoTL, 2022).

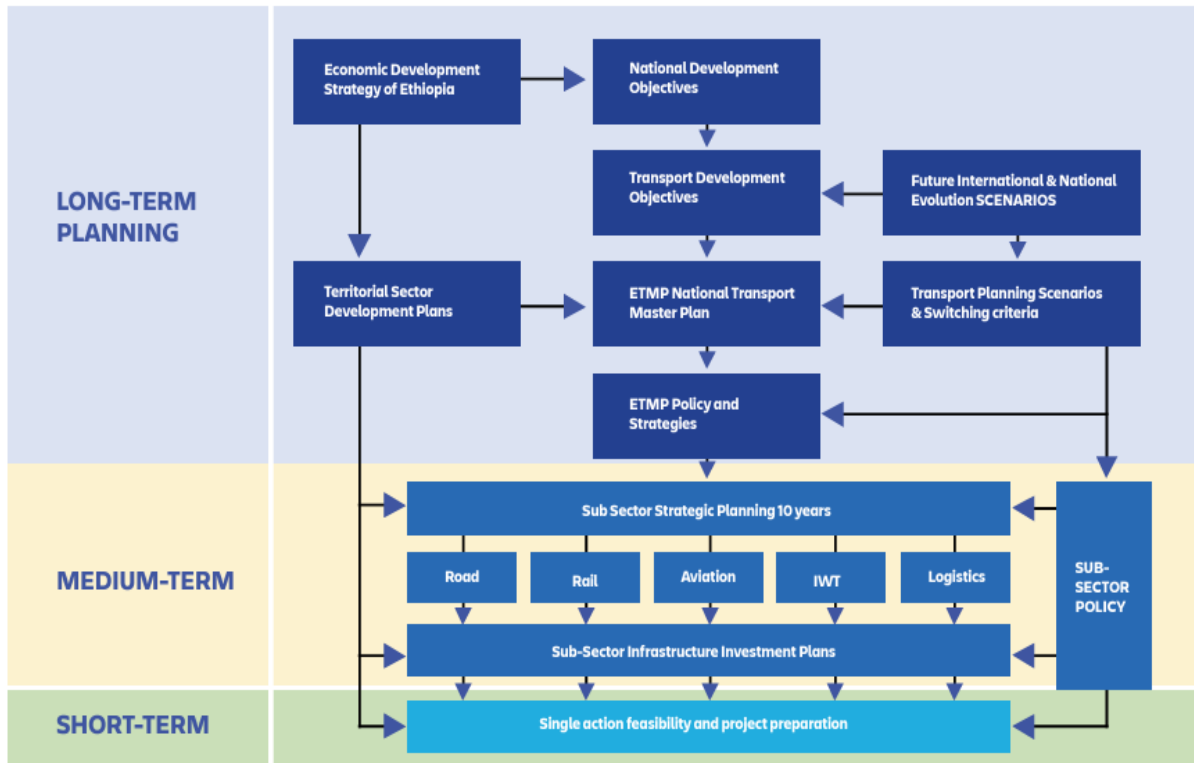


Figure 2.3 Transport planning frame work

Source:(MoTL, 2022)

At the city/urban scale, the Addis Ababa Structure Plan (2017-2027) is a plan guiding urban development, including the development of transportation infrastructure. Its major aspect is the Urban Transport Strategy, which also responds to the increasing demand for regional connectivity via transport interchanges. The regional bus terminals like Lamberet Terminal are a result of such a strategy, which aims at connecting Addis Ababa to other Ethiopia regions in an efficient manner of transporting passengers (AACPPPO, 2017).

The Addis Ababa Transport Authority is responsible for managing and regulating planning and implementation of transport infrastructure in the city. The office's duty is to deliver the transport strategy for the city and ensure that regional terminals are linked to the overall transport plan of the urban area. The terminals play a fundamental role in eliminating transport inefficiencies and accommodating a large number of passengers through intercity transport.

Urban Policy and Transport Planning Background

On the city and urban level, the Addis Ababa Structure Plan (2017/2027) is the main planning document that guides urban development, including transportation infrastructure. One of its major components is the Urban Transport Strategy, which aims to address the rapid increase in the demand for regional connectivity by the development of transport interchanges and regional bus terminals. Terminals like the Lamberet Transport Hub are a direct result of this strategy, which aims at improving the intercity connectivity by efficiently linking Addis Ababa with other regions of Ethiopia (AACPO, 2017).

The Addis Ababa Transport Authority (AATA) is the city organ that is in charge of the management, regulation, and implementation of transport infrastructure and services inside the city. Part of its responsibility is to make sure that the regional transport terminals are well integrated into the comprehensive urban transport system so that they can play their part in reducing the overall inefficiency as well as improving the freedom of movement of passengers. The regional bus terminals have a vital function in providing facilities for large numbers of travelers, thus helping to lower congestion and supporting intercity mobility; however, their success is mainly determined by the right location, the smooth running of activities, and the designs that take into account the needs of the users.

People-Centered Design in Transport Terminals (WITH EMPIRICAL EVIDENCE)

People, centered design is increasingly being perceived as the first principle for the creation of efficient, accessible, and sustainable transport hubs. Studies reveal that bus terminals and train stations which are built with considerable attention to the needs of the users show marked improvements in passenger satisfaction, safety, and efficiency of operations (Gehl, 2010; Cervero, 2013). Apart from these, the fundamental people, centered design features comprise unambiguous pedestrian movement, safe areas for waiting, universal accessibility, easy, to, understand wayfinding systems, and sufficient provision for shading and seating. On the other hand, case studies from cities in the developing world have shown that the lack of foresight in the design of bus terminals leads to pedestrian vehicle conflict, overcrowding, and safety jeopardy, most of which are endured by the vulnerable segments of the society like women, children, and the elderly (Vasconcellos, 2014; UN, Habitat, 2013). Likewise, in Addis Ababa, the study of transport hubs within the city exposes a high level of informal transport operations and insignificant spatial planning as the main reasons for buggy streets, unsafe areas for pedestrians, and slow movement of passengers (World Bank, 2017; AATA, 2020). These are

just a few points that emphasize the importance of incorporating human factors in the planning and redesign of transport hubs like Lamberet.

Integration of Transport Hubs with Urban Systems

Successful transport hubs are not just nodes of mobility but they also become one of the components of the urban fabric. International best practices reveal that efficient transport terminals are in close connection with mixed, use development, pedestrian and cyclist networks, environmental considerations, and the social and economic activities of the area (ITDP, 2017; UN, Habitat, 2020). This kind of integration raises the level of accessibility, cuts down on travel time, and thus is a way to support local economic development while at the same time enhancing the overall urban livability. Moreover, research has pointed out that transport hubs that are designed as people, centered public spaces have the potential to positively affect the quality of the surrounding neighborhoods by lessening congestion, improving safety, and forming a basis for economic activities that are inclusive (Calthorpe, 2011; Newman & Kenworthy, 2015). Thus, the incorporation of regional bus terminals into the wider urban transport system turns out to be one of the essential factors for a sustainable mobility solution and consequently, an increase in the general urban welfare of the inhabitants.

2.8. Precedent Case Studies of Human-Centric High-Density Transport Hubs

This part reviews several international and regional precedents that show human, focused, people, friendly approaches for planning, designing, and operating high, density public transportation hubs. They were chosen for their relevance to fast urbanizing contexts, their integration of land use and transport, their prioritization of pedestrians, and the socio, economic and mobility outcomes they demonstrated. The resulting lessons from these precedents form the basis for analyzing Lamberet Bus Terminal and its adjacent urban neighborhood.

International best practices for human, centric urban mobility focus on the safety of pedestrians, accessibility, inclusivity, and the integration of transport infrastructures with adjacent land uses. UN, Habitat (2013), the World Bank (2020), and the World Health Organization (2017) point out that efficient transport hubs must concentrate on safe pedestrian crossings, traffic calming, appropriate lighting, uninterrupted sidewalks, and transit, oriented development to improve mobility, safety, and social interaction. These principles have been extensively implemented in transport hubs of cities like Copenhagen, Singapore, and Curitiba where pedestrian, friendly design has enhanced accessibility and urban livability.

2.8.1. Curitiba Bus Rapid Transit (BRT) System, Brazil

The Curitiba BRT system is widely acknowledged as one of the world's best examples of transport and land, use integration. It was conceived in the 1970s, and it includes a number of features such as exclusive lanes for buses, pre, and payment of fares, level boarding, and stations that are designed with pedestrians in mind. Each of these steps has made the service more efficient, safer, and more comfortable for users, and at the same time, they have allowed the development of high, density mixed, use urban areas along transit lines.

How it can be applied to Lamberet Bus Terminal: Through the example of Curitiba, it is possible to understand how important the proper meshing of bus terminal design with the adjacent land uses is, as well as the need of prioritizing pedestrian movements by means of an efficient operational strategy.

2.8.2. Lagos Bus Rapid Transit (BRT) Terminals, Nigeria

Lagos BRT terminals have set an African example of how congestion and informal sectors can be managed through incremental, human, centric interventions. The introduction of pedestrian routes and separation of vehicles and pedestrians are design features that have enhanced safety and reliability.

Relevance to Lamberet Bus Terminal: This example shows that terminal reorganization and pedestrian prioritization are doable in dense and informal urban contexts that are similar to Addis Ababa.

2.8.3. Seoul Bus Transfer Centers, South Korea

Seouls bus transfer centers have become more than just places to change buses. They are now fully inclusive public spaces where people can enjoy feature such as seating, lighting, real, time information systems, and even areas protected from weather.

These amenities help to reduce transfer stress and make the overall environment more accessible for the vulnerable groups.

Concerning the Lamberet Bus Terminal: Seoul is a perfect example of how comfort, safety, and modern information systems is what matter the most in a busy transport hub.

2.8.4. Synthesis and Implications for Addis Ababa

Analyzing the reviewed precedents, several shared principles can be identified such as giving priority to pedestrians, integration of transport and land, use, ensuring user comfort and safety, and acknowledging socio, economic realities. These principles form the basis of evaluation criteria used in the Lamberet Bus Terminal case study.

2.9. Summary of Literature Review

People-centered design is a fundamental aspect of creating efficient, accessible, and sustainable local bus terminals. This comes about by ensuring that people's needs are at the forefront of the designing of the bus terminals. This will result in higher levels of satisfaction and safety among the people. Other factors that should be involved are the creation of interfaces that are people-centered and safe. Blending the local bus stops into the urban space is fundamental to ensuring that the accessibility of the city is improved. This will contribute towards economic development. A successful integration integrates with other modes of transport, mixed-use development, pedestrian and cyclist connectivity, environmental factors, and social factors. As such, by embracing all these elements, public transport stops can be an important resource at the local level, an important factor for sustainable transport and the general welfare of the citizens.

Conceptual Framework of the Study

This research utilizes a human, centric urban mobility model to understand the effectiveness of high, density transportation hubs. Lamberet Transport Hub is taken as a case study. The model rests on the interplay between the physical design, operational systems, and user experience, which together determine mobility efficiency at large and the quality of life in the neighborhood. The model breaks down the main independent variables as spatial layout, pedestrian facilities, accessibility, safety measures, and terminal management practices. All these in turn influence user experience components such as comfort, feeling of safety, accessibility, and mobility. The frameworks dependent results are enhanced passenger satisfaction, improved operational efficiency, lowered pedestrian vehicle conflicts, and the transport hub's better integration with the urban environment of its surroundings. Through the utilization of site observation, user surveys, and stakeholder interviews to analyze these relations, the paper plans to suggest human, centered urban mobility solutions that may guide

transport hub development and policy in Addis Ababa and other similar high, density cities of developing countries.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1. Introduction

In this chapter, the researcher provides a short explanation for the entire research process, such as what kind of research it is, what kind of research methodology and approach the research follows, as well as overall perception about conducting the research work. The study area where the research is going to be carried out, research design, data types, sources of data, design for sampling, conducting data analysis and collection, research validity and reliability, and research ethics are also depicted.

3.2. Study Area

3.2.1. Description of the case Study areas

The study location is situated in the Lambert Regional Transport Hub/Menahariay/ in the Yeka Sub-City, which is found in the north-eastern part of Addis Ababa in Ethiopia, with a ground coverage of 5.1 hectares. This transportation hub in the city acts as a major transport hub in the regions of northern Ethiopia with a busy transportation station linking different routes for the passage of commuters in the region. The region around the location is characterized by a bustling mix of commercial activities of different businesses such as markets that are in contact with both locals and foreigners.

Lamberet Transport Hub is made up of different spaces, such as bus parking and movement areas, passenger waiting areas, ticket offices, informal vending spots, and auxiliary service rooms. The main terminal area is mainly devoted to bus arrivals and departures, whereas the other areas are for pedestrian movement and shops. Nevertheless, because there are no clear functional zones, the functions have mixed, especially the pedestrian and vehicle circulation areas and the informal trading ones. Such an overlap of functions leads to congestion, less operational efficiency, and greater safety risks for the terminal users.

The terminal is equipped with basic facilities like ticket offices, small covered waiting areas, informal seats, and tiny retail kiosks. Sanitary facilities exist but are still not enough for the number of passengers that use the terminal daily. Moreover, the terminal is missing proper

wayfinding systems, formal passenger information displays, and facilities reserved for vulnerable users such as women, elderly passengers, and persons with disabilities. These infrastructural shortcomings have a direct impact on user comfort, accessibility, and safety perception within the terminal environment.

Passenger turnover at the Lamberet Transport Hub sharply differs between weekdays and weekends. The main factor for the weekday passenger flow is basically daily working and commercial trips, this is why the pattern of arrivals and departures remains stable during the whole day. On the contrary, at the weekends the number of passengers is much more, especially there are a lot of passengers leaving in the morning and arriving late in the afternoon. These peak conditions put a lot of stress on the space of the terminal, the routes for circulation, and the service facilities.

Passenger arrivals at and departures from the terminal depend on the route category and direction of travel. Mainly long, distance buses run the routes to the northern region, while the short, and medium, distance lines serve rural, urban and the towns located nearby. On weekdays, arrivals and departures tend to be more or less balanced, and the weekends are marked by the departure peak that is very concentrated and the passenger dwell to be extended in the terminal. Furthermore, the lack of clearly separated arrival and departure zones makes the overcrowding even worse during the rush hours.

The terminal is located in the centre of a mixed, use urban environment which is very dense and characterizes by having markets, shops, food vendors, and service, oriented businesses. Such activities not only bring their own local community but also various groups of transient users, thus strengthening the terminal's role as a socio, economic node within the neighbourhood. Although this urban mix certainly adds to the economic vitality, it also results in higher pedestrian congestion and land, use conflicts if no coordinated planning and proper spatial management are implemented.

Basically, the layout, activities, and mode of operations of Lamberet Regional Transport Hub point strongly to the need for a people, oriented study to be made that would cover the aspects of space utilization, pedestrian safety, functional zoning, and blending of transport facilities with the neighbouring urban setting

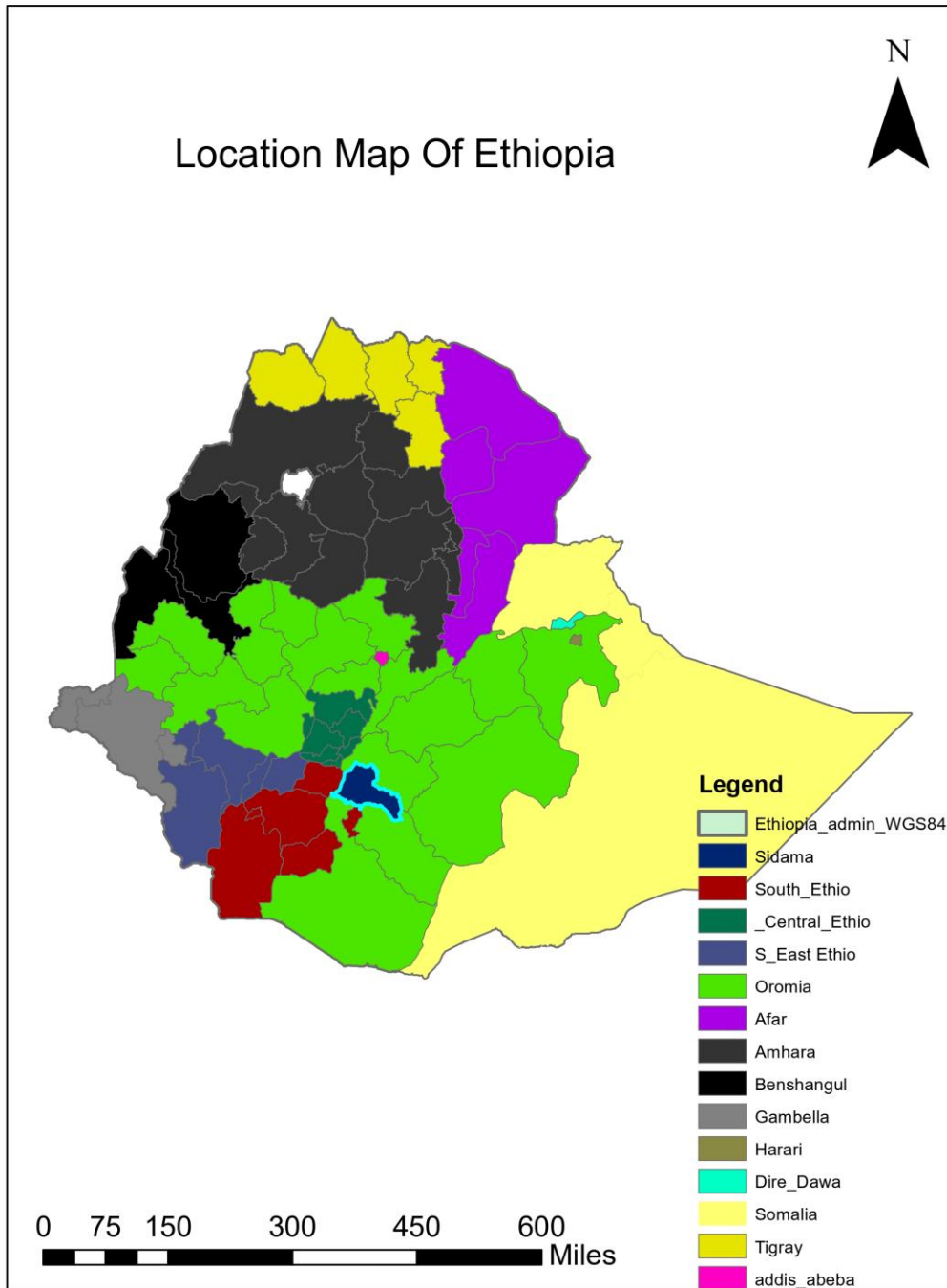


Figure 3.1 Location map of Ethiopia

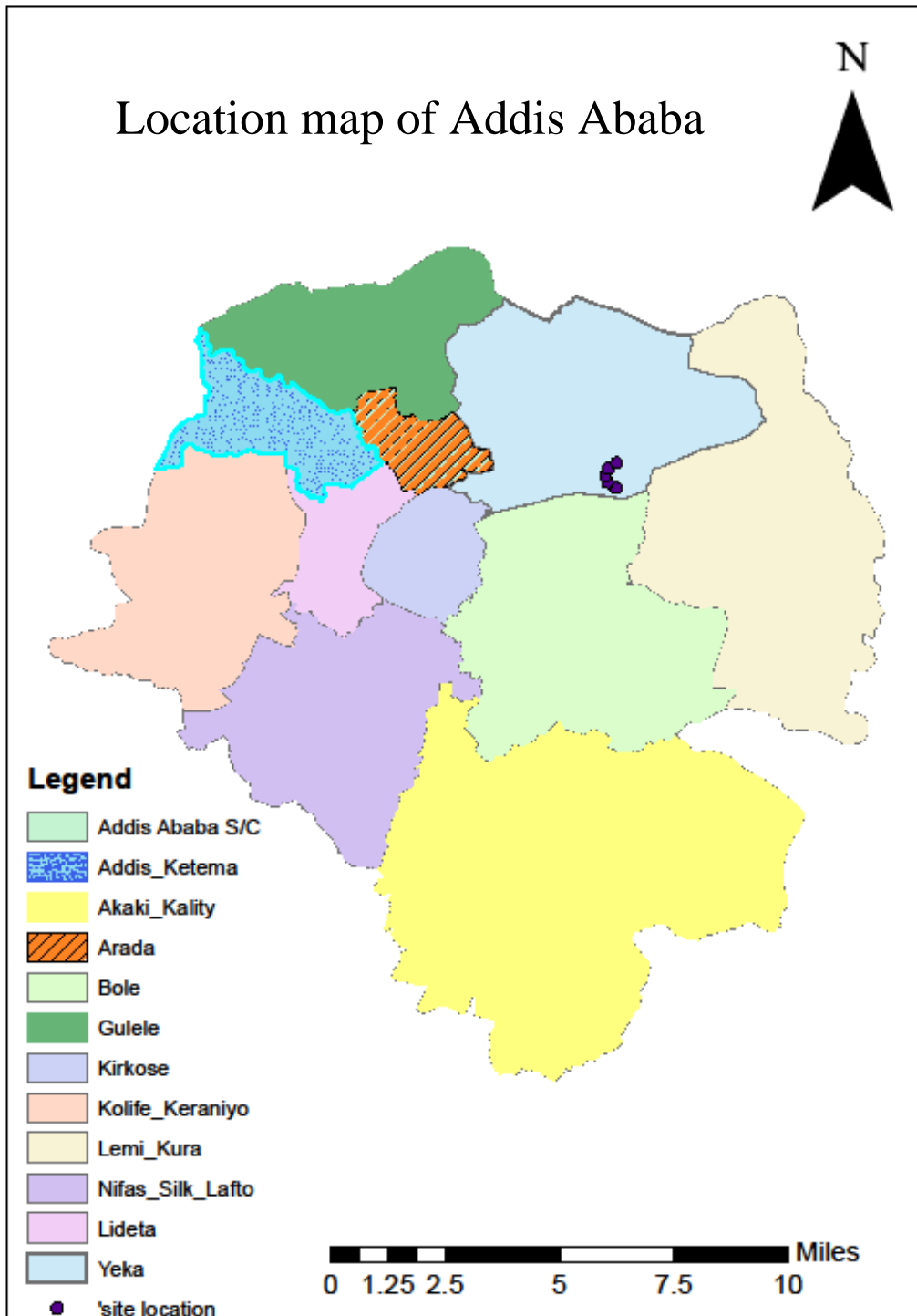


Figure 3.2 Location map of Addis Ababa

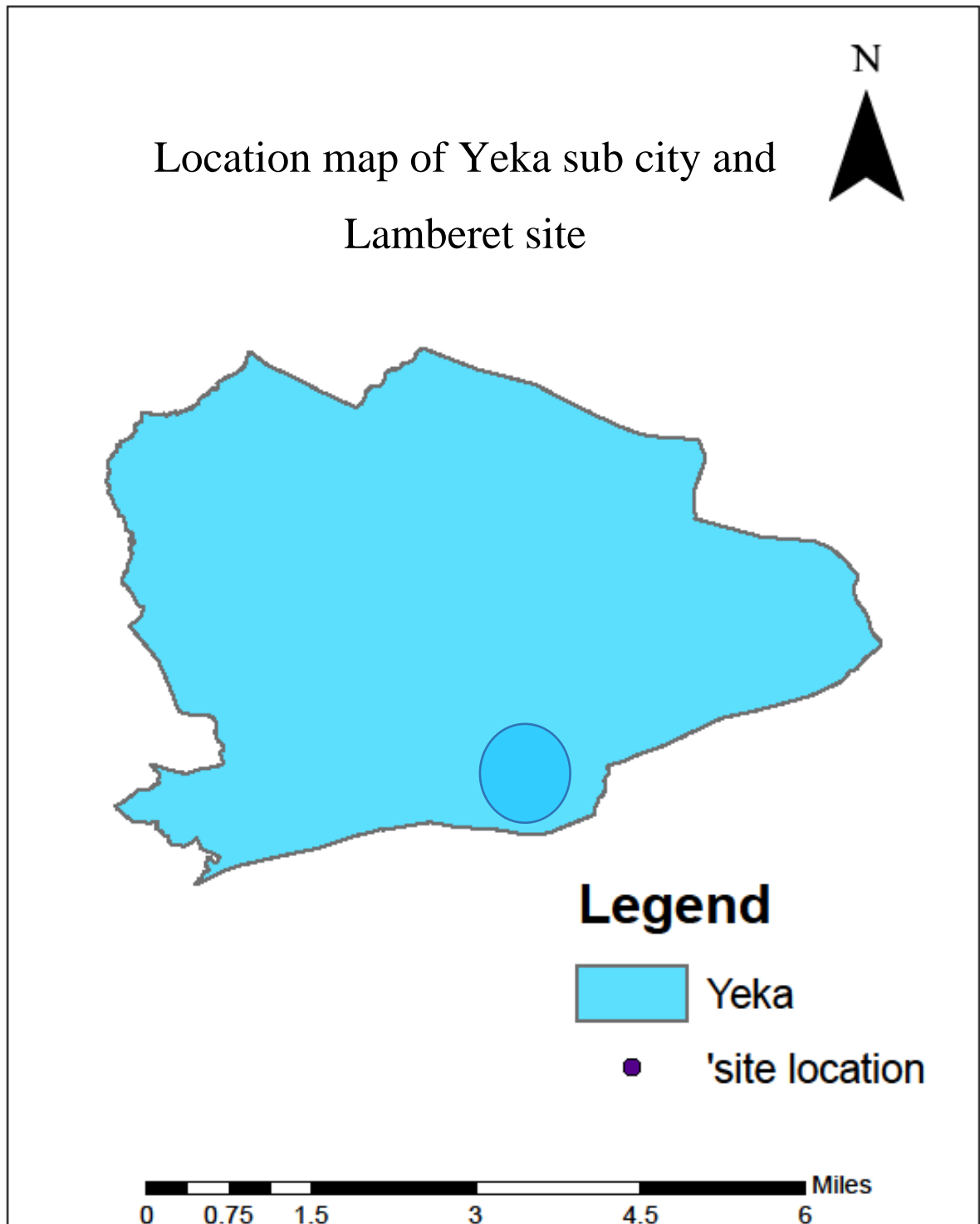
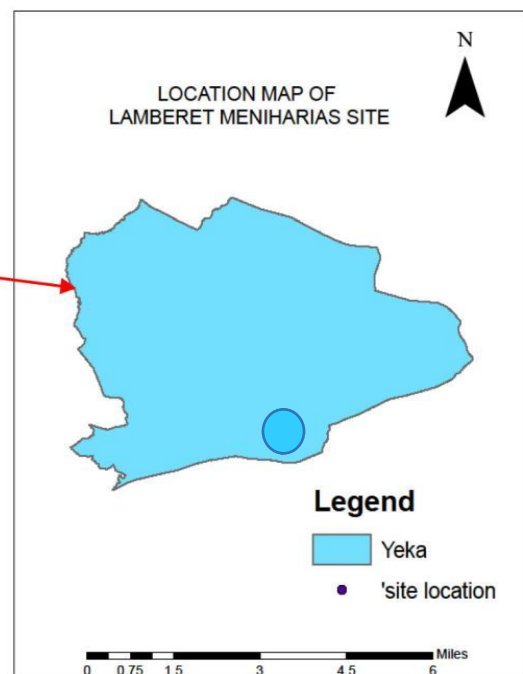
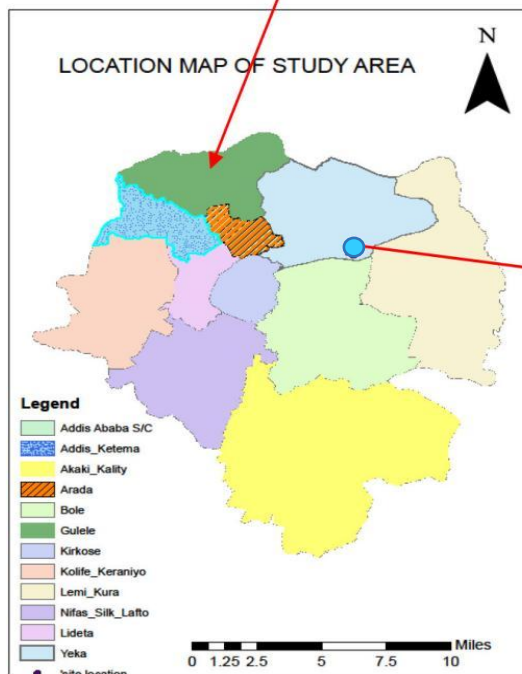
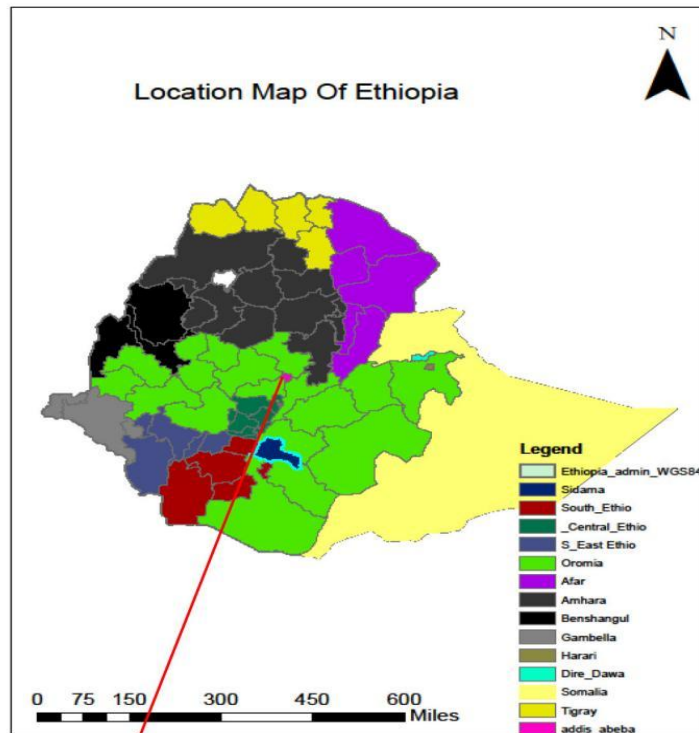
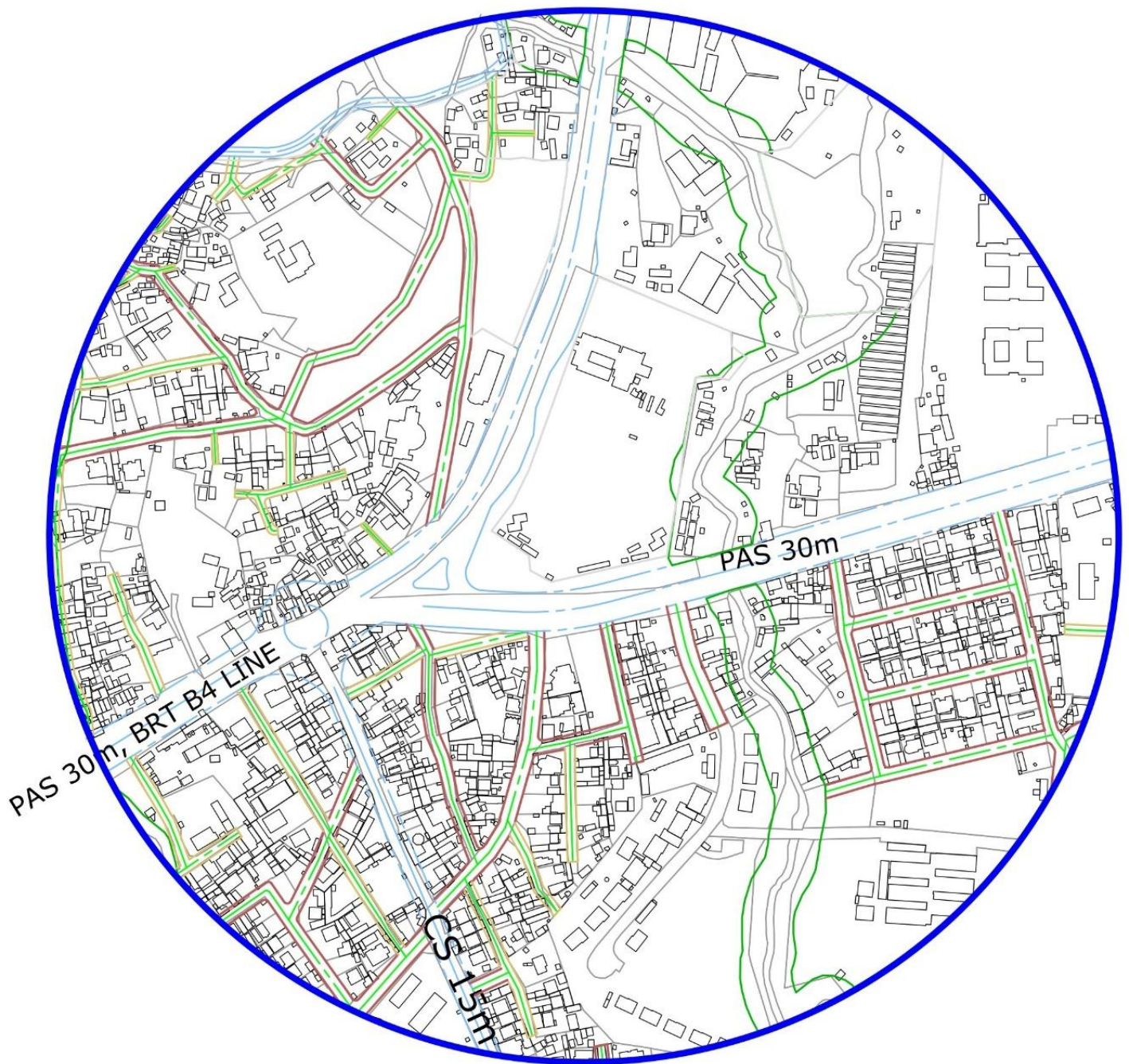


Figure 3.3 Location map of Yeka sub city and Lamberet site



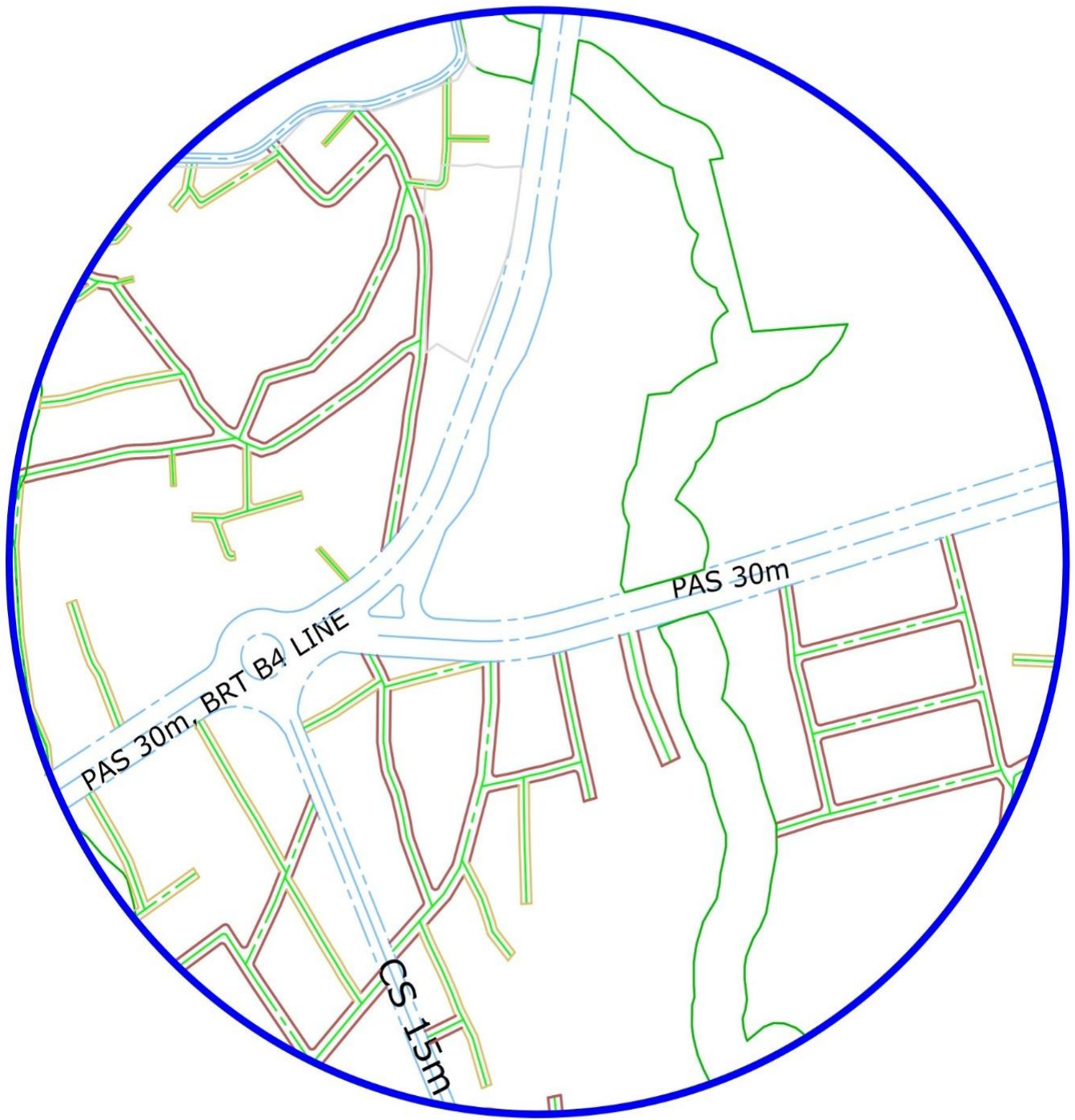
Location Map of Lamberet Transportation Hub and Its Neighborhood

Figure 3.4 Location map



LAMBERET NEIGHBORHOOD

Figure 3.5 Lamberet site and its neighborhood



LAMBERET SITE ROAD

Figure 3.6 Lamberet site and neighborhood road map

3.3. Type of research

This study employs a mixed, methods research approach, and thus, it is descriptive, exploratory, and explanatory research that fits the different research objectives. The descriptive research part is used to record and analyse the current conditions of transportation hubs in Addis Ababa, mainly the spatial organization, facilities, space utilization, pedestrian movement, and operational characteristics of Lamberet Bus Terminal. Such a method provides an orderly and clear picture of the existing local practices and conditions without changing the study environment (Creswell, 2014).

The exploratory research part is used to find out the challenges and opportunities of human, centric urban mobility that are hardly documented in the local context. Also, it covers user experience, safety issue, accessibility, and informal operation of the terminal as well as the surrounding area. Exploratory research suits situations where there is hardly any research done, thus it becomes necessary to have a deeper understanding of the context (Saunders, Lewis, & Thornhill, 2019).

The explanatory research component is employed to discern the connections between transportation hub features and their socio, economic, environmental, and spatial impacts on adjacent neighbourhoods. In particular, it entails studying how terminal design, infrastructure provision, and the mode of operation can affect pedestrian safety, accessibility, and the overall sustainability of neighbourhoods.

By applying the explanatory approach the researchers can find out what kinds of cause, and, effect or correlational relationships exist between transport infrastructures and urban outcomes (Neuman, 2014). In general, the research essentially being explanatory as the main aim of the researchers was to clarify how transportation hubs influence urban sustainability and to guide policy and design planning towards human, centred mobility solutions, the study also has descriptive and exploratory aspects.

3.4. Research Design

An exploratory, explanatory, and descriptive framework influences the research methodology. According to Saunders, Lewis, and Thornhill (2019), exploratory research is particularly useful in identifying issues that are still not adequately articulated or adequately researched. Descriptive research is necessary for providing systemic and thorough descriptions of

phenomena from which other analyses can be developed (Creswell 2014). The explanatory section's purpose is to identify the relationships among variables in order to understand the mechanisms responsible for the patterns developed in the previous sections. The case study design is employed and as outlined by Yin (2014) provides a systematic framework to connect research questions to the final conclusion while providing a thorough examination of the contextual realities surrounding the study.

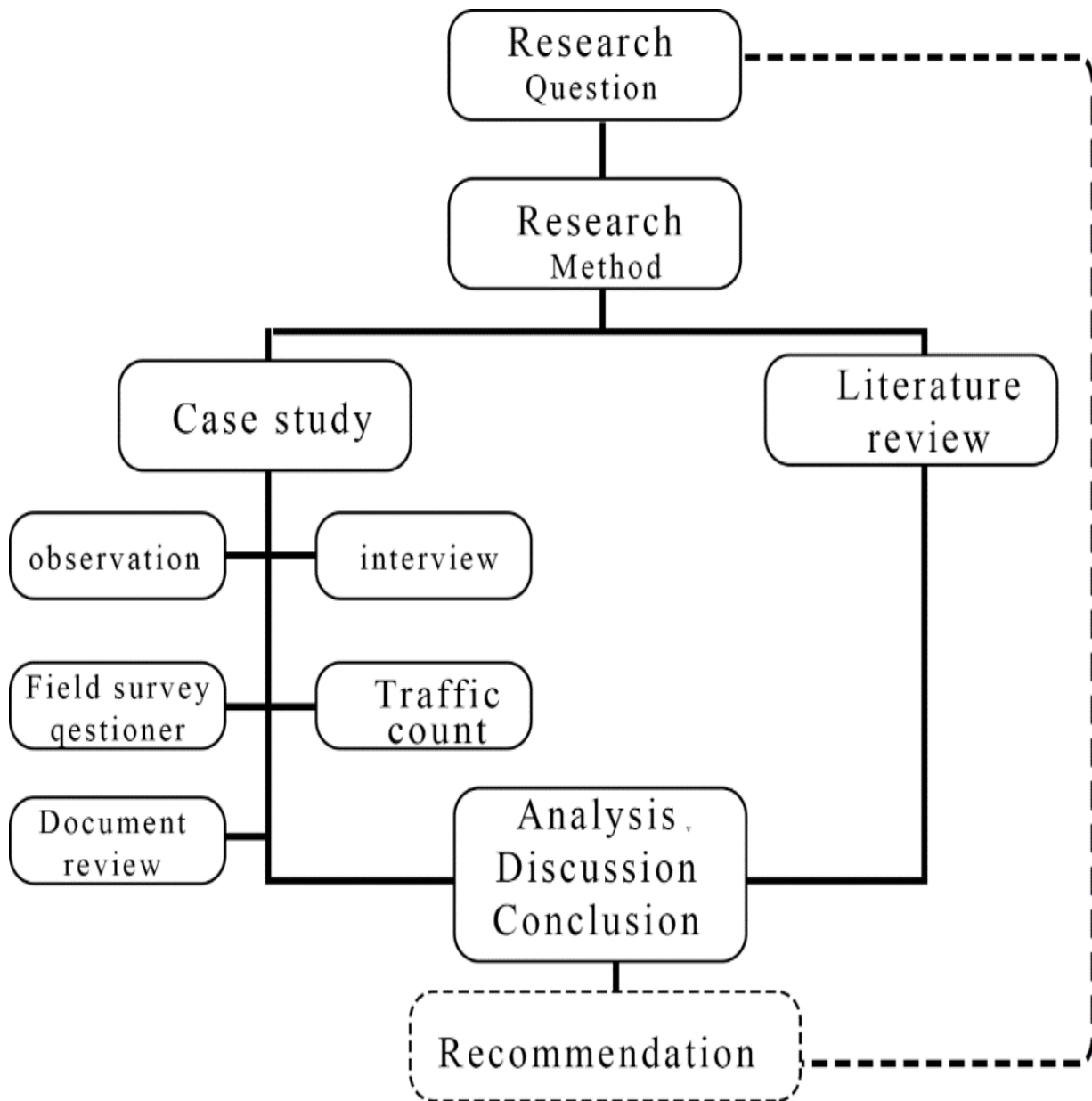


Figure 3.7 Research question method

3.5. Selecting Appropriate Research Methodology

Considering the nature of the study objectives and the phenomena under study, the case study method is most appropriate. This is the view of Yin (2009) as well as Creswell (2014).

According to Yin (2009), there are three essential criteria guiding the choice of research strategy:

Type of research question: Your research question is “how” and “why” in nature and includes questions such as “how” and “why” transportation hubs impact sustainability. These types of research questions are best suited as suggested by Yin (2009) in a case study design

Extent of control of BWEs: It does not contain control or impacts of transport infrastructural systems.

Emphasis is upon contemporary events: The study deals with the ongoing events of urban planning and transportation, hence requiring a case study rather than a historical study.

“The qualitative design should emerge from the researchers’ answers to questions about the study’s purpose, participants, settings, and expected levels of inference.” Creswell (2014

- Descriptive elements (evaluation of the practice of urban planning in
- Exploratory components (identifying problems related to human-focused mobility),
- Explanatory elements (analysing the influence of transport hubs on sustainability)._

Such complex ingredients suggest a qualitative dominant approach based on a case study design that permits:

A holistic inquiry into complex, multi-dimensional urban phenomena,

Integration of both qualitative and some quantitative data,

A contextual understanding of transport policy and planning practices in Addis Ababa.

3.6. Case Study as Research Methodology

Typically, a case study done by a researcher will concentrate on the distinctiveness, the strangeness, or the difficulty of the phenomenon to a great extent so that, from such a focus, a more enriched and a more contextual understanding of the subject matter can be gleaned (Yin, 2014).

Case study research is characterized as an empirical investigation that studies contemporary phenomena within their real, life setting contexts, utilizing a variety of evidence sources, but only zooming in on the facets that are most relevant for deep analysis (Yin, 2009).

While the method has been criticized as having potential problems with validity and the researchers' bias, it is still a valuable methodology to provide detailed insights into complicated problems and to make a significant contribution to the scholarly knowledge base (Yin, 2014).

3.6.1. Case Selection Criteria

Revelatory or Unique Case:

Yin stresses that a case selection should be “unique,” “revelatory,” or “critical” to the studied phenomenon.

The Lamberet Long Distance Bus Station represents a paradigm case study where the themes of Human-Centric Urban Mobility in Addis Ababa can be explored. The aforementioned station is characterized by a high population density and a number of mix-modality options which exemplify both the problems associated with urban mobility planning in light of population pressure and the solution-sets being developed in response to informal transit systems in use in the city.

Current and Real-Life Context:

Yin described the "case study" as a strategy suitable for use "when the investigator is interested in studying phenomena as they are happening in their present contexts, particularly when the phenomenon is wrapped up with its context."

The change and expansion taking place at Lamberet become a real-time case study, making it a living lab to investigate how the impact of mobility infrastructure extends to the adjacent communities from a perspective of sustainability, equity, and accessibility. The case study enables the researcher to monitor and study the change first hand.

Theoretical Significance / Contribution to Knowledge:

Yin recommends the selection of cases that can improve or extend propositions.

Analysis of Lamberet might inform theoretical discussions surrounding Human-Centric Urban Design and Sustainable Transport Systems in the Global South. The transport node and

neighbourhood characteristics and dynamics studied in Lamberet might offer a rich source of evidence for testing mainstream theories in urban design.

Data Availability:

A good case should provide access to multiple sources of data, including interviews, documents, statistics, observation, and others.

Lamberet station is appropriate for analysis given its visibility and the fact that it has various stakeholders involved: planners, transport providers, commuters, and residents. The area also has a wide range of data sources such as urban planning documents, responses to planning proposals in the area, observation in the area, and transport data provided by Transport for London.

Embedded Units of Analysis

Yin further permits embedded case studies. In this regard, there could be sub-units within a major case.

The Lamberet hub and neighbouring neighbourhoods, informal economic zones, and transit corridors offer a set of embedded units of analysis that enable a multi-level analysis of urban mobility and social and economic interactions.

The Lamberet Long-Distance Bus Station was purposively selected with consideration for the principles of case selection presented by Robert K. Yin (2009). It is essentially revelatory and information-rich, clearly demonstrating the intricacies and implications associated with high-density transport nodes during the process of urbanization. Significant for study design, it is situated within a dynamic environment that embraces human-centred mobility systems to respond to real-time concerns. Furthermore, it happens to be one of the consistently evolving stations with multiple stakeholders and improved data availability, providing an ideal research case for empirical research. In essence, it fits well within the recommended case selection principle by Yin (2009) for studying contemporary phenomena within real-life settings, especially in those cases that could be theoretically valuable within the domain of urban transport.

3.7. Data Type and Sources

Data sources can be primary and secondary based on whether the data has some level of uniqueness and whether the source of information has some level of expertise in the matter at hand. The primary sources can be defined as information collected directly for a given study (Creswell, 2014). On the same note, secondary sources can be outlined as those which interpret data and can be in forms such as reports and publications (Saunders, Lewis, and Thornhill, 2019). Although primary data sources generally have a sense of directness and novelty, a lack of access might render them secondary (Neuman, 2014).

In the study, both primary and secondary data were collected with the aim of gathering comprehensive information about Lamberet Bus Station as well as the surrounding urban area. The primary data involved a number of stakeholders at the Lamberet Bus Station, including public transport users, administrative staff, as well as residents of the surrounding urban neighbourhood.

Secondary data collection involved documents issued by the concerned sub-urban transport authorities. The findings of such documentation are important in terms of transport policy and structure within the concerned regions. Google Maps and other analytic cartography techniques have been used to analyse the geographical relation and transport network around Lamberet Bus Station.

Both the primary research data collected in this study and secondary research information provide a very good foundation for comprehension of the complexities that exist in urban mobility in a highly dense setting.

3.8. Target population

Target populations for this research may include transport users, drivers and assistants, administrative personnel, as well as local authorities or residents of Lamberet who may be directly or indirectly related to the Lamberet bus terminal activities.

3.9. Sampling method and sample size

This study employed multiple sampling methods to ensure a comprehensive understanding of Lamberet Bus Terminal and its surrounding urban context. Sampling was structured to reflect both the core terminal site and its immediate neighbourhood influence zone, recognizing the terminal's role as a high-density urban mobility hub.

Urban Residents:

According to the Central Statistical Agency (CSA, 1993), the average household size in Addis Ababa is 4.8 persons per household. While the terminal plot itself directly interfaces with approximately 114 residential households, this figure represents only the core site and does not capture the broader area affected by terminal-related activities.

Given the scale and function of Lamberet Bus Terminal, the study defined its primary area of influence as a 400–500 meter walkable radius, consistent with transit-oriented development and urban accessibility standards. Within this defined catchment area, field observation and local administrative data indicate an estimated households.

Based on this boundary, the estimated residential population of the study area was calculated using CSA household size data, resulting in an estimated population of approximately 2,800–3,800 residents.

To ensure representative yet feasible data collection, 10% of the estimated urban resident population was selected as the sample size. This proportion aligns with established practices in urban design and human-centred mobility research, where emphasis is placed on capturing behavioural patterns, lived experiences, and perception-based insights rather than statistical generalization.

Accordingly, approximately 280–380 residents were considered for sampling, from which 20 in-depth resident interviews were conducted using purposive sampling to ensure diversity in age, gender, length of residence, and proximity to the terminal.

Sample Size Determination and Sampling Techniques

Target Population

The target population of this study consists of public transport users, drivers and drivers' mates, and administrative staff operating at Lambert Bus Station. These groups were selected because they are the primary stakeholders directly involved in daily public transport operations and service delivery at the terminal.

Sample Size Determination

The sample size for each category was determined using proportional sampling, a method recommended when populations are large and heterogeneous, as it ensures fair representation of each subgroup (Kothari, 2004).

Public Transport Users

The average number of passengers served per day at Lambert Bus Station is approximately 15,500. Due to the large population size, 1% of the total daily passengers was selected as a representative sample.

This percentage is consistent with social science research practices where 1–5% samples are acceptable for large populations to balance representativeness, time, and cost efficiency (Israel, 1992).

Sample size = $15,500 \times 1\% = 155$ passengers

Drivers and Drivers' Mates

The total number of vehicles served at Lambert Bus Station is 620, representing drivers and drivers' mates. A 5% sampling proportion was applied.

The use of a higher percentage than passengers was justified because this group has more direct operational knowledge relevant to transport service efficiency and challenges.

Sample size = $620 \times 5\% = 31$ drivers and drivers' mates

Administrative Staff

The total number of administrative staff at the terminal is 40. Since this population is relatively small, a 20% sampling proportion was selected.

According to Creswell (2014), when the population is small, a higher sampling fraction improves data reliability and depth.

Sample size = $40 \times 20\% = 8$ administrative staff

3.10. Data Collection Methods

3.10.1. Structure Interviews

Table 3.1. Interview

Description	Key Personnel	Purpose of Data from Personnel
Structured interviews were carried out with transit users, administrative staff, and local residents to collect qualitative data on experiences and perceptions. Standardized questions ensured consistency, helping to analyze satisfaction, stress, and social impacts.	Transit Users, Station Managers, Sub-city Officials, Local Residents	To capture diverse perspectives on transportation challenges, satisfaction levels, governance issues, and social outcomes.

3.6.1 Survey Questionnaire

Table 3.2. Questionnaire

Description	Key Personnel	Purpose of Data from Personnel
Questionnaires were distributed to a diverse group of bus terminal users to gather quantifiable feedback on satisfaction, accessibility, and operational issues. The responses identified patterns in user experience and highlighted areas for improvement.	Frequent and Occasional Bus Terminal Users	To quantify user satisfaction and accessibility challenges, and to identify statistically significant patterns for improvements.

3.10.2. Direct Field Survey Observations:

Direct field observations will be carried out at Lamberet bus stops to get a first understanding of the daily activity related to the bus stops themselves, congestion points, traffic flow, and accessibility. Direct field observation has been useful here as it was able to provide insight into the workings of the bus infrastructure related to space and usage.

3.10.3. Mapping Tools and Spatial Analysis:

Google Maps was used in mapping applications in order to study the relation in space and transportation infrastructure around the Lamberet Bus Station. This assisted in understanding areas of congestion and integration around which improvements in the urban environment can be advised.

3.11. Data analysis method

The study conducted an investigation using a mixture of both qualitative and quantitative research methodologies. It was the study's questions that dictated the choice of analytical methods, these questions being the user experience, accessibility, safety, spatial functionality, and connectivity of the Lamberet Bus Terminal and its neighborhoods. Established methodological guidelines were used as a basis for work (Creswell, 2014; Yin, 2014; Saunders et al., 2019).

3.11.1. Quantitative Data Analysis

The In order to answer research questions about user satisfaction, accessibility, safety perception, and terminal functionality, quantitative data collected via structured questionnaires were analyzed using descriptive statistical methods.

User responses were summarized and the main patterns and trends were identified by using statistical measures such as frequencies, percentages, means, and standard deviations. Cross, tabulation was also used, for example, to study the correlation between user characteristics (such as user type or trip purpose) and the user's perception of the terminal environment.

The analysis of quantitative data was performed with the help of the Statistical Package for the Social Sciences (SPSS) which facilitated the orderly coding of data, its analysis, and the representation of results.

3.11.2. Qualitative Data Analysis

Qualitative data obtained from in, depth interviews and open, ended questionnaire responses were thematically analyzed. The decision to use this method was to obtain users' subjective experiences and perceptions that could hardly be illustrated by quantitative data alone.

The study of transcripts and textual responses was carried out as a case study following the methodology (Yin, 2014). The research questions of the study were used as a basis for a direct line of coding and categorization of themes. The main themes were terminal, related socio,

economic interactions, pedestrian movement patterns, spatial comfort, safety concerns, and accessibility challenges.

To strengthen the analysis, data triangulation was utilized by checking the interview findings against the questionnaire and field observation results. In this way, it was possible to verify that the interpretations were consistent and valid across the different data sources.

3.11.3. Analysis of Observational and Spatial Data

The observational and locational information obtained through the field research was examined by employing a pattern, matching technique, which is a method advocated by Yin (2014). It required the comparison of actual conditions in the world with the set of hypotheses concerning the design of human, centered transport hubs and the principles of urban mobility.

Observations were thoroughly organized/taken down using the parameters of time, activity, user behavior, and place in order to discern and document issues that kept recurring such as pedestrian congestion, conflict points between vehicles and pedestrians, peak, hour overcrowding, and physical barriers to movement.

Google Maps was employed as a spatial analysis tool to study connectivity, accessibility, and integration of transport networks around Lamberet Bus Terminal. Street networks, pedestrian routes, and public transport connections were visually analyzed to help assess how the spatial configuration impacts accessibility and the efficiency of the movement in the area under study.

3.11.4. Integration of Data (Triangulation)

Improving the validity and reliability of the findings of the research work, a triangulation method has been adopted as suggested by Creswell in the year 2014. By using different methods of data collection like conducting interviews and using questionnaires or observations and geographical location analysis, there has been a better understanding of the phenomenon being studied. All the findings have been brought together to identify the common themes in all the different findings to create a database of conclusions based on evidence in a reliable manner. This helped to create a coherent interpretation of results irrespective of methodological divisions.

3.12. Validity and Reliability

Accuracy, consistency, and the liableness of the data were at the top of the list of considerations throughout this research. Since it was a human, centered and mixed, methods study, particular ways of boosting the validity and reliability of the research instruments and procedures, in the case of Lamberet Bus Terminal and its surrounding neighborhood, were implemented.

Validity: It is about the degree to which research instruments accurately measure the concepts they are intended to measure. In the present research, content validity was given the highest priority to make sure the survey questionnaires, interview guides, and observation checklists correspond well with the research objectives and questions concerning accessibility, safety, user experience, spatial functionality, and connectivity of the terminal.

The research instruments were initially formulated through a comprehensive study of the most recent articles related to urban mobility, transport hubs, and human, centered urban design. Creswell (2014) indicates that matching the research instruments with the clearly defined objectives and research questions is the reason for high content validity.

Moreover, in order to enhance the validity of the study, a pilot test was done with a very small number of people who were from the same demographic as the target group. The pilot test results were very helpful in modifying the question sentences, getting rid of ambiguities, and thus the questions became clear and relevant to the Lamberet Bus Terminal context.

Reliability: This means that research findings remain consistent when the study is carried out under similar circumstances. To secure reliability, the research team made sure that the same standardized data collection procedures were rigorously applied throughout all data sources.

Regarding the quantitative part, uniform instructions were given to all respondents, and throughout the survey process, the same questionnaire structure and wording were used. The data collectors were thoroughly briefed and instructed so they could administer the questionnaires and interviews in a standardized manner, thus reducing the impact of interviewer, related bias (Yin, 2014).

For qualitative and observational data, the same consistency was ensured by using predefined observation categories and interview themes that were based on the research questions. This has allowed data collection and interpretation to be conducted in a systematic and reproducible manner.

Moreover, quantitative data were analyzed through the statistical software SPSS, which helped to increase the reliability of the study by limiting the possibility of human errors and providing a consistent and objective method of statistical analysis (Saunders et al., 2019).

CHAPTER FOUR: DATA ANALYSIS, INTERPRETATION AND PRESENTATION

This chapter involves the analysis, interpretation, and portrayal of the answers that have been derived from the questionnaires and sample respondents for the interview.

On the basis of the objectives that were to be achieved in this study, both qualitative and quantitative data were collected through various instruments. Throughout this chapter, analysis of data is done and presented by the use of measurements of the Likert Scale measurements, SPSS version 26, and the transcription of the summary of the qualitative interview was presented in the transcription of the response of the interviewees.

4.1. Response Rate of the Respondents

Around 156 questionnaires were handed out to public transport users and drivers at Lambert Bus Station. 120 questionnaires were properly filled and returned from those, giving the rate of return **77%**.

The returned questionnaires were examined for completeness and consistency and were deemed to be suitable for analysis.

Besides the questionnaires, 8 administrative staff were interviewed, as was already planned in the sample design. Those interviews were accomplished successfully and used for qualitative analysis.

Hence, the overall sample size of the study was 204 respondents, made up of 120 questionnaire respondents and 8 interview participants.

4.2. Demographic distribution of respondents

This section presents the demographic characteristics of respondents who participated in the questionnaire survey. The demographic variables include sex, employment status, and work experience.

Table 4.1. Sex of the respondents (N=120)

Sex			
	Sex	Frequency	Valid Percent
	Male	78	73.33
	Female	42	26.67
	Total	120	100.0

Source: Researcher’s Survey, 2025

As shown in the above table, the majority of questionnaire respondents were male, accounting for 78 respondents (**73.33%**), while 42 respondents (**26.67%**) were female. This indicates that male participants were more dominant in the public transport sector at Lambert Bus Station, which reflects the gender composition commonly observed in transport-related activities.

Table 4.2. Status of the respondents

Status		
	Frequency	Valid Percent
Public transport users	76	63.33
Drivers	23	19.16
Residents	21	17.5
Total	120	100.0

Source: Researcher’s Survey, 2025

Out of the total 120 people filling the questionnaires, the largest group was public transport users (**63. 33%**), followed by drivers (**19. 16%**) and residents (**17. 5%**). The spread of respondents shows that the study was mainly based on the opinions of the people who are transport users and the ones who have direct contact with the transport services at the terminal, which is quite reasonable from the point of view of evaluating urban planning and service conditions.

4.3. The effectiveness of current urban planning and zoning regulations, including the physical design, infrastructure quality, and service conditions

This section deals with the analysis of the information gathered from the questionnaire survey to answer the first objective of the research. A Lists of factors about urbanizing and zoning regulations was given to the respondents, who were asking to rate them on scale 1 to 5 based on their frequency occurrence.

Table 4.3. Physical Environment (Terminal Design & Condition)

A. Physical Environment (Terminal Design & Condition)

		Frequency	Percent	Mean	SD
Adequacy of terminal space	Strongly Disagree	42	5.8		
	Disagree	59	9.2		
	neutral	7	35.0		
	Agree	11	49.2		
	strongly agree	1	0.8		
	Total	120	100.0		
		Frequency	Percent	Mean	SD
Cleanliness of the terminal	Strongly Disagree	33	27.5		
	Disagree	66	55.0		
	neutral	21	17.5		
	Total	120	100.0		

Restrooms, water points, and other amenities are in good condition		Frequency	Percent	Mean	SD
	Strongly Disagree	51	42.5		
	Disagree	43	35.8		
	neutral	17	14.2		
	Agree	9	7.5		
	Total	120	100.0		
Waiting area comfort		Frequency	Percent	Mean	SD
	Strongly Disagree	70	58.3		
	Disagree	28	28.3		
	neutral	17	14.2		
	Agree	5	4.2		
	Total	120	100.0		
The terminal has clear and readable signs for directions.		Frequency	Percent	Mean	SD
	Strongly Disagree	65	54.2		
	Disagree	34	28.3		
	neutral	8	6.7		
	Agree	13	10.8		
	Total	120	100.0		

Source: Researcher's Survey, 2025

The above table presents the frequency, mean and standard deviation of terminal design and physical conditions respond. About cleanliness and maintenance, a considerable number of respondents disagreed that the terminal is clean and well-maintained, with **49.2%** disagreeing

and **35.0%** remaining neutral. Only **0.8%** strongly agreed. This reflected in a low mean of **1.92** and a standard deviation of **0.92**, indicating a general dissatisfaction and moderately consistent views.

Regarding seating comfort and waiting area comforts, **55.0%** disagreed and **27.5%** strongly disagreed; only **17.5%** were neutral. A mean of **2.9** with a standard deviation of **0.67** indicates a collective feeling of discomfort with a certain degree of uniformity of responses.

The availability and condition of rest rooms, water, and other basic facilities earned a poor rating, with **42.5%** strongly disagreeing and **35.8%** simply disagrees. Only **7.5%** agreed to the availability and condition of these basic services. This is evidenced by a mean score of **2.2** and a Standard Deviation of **0.92**.

Regarding the provision of shelter for the sun and rain in the waiting area, a remarkable **58.3%** strongly disagreed, and **28.3%** disagreed, while only **4.2%** agreed. The mean value was **1.64**, and the standard deviation was 0.87, which again reinforced the negative perception.

Finally, with regard to directional signage, **54.2%** strongly dis-agreed and **28.3%** dis-agreed with regard to whether signage in the terminal is clear and easy to read. A mean of **1.74** and standard deviation of **0.99** reflect that this is a concern shared broadly, with a touch more variation than some other issues.

B. Planning and Regulation

Table 4.4 Planning and Regulation

		Frequency	Percent	Mean	SD
The terminal and nearby area are planned in a good way.	Strongly Disagree	73	60.8		
	Disagree	39	32.5		
	Neutral	2	1.7		
	Agree	6	5.0		
	Total	120	100.0		

Land use activities around the terminal are properly regulated.		Frequency	Percent	Mean	SD
	Strongly Disagree	66	55.0		
	Disagree	40	33.3		
	Neutral	5	4.2		
	Agree	3	2.5		
	strongly agree	6	5.0		
	Total	120	100.0		
There is effective enforcement of planning regulations within and around the terminal.		Frequency	Percent	Mean	SD
	Strongly Disagree	33	27.5		
	Disagree	58	48.3		
	Neutral	13	10.8		
	Agree	16	13.3		
	Total	120	100.0		
People from the community are involved in discussions about the terminal.		Frequency	Percent	Mean	SD
	Strongly Disagree	20	16.7		
	Disagree	51	42.5		
	Neutral	33	27.5		
	Agree	16	13.3		
	Total	120	100.0		

Source: Researcher’s Survey, 2025

The degree to which the answers reveal concerns expressed concerning the planning and regulation of the terminal and its neighborhood is evident. For the question “The terminal and neighborhood are well planned,” **60.8%** specifically disagreed, while **32.5%** also disagreed.

This translates to a mean score of **1.51** with a standard deviation of **0.77**. This is far from showing any satisfaction with very little variation. People feel that there is no order in how the terminal is planned.

Concerning the perception of traffic signs, rules, and the availability of personnel to facilitate the management of traffic, a large majority of the participants (**55.0%**) strongly disagreed with it, followed by **33.3%** who disagreed with the availability of appropriate traffic management structures. The mean was **1.69**, with a relatively high standard deviation of **0.94**.

Participation or role played by the local authority in maintaining the terminals, only **13.3%** agreed that they are involved, while most (**48.3%**) disagreed, with 27.5% strongly disagreeing. The **mean score of 2.1** and **SD of 0.96** reinforce the perception that local governmental involvement is limited or ineffective.

At last, participants were asked whether the community is involved in discussions about the terminal. Here, **only 13.3% agreed**, while **42.5% disagreed** and **16.7% strongly disagreed**. Interestingly, **27.5% remained neutral**, indicating possible unawareness or uncertainty regarding participatory processes. The **mean response was 2.38** with an **SD of 0.92**, showing low community engagement.

The findings in Table 4. 4 prove that most people around the terminal have a negative perception of the quality of infrastructure. All the indicators have mean values of less than 2.0, which means that the majority of people who responded to the survey are not satisfied. Especially, the arrangement of the loading and unloading areas is the one that received the lowest average score (Mean = 1.64), pointing it out as the main problem of the infrastructure. Hence, these findings indicate that the existing urban planning and zoning laws have not been effective in providing high, quality transport infrastructures at the terminal.

As a result of the above findings, the study generally concludes that the physical layout of the terminal, the quality of the infrastructure, and the urban planning and zoning regulations are not only ineffective but also poorly enforced. On top of that, these regulatory processes seem to be, for the most part, totally out of touch with the needs and contributions of local residents, users of the terminal (passengers), transport operators, and traders in the vicinity, who together constitute the community of the terminal.

4.4. Identifying the challenges and opportunities related to a human-centric mobility approach

The other objective of the research is identify the challenges and opportunities related to a human-centric mobility approach. Under this category human-centric mobility challenges were identified. Similarly drivers, residents and users were asked about the **Accessibility & Safety, Transport Services & Movement, Weekday Mobility and Weekend Mobility**. The following table shows the percentile, mean and standard deviation of each cases.

Table 4.5. Accessibility and Safety

Accessibility and Safety

		Frequency	Percent	Mean	SD
There are adequate sidewalks and ramps to support people with disabilities within and around the terminal.	Strongly Disagree	55	45.8		
	Disagree	23	19.2		
	Neutral	42	35.0		
	Total	120	100.0		
Pedestrian access to and within the terminal is safe and well designed.		Frequency	Percent	Mean	SD
	Strongly Disagree	57	40.7		
	Disagree	40	28.6		
	Neutral	33	23.6		
	Agree	10	7.1		
	Total	120	100.0		

There is enough lighting at the terminal and nearby streets.		Frequency	Percent	Mean	SD
	Strongly Disagree	42	35.0		
	Disagree	50	41.7		
	Neutral	17	14.2		
	Agree	11	9.2		
	Total	120	100.0		
The terminal is easily accessible for all users, including women, children, and the elderly.		Frequency	Percent	Mean	SD
	Strongly Disagree	21	17.5		
	Disagree	13	10.8		
	Neutral	32	26.7		
	Agree	54	45.0		
	Total	120	100.0		
Users feel safe from accidents and crime while accessing and using the terminal.		Frequency	Percent	Mean	SD
	Strongly Disagree	76	63.3		
	Disagree	35	29.2		
	Agree	2	1.7		
	strongly agree	7	5.8		
	Total	120	100.0		

Source: Researcher’s Survey, 2025

The above table summarizes the responses related to accessibility and safety in the terminal. The availability of sidewalks and ramps for people with disabilities was rated poorly, as **45.8%** of respondents strongly disagreed and **19.2%** disagreed. With only **35.0%** remaining neutral

and none agreeing, the mean score of **1.86** and standard deviation of **0.90** reflect a general dissatisfaction with accessibility provisions.

Similarly, safety concerns while walking to and from the terminal were notable. A large portion of respondents strongly disagreed (**40.7%**) and disagreed (**28.6%**), while **23.6%** remained neutral and only **7.1%** agreed. The average of **1.97** and standard deviation of 0.96 indicate a general worry about the safety of pedestrians.

On the issue of lighting, **41.7%** of the participants disagreed and **35.0%** strongly disagreed with the statement that the terminal and streets around are well-lighted. Only **9.2%** agreed, and **14.2%** neither agreed nor disagreed. The mean score of 1.98 with a standard deviation of 0.93 again proves that there has been some dissatisfaction with the lighting.

In contrast, views concerning road crossing and zebra line safety were relatively positive. Though **17.5%** strongly disagreed and **10.8%** simply disagreed, **26.7%** were neutral, and a significant **45.0%** agreed. The mean score of **2.99** and standard deviation of **1.12** indicate that opinions concerning the same were quite varied and to a certain extent positive.

Transport Services and Movement

Table 4.6. Transport Services and Movement

		Frequency	Percent	Mean	SD
There are adequate transport services (buses and taxis) available at the terminal.	Strongly Disagree	41	34.2		
	Disagree	62	51.7		
	Neutral	9	7.5		
	strongly agree	8	6.7		
	Total	120	100.0		

The transport services (buses, taxis) are usually on time.		Frequency	Percent	Mean	SD
	Strongly Disagree	68	56.7		
	Disagree	34	23.8		
	Neutral	15	12.5		
	Agree	1	0.8		
	strongly agree	2	1.7		
	Total	120	100.0		
Public transport services operating at the terminal are comfortable and convenient for users.		Frequency	Percent	Mean	SD
	Strongly Disagree	44	36.7		
	Neutral	52	43.3		
	Agree	11	9.2		
	strongly agree	13	10.8		
	Total	120	100.0		
Transport services are sufficient and reliable during weekends and off-peak hours.		Frequency	Percent	Mean	SD
	Strongly Disagree	78	65.0		
	Disagree	30	25.0		
	Neutral	2	1.7		
	Agree	9	7.5		
	strongly agree	1	0.8		

	Total	120	100.0		
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Source: Researcher’s Survey, 2025

The above table shows the respondents’ opinions in relation to transport services and travels in the terminal. First, in regard to buses and taxi accessibility, **51.7** percent of respondents showed disagreement and **34.2** percent strongly disapproved of these vehicles being readily accessible, whereas only **7.5** percent were neither in agreement nor disagreement, and **6.7** percent agreed. A mean of **1.87** and standard deviation of **0.82** have shown dissatisfaction with transport in relation to availability.

Equally, the reliability of transport services concerning punctuality was not positive because **56.7%** disagreed strongly and **23.8%** disagreed with the statement that buses and taxis normally come on time. Few people agreed or disagreed strongly at **2.5%**, with **12.5%** being neutral. A very low mean of **1.63** and a standard deviation of **0.86** confirmed the understanding that transport services come late.

When considering the visibility and demarcation of spots allocated to taxis for drop off and pick up, **43.3%** disagreed and **36.7%** strongly disagreed; in contrast, only **20%** agreed. The mean score of 1.94 and standard deviation of 0.94 indicate collective concern in this case.

Finally, the challenge involved changing from one mode of transport to another. For instance, a change from minibus to bus was difficult because **65.0%** of the respondents strongly disagreed while **25.0%** actually disagreed. Not more than **2.5%** of the respondents neither agreed nor disagreed or agreed. The mean score measured **1.54**, while the standard deviation stood at **0.91**.

I. Weekday Mobility Around the Terminal

Table 4.7. Weekday Mobility

		Frequency	Percent	Mean	SD
It is easy to walk around the terminal during weekdays	Strongly Disagree	62	51.7		
	Disagree	47	39.2		
	Agree	8	6.7		

	Strongly Agree	3	2.4		
	Total	120	100.0		
Public transport services are readily available around the terminal during weekdays.		Frequency	Percent	Mean	SD
	Neutral	5	4.2		
	Agree	69	57.5		
	Strongly Agree	46	38.3		
	Total	120	100.0		
Traffic congestion around the terminal during weekdays does not significantly affect movement.		Frequency	Percent	Mean	SD
	Disagree	61	50.8		
	Neutral	46	38.3		
	Agree	7	5.8		
	Strongly Agree	6	5.0		
Total	120	100.0			
Movement around the terminal during weekdays is safe and comfortable for all users.		Frequency	Percent	Mean	SD
	Strongly Disagree	56	46.7		
	Disagree	51	42.5		
	Agree	11	9.2		
	Strongly Agree	6	5.0		
	Total	120	100.0		

Source: Researcher's Survey, 2025

Mobility patterns around transport terminals generally change during the weekdays and weekends because of the different reasons for traveling, the amount of traffic, and the

frequency of services. It is habitual that on weekdays people go to work and school mainly, thus, causing the peak hours and high demand, whereas on weekends there are less workers and more people doing leisure activities, which means fewer trips. This is the main reason why the paper deals with weekday and weekend mobility separately so as to reflect these differences and thus give a more accurate picture of human, centric mobility conditions around the terminal.

The mobility conditions around the terminal during weekdays (Monday to Friday) reveal around the terminal reveals a mix of accessibility concerns and safety perceptions among the respondents. More than half of the participants (**51.7%**) strongly disagreed with the statement that walking around the terminal during weekdays is easy, while **39.2%** disagreed, and only **6.7%** agreed. This sentiment appears in the low mean score of **1.69** and a standard deviation of **0.96**. This indicates strong dissatisfaction and low variability in responses.

Regarding overcrowding, the perception was largely negative. A total of 95.8% of respondents either agreed (**57.5%**) or strongly agreed (**38.3%**) that there is significant congestion from people or vehicles during weekdays. This is shown by a high mean of **4.34** and a lower standard deviation of **0.56**.

These figures suggest strong agreement and consistency in views on hub overcrowding. Safety perceptions during weekday movement also showed a troubling trend. Half of the respondents (**50.8%**) disagreed with the statement "I feel safe when moving around the terminal," while **38.3%** remained neutral. Only a small number agreed (**5.8%**) or strongly agreed (**5%**). This resulted in a moderate mean of **2.65** and a standard deviation of 0.80, which implies that many users feel uneasy or unsure about their safety in the area.

In terms of transport services, **46.7%** of respondents strongly disagreed and **42.5%** disagreed that these services are easy to reach on foot during weekdays. Only **9.2%** agreed and **5.0%** strongly agreed. The overall mean was **1.79** with a standard deviation of **0.83**, highlighting that, for most people, accessing transport services on weekdays remains a significant issue.

II. Weekend Mobility Around the Terminal

Table 4.8. Weekend Mobility

Mobility around the terminal is easier on weekends.		Frequency	Percent	Mean	SD
	Strongly Disagree	50	41.7		
	Disagree	58	48.3		
	Neutral	7	5.8		
	Agree	5	4.2		
	Total	120	100.0		
Feeling safe when moving around the terminal during weekends.		Frequency	Percent	Mean	SD
	Strongly Disagree	5	4.2		
	Disagree	6	5.0		
	Agree	70	58.3		
	Strongly Agree	39	32.5		
	Total	120	100.0		
Transport services around the terminal are easy to access on foot during weekends.		Frequency	Percent	Mean	SD
	Strongly Disagree	55	47.0		
	Disagree	58	49.6		
	Agree	4	3.4		
	Total	120	100.0		

		Frequency	Percent	Mean	SD
There is enough walking space around the terminal on weekends	Strongly Disagree	58	48.3		
	Disagree	46	38.3		
	Neutral	9	7.5		
	Agree	4	3.3		
	Strongly Agree	3	2.5		
	Total	120	100.0		

Source: Researcher’s Survey, 2025

The responses of the survey reveal that mobility within the terminal throughout weekends is still a challenge to many. The most common (**41.7%** strongly disagreed and **48.3%** disagreed) respondents believed that weekend mobility was not easier leading to a low mean of **1.73** and a standard deviation of **0.75** which gave the general dissatisfaction among the respondents without much variation.

On the other hand, the percentage of those who agreed to the statement that street vendors and other informal activities hinder walking paths during weekends was high (**58.3%** agreed and **32.5%** strongly agreed). This is attested by the mean value of **4.1** which represents high level of agreement and a standard deviation of **0.95**.

In terms of safety, nearly all the respondents strongly disagreed (**47.0**) or disagreed (**49.6**) with the fact that walking close to the terminal on Saturdays and Sundays is safe. The mean and standard deviation of **1.6** and **0.67**, respectively, are extremely low and demonstrate that the participants care much about their security and are always concerned.

Finally, on the question on whether the terminal has adequate amount of walking space during weekends, **48.3%** strongly disagreed and **38.3%** disagreed. With a **mean score of 1.73** and **standard deviation of 0.92**, it is clear that respondents do not feel the pedestrian environment is adequately spacious, indicating the need for improved infrastructure and regulation of informal vendors.

Generally, from the above responses, the researcher conclude that human mobility is severely constrained by congestion, unsafe infrastructure, poor service integration, and unregulated vendor activities.

4.5. Transportation Hubs affect the Economic, Social, and Environmental Sustainability of Surrounding Urban Neighborhoods

The third objective of the research was examining transportation hubs affect the economic, social, and environmental sustainability of surrounding urban neighborhoods in Lamberet transport hub. So in this section the respondents answered regarding to the case in the following table.

Environment and Cleanliness

Table 4.9.Environment and Cleanliness

		Frequency	Percent	Mean	SD
The environment around the terminal is clean and well maintained.	Strongly Disagree	68	56.7		
	Disagree	44	36.7		
	Neutral	6	5.0		
	strongly agree	2	1.7		
	Total	120	100.0		
			Frequency	Percent	Mean	SD
	Strongly Disagree	54	45.0		

Waste disposal facilities such as bins are adequate around the terminal.	Disagree	48	40.0		
	Neutral	18	15.0		
	Total	120	100.0		
The terminal environment is free from unpleasant odors and unsanitary		Frequency	Percent	Mean	SD
	Strongly Disagree	67	55.8		
	Disagree	46	38.3		
	Neutral	5	4.2		
	Agree	2	1.7		
	Total	120	100.0		
Drainage systems around the terminal are working and not flooded.		Frequency	Percent	Mean	SD
	Strongly Disagree	66	55.0		
	Disagree	40	33.3		
	Neutral	10	8.3		
	Agree	4	3.3		
	Total	120	100.0		

Source: Researcher's Survey, 2025

The evaluation of the environmental and cleanliness factors of the terminal showed a significant concern of the respondents. Most (**56.7**) people strongly disagreed and **36.7** disagreed that there were sufficient garbage bins used in a proper manner, hence the low mean score of **1.52**. This implies that there is a severe absence of good waste disposal facilities.

On air quality, **45%** strongly disagreed and **40** percent disagreed that the air surrounding the terminal is not polluted and the mean was **1.70**, which suggests that air pollution is a visible issue in the area of the terminal.

Noise levels were also identified as one of the problems, with **55.8** percent strongly disagreeing and **38.3** percent disagreeing that vehicles or vendors make noise that would be tolerable, adding to low mean of **1.52**, indicating that the area is seen as noisy and disruptive.

Finally, the drainage systems were in poor ratings. In the question of whether drainage systems are performing and not overwhelmed, more than **88** percent of the people answered that it was not true, strongly not, and the mean was **1.77**. This implies that there is always a problem of poor drainage and flooding at the time of rainfall or overflow.

Economic and Social Life

Table 4.10. Economic and Social Life

		Frequency	Percent	Mean	SD
The terminal has improved economic opportunities for local residents.	Strongly Disagree	56	46.7		
	Disagree	45	37.5		
	Neutral	9	7.5		
	Agree	10	8.3		
	Total	120	100.0		
The terminal supports local businesses and informal economic activities.		Frequency	Percent	Mean	SD
	Strongly Disagree	10	8.3		
	Neutral	7	5.8		
	Agree	58	48.3		

	strongly agree	45	37.5		
	Total	120	100.0		
The terminal has enhanced social interaction and daily livelihood activities in the area.		Frequency	Percent	Mean	SD
	Disagree	6	30.0		
	Neutral	11	0.8		
	Agree	60	33.3		
	strongly agree	43	35.8		
	Total	120	100.0		
I feel safe buying things from vendors at the terminal.		Frequency	Percent	Mean	SD
	Strongly Disagree	42	35.0		
	Disagree	59	49.2		
	Neutral	3	2.5		
	Agree	15	12.5		
	strongly agree	1	0.8		
	Total	120	100.0		

Source: Researcher’s Survey, 2025

The information gathered in the economic and social life category will give a lot of insight into how the terminals have been perceived to affect the immediate community. When the respondents were questioned about the presence of shops and kiosks around the terminal, most of them complained that they were not well arranged. In particular, a large proportion (**46.7**) of strongly disagree and **37.5** of disagree showed that there is a general concern with poor organization. The average of this item was **1.78** which indicates a great deal of disagreement and its standard deviation of **0.91** indicates that there was some variation in perception, although the major trend is negative.

However, perceptions were made to be significantly better when evaluating the presence of the terminal helps the nearby businesses obtain more customers. In this case, almost half of the respondents (**48.3**) affirmed and **37.5%** affirmed strongly which shows that the respondents have a positive perception of the role played by the terminal in economic activity. Very little of them indicated disagreement or neutrality. This was a mean score of **3.15** with standard deviation of **0.86** indicating moderate agreement and consistency in response.

The statement that had better scores was the one that stated that there are adequate job opportunities associated with the terminal; with **33.3%** agreeing and **35.8** strongly agreeing. This shows that the terminal is viewed as important in the generation of employment. This item has the highest mean of **4.17**, and it is supported by a low standard deviation of **0.79**; hence, the majority of the respondents had a similar view.

Safety in purchasing items of sellers in the terminal, on the other hand, was an issue of concern to respondents. The percentage strongly disagreeing (**35**) and disagreeing (**49.2**) to the statement was large. Those who agreed and strongly agreed were very few and only **2.5%** were neutral. The average of **1.95** obviously suggests the negative attitude towards safety and the standard deviation of **0.97** is rather high which means that the majority of the answers were directed to disagreeing, but some of them had controversial points.

In general, the findings indicate a high level of dissatisfaction with the cleanliness, quality of air, noise level, and drainage in the area surrounding the terminal, which are below the standards of the quality of services. Plus, even if the hub contributes positively to economic life but undermines environmental sustainability. Social impacts are mixed, with opportunities for jobs but concerns about safety and organization.

4.6. Comparison the current practices with international best practices in human-centric urban mobility

The last objective of the research was aiming to compare the current practices with international best practices in human-centric urban mobility, with the aim of enhancing economic, social, and environmental sustainability around high-density regional transportation hubs and their surrounding neighborhoods, taking Lamberet transport hub. The following table prepared to evaluate the opinion about best practices from the targeted respondents.

Table 4.11. Comparison the current practices with international best practices in human-centric urban mobility

The best practice indicators used in this table are derived from international guidelines on human-centric urban mobility proposed by UN-Habitat, the World Bank, and the World Health Organization.

Installing safe pedestrian crossings (zebra lines, overpasses, and underpasses) would improve mobility around the terminal.		Frequency	Percent	Mean	SD
	Disagree	3	2.5		
	Agree	55	45.8		
	Strongly Agree	62	51.7		
	Total	120	100.0		
Providing wide, continuous, and well-maintained sidewalks would improve pedestrian movement around the terminal.		Frequency	Percent	Mean	SD
	Neutral	7	5.8		
	Agree	69	57.5		
	Strongly Agree	44	36.7		
	Total	120	100.0		
		Frequency	Percent	Mean	SD
	Disagree	2	1.7		
	Neutral	10	8.3		
	Agree	71	59.2		
	Strongly Agree	37	30.8		
	Total	120	100.0		
		Frequency	Percent	Mean	SD
	Neutral	7	5.8		
	Agree	51	42.5		
	Strongly Agree	62	51.7		
	Total	120	100.0		
		Frequency	Percent	Mean	SD

Involving the community in planning decisions would create better solutions for mobility around the hub.	Agree	22	18.3	4.82	0.39
	Strongly Agree	98	81.7		
	Total	120	100.0		
		Frequency	Percent	Mean	SD
	Agree	67	55.8		
	Strongly Agree	53	44.2		
	Total	120	100.0		

Source: Researcher’s Survey, 2025

The findings show that installing safe pedestrian crossings such as zebra lines, overpasses, and underpasses would significantly improve mobility around the terminal. More than half of the respondents (**51.7%**) strongly agreed with this statement, while **45.8%** agreed, and only **2.5%** disagreed. The responses have a mean value of 3.49 with a standard deviation of 0.55, indicating a high level of uniformity in the responses and how the community believes that there should be safe pedestrian crossing to enhance movements and safety in the vicinity.

The introduction of additional pedestrian facilities, such as sidewalks, ramps, and shelters, was also considered as significant in order to increase accessibility to all users. Fifty-seven and a half percent concurred, **36.7** percent strongly concurred, and **5.8** percent of the respondents were indifferent. A value of **3.31** with a standard deviation of **0.57** shows a clear indication that there is support to increase the facilities of the walkers. This implies that value infrastructure of respondent that allows safe and convenient access to all people including those with mobility issues.

The introduction of the appropriate waste management and drainage systems was considered another significant element of enhancing environmental sustainability in the area of the terminal. According to the results, **59.2%** responded affirmatively, **30.8%** with a strong affirmation, only **1.7** percent responded negatively, and **8.3** percent expressed a neutral view. The average of **3.19** and the standard deviation of **0.65** show a general consensus; however, there is the tendency to have a wider range of opinions. On the whole, the answers highlight the necessity to deal with the waste and drainage issues and make the terminal works cleaner and more sustainable.

Enhancing the local authority participation and surveillance was also highly favored as a means of enhancement in terminal management. A greater proportion of the subjects (**51.7**) strongly agreed with it, with **42.5%** agreeing but with **5.8%** of the respondents being neutral. The standard deviation and mean score of **3.46** and **0.60** respectively verify the confidence uniformity in the authority role. This implies that the local authorities should have more oversight and monitoring as well as accountability over the terminal to enhance management.

Including the community in the decision making process had a resounding approval among the respondents. The findings were very persuasive with **81.7%** strongly agreeing, and the rest of **18.3%** agreeing, with no disagreement and no neutrality. The large value of the mean score **4.82** and small value of standard deviation **0.39** indicate a very strong and great agreement. This points out that residents and users consider their involvement in planning as essential towards practical and effective solutions to mobility issues.

Lastly, the idea of having all the various forms of transport like buses, taxis and minibuses under a single hub was highly recognized to enhance efficiency as well as mobility. More than half (**55.8%**) agreed, while **44.2%** strongly agreed, and no one disagreed or remained neutral. With a mean of **4.44** and a standard deviation of **0.50**, the responses reflect strong and consistent support. This indicates that respondents believe coordinated transport services would reduce inefficiencies and make movement around the hub smoother and more reliable.

The last aim of the research was to benchmark the present mobility situation at Lambert Transport Terminal against the international best practices in the human, centric urban mobility. The rationale behind such a comparison lies in the fact that it enables the identification of the discrepancies between the local habits on the one hand and the globally recognized standards that put pedestrian safety, accessibility, inclusivity, and the integration of sustainable transport within the high, density transport hubs on the other.

Among the international best practices that are presently strongly emphasized by such major players as UN, Habitat, the World Bank, and the World Health Organization are pedestrian, friendly, safe movement, rational traffic management, good lighting, a good combination of land, use, and well, functioning public transportation systems that offer equal opportunities.

Such principles have been the basis of transportation centers in such cities as Copenhagen, Singapore, and Curitiba whose pedestrian, oriented design has led to an increase in the efficiency of mobility as well as the overall quality of the urban environment.

On the whole, the results of the investigation highlight the fact that, on the one hand, the present mobility arrangement at Lambert Transport Terminal does not meet the requirements of the international best practices, but on the other, there is a great deal of public readiness to human, centric changes. What is more, the similarity of the approval levels of all best practice indicators means that if pedestrian, focused design, safety infrastructure installation, and integrated transport planning were chosen as the preferred development paths, not only the mobility, but also the safety and urban environmental quality around the terminal would be greatly improved.

This comparison highlights the need for policy alignment with global urban mobility standards and provides evidence-based guidance for planners and decision-makers seeking to transform the terminal into a safer, more accessible, and people-centered transport hub.

4.7. Result and discussion from the interview

Alongside the quantitative survey results, qualitative information was gathered through interviews with staff working at the Lambert Transport Terminal. In total, 12 interviewees were involved in the study of whom the terminal management staff (3), transport operators including bus and taxi coordinators (4), security personnel (3), and maintenance workers (2) formed the composition of the interviewee pool. The reason for inclining the purposive selection of these participants was because of their direct involvement thus operation, management, and maintenance of the terminal on a daily basis.

The interviews were semi, structured and developed mainly to gauge the experiences and perceptions of the respondents on issues related to physical infrastructure, accessibility, safety, mobility, planning, and environmental conditions. The interviews were geared towards understanding recurring issues in the terminal, operational loopholes, and the impacts, as perceived by users, of the condition of the terminal on the users and the surroundings.

A thematic analytical method was used to sort out the findings into the major topics that are elaborated in the succeeding parts.

4.7.1 Interview Results

This section presents the empirical findings from the semi-structured interviews conducted with staff at the Lambert Transport Terminal. The results are organized thematically and reported descriptively, without interpretation.

Theme 1: Physical Environment and Infrastructure

Interview responses indicate that most participants perceive the physical condition of the terminal negatively. Respondents identified deficiencies related to design quality, maintenance, and general infrastructure condition. Frequently reported issues included poor cleanliness, insufficient seating, and inadequate shelter for passengers.

Participants also noted the absence of modern facilities. Interior elements such as floors, walls, and ceilings were described as poorly maintained, contributing to discomfort and a general perception of neglect among users and staff.

Theme 2: Accessibility and Safety

The findings reveal notable concerns regarding accessibility and safety. Most respondents reported that essential accessibility features—such as ramps, sidewalks, and clearly marked pedestrian crossings—are either missing or in poor condition, posing challenges for elderly users and persons with disabilities.

Additional safety concerns included inadequate lighting, blind corners, and unregulated pedestrian–vehicle interactions. Respondents associated these conditions with feelings of insecurity, particularly during early morning and evening hours.

Theme 3: Environmental Cleanliness

Environmental cleanliness emerged as a major concern. Respondents highlighted problems related to waste management, air quality, noise pollution, and drainage. Garbage bins were described as insufficient or poorly managed, leading to overflowing waste.

Participants also reported clogged or non-functional drainage systems, which result in water stagnation and unsanitary conditions, especially during the rainy season.

Theme 4: Mobility and Human Flow

Most respondents reported significant challenges related to pedestrian and vehicular movement within and around the terminal. High levels of congestion were observed during both weekdays and weekends.

Pedestrian movement was reported to be particularly restricted during weekends due to street vendors and informal activities obstructing walkways. While a small number of respondents perceived minor improvements during weekends, dissatisfaction with overall freedom of movement remained predominant.

Theme 5: Planning and Regulation

Interview findings indicate perceptions of inadequate urban planning and weak regulatory control. Respondents reported the absence or ineffective implementation of traffic signals, regulatory signage, traffic laws, and traffic control personnel.

Participants further indicated minimal institutional involvement in long-term planning, regulation, and maintenance, resulting in poorly coordinated terminal operations.

Theme 6: Community Involvement

The findings show minimal community involvement in the planning, development, or maintenance of the terminal. Most respondents stated that community members do not participate in planning discussions, consultation forums, or feedback mechanisms.

Theme 7: Vendor Impact and Informal Activities

Respondents expressed mixed views regarding street vendors. Some acknowledged their role in providing services and convenience to terminal users. However, most respondents reported that informal trading contributes to congestion and obstructs pedestrian movement.

Participants emphasized that vendors operate without designated spaces or regulatory control, particularly during peak periods.

4.7.2 Discussion of Interview Findings

This section interprets the interview results and relates them to the broader study objectives and survey findings. Overall, the interview findings indicate widespread dissatisfaction with the physical, functional, and managerial conditions of the Lambert Transport Terminal. The concerns expressed regarding infrastructure quality, accessibility, safety, environmental

cleanliness, and mobility strongly reinforce the quantitative survey results, demonstrating consistency across data sources.

The poor physical condition of the terminal reflects deficiencies in infrastructure maintenance and design quality, which directly affect user comfort and operational efficiency. Accessibility and safety challenges further indicate that the terminal does not adequately support inclusive mobility, particularly for vulnerable user groups.

Environmental cleanliness issues suggest weaknesses in basic service provision and infrastructure management, negatively affecting user experience and public health conditions. Mobility challenges related to congestion and informal activities highlight shortcomings in circulation planning and spatial organization.

Weak planning and regulatory frameworks, combined with limited community involvement, indicate a top-down management approach that fails to incorporate user needs and feedback. Together, these factors limit the terminal's functionality, efficiency, and long-term sustainability.

4.7.3 Discussion of Findings in Relation to Literature

The findings of this study are consistent with existing literature on transport terminal performance in developing urban contexts. Previous studies emphasize that poor pedestrian circulation, inadequate infrastructure maintenance, and uncontrolled informal activities significantly reduce terminal efficiency and user satisfaction (Cervero, 2013; UN-Habitat, 2015).

The mobility challenges identified align with research indicating that congestion in transport hubs is often exacerbated by insufficient spatial planning and weak enforcement mechanisms (Cervero, 2013). Similarly, the lack of effective planning and regulation observed in this study supports literature highlighting the role of institutional capacity and governance in transport infrastructure performance (UN-Habitat, 2015).

The minimal level of community involvement corroborates studies which argue that infrastructure projects developed without stakeholder participation frequently fail to respond to user needs and local conditions (Arnstein, 1969; Healey, 1997). Existing literature further emphasizes that participatory planning is critical for ensuring infrastructure relevance, sustainability, and long-term effectiveness.

Regarding informal economic activities, the mixed perceptions reported reflect findings in existing studies that recognize both the socio-economic benefits and spatial challenges posed by street vendors (Roy, 2005). Unregulated informality has been widely documented as a contributor to congestion, reduced walkability, and safety concerns in transport terminals, particularly in rapidly urbanizing cities.

Overall, the study reinforces established literature asserting that effective planning, regulatory enforcement, stakeholder participation, and managed integration of informal activities are essential for improving the functionality and usability of transport terminals.

4.7.3 Urban Planning and Urban Design Implications

From an urban design perspective, the findings highlight critical gaps in the spatial, functional, and governance dimensions of the Lambert Transport Terminal. Key implications include:

- Need for improved pedestrian-oriented design, including clear circulation routes, protected walkways, and universal accessibility features
- Strengthening regulatory and management frameworks to improve safety, mobility, and operational efficiency
- Integration of informal activities through spatial planning, such as designated vendor zones that reduce conflict while supporting livelihoods
- Incorporation of community participation in planning and decision-making to align terminal design with user needs

Addressing these issues requires a holistic urban design and planning approach that integrates mobility planning, infrastructure quality, regulation, and stakeholder engagement to support human-centric urban mobility.

CHAPTER FIVE: CONCLUSION AND RECOMMENDATIONS

5.1. Conclusion

The study was carried out to see the level of utilization of urban transport systems at the Lamberet Transport Hub. The emphasis was given to user experience, service delivery, and human, centered mobility. The results show a less than average situation in terms of infrastructure provision, accessibility, safety, environmental management, and planning enforcement. At present, Lamberet is one major transport hub in Addis Ababa, but current zoning regulations and land, use policies are not effectively assisting the mobility needs of users. This is mainly attributed to poor planning standards and a large gap between policy intentions and actual implementation. One of the most outstanding contributions to this gap is the poor state and an insufficient amount of basic infrastructure, which affects directly the daily experience of the users. There is a lack of adequate seating, insufficient shelter, poor sanitation, absence of signage, weak traffic management, and a low level of maintenance that leads to congestion, confusion, and unsafe conditions for both pedestrians and vehicles. These defects not only affect the operational efficiency of the hub but also convert the hub from an enabler of movement to a source of stress and inefficiency.

The research highlights that accessibility and safety issues are the main barriers to a human, centered transport environment at Lamberet. Vulnerable groups, such as women, children, the elderly, and people with disabilities, are the most affected by the lack of pedestrian facilities like wider walkways, safe crossings, ramps, good lighting, and well, defined separation between pedestrian and vehicle movement. During rush hours, the already unsafe situation gets worse because there is a competition for space between buses, taxis, and pedestrians. Although the presence of informal vendors is important from an economic point of view since they provide local livelihoods, the absence of regulation leads to various problems such as the obstruction of pedestrians, traffic holdups, and safety issues. The situation is aggravated by the ineffective implementation of traffic control and space management, which lead to more congestion, frustration, and upsets the natural flow of the hub. Nevertheless, the multi, modal facility of Lamberet offers great potential for it to become a benchmark Human, Centric Transport Network through combined planning, better space allocation, and interventions of inclusive design. The impacts of Lamberet extend beyond the mere aspect of mobility. It also influences its surrounding community socially, economically, and environmentally. On the one hand, the terminal is a source of local employment and commercial activity. On the other hand,

it entails environmental degradation such as poor waste management, lack of proper drainage, air pollution, and noise disturbance. These conditions are detrimental to public health, environmental sustainability, and the overall neighborhood quality of life. If nothing is done to balance the situation, the long, term viability of the hub as a sustainable urban transport center will be compromised. It is safe to say that any comparison with international best practices will reveal significant deficiencies in accommodating the needs of the disadvantaged, ensuring pedestrian safety, controlling street vendors, and involving the community. Transport hubs that have been successful on a global scale place great emphasis on universal access for all, pedestrian comfort, regulated informal vendor activities, integrated transport modes, and community participation in planning and management.

On the other hand, results from the Lamberet investigation reveal that only a few users and residents had decision, making power even there was a strong public support for accessibility, cleanliness, safety, and organization improvements. Ultimately, the challenges at Lamberet can be met through concerted efforts encompassing policy reform, infrastructure redevelopment, governance improvement, and community, oriented planning. There is a great opportunity for Lamberet Transport Hub to serve not only the transport demands of Addis Ababa but also to be a model that can be duplicated in other urban transport hubs within the city if it adopts human, centered design principles and international best practices. It can become a safe, inclusive, and sustainable mobility node.

5.2. Recommendations

Based on the study findings, the following recommendations are proposed to transform the Lamberet Transport Hub into a human-centered, inclusive, and sustainable urban mobility node. The recommendations focus on strengthening infrastructure and planning, improving accessibility and safety, enhancing environmental sustainability, regulating informal activities, improving governance, and aligning the hub with international best practices.

Strengthening Urban Planning and Infrastructure

The physical condition of the Lamberet Transport Hub requires immediate improvement to enhance passenger comfort and system efficiency. Adequate waiting areas, seating, shelters, sanitation facilities, and clearly organized terminal layouts should be prioritized. Zoning regulations must clearly separate pedestrian movement, vehicular circulation, and vending activities to reduce congestion and safety conflicts. In addition, a dedicated maintenance and

funding mechanism should be established to ensure continuous upkeep of facilities. Routine maintenance should be integrated into terminal management to improve service quality, enhance user trust, and extend the lifespan of infrastructure investments.

Improving Accessibility and Safety

Accessibility and safety are fundamental to achieving a human-centered transport environment. Universal design principles should be adopted to ensure inclusive access for people with disabilities, women, children, and the elderly through the provision of ramps, tactile paving, sidewalks, safe crossings, adequate lighting, and clear signage. Pedestrian routes must be physically demarcated from vehicle movement, and traffic flow within the hub should be actively managed. Improved lighting, surveillance systems, and trained traffic marshals will increase safety, particularly during peak hours and at night, and encourage greater use of public transport.

Enhancing Environmental Sustainability

Environmental management must be strengthened to improve health conditions and long-term sustainability. This includes the provision of sufficient waste bins, regular waste collection, waste segregation, and public awareness programs. Improved drainage systems are essential to prevent flooding and sanitation risks during rainy seasons. Air and noise pollution should be monitored and regulated through emission controls and traffic management measures. Promoting cleaner transport options, such as improved public transit and low-emission vehicles, will further reduce environmental impacts at the hub.

Regulating Informal Vendor Activities

Informal vending should be integrated into the transport hub through regulation rather than exclusion. Designated vending zones should be incorporated into the terminal layout to support livelihoods while maintaining pedestrian flow and safety. Licensing, monitoring, and basic infrastructure support for vendors can improve order, reduce conflicts, and enhance the overall travel experience, while still contributing to the local economy.

Promoting Governance and Community Participation

Effective governance and stakeholder collaboration are essential for sustainable improvement. Participatory planning processes should involve passengers, drivers, vendors, and nearby residents to ensure that interventions respond to real needs. Clear monitoring and evaluation

systems should be established to track infrastructure conditions, safety, environmental performance, and service quality. A multi-stakeholder governance framework involving municipal authorities, transport operators, and community representatives will improve accountability and long-term management.

Alignment with International Best Practices

Lamberet Transport Hub should align with global best practices by adopting universal design, complete streets concepts, and integrated transport systems. Coordinated transport modes, clear wayfinding, and performance indicators such as accessibility, safety, user satisfaction, and environmental quality should be used to evaluate progress. Applying these standards will position Lamberet as a model for sustainable urban mobility in Addis Ababa and other developing cities.

Overall Impact and Implementation of the Recommendations

The implementation of the suggested human, centered planning and design guidelines can significantly lessen traffic jams, bolster pedestrian safety, improve the environmental quality, and raise the overall operational effectiveness of the Lamberet Transport Hub. These proposals, by giving priority to pedestrian movement, accessibility, functional zoning, and sanitation, intend to enhance the transport experience without compromising transport performance.

The proper execution of the plan demands a joint effort among various institutions under the leadership of the Addis Ababa Transport Authority and collaboration with the city planning and administrative departments, private transport operators, and local community members. The involvement of the community, especially informal vendors, is a must, to make the outcomes inclusive and responsive to the local context.

Ultimately, the Lamberet Transport Hub could be an integrated urban mobility node that aligns with sustainable land, use patterns, offers better connectivity, and supports transit, oriented development. A successful implementation of the proposed framework may be a viable, replicable model of a human, centric transport hub development not only in Addis Ababa but also in other fast, growing cities of developing countries.

5.2.1 Recommendations Matrix (Problem → Action → Impact)

Identified Problem	Recommended Action	Expected Impact
Poor passenger comfort due to lack of seating, shelter, and sanitation	Upgrade terminal infrastructure with adequate seating, shaded waiting areas, and clean restroom facilities	Improved user comfort, increased public transport attractiveness, enhanced user satisfaction
Congestion and unsafe interaction between pedestrians, vehicles, and vendors	Introduce clear zoning to separate pedestrian corridors, vehicular circulation, and vending areas	Reduced congestion, improved pedestrian safety, smoother traffic flow
Deterioration of facilities due to weak maintenance systems	Establish dedicated maintenance funding and routine asset management plans	Extended infrastructure lifespan, consistent service quality, reduced long-term costs
Limited accessibility for people with disabilities, elderly, women, and children	Apply universal design principles: ramps, tactile paving, wide walkways, safe crossings, and step-free access	Inclusive mobility, equitable access to transport services, compliance with universal access standards
Inadequate lighting, signage, and traffic control	Install energy-efficient lighting, clear wayfinding signage, surveillance systems, and deploy trained traffic marshals	Enhanced safety, reduced accidents, increased user confidence
Poor waste management and sanitation conditions	Provide adequate waste bins, regular collection, waste segregation, and public awareness programs	Improved hygiene, reduced environmental pollution, healthier terminal environment
Flooding and stagnant water during rainy seasons	Upgrade drainage systems and conduct regular maintenance	Improved climate resilience, reduced health risks, uninterrupted terminal operations
Air and noise pollution from high vehicle concentration	Monitor emissions and noise levels; promote cleaner public transport options	Improved air quality, reduced noise disturbance, better public health outcomes
Unregulated informal vending obstructing movement	Designate formal vending zones with licensing and monitoring systems	Balanced livelihood support, reduced pedestrian obstruction, organized terminal space
Weak governance and lack of stakeholder engagement	Introduce participatory planning, feedback mechanisms, and multi-stakeholder governance frameworks	Improved accountability, responsive management, community trust
Limited integration of transport modes	Improve modal integration through coordinated layouts, schedules, and signage	Efficient transfers, reduced travel time, increased public transport use

Table 5.1. Recommendations Matrix

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Annex 1 Questionnaire

I. Questionnaire for Bus Terminal and Neighborhood Study

This questionnaire is designed to gather feedback on different aspects of the bus terminal and its surrounding neighborhood. Please respond by marking the option that best matches your opinion.

A. Physical Environment (Terminal Design & Condition)

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
The terminal is clean and well-maintained.					
The seating and waiting areas are comfortable.					
Restrooms, water points, and other amenities are in good condition.					
There is shelter from sun and rain in waiting areas.					

The terminal has clear and readable signs for directions.					
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B. Accessibility and Safety

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Sidewalks and ramps are available for people with disabilities.					
It is safe to walk to and from the terminal.					
There is enough lighting at the terminal and nearby streets.					
Crosswalks and zebra lines are visible and safe.					

There are no dangerous areas or hidden corners in the terminal.					
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C. Transport Services and Movement

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Buses and taxis are easy to find at the terminal.					
The transport services (buses, taxis) are usually on time.					
There are areas for taxis, drop-off, and pick-up clearly marked.					
It is easy to change from one mode of					

transport to another (e.g. minibus to bus).					
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D. Environment and Cleanliness

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
There are enough garbage bins and they are used properly.					
The air around the terminal is not polluted.					
Noise levels from vehicles or vendors are not too high.					
Drainage systems around the terminal are working and not flooded.					

E. Economic and Social Life

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Shops and kiosks near the terminal are well-organized.					
The terminal helps nearby businesses get more customers.					
There are enough job opportunities linked to the terminal.					
I feel safe buying things from vendors at the terminal.					

F. Planning and Regulation

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
The terminal and nearby area are					

planned in a good way.					
There are traffic signs, rules, and staff helping manage traffic.					
Local authorities seem to care about maintaining the terminal.					
People from the community are involved in discussions about the terminal.					

Annex 2 Interview

Data Collection Instruments

II. Semi-Structured Interview Guides

1. A. Interview Guide for Transit Users

1. How frequently do you use the regional bus terminal?
2. What aspects of the terminal design make your travel experience easier or harder?
3. Do you feel the terminal is accessible for people with different mobility needs?
4. How safe and secure do you feel in and around the terminal?
5. What are your thoughts on the integration of the terminal with the neighborhood (e.g., walkways, lighting, and cleanliness)?
6. Have you observed any social or environmental challenges associated with the terminal or its surroundings?
7. What improvements would you suggest for better user experience and neighborhood harmony?

2. B. Interview Guide for Station Managers

1. What operational challenges do you face at this terminal?
2. How do current zoning and planning regulations support or hinder terminal operations?
3. In what ways is human-centric design applied in the terminal and surrounding area?
4. How do you address safety and accessibility for users, including those with disabilities?
5. Are there any initiatives or partnerships aimed at improving sustainability and neighborhood development?
6. What best practices have been implemented to enhance user experience and neighborhood integration?

3. C. Interview Guide for Sub-city Officials

1. How are zoning and planning policies enforced around the terminal?
2. What are the key planning challenges associated with transportation hubs?

3. What role does community involvement play in planning and monitoring terminal areas?
4. Are there mechanisms to ensure economic, social, and environmental sustainability?
5. What support is needed to implement human-centric mobility approaches more effectively?

4. D. Interview Guide for Local Residents

1. How has the terminal affected the quality of life in your neighborhood?
2. Are there any concerns related to noise, pollution, or safety?
3. How accessible is the terminal by foot or bicycle from your home?
4. Do you think the design of the terminal reflects community needs?
5. What economic or social benefits or drawbacks have you experienced due to the terminal's presence?

Annex 3 Publishable Article

Issues and Opportunities in Embracing a Human-Centric Mobility Pattern around the Lamberet Transportation Hub and Neighborhoods, Addis Ababa

By: Feben Ramish and Birhanu Girma (PhD)

Abstract

"Humans-centered mobility has emerged as an increasingly important paradigm for the modern vision for the future of mobility, with its emphasis on the needs of accessibility, safety, and user-friendly mobility, instead of focusing on efficient vehicles." Nevertheless, the implementation of this strategy in high density transportation centers of developing cities can be considered an important challenge. This study explores issues and possibilities of implementing human-centric mobility strategy in and around the Lamberet Regional Transportation Hub and the neighborhoods of Addis Ababa, Ethiopia. The study is a mixed-methods case study that combines structured interviews, questionnaire surveys, direct field observations, and spatial analysis to analyze mobility conditions, user experiences, and neighborhood effects. The analysis reveals that the major solutions to the problem are the existence of pedestrian-vehicle problems, congestion, lack of spatial integration, insufficient accessibility, and lack of governance. On the other hand, there are possibilities for increasing the walkability, quality of the public space, connectivity between neighborhoods, and inclusive planning by incorporating human centric design and policy interventions. The research adds the empirical data using Global South perspective and gives evidence-based recommendations to facilitate people-centered mobility change in high density transportation centers.

Keywords:

Human-centered mobility, Transportation hubs, Accessibility, Urban public space, Inclusive transport planning

Introduction

There is fast urbanization in these cities, which has increased pressure on their transport networks, and in most instances, there is emphasis on motorized transport and not the human experience. Addis Ababa, which is the capital of Ethiopia, is experiencing a high rate of demographic and spatial growth, which is straining the public transport system. Centers of transportation, such as long distance bus terminals, play a critical role in transportation within towns as well as between regions, yet they are associated with concepts of over-crowding, insecurity, and social disintegration.

In recent times, to tackle these challenges, the field of urban planning has witnessed the rise of the emphasis of human-centered mobility, where the needs of people, security, comfort, and social interactions have been given more emphasis. Even though this paradigm is now one of the essential elements of international frameworks, it lacks much relevance to high-density transport nodes in the global South, as it remains an unexplored area of study. Usually, the implementation of people-centered mobility paradigms gets thwarted by informal transport networks, the absence of effective frameworks, and poor urban planning.

This study is expected to fill this gap by investigating the challenges and opportunities which might exist in the implementation of a human-centric mobility solution within the Lamberet Transportation Hub as well as in the vicinities. The target population, through the application of a real-life, high-density environment, is expected to produce contextualized insights which could be applied in transport planning in Addis Ababa, among other cities as well.

Literature Review

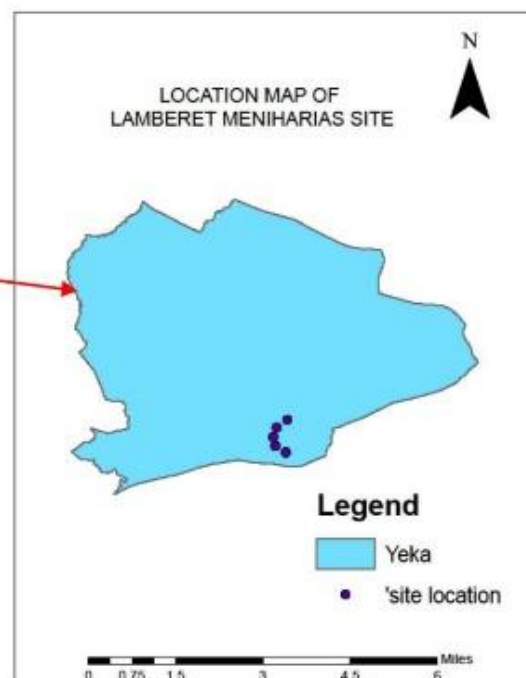
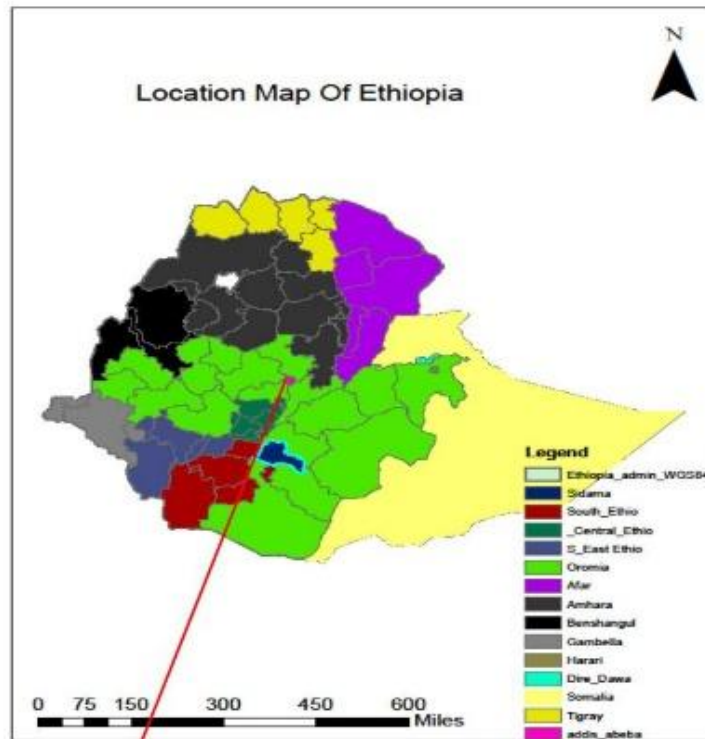
Human-centric mobility denotes transportation systems that anchor on human behaviors, experience, and welfare rather than efficiency of vehicles. According to scholars, such systems focus on the priority of pedestrians, accessibility to everyone, safety, social inclusion, and quality of the environment (Gehl, 2010; UN-Habitat, 2013). This method considers streets and transportation points not solely as the corridors of movement, but also as the spaces that facilitate the daily activities (Jacobs, 1961; Gehl, 2010). In this regard, transport hubs are crucial boundaries that interconnect the mobility systems and urban life. As noted by Bertolini (1999), hubs have an impact on patterns of land use, economic activity, and social interaction. Indeed, they might constitute physical and social obstacles when ill-knit with resultant congestions, environmental dissent, and marginalization (Cervero, 2013). These issues are

often exacerbated in developing urban centers by the prevalence of unofficial transport and a little investment in infrastructure (Pojani & Stead, 2015).

Studies of high-density transport hubs point to common barriers, such as pedestrian-vehicles conflicts, congestion, poor wayfinding, low accessibility to vulnerable users, and weak governance structures (Cervero, 2013; UN-Habitat, 2013). The difficulties compromise comfort, safety, and equity among women, elderly users, and people with disabilities (Vuchic, 2007). However, transport hubs can be transformed further into human-centered facilities based on better spatial planning, prioritization of pedestrians, integration into land use, and inclusive governance (Bertolini, 1999; Healey, 1997). Case studies of various cities present evidence that re-designing the circulation systems, improving public open spaces, and coordinating transport planning with neighborhood development lead to dramatic improvement in the results of mobility (Jacobs, 1961; Gehl, 2010).

Description of the study area

The study location is in Lambert Regional Transport Hub/Menahariay/ in the Yeka Sub-City, which is located in the top part of Addis Ababa, Ethiopia, with ground space of 5.1-hectare. This transport hub is among the most significant transport hubs in regions of northern Ethiopia, with a highly busy transport station where it serves all routes for the transit of people in this particular field. This particular field is also characterized by diverse commercial businesses such as markets that are in touch with both local and foreign people



Location Map of Lamberet Transportation Hub and Its Neighborhood

Figure 1 Location map

Methodology

Research Design

The study case is Lamberet (Menahariay) Regional Transportation Hub, located in the Yeka Sub-city, Addis Ababa, in the northeastern part of the city. The transportation hub occupies around 5.1 hectares and is a large bus terminal that interlinks Addis Ababa to the northern parts of Ethiopia. The Lamberet neighborhood is found in a high-density setting, while the surrounding areas constitute a typical high-density residential area cum mixed land use. The Mixed Method study, using the Descriptive, Exploratory, and Explanatory types in the Case study design, the Case study method has helped to explore the Socio-Spatial dynamics in relation to the Lamberet Transportation Hub in depth in the real-life setting.

The investigation was driven by well, articulated research goals that sought to explore the operation of the Lamberet (Menahariay) Regional Transportation Hub through a human, centric mobility lens. The main goal was to survey the present socio, spatial conditions of the transport hub and understand the roles of infrastructure, accessibility, safety, environmental quality, and mobility patterns in the usage experience and the efficiency of the terminal.

A total of 261 respondents were involved in this research, and these were major stakeholders connected to the transportation hub. The transport user community comprised the largest population of respondents (155 or 59.4%), and they ensure a robust foundation for analysis in terms of frequent and daily users of the terminal. The resident community made up 55 respondents (21.1%), and they ensure valuable information regarding neighborhood-level factors such as congestion, security, and socio-economic factors within the neighborhoods. The drivers and driver assistants made up 31 respondents (11.9%), and they ensure operational perspectives regarding traffic management, functionality of the terminal, and working conditions. The administrative staff made up the remaining 20 respondents (7.6%), and they ensure institutional perspectives regarding implementation and terminal management. Inclusivity of stakeholders is well covered, and this will ensure robustness of the analysis regarding human-centered issues of mobility within the transportation hub.

Table 1: Sample Distribution by Stakeholder Group

Stakeholder Group	Number	Percentage (%)
Transport users	155	59.4
Local residents	55	21.1
Drivers & assistants	31	11.9
Administrative staff	20	7.6
Total	261	100

Note. Percentages are calculated based on the total number of respondents (N = 261).

Walking conditions at Lamberet Terminal are highly precarious due to the continuous occurrence of risky conflicts between pedestrians and vehicles, arising out of poor spatial and traffic management. The absence of clearly defined pedestrian walkways and marked crossings is an insistence that pedestrians move within vehicular flows, which highly compromises the safety factor. Moreover, the total lack of traffic-calming measures around the terminal means that there will be a free flow of vehicles with unsafe speed limits, further contributing to accident risks. Visibility from poor lighting also heightens these risks and limits any form of safe access during nighttime. All these factors combined demonstrate profound lapses in pedestrian infrastructure, traffic control, and lighting, which necessitate targeted interventions—building exclusive walkways, providing crossings, traffic-calming measures, and enhancing lighting—to create an environment for people-centered mobility.

Table 5.2: Pedestrian Safety Challenges at Lamberet Terminal

Safety Indicator	Observed Condition
Pedestrian–vehicle conflict	High
Designated pedestrian walkways	Very limited
Marked pedestrian crossings	Absent
Traffic calming measures	Absent

Night-time visibility	Poor
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Note. Data are based on field observations and user perceptions collected during the survey.

The congestion experienced at the Lamberet Transportation Hub is caused by interlocking demands, bottlenecks created by the efficiency of operations, as well as spatial limitations. The main problem is the large number of users, which is considered more critical as it exceeds the capacity of the terminal. The operations of the private means of transport are also closely associated with congestion and the chaotic movements of vehicles. The street vending activities may be viewed as activities that generate employment and income but are critical in that they limit mobility and exacerbate congestion during peak hours. The layout of circulation inside the terminal is also responsible, as it produces bottlenecks that make routing systems unidirectional while limiting vehicular motion. The levels of severity required to address the congestion problem presented by the Lamberet Terminal are measured using combined observation and survey qualitative measures.

Table 5.3: Major Causes of Congestion at Lamberet Transportation Hub

Cause of Congestion	Severity Level
High passenger volume	Very high
Informal transport operations	High
Street vending activities	Medium-High
Poor internal circulation design	High

Note Analysis of Major Causes of Congestion at Lamberet Transportation Hub

Accessibility at Lamberet Terminal is highly limited for all vulnerable groups of users, since they face various barriers to safe and comfortable access. Elderly users are threatened by unsafe crossings and very long walking distances, growing physical stress and the risk of accidents. Persons with disabilities may face major obstacles because of missing ramps and un-evenness of walking surfaces, which limit their capacity to get to terminal facilities independently. Women with children will be affected by overcrowding and insufficient seating, leading to discomfort and perceived safety problems in high-traffic areas. Children, who are particularly exposed to moving vehicles, reflect a lack of proper separation between pedestrian and vehicular zones. This set of findings all together suggests that accessibility at Lamberet Terminal is not in line with the principles of inclusive design and requires targeted

interventions, such as ramps, designated crossings, seating provision, and child-safe space to enable equitable and human-centered mobility.

Table 5.4: Accessibility Challenges by User Group

User Group	Identified Accessibility Barriers
Elderly	Unsafe crossings, long walking distances
Persons with disabilities	Absence of ramps, uneven surfaces
Women with children	Overcrowding, lack of seating
Children	Exposure to moving vehicles

Note. Accessibility barriers reflect the experiences of vulnerable users within and around the terminal.

The assessment shows that Lamberet Terminal has weak integration with the surrounding neighborhood, mainly because of the lack of connectivity and the low level of urban cohesion. Walkability is considered poor due to the unsafe and inconvenient pedestrian routes that deter non-motorized access. Visual permeability is low, with limited views between the terminal and the surrounding areas, affecting the legibility, perceived safety, and spatial openness negatively. The continuity of land use is also weak, showing a lack of functional fit between the terminals and surrounding activities, which reduces urban vitality. Moreover, public space linkages are fragmented, hindering pedestrian flow and limiting the opportunity for social interaction. These findings together underscore the necessity for interventions such as improved pedestrian networks, visually improved corridors, mixed-use development, and better-connected public spaces in enhancing integration between the terminal and the neighborhoods and supporting a human-centered urban environment.

Table 5.5: Assessment of Terminal–Neighborhood Integration

Integration Indicator	Existing Condition
Walkability	Poor
Visual permeability	Low
Land-use continuity	Weak
Public space linkage	Disrupted

Note. Assessment is based on spatial analysis and field observations.

Analysis of Governance and Management Challenges

Governance and management challenges significantly constrain mobility performance at Lamberet Terminal due to institutional and regulatory weaknesses. Fragmented institutional

roles limit coordination among responsible agencies, resulting in unclear accountability, overlapping mandates, and reduced operational efficiency. Weak regulation of informal transport services and street vending contributes to congestion and disrupts orderly traffic flow, while limited enforcement of transport policies and safety standards increases risks for both pedestrians and vehicle operators. In addition, poor collaboration among key stakeholders including government bodies, terminal operators, transport workers, and local communities creates implementation gaps that hinder effective responses to mobility challenges. Collectively, these findings highlight the need for stronger institutional coordination, improved regulation of informal activities, consistent policy enforcement, and enhanced stakeholder collaboration to support a safer, more efficient, and human-centered transportation hub.

Table 5.6: Governance and Management Challenges

Governance Issue	Impact on Mobility
Fragmented institutional roles	Inefficient coordination
Weak regulation of informal activities	Increased congestion
Limited policy enforcement	Safety risks
Poor stakeholder collaboration	Implementation gaps

Note. Governance challenges were identified through interviews with key stakeholders.

Analysis of Opportunities for Human-Centric Mobility Improvement

The assessment identifies several opportunities to enhance human-centered mobility at Lamberet Terminal by directly addressing existing challenges through integrated design and policy interventions. Reorganizing pedestrian spaces can significantly improve safety by reducing pedestrian–vehicle conflicts and providing clear, protected pathways. Enhancing walkability through continuous and accessible pedestrian routes can improve terminal accessibility for all users, particularly vulnerable groups such as the elderly, children, and persons with disabilities. Integrating and formalizing informal economic activities can reduce spatial conflicts, mitigate congestion, and support local livelihoods. Improvements to public spaces, including seating, shade, and visually appealing environments, can enhance user comfort and social interaction. In addition, inclusive policy reforms that prioritize equitable access and safety for all user groups can reinforce a human-centered mobility approach.

Collectively, these interventions demonstrate the potential to improve safety, accessibility, and user satisfaction while balancing operational efficiency and community needs.

Table 5.7: Opportunities for Human-Centric Mobility Improvement

Opportunity Area	Expected Outcome
Pedestrian space reorganization	Improved safety
Walkability enhancement	Increased accessibility
Integration of informal economy	Reduced spatial conflict
Public space improvement	Enhanced user experience
Inclusive policy reform	Equitable mobility

Note. Opportunities were identified based on analysis of challenges and best-practice principles

Analysis of Key Challenges and Corresponding Opportunities

The study’s main findings demonstrate a clear alignment between critical mobility challenges at Lamberet Terminal and targeted opportunities for improvement. High pedestrian–vehicle conflicts, inadequate walkways, and limited crossings present significant safety risks, which can be addressed through the provision of dedicated pedestrian infrastructure and traffic-calming measures. Severe congestion resulting from high passenger volumes, informal transport operations, and inefficient internal circulation can be mitigated through spatial reorganization and improved traffic management. Accessibility limitations affecting vulnerable groups—including the elderly, children, and persons with disabilities—highlight the need for universal design interventions such as ramps, seating, and inclusive signage. Weak integration with surrounding neighborhoods, characterized by poor walkability, low visual permeability, fragmented public spaces, and discontinuous land uses, can be improved through mixed-use development and pedestrian-oriented planning. Governance challenges, including fragmented institutional roles, weak regulation, limited enforcement, and poor stakeholder collaboration, require strengthened coordination and inclusive governance frameworks. Collectively, these findings illustrate a coherent pathway toward human-centered mobility, safer environments, equitable access, and integrated urban development at Lamberet Terminal.

Table 5.8: Summary of Key Challenges and Corresponding Opportunities

Identified Challenge	Corresponding Opportunity
Pedestrian safety risks	Dedicated pedestrian infrastructure
Severe congestion	Spatial reorganization
Limited accessibility	Universal design implementation
Weak neighborhood integration	Mixed-use and walkability planning
Governance gaps	Strengthened stakeholder coordination

Note. This table synthesizes the main findings and proposed responses.

Conclusion

Implementation of human-centric mobility practices in the Lamberet (Menahariay) Regional Transportation HUB and neighborhood areas in Addis Ababa. A case study using a mixed-methods approach was conducted because personal face-to-face in-depth interview sessions, questionnaire surveys, observation studies in the field, and spatial analyses are juxtaposed in this study design. The study conducted data gathering activities from sources representing main stakeholders in transportation in Addis Ababa (users, transportation drivers and their assistants, administration staff in the transportation sector, and citizens residing in Addis Ababa). On the other hand, secondary sources include government publications, scholarly literature, and geospatial analysis software. A strategy involving proportional sampling was used in data gathering.

The analysis of the results shows that the mobility state at Lamberet Terminal is influenced by several interrelated issues, hindering the use of a human-oriented mobility approach. Pedestrian safety is a concern because pedestrian-car collision incidents regularly occur due to the lack of defined walkways, crossings, traffic calming, and night visibility. Congestion and overcrowding issues result from a large number of passengers, informal transport services, street vendors, and the internal routing layout designed for circulation.

Barriers to accessibility add to these circumstances. Senior citizens are confronted with insecure crossing points and long walks, while the disabled are compromised by uneven surfaces and the lack of ramps and accessible facilities. Women with children and young commuters are adversely affected by the problem of overcrowding, the lack of sitting space,

and the hazard of moving vehicles. The results have shown that there is inadequate infrastructure and universal design for Lamberet Terminal.

Apart from the physical and functional issues, the lack of integration between the terminal and the neighborhood is an aspect that disrupts walking and the overall neighborhood dynamics. There are issues in the governance and management, including the lack of enforcement and regulation, especially in the informal sectors. These issues are linked with the general trends and issues identified in the existing literature regarding transportation terminals in developing regions, which address functionality and vehicle-centric design at the expense of human factors and neighborhood sustainability (Banister, 2008; UN-Habitat, 2013; Pojani and Stead, 2017).

Despite these challenges, the analysis has identified a wide range of possibilities for the transformation of Lamberet Terminal into a more inclusive and human-centered space. The hub's strategic location, activity level, and socio-economic value create a potential location for human-centered mobility interventions. The identified possibilities include the reorganization of pedestrian movement paths and public spaces, improving the spatial legibility of the location, the integration of transport infrastructure with the land use environment, along with the legalization of the economic activities.

In general, the results of the findings have illustrated that a human-centric mobility solution cannot be ensured by physical transformation alone. Moreover, the study contributes to the increasing literature base of the Global South, backed by the case of Addis Ababa, emphasizing the possibilities of transforming high density transport hubs from an automobile-centric space to an inclusive, safe, and human-centric space, as described in the context of the narrowing the gap in the quality of mobility services for the residents of the transport hubs situated in the Global North, as stated in Cervero (2013).

Recommendations

With the data collected from the research, the following recommendations are proposed based on the study outcomes for the implementation of the human-centered mobility approach in the Lamberet Transportation Hub and other transport hubs with high transportation density:

Make Pedestrian Safety and Universal Access Primary Objectives

- Establish clearly defined pedestrian paths, crossings, traffic calming features, and enhanced lighting.

- Integrate universal designs such as ramps, smooth surfaces, seating spaces, and safe cross paths to benefit senior, disabled, and women with children, and children users of the park.

Enhance Internal Body Circulation & Lessen Congestion

- Internal movement can be reorganized to reduce pedestrian and vehicle conflict.
- Control the operations and vending activities of the informal transport sectors in a way that ensures the elimination of bottlenecks while protecting the livelihood

Enhance Terminal & Neighborhood Integration

- Improve the physical and functional linkages between the terminal and the surrounding neighborhoods to promote walkability.
- Tie transportation infrastructure to land use activities and neighborhood patterns.

Improve the Quality and Legibility of Public Space

- Enhance wayfinding and signage, and organize the space in order to improve user comfort and experience.
- Rearrange public spaces to facilitate socializing and pedestrian traffic.

Strengthen Governance and Institutional Coordination

- Enhance the level of cooperation between transport authorities and the local community.
- Harmonize mobility planning with transport policies and develop more distinct regulatory frameworks around the management of terminals.

Emphasize Participative and Contextual Planning

- Invite local community participation as well as that of users and informal actors.
- Ensure that the interventions are targeted to the local socio-economic and geographic context to ensure long-term sustainability.

By adopting these recommendations, Lamberet Transportation Hub can improve safety, accessibility, and integration into the urban environment and become exemplarity for the rest of the transportation hubs in the Global South for people-focused mobility transition.

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