ASSESSING THE IMPACTS OF STREET VENDING ON THE PEDESTRIAN WALKABILITY-IN THE CASE OF SEBETA TOWN.

Misganu Sisay Bayisa

A Thesis Submitted to

The department of Architecture.

School of Civil Engineering and Architecture.

Presented in Partial Fulfillment of the Requirement for Master of Science degree in Urban Planning and Design

Office of Graduate Studies

Adama Science and Technology University

September 2022

Adama, Ethiopia.

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I, the advisors of the thesis entitled "**Assessing the Impacts of Street Vending on the Pedestrian Walkability in the case of Sebeta Town"** and developed by **Misganu Sisay,** hereby certify that the recommendation and suggestions made by the board of examiners are appropriately incorporated into the final version of the thesis.

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I hereby declare that this Master Thesis entitled **"Assessing the Impacts of Street Vending on the Pedestrian Walkability in the case of Sebeta Town"** is my original work. That is, it has not been submitted for the award of any academic degree, diploma, or certificate in any other university. All sources of materials that are used for this thesis have been accordingly acknowledged through citation.

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I, the Advisor of this thesis, hereby certify that I have read the revised version of the thesis entitled "**Assessing the Impacts of Street Vending on the Pedestrian Walkability in the case of Sebeta Town".** prepared under my guidance by **Misganu Sisay Bayisa** and submitted in partial fulfillment of the requirements for the degree of Masters of Science in **Urban Planning and Design**. Therefore, I recommend the submission of the revised version of the thesis to the department following the applicable procedures.

Yared Girma (Ph.D.)	_____	_____
Major Advisor	Signature	Date

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LIST OF ACRONYMS AND ABBREVIATIONS

AI----------Adobe illustrator

AUTOCAD----------Computer Aided design

ASTU----------Adama science and technology university

CBD----------Commercial business district

CS----------Collector Street

FS----------Family Size

GIS----------Geographic Information System

HCM----------Highway Capacity Manual

LOS----------Level of Service

LS----------Local Street

MOE----------Measure of effectiveness

PF----------Pedestrians flow

PFR----------Pedestrians flow Rate

PLOS---------- Pedestrians' Level of Service

PWI----------Pedestrian walkability index

R^2---------- Coffients of correlations

SAD----------Shy Distance

SP----------Structural Plan

SAS----------Sub Arterial Street

SV----------Street vendor

SPSS----------Statically Package for Social Science.

TIA----------Traffic impact assessment

We----------Effective width

ABSTRACT

*Street vendors' benefits for the urban poor and their ability to obtain self-sufficient jobs were researched by various Scholars. Although pedestrians are the most susceptible to traffic accidents and are influenced by vendors, very little has been done to quantify their impact on street performance in terms of various measuring factors. Sebeta, a rapidly expanding town, lacks any planned walking environment, and the existing streets are also inaccessible and crowded with obstructions like street vendors. The main objective of this study is to understand the current situations of the pedestrian walkways along kenter Street and investigate the impacts of street vending on pedestrian movement and develop an appropriate strategy for enhancing walkability. In this study, both quantitative and qualitative methods were used to achieve the intended objectives. The study conducted 384 questionnaire surveys using a purposive sampling method to obtain information related to pedestrian walking patterns, vendor challenges to pedestrian movement, and perceptions of built environment infrastructure. based on the observation data gathering the Pedestrian level of service and walkability index results show that in three surveyed areas resulted 33.3 ped/min/m, 52.5 ped/min/m, and 87.5 ped/min/m putting the sidewalks level of service in **E**, **D** and **C** respectively and 0.112 walkability index which implies Street is not safe and disaster for walking which needs upgrading and improvement. Based on PLOS and walkability index the finding analysis indicates that the current physical condition of the sidewalk has inadequate pedestrian facilities and lacks connectivity with many pedestrian movement obstructions, and also, the study found that street vendors occupied sidewalks and roadsides to form business activities which resulted in the reduction of pedestrian walking speed and pedestrian level of service (PLOS). In general, the study developed a strategy and proposed a design for a pedestrian walking environment and a better space where street vendors can work without disturbing the surrounding space. This being a pilot study, the effects of the street vendor on pedestrian speed, pedestrian space, and lack of consideration for the street vendor in urban design should be considered.*

***Key words**:* Congestion, Pedestrian, Urban design, Street Vendor, Walkability.

CHAPTER ONE

INTRODUCTION

Walking is one of the only and least costly sorts of physical activity (Gehl, 2013). Walkability could be a measure for assessing the extent of sociability of a district which is taken into account one among the foremost significant aspects of a livable society and an indispensable means of developing sustainability in urban space" (Southworth M, 2005). Street vending is an income-generating activity where individuals sell their wares along streets and pavements to passing pedestrians (Kamunyori, 2007).

Sebeta is a fast-growing city in a way for more economy, industrial, and residents. Although the town is growing, the streets are not pedestrian and environmental-friendly. This study aimed to make walkable pedestrian walkways in Sebeta town by examining the road vending effects related to walkability problems.

Due to the area is dominated by many obstacles to pedestrian movement, like street vendors, and the poor quality, safety, and comfort of the roads motivate me to study this area. As Kenter Street is the main urban road connecting the capital cities with various cities in Ethiopia, the road needs to be improved and modernized to accommodate all activities in the region.

1.1 Background of the study

Historically, walking was the primary standard mode of travel because of the short distances required. The primary walkability-related scientific papers appeared at the start of the1990s with their origin within the field of Urban Development and concern with the standard of the Urban Environment and suburbs (Southworth M, 1993). Fast growth within the metropolitan areas and also the high growth of population in cities within the previous century converted the trend and motorized transportation became the dominant mode (Rankavat and Tiwari,2016) and this left the planet with the vast challenge of congestion and carbon emissions were making pedestrian travel harder.

A various researcher, city administrators, and International and National organizations try to find a way to make the public asset, street, accessible to all citizens. The ILO (2013) employment policy department asserts street vending activities to be executed as legal (ILO, 2013). Therefore, it is necessary to deploy a method that enables street vendors to execute their job with the consideration

of not affecting the traffic phenomenon. Husain, S., et al. (2015) describes the puling factor for street vendors to engage in this activity as: rapid urbanization, inadequate opportunities in the formal workplace, and perpetually increasing the population of the city compels unskilled people to engage in street trading which entails small capital to start and there are low barriers to entry and flexible work hour (Husain, S., 2015).

Fast urbanization significantly contributed to a decline in the safety levels of pedestrians. Within the endeavor to supply better transport amenities, traffic engineers often fail to either offer pedestrian facilities on the roadside or compromise safety (Rankavat & Tiwari, 2016) in most developing countries. Pedestrians should be supplied with a secure environment without interfering with other transport modes. Pedestrians are most in Danger in Urban areas thanks to street vendors' activities and vehicle activity in Urban areas. The space taken by sidewalk vending activities is an obstacle that reduces walking space and reduces the pedestrian level of service (PLOS) (Sahani, 2017). Sidewalk vendors also are among the Danger factors that force pedestrians to share carriageways and increase pedestrian crash risk (Quistberg, 2015). The chaotic arrangement of vending stalls compromises the pedestrian level of service (PLOS), force pedestrian to share carriageways and increases hold-up, and reduces both walking space and speed of the pedestrian (AARTB et al., 2018) in both developing and developed countries.

Professionals within the Urban planning field have tried to encourage citizens to vary their mode options to non-motorized rather than highly used motorized mode choices (Tran, 2015). To stimulate walking as a preferred mode of travel, it has vital to supply safe and adequate pedestrian travel areas.

Many Ethiopian cities and towns are not friendly to pedestrian movements. Within the country, Urban and transport planners mainly emphasized the issues of cars, and they give little attention to the design and maintenance of pedestrian roadside walkways. The absence of sidewalks, street vendors on the sidewalk, deteriorated conditions of the footpath; encroachments of the footpath are a number of the issues within the Urban areas of Ethiopia. In step with (Redi, 2015) identified that the most reason behind the pedestrian crash was the absence of optimal site location for vendors, inadequate and appropriate automobile parking space, pedestrian pathways, and also the available pedestrian walkways are very narrow and not respected the universal accessibility standards, aggravates the issues and enforces the pedestrians to encroach to the most carriageways.

Though street vendors are conspicuous in the main arterials of sebeta, their main hub was traditional open market areas around kenter street and Ayer-Tena roads. Jib (2015) considers street vendors as an urban Safety net since they have been creating employment opportunities for the urban unskilled poor and migrated rural poor workers together with expanding the market for cheap products contributing to poverty alleviation (Jibat, 2015). On the contrary, street vending harms traffic safety and operation due to their haphazard settlement. The main problem resulting from increasing street vending is overcrowding and it leads to encroachment of the roads. Thus, travel speed will be compromised

The vendors are occupying most pedestrian paths and waiting areas, and sometimes they occupy most street parts to display their products in Sebeta town. The road vendors' concentration in such places causes street congestion, conflicts with pedestrians, and increased traffic problems. This can is evident to occur, as there has an absence of accessible convenient places for vendors and their customers. Therefore, the study has assessed pedestrian walkability by taking one major route (Kenter Street) as a case study and drawing possible measures to support the findings to create a town pedestrian-friendly.

1.2 Problem statement.

Today, the pedestrian-oriented spaces within the CBD area of Sebeta are limited to many streets like kenter Street. The town has no clear policy and guidelines regarding sidewalk standards and lacks strategies to form a pedestrian-friendly walking Urban environment within the town. One of the most problems the town was facing today is the lack of properly planned and designed pedestrian walkways and also the absence of proper locations for street vendors.

In Sebeta, most of the urban poor get easy accessibility to goods from those vendors. However, the vendors occupy the footpath leaving no space for pedestrians. This has become a public concern because it creates an issue for vehicular and pedestrians' movement, and has polluted the environments of the encircling. One of the most problems of street vending activities is that it creates difficulty for the traffic to move more smoothly during peak hours. They occupy public sidewalks and roads, which might also create social problems like pickpocketing, crime, and theft.

Sebeta town arterials were designed with the primary intention of giving a higher degree of traffic mobility and accommodating vehicle capacity. Apart from this, the arterials were obliged to sustain

street vendors too. So, mobility as well as the accessibility service of arterials were highly compromised. Not only these but also other issues like traffic safety, environmental pollution, subsequent epidemic, etc. were prominent. Street vending activities were highly associated with traffic congestion, and health and safety risks.

Pedestrians are forced to steer on a little of the carriageway because of street vendors, thus increasing their interaction with vehicles and putting them at greater risk. Street vendors are one of the most important pedestrian obstruction problems within the study area. Street vendors do not seem to be evenly spread across the town. They concentrate very heavily on some locations, and people locations are typically the points with the best levels of pedestrian and vehicular congestion. A street vendor may be a violation of public space users, considered a reason behind the reduced walking speed, decreased Urban aesthetics, sidewalk occupations, physical appearance, and activity. Their problem arises because of the absence of reference spatial products that specifically determine suitable locations for the activities of street vendors in Urban areas.

(Estubdink,2012) was researched cause and effects of the informal sector focused on street vendors in the capital city of Ethiopia (Addis Ababa). During this study, the author focused on the importance of the informal sector within the Ethiopian economy, but the author does not interpret the challenges of street vendors with relatives as spatial forms. Therefore, the gap that the study filled during this study is that Etsubdink lacked to determine the drawbacks of street vending especially in hindering pedestrian movement and causing traffic jams, within the study area.

In the present study, efforts have been made to quantify the impact of street vendors on travel speed and Capacity of sebeta arterial road. The speed and capacity are an important quantitative measure of the transportation facility and it's decreasing continuously in an arterial road segment. Street vending activity influences the traffic performance of roads to a considerable extent. Thus, determination of the ill effect of these side friction factors on vehicle mobility is an essential task for traffic engineers.

1.3 Objective of the study

1.3.1 General objective

The main objective of the study is to assess the Impacts of street vending on pedestrian walkability in the case of Sebeta town.

1.3.2 Specific objective

1. To investigate the existing conditions of pedestrian walking facilities in the study area.
2. To assess the effects of street vendors on pedestrian walkability in the study area.
3. To propose strategies that enhance pedestrian walkability in the study area.

1.4 Research questions

1. What are the existing pedestrian facilities in the study area?
2. How do street vendors affect pedestrian walkways?
3. What are the most appropriate strategies that help to enhance pedestrian mobility in the study area?

1.5 Significance of the Study

The outcome of the study will be very important to insight into the following main reasons along the study routes. To determine whether the pedestrian walkways along the study routes are safe for pedestrians (children, disabilities, and elders) to walk on. In addition to advancing knowledge, the finding could be a significant input for plans in the town regarding the provision of a walkable urban environment. Assessing the existing walkway facilities, pedestrian behaviors, perceptions, and also the safety of the walkways would greatly help plans in the entire town by revealing the hindering factors related to pedestrians' experience of walking habits. To insight the concerned government body and the community that walking is the best transportation mode to create livable and walkable urban environments and provide an appropriate site for street vending activities, so that, they pay great emphasis on the provision of safe pedestrian walkways in their plan to make the cities pedestrian-friendly. Generally, the study will help to motivate further investigation by any stakeholder for supplementary proceedings, provide contributions for policy and strategy development and decision-making in the planning process, it could be a supplementary source of documentation for those who want to make research on related subjects areas, can be used for educational purpose, and foremost contributes knowledge on how to create walkable pedestrian walkways in given urban areas.

1.6 Scope of the study

1.6.1 Spatial scope

The study assessed both the left and right sidewalks of kenter street from Butajira Round to Kenter Condominium (1.75 km length and 23m width, but the width is not consistent until the endpoint) with an uneven sidewalk width (ranging from 0.5-.2.5m) on both sides of the street.

The study was executed on Kenter Street due to the factors that highly influence pedestrian walkability it is located at the CBD, the presence of many street vendors is exposed it to many hazards, the area needs heavy maintenance, and has an inadequate width from both sides for future growth.

1.6.2 Thematic scope.

The study employed both the left and right sides of center Street which is the main Street in Sebeta town that has high walkability problems. Thematically the study focused on the effects of Street Vending on the walkability of the pedestrian street in Sebeta town by investigating the factors obstructing pedestrian's experience of walking habits, pedestrian behaviors, and perceptions about the sidewalk facilities, performance, infrastructures, amenities, and safety of the pedestrian walkways along the study route. Furthermore, the study assessed the mitigation system between street vendors and a walkable environment and develop strategies, which enhance the street vendors at the appropriate site in the urban area.

1.7 Limitations of the study.

A potential limitation of this research is that when doing pedestrian count digital video and digital speed meter materials were not used instead manual count by using hand tally material was used this creates difficulty in determining an accurate number of a pedestrian who is using that specific street at a given period. Finally, this study has been challenged by the political instability of our country. At the time of data collection, freely measuring the sidewalks, and counting pedestrians were difficult at this time, and also people are afraid to talk about anything. These problems somehow affected the process of data collection and analysis.

1.8 Organization of the paper

The thesis is categorized into five chapters. Each chapter systematically and effectively examines the content and data of the study accordingly. The elemental chapters within the thesis are further demonstrated as follows.

Chapter One: The primary chapter of the research contains, an introduction, background of the study, statement of the problem, objectives as general and specific, research question significance, delimitation or scope of the study, limitation of the study, and last an outline of the chosen site and organization of the research were clearly stated.

Chapter Two: Within the second chapter border area of the research was examined, evaluated, and stated from different literature within the literature review. It contains an Introduction, basic conceptual definitions, and theoretical and empirical views of the research area were referred to carefully.

Chapter Three: Chapter three discusses the tactic and materials used for this specific research. It explains the research approach, research design, research methods, methods for data collection, types and sources of knowledge and eventually, data analysis and presentation methods were discussed.

Chapter Four: Result and Discussion may be a chapter that discusses the results of qualitative and quantitative data findings. The subjective qualitative data are analyzed and supported by a questionnaire survey, field observation notes, and printed documents from different sectors. The target quantitative data are analyzed and supported by field observation, measurements of the physical feature of the walking environment, images, aerial photographs, topographic maps

Chapter Five: Conclusion and recommendation are the concluding part of the thesis. The chapter made a conclusion that supported the findings from the literature review, the case study of kenter Street, and therefore the results of the discussions. Additionally, the study recommends the most effective proper location for street vendors supported by urban design principles.

CHAPTER TWO

LITERATURE REVIEW

This literature part includes theoretical and empirical works of literature related to the problem under study. The study deals with the challenges of the street vendor on pedestrian walkability and pedestrian facilities are reviewed. Taking the research questions because the indicator of view, this literature reviews the definition of the overall study area, walkability, pedestrian facilities, walkability standard, pedestrian level of service, street vendors, and their challenges to pedestrian movement normally planning principles and guidelines for street design, has been reviewed and two empirical reviews were investigated.

2.1 Theoretical literature review

In this section, the study explored facts and theories that help the issue under the study area reviewed and presented underneath.

Pedestrian.

A pedestrian is somebody traveling on foot and therefore the mobility-impaired Person employing a wheelchair, not just for transportation purposes but also for social interaction, shopping, leisure, recreation, exercise, and protest (Oxford English Dictionary, 2006). A pedestrian is anyone that has a foot or who is employing a means of conveyance propelled by human power. A pedestrian includes a Person that has operated a self-propelled wheelchair, invalid tricycle, or motorized quad cycle and, thanks to physical disability, is otherwise unable to maneuver about as a pedestrian. A Pedestrian may be a Person walking instead of traveling through a vehicle. Pedestrian behavior is especially defined because of the transportation mode compared to vehicles, transit, or bicycles (Dunmore & Fleischer, 2008).

Walkability

Walkability is the extent to which the built environment supports and encourages walking by providing for pedestrian comfort and safety, connecting people with varied destinations within an inexpensive amount of your time and energy, and offering visual interest in journeys throughout the network" (Southworth M, 2005). The Wisconsin Pedestrian Policy Plan 2020 describes a walkable community well: "Ultimately, the goal of any effort to facilitate pedestrian travel is

walkable communities. A walkable community is thoughtfully planned, designed, or otherwise retrofitted to integrate pedestrian travel into the community's fabric. In an exceedingly walkable community, walking is taken into account as a standard transportation choice and isn't a distraction or obstacle to car traffic". Walkability may be a fundamental concept in sustainable urban design. The advantages of walking may be discussed from three perspectives: economic benefits, social benefits, and environmental benefits (Ariffin, 2013).

2.2 Basic pedestrian Walkways Requirements

According to the Florida Department of Transportation (1997), all Urban sidewalks need the subsequent basic elements for success: adequate width of travel lanes, a buffer from the travel lane, curbing, minimum width, gentle cross-slope (2 percent or less), a buffer to non-public properties, adequate sight distances around corners and at driveways, shy distances to walls and other structures, a transparent path of travel freed from street furniture, continuity, a well-maintained condition, ramps at corners, and flat areas across driveways. Sidewalks also require sufficient storage capacity at corners so that the expected volume of pedestrians can gain access to and depart from signalized intersections in an orderly and efficient manner (Coree, 1999)

2.3 pedestrian perceptions towards various sidewalk facilities

Recent studies have examined the link between perceived walkability and sidewalk quality, mostly counting on non-quantitative pedestrian facility assessment criteria. Sidewalk width, a buffer between sidewalk and street, and therefore the presence of amenities are predictors of pedestrian travel, perceived safety, and quality of the pedestrian environment. Effective sidewalk width, pavement condition, and material composition were important variables for sidewalk accessibility supported perceived importance to wheelchair users (Marshall, 2010).

2.4 Sidewalk Environment and Affecting Factors of Pedestrian Activity

While pedestrian activity and an honest sidewalk are conventionally believed to be essential for a decent geographic region, some factors still affect the standard and flow of traffic like obstacles, street vending, and also the general condition of the sidewalk. There has also the physical environment that involves things like land-use restrictions, existing buildings, roads, and more (Handy, 2002).

2.5 Major factors affecting the Safety and Comfort of Pedestrians

According to a study pedestrian safety Comfort and convenience in a developing country can majorly be stricken by inadequate visibility, illegal crossing, alcohol intoxication while driving and walking, sidewalk vendors, pedestrian fatigue, institutional capacity, walking along the roadway, socioeconomic factors, poor transport, and land use planning, increase, lack of road safety education, high annual growth of motorization, the proportion of two- and three-wheelers within the traffic mix, and poor enforcement of traffic regulation. These factors will be considered to be a general affecting factor the pedestrian users on crossings vehicular bridges, vehicular roadways, and also on sidewalks.

2.6 Lack of pedestrian facilities and lack of perfect land-use planning

According to (Zegeer, 2012), the pedestrian risk increases when roadway design and land-use planning fail to plan for and supply facilities like sidewalks, or adequate consideration of pedestrian access at intersections. Additionally, infrastructure facilities and control mechanisms that separate pedestrians from motorized vehicles and enable pedestrians to cross roads safely are important mechanisms to make sure pedestrian safety, complementing vehicle speed and road system management. Beyond design elements of the roadway itself, the look and use of the broader land for commercial, industrial, recreational, transport, conservation, agricultural, or a mixture of purposes, can contribute to the occurrence of pedestrian injuries and fatalities (Peden, 2004), (Elvik, 2009) stated that the extent to which land-use planning provides facilities and services to confirm continuity, safe pedestrian access constitutes a significant influence on traffic risk. WHO stated that the land-use planning factors that affect traffic risk include Population density (McLean, 1972), Land-use mix (Ackermann, 2011) and), and City structure (Ingram, 2008).

2.7 Inadequate visibility of pedestrians

According to (Peden, 2004) inadequate visibility of pedestrians arises from inadequate, or lack of, roadway lighting, vehicles and bicycles not equipped with lights, and pedestrians not wearing reflective accessories or brightly colored clothes, especially at night and at dawn or dusk; and pedestrians sharing road space with fast-moving vehicles.

2.8 Pedestrian Space Requirements

Pedestrian facility designers use body depth and shoulder breadth for minimum space standards, at least implicitly. A simplified body ellipse of 0.5m by 0.6m, with a total area of 0.27m^2, is used

as the basic space for a single pedestrian. This represents the practical minimum for standing pedestrians. In evaluating a pedestrian facility, an area of 0.74$m^2$is used as the buffer zone for each pedestrian. (HCM, 2010). A walking pedestrian requires a certain amount of forwarding space which is a critical dimension since it determines the speed of the trip and the number of pedestrians able to pass a point in a given period (Fruin, 1992).

2.9 Pedestrian Walking Speed

Pedestrian walking speed is highly dependent on the characteristics of the walking population. The proportion of elderly pedestrians (65 years old or more) and children in the population, as well as trip purpose, affect walking speed. In a national study conducted by (Fitzpatrick, 2006) on improving pedestrian safety at un-signalized crossings, the average walking speed of younger pedestrians aged 13-60 crossing streets was found to be significantly different from that of older pedestrians 1.44m/s versus 1.30m/s. For flow analysis, a default free-flow speed (that is, an average pedestrian's speed on an otherwise empty sidewalk) of 1.52m/s is appropriate for sidewalks and walkways, based on average walking speeds (Lenters, 2010).

2.10 Pedestrian Facility Characteristics

Effective Walkway Width

The portion of a pedestrian facility's width that is used for pedestrian circulation is called the effective width. The degree to which single obstructions, such as poles, signs, and hydrants, influence pedestrian movement and reduce effective walkway width is not extensively documented. Although a single point of obstruction would not reduce the effective width of an entire walkway, it would affect its immediate vicinity (Lenters, 2010).

Pedestrian Level of Service

(HCM,2010) defines the Level of Service (LOS) as a qualitative measure used to relate the quality of traffic service by categorizing traffic flow and assigning quality levels of traffic based on performance measures like speed and density.

2.11 Accessibility of pedestrian facilities

As stated, (Litman, 2017)“Accessibility refers to people’s ability to reach goods, services, and activities, which is the ultimate goal of most transportation activities. Many factors affect accessibility, including physical movement, informal activity on the roadway, the quality and

affordability of transportation options, transportation system connectivity, mobility substitutes, and land-use patterns."

2.12 Sidewalk Standards in Addis Ababa

According to the Norms and Standards of the Addis Ababa structure plan outlined in May 2002, pedestrian sidewalks must be provided on both sides of arterial streets and should be raised 15-20 centimeters above the carriageway. The pedestrian capacity on a sidewalk should be a minimum of 30 and a maximum of 50 persons per minute per meter width after deducting approximately 0.9-meter dead width in shopping areas and 0.45 meters elsewhere. Pedestrian sidewalk width should be 2.5-4 meters on one side of a sub-arterial street and alongside a principal arterial; it should be 3.5-5 meters.

Table 1: Sidewalk standard used in Addis Ababa.

Type of street	Width (on both sides of the street in M)
Principal arterial	7-10m
Sub arterial	5-8m
Collector street	<2m
Local street	Should not be decided

Source: Norms and standards (2002)

2.13 Pedestrian Norms and Standards (Local)

Pedestrian ways should be provided on both sides of Arterial Street. For Collector Street and local street provision, the location and size of pedestrian ways should be decided by local development plans, detailed plans, and other studies as applicable. Pedestrian ways should be raised 15-20 cm above the carriageway. The average width of pedestrian walkways along sides of Arterial Street: In Industrial areas 1.8m, ii. Shopping frontages 3.7-4.5 m, iii. Business and commercial areas 3-5 m.

Table 2:Norm and standards for pedestrians

No.	Street Types	Average Width of Pedestrian Ways (M
1	Urban Motorway	No pedestrian ways
2	Sub-Arterials	2.5-4 m.
3	Principal Arterial	Should not be less than 3.5 m and a maximum of 5.
4	Collector Streets	Should not be less than 2 m.
5	Local Streets	Should be decided based on Local conditions

Source: Norms and standards 2002).

2.14 Street Vendors

Street vendors are those who have no fixed job in the formal sector because of a low level of education and skill. Therefore, they run this business as the main livelihood of their inadequate resources but this business activity does not meet their need (Bhowmik, 2012). (Timalsina, 2007) stated that Street vendors may be immobile or mobile and occupy the public or private spaces by carrying their materials on push charts or in a cycle or by baskets on their heads, or may sell by moving. Broadly, defined, street vendors include all those selling goods or services in public spaces with temporary built-up structures (Indira, 2014).

2.15 Cause of Street Vending

According to (Sibhat, 2014) in Addis Ababa, people are involved in street vending due to unemployment, unable to fulfill formal economic criteria, to avoid tax, to get high profit, rural-urban migration, trade liberation, poverty, easier entry, and social factors are causes to increases informal sector.

2.16 Impact of street vendors on pedestrian movements.

(Kimathi, 2004) Urban public spaces are the physical space and social relations that determine the employment of space within the non-private realms of cities. It is the basic area for human activities and a determinant of the character of towns. Consistent with (Ndung'u, 2014) Vendors are people who promote or exchange goods or services for money on roads, and pedestrian

walkway and obstructs pedestrian movement when freely left in an exceedingly pedestrian environment. From the sector observations and field survey, the main problems related to pedestrians were the ever-increasing number of street vendors operating on sidewalks and therefore the streets. Consequently, there has an intense struggle for space between the traders and therefore the pedestrians, and when street vendors occupy space, the pedestrian is forced to steer on the carriageway, leading to a conflict between vehicular and traffic.

2.17 Street Vending and Its Drawback

The negative impacts of street vending activity are causing traffic jams, blocking/narrowing pedestrian paths, causing environmental pollution which affects health and concrete beauty and reduces the revenue of the municipality, increasing crime, etc. Street vendors create traffic accidents and that are selling prohibited goods which will affect the health of the people leading to the govt. always worrying about them (Getahun, 2015). Furthermore, the identical issue (Ademola, 2012) reported that in Nigeria usually stalls are located on the roadside, and walkways of pedestrians are still as along drainage channels which seriously affects traffic accidents and narrows the road width.

2.18 Empirical Literature Review

This phase takes a look at related pedestrian walkability with pedestrian centers based totally on discovered and measured phenomena that have been studied and implemented around the sector and responded to studies questions raised, which helped to make clear the general idea of pedestrian walkability.

Pedestrian mobility in Kigali, Rwanda

The growth of the city should be hand in hand with the development of transportation facilities for easing the movement of people and goods from one part of the city to another. According to the Kigali City Master plan 2013, the road network in the city was supposed to be developed to fully meet the requirements of a modern city that is promoting the standard quality of life for its residents. The City of Kigali is doing good to improve the existing road networks through various projects specifically the project termed Kigali Urban Road Upgrading. The project where road network widening and traffic management utilizing non-signalized and signalized junctions with traffic lights were implemented in 2016 till now. It is therefore important to upgrade and revitalize

existing major master plan road networks for vehicles. Surprisingly however very little has been implemented for the city pedestrian in the matter of their crossing facilities.

Walkable Environment in Sydney

Dobson (2011) stated that Sydney has historically been a walking city. Gadigal people have been walking along its ridgelines for thousands of years. It wasn't until World War I that public transport changed the character of the city, and after WWII the car started to dominate planning. Gehl's study of central Sydney in 2007 discovered that the focus on moving cars means Sydney has some of the longest pedestrian waiting times at lights in the world. The solution to these problems is to create spaces and networks and infrastructures for the slow, steady, reliable, and human-scale experience of walking through the city not a new kind of car.

According to the Department of Infrastructure and Transport (2012), there are six ideas to start the walking revolution: First, make it easy to temporarily close streets. This could begin with trials and pop-up community activation. Second, start to close smaller local streets or create shared slow lanes with access only for residents. Streets with few cars could accommodate the passage of slow traffic when needed by residents while opening up new spaces for permanent gardens, planting, children's playgrounds, and more community space. Third, put human life before time savings. Thirty km/h should become the default speed for local residential streets. Fourth, start designing cities for children. Fifth, create a process that begins to charge drivers the real costs of alienating public space for street or public off-street parking. Lastly, we could expand on research by scholars. Trees and physical shelters could be used to keep people cool during increasingly hot days.

2.19 Summary and Gaps of the Literature

According to Dannenberg and Wendel (2011), walkability is an increasingly important issue in urban planning, public health, and transportation, and researchers have developed methods to assess it in a quantifiable way. Currently, there are many tools for measuring walking ability, but there's no consensus on which tools are best for measuring walking ability. Studies of the human environment Behavioral studies are of great importance within the analysis of manner, as they lend themselves to interdisciplinary investigations. additionally, the promotion of walkable parts of the town. Pedestrian infrastructure planning and integrated design are required. In general, the above literature contains perspectives and methods for studying walkability in urban environments. The

research focused totally on the built environment, with informal street commerce and human behavior (land use, visual complexity, perception, connectivity) because of the main drivers of sidewalk walkability. distance, convenience, and safety) aspects. However, for further studies, the topography, climate, and temperature of the study area should be considered to research the walkability of the urban environment.

CHAPTER THREE

METHODS AND MATERIAL.

This chapter provides details of the study area, the kinds of information required for the study, sampling techniques, and also the methods that were used for gathering the assorted data together with the tools employed. The chapter also addresses and describes the techniques used to analyze the information that yields to answers the research questions and realize the objectives of the research.

3.1 Description of the study area.

Sebeta town is one of the Oromia towns and is the capital town of Sebeta Awas district of Oromia special zone surrounding Finfinnee as shown in Figure 1, situated at about 24 km southwest of the Addis Ababa along Jimma Road and located within an approximate geographical coordinate of $8^0$53'N, $8^0$59'N latitude and $38^0$35'E, $38^0$39'E longitude. It shares common boundaries with Addis Ababa in the North, Northeast, and East, Burayu town in the North, and rural villages of Sebeta Awas district to the South and West. The present Sebeta town consists of 10 Kebeles. Based on the information from the administrative unit, the current population of the town is 352,505 with an average family size (FS) of 4.8 members.

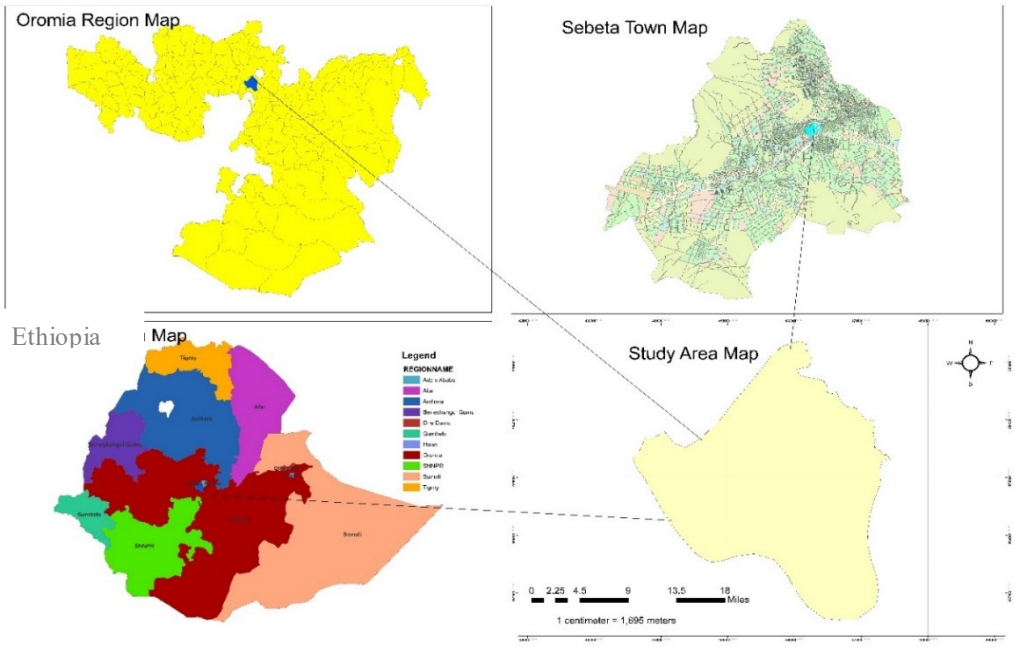


Figure 1:Study Area Map

3.2 Criteria for selecting the study area

To select the study area for this study, the study developed criteria and principles, and various selection criteria based on walkability factors. The route from Butajara Round to Addis Safer (Kenter) was chosen based on traffic, pedestrian activity, informal business activity, and physical characteristics of the city. Observations were made based on these selection criteria. This observation examines the physical form of the street, such as width, sidewalk facilities, pedestrian movement, street vendor activity, and appearance. Another factor is that this is the main street of the city where many activities take place.

3.3 Background of the study area.

The selected street Butajara Round to Addis Safer (Kenter) is 1.75 kilometers long. The physical condition of the road concerning geometric features is not standard in the study area. The carriageway width of the existing Road is below the standards and the walkways are very narrow compared to the surrounding land use. The study area is more dominated by commercial land-use types (See Figure 2) and informal trade activities are experienced highly on the roadway and those activities have resulted in the obstruction and crowdedness of the main street.

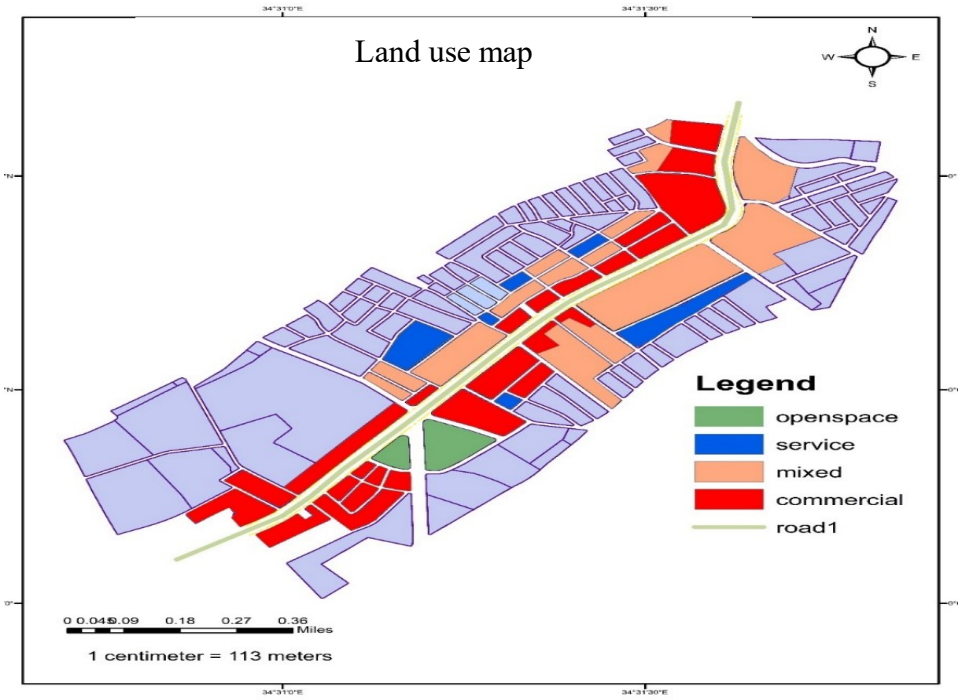


Figure 2:Existing land use of the study area.

Figure 2 illustrates the existing land use category in the area. the study area contains different land use type which is classified in the legend parts as commercial, mixed, service, open space, and circulation. Of the all types of land use the study area is dominated by commercial land use type.

Street network map of the study area

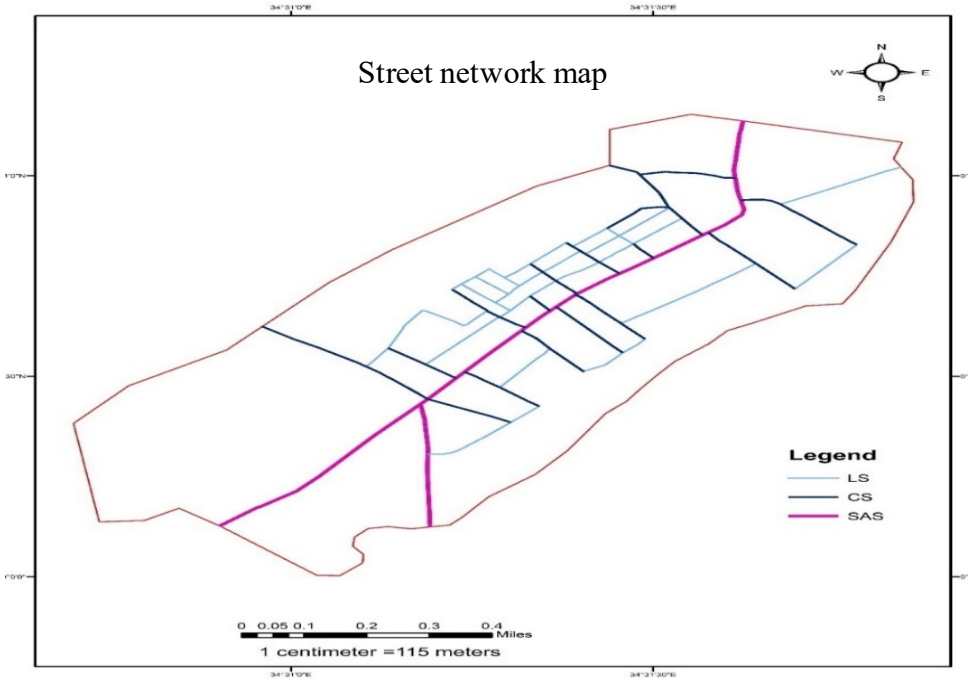


Figure 3:Existing Street network of the study area

Figure 3 illustrates the existing street network in the area. the study area contains different street type which is classified in the legend parts as sub arterial street, collector, and local street. the street in the area lacks connectivity with different infrastructures like street lights, street trees, and visual attractiveness. the street hierarchy was also not well connected and lacks accessibility with high traffic movement and density.

3.4 Research Design

A research design is the 'procedure for collecting, analyzing, interpreting and reporting data in research studies (Yu, 2009) it's the general plan for connecting the conceptual research problems with the pertinent (and achievable) inquiry. In other words, the research design sets the procedure for the specified data, the methods to be applied to gather and analyze this data, and the way all of

this is often visiting to answer the research question (Wilkerson, 2014). A descriptive research design was employed for the study to research the situations thoroughly.

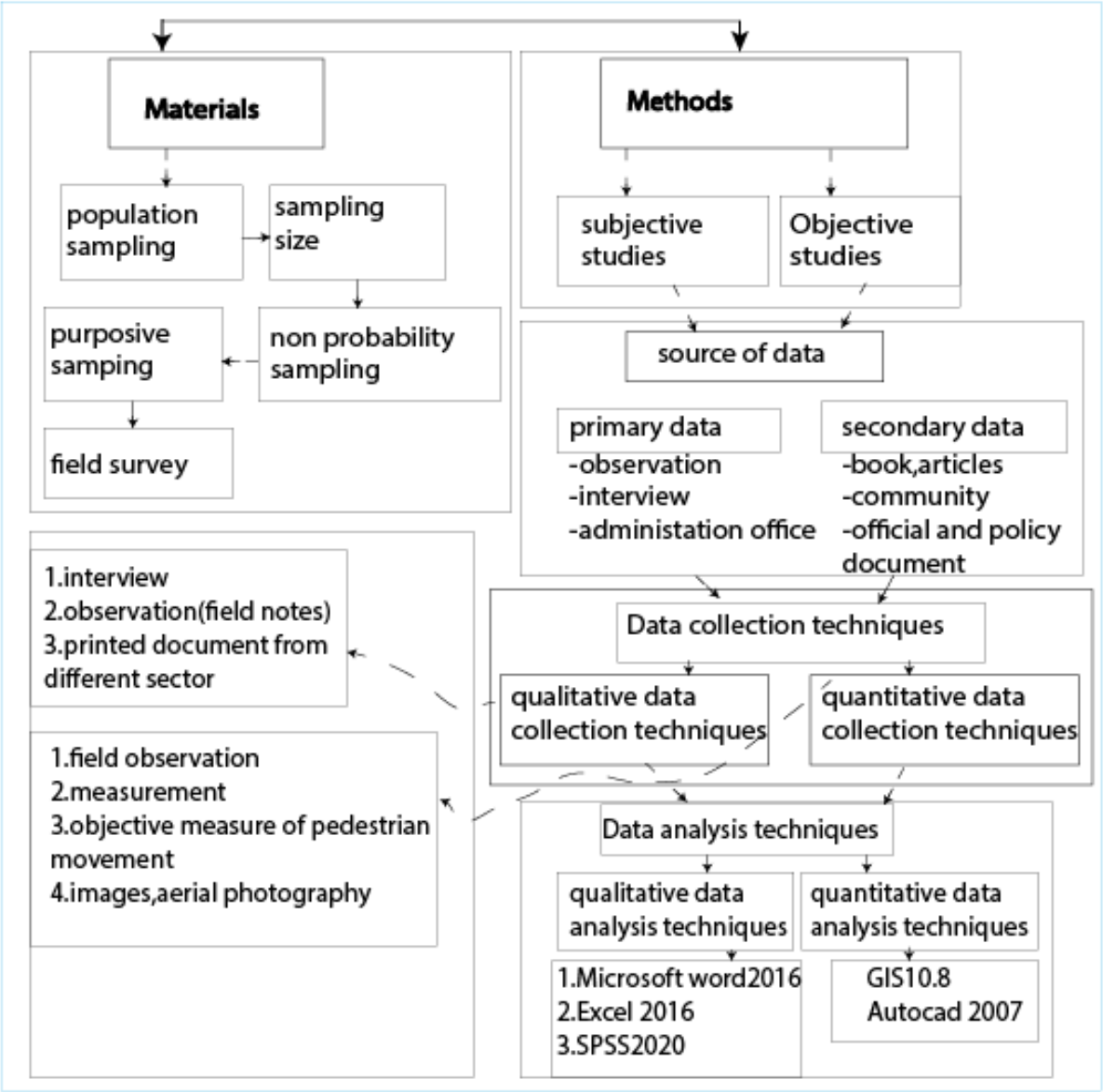


Figure 4:methodological design (Source: Own design, 2022)

3.5 Research Approach

The study applies a general deductive research approach to the study. During this approach, the study generates general information on specific information that enables them to gather both qualitative and quantitative data. A qualitative approach is vital for gathering respondents' attitudes and experiences regarding pedestrian facilities and related issues. Quantitative approaches, on the

opposite hand, are important for obtaining numerical data through questionnaires, so the study can collect statistics in large-scale surveys.

3.6 Research method

To attain the objectives of this research, both quantitative and qualitative approach research was implied. A qualitative approach was followed to explore the current quality and condition of obtainable pedestrian facilities and to live the extent to which these existing facilities serve the pedestrian demand quantitative approach was implied. Primary data sources were accustomed collect data for this study. Existing pedestrian facilities, their conditions observed and measured through field surveys, and their extent of services and sampling size in line with demand were measured by counting peak pedestrian volume from the study area. For this study, the CBD zone of kenter was considered because the area of interest, maybe a center of various business and repair activities that draw the best flow of pedestrians.

3.6.1 The Existing condition of the pedestrian facility in the study area.

Observation method

For the first objective of site survey analysis, direct site observation, photography, and checklist observation was used as the primary data collection methods. The initial data collection approach was a direct and controlled observation, taking site photos and filling out prepared checklists in which the physical qualities and characters of the sidewalk streets from butajera round to the kenter condominium were assessed.

The checklists were created based on general elements of sidewalk elements, sidewalk width, sidewalk green elements, sidewalk sitting area, buffer zone, ditch, and all the existing street amenities. The checklists were used for two consecutive days on March 15 and 18. The current physical character of the streets was documented based on those approaches. This method was applied and used in this research to deeply understand the extent of the existing physical condition of pedestrian facilities.

Pedestrian level of service analysis method

The Highway Capacity Manual (HCM) is used in this study to determine the level of service provided by the sidewalks. As a major component of the pedestrian facilities, the level of service was used in this study to assess the current state of the sidewalk. This method was chosen because

it takes less time to obtain and is easy to implement and apply in the whole town. It helped in measuring the physical characteristics of the existing condition of the pedestrian sidewalk due to the existing pedestrian obstruction around the study area.

Manual counts for pedestrian

To measure the pedestrian flow, manual counts were carried out based on pedestrians per hour. This is where pedestrians were counted manually along the sidewalks using a tally marking sheet. Manual counting of pedestrians was done at 15- minute intervals because the pedestrian account is effective if it is taken between 10-15 minutes using cordon count. The observation site was carefully chosen to make sure that the prevailing demand was observed. The merits of this approach are that it is flexible and simple to carry out. Pedestrians count within the selected sites based on pedestrian activity from the street was carried out in 3 different sites in 1.6 km within a 400–650-meter range. This count within selected sites from the street was carried out on 5 weekdays and weekends. To identify the space occupied by vendors, vendors' manual counts were carried out based on the sidewalk space or sidewalk width. Monday, Tuesday, Wednesday Thursday, Saturday, and Sunday were selected to analyze PLOS. The reason for selecting those days is that Monday is the first working day, Thursday and Saturday are market days in the city, and Sunday is a break, which helps to understand pedestrian activities on different days. This would occur on March 19,20,21,22,2022, from 12:3:00 to 7:30 am to 8:00 am and 6:30 to 7:00 the night. The measurements were taken on "typical" days that were free of weather-related distortions.

Figure 5:site selected for PLOS

Manual walking speed calculation

The pedestrian walking speed was calculated manually. A 20 m distance was marked by using tape within the location. When a pedestrian crosses the first point, a stopwatch was started and when he/she reaches the 2nd point, the time required for the pedestrian to travel a distance of 20 m was noted down in seconds. Then the pedestrian walking speed was calculated by distance/ time taken. Within the beginning, a 50 m distance was marked within the locations to calculate the pedestrian walking speed. But it had been observed that several pedestrians were scattering and weren't following the identical lane. Hence, a 20 m distance was finally fixed to calculate the pedestrian speed. Within the study area, over 10 pedestrians' walking speed was measured to own a mean walking speed for the all-age group of pedestrians since it had been taken manually. By knowing the pedestrian volume and calculating the pedestrian speed, the LOS of pedestrians is calculated by the specifications given within the HCM.

Pedestrian level of service calculation for the study area

Table 3:Steps to calculate PLOS

Steps to calculate the pedestrian level of service for the sidewalk in the study area
Step1: identification of sidewalk based on land use type
Step 2: measurement of sidewalk width
Step 3: Estimation of the effective walkway width of the facility
Step 4: observe pedestrian flow(p/min)
Step 5: Estimation of maximum or peak flow rate p//m/min
Step 6: determination of PLOS

Table 4:Criteria for the pedestrian level of service determination

LOS	Space (m^2/ped.)	Flow Rate (ped/min/m)	Speed (m/s)	Volume (v)/Capacity (c) ratio
A	≥6.0	≤7	≥1.32	<0.21
B	3.7-6.0	7-23	1.27-1.32	0.21-0.31
C	2.2-3.7	23-33	1.21-1.27	0.31-0.44
D	1.4-2.2	33-50	1.14-1.21	0.44-0.65
E	0.6-1.4	50-81	0.76-1.14	0.65-1.00
F	≤0.6	variable	≤0.76	variable

The formula used to calculate the pedestrian level of service (PLOS)

We = Wt - SAD (approximate preempted width) …… Equation 1

PF = No pedestrian/ min…… Equation 2

PFR = Ped flow/We…… Equation 3

Where; -

We = Effective width of walkway PF = Pedestrian Flow (per/min)

Wt = total width of walkway PFR = Pedestrian Flow Rate (ped/m/min)

SAD = shy away from distance (approximate preempted width).

Table 5:Pedestrian LOS Grade Scale

LOS grade	**Range of score**
A	132 or higher
B	101 to 131
C	69 to 100
D	37 to 68
E	36 or lower
F	Depends on walkway conditions

Source:(Gallin, 2001).

3.6.2 Pedestrian walkability index Analysis (PWI)

PWI = ((∑ (Facility rating × length of the stretch × pedestrians count×10))/ Number of stretches)/1000 Where,

PWI= Pedestrian walkability index Facility rating= the ratings provided by the pedestrians in the field walkability survey.

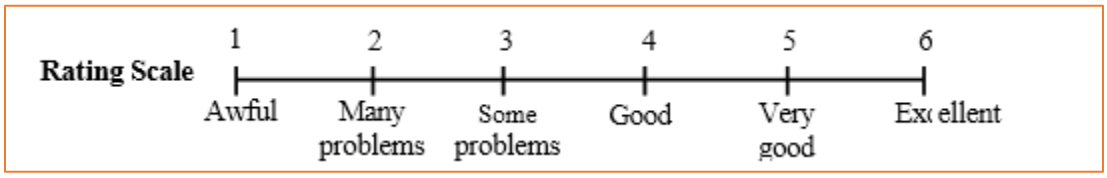
Length of stretch= field data obtained

Several stretches= the stretches selected for the study.

Built Environment Auditing Analysis of the study area (kenter street)

Direct site observation the means of photography and checklist observation were used because the main data collection methods for the primary objective. The initial data collection approach was directed by taking site photos and by filling prepared checklists during which the physical qualities and characters of the streets within the study area were assessed using the checklist the present pedestrian facilities were evaluated. The checklists were prepared and supported general street elements, Urban utilities, and concrete street transport amenities. The checklists were used on the observation date of March 13 and 14 for 2 consecutive days. Counting on those approaches the physical character of the streets was documented. This method was applied and employed in this research deeply understand the extent of Urban physical changes or observed situations occurring within the selected street and therefore the existing condition of the pedestrian facilities.

The walkability of the sidewalks is executed by adopting the walkability checklist guidance of the 'Pedestrian and Bicycle Safety Team, Washington, DC. http://safety.fhwa.dot.gov/ped_bike/. Thus, the rating scale for the attributes is:



The average score of each walking environment element describes the situation on kenter Street. Hence, the average score from 26-30 is a great neighborhood for walking, 21-25 is pretty good to walk, 16-20 is okay but needs repair, 11-15 needs a lot of work, and 5-10 the sidewalk is a disaster to walk and the existing situation of the study area are evaluated based on this standard able score through the checklist.

3.7 The Effects of street vendors on the pedestrian walkability

Questionnaire and survey method

To achieve the study's second objective, a questionnaire survey and an interview were used. 384 questionnaires were printed and deployed by using 6 data collectors for 384 questionnaire respondents. In this process, pedestrians were respondents for the questionnaires because they are direct and day-to-day relations with the streets and highly exposed and facing problems because

of unconventional streets and streetscapes in the town. Walking speed, traffic congestion, connectivity, accessibility, and safety due to street vendors are the main concerns of questionnaires for pedestrians. The series of questionnaires was made to get a better understanding of the current problems pedestrians are facing and what they do want to see for the future on kenter street.

Semi-structure interview method

Semi-structured interviews were used in the study to directly interact with vendors on the sidewalk and with professionals (urban planners) in the sebeta town municipality to deeply identify the reason why street vendors use the sidewalk and to openly identify what type of approaches were used to control street vendors by adopting judgment sampling techniques. Lastly to identify the future perspective of the government on the street vendors' condition on the sidewalk. On the other side, data was gathered from published and traditional reports, such as journals, articles, and reports, which were used to discuss the findings of the questionnaire and interview results.

The material used to achieve the second objective for the study area

Materials used during the interview include an A4-sized printed questionnaire, a cell phone, an audio recorder, and notebooks. PSS software and Microsoft Excel were used to analyze the valid questionnaires after they were collected.

3.8 Sampling

The study conducted an on-site pedestrian questionnaire survey even though the total population is unknown. Thus, the study employed a purposive sampling technique to employ participants who are easily accessible and convenient for the study. Cochran's formula (1963) had used to determine the sample size since the population size is unknown for street surveys.

$$n = \frac{z^2 pq}{e^2}$$

Where;

n_o = sample size

Z = confidence level at 95% (standard value is 1.96)

P = the estimated proportion of an attribute that is presented in a population with 50%

q = 1-p

e = designed level of precision with + 5%

$$n_o = \frac{(1.96)^2 (0.5)(0.5)}{(0.05)^2} = \frac{(3.84)(0.25)}{(0.0025)} = 384$$

Thus, the study conducted a 384-sample population size purposively for those who were convenient and willing to questionnaire.

3.9 Data Analysis Techniques.

3.9.1 Qualitative data analysis techniques

The qualitative data interviews, notes, video, audio recordings, images, and text documents were analyzed as follows.

Table 6:Qualitative data analysis techniques.

Types	Descriptions	The software used
Content analysis	This is one of the most common methods to analyze qualitative data. It is used to analyze documented information in the form of texts, media, or even physical items. When to use this method depends on the research questions. Content analysis is usually used to analyze responses from interviewees. this analysis particularly focused on the first objective	Excel and Word 2016 were used to analyze interviews, surveys, and videos)
Narrative analysis	This method is used to analyze content from various sources, such as interviews of respondents, observations from the field, or surveys. It focuses on using the stories and experiences shared by people to answer the research questions.	

Discourse analysis	The interviews and all forms of text data Were analyzed. mainly for the second objective
Framework analysis	Finally, formalization, identifying a thematic framework, coding, charting, mapping, and interpretation were employed.

(Source: Own design, 2022)

3.9.2 Quantitative data analysis techniques

The data like measurements, statics, and numerical data collected through census, questionnaires, and surveys have been analyzed through descriptive analysis quantitatively using, SPSS, and Excel software to analyze and describe the data, maps, diagrams, charts, graphs, text, figures, and tables. Furthermore, the study used GIS 10.5 and AutoCAD 2016 software for working on the general spatial analysis of the study area. Moreover, Revit 2020 is used for some detailed 3D designs, and others like Microsoft office word 2016, and PowerPoint 2016 are used for documentation and presentation.

3.10 Perception Data Analysis.

After the data collection, the variables are coded on SPSS and Microsoft Excel and a reliability test is made to check the consistency of the data. To understand the relation between the variables, it used linear regression analysis. By displaying variables side by side, the relationship is shown by doing correlation, and finally linear multiple regression is made to investigate which independent variable is affecting the dependent variables more.

3.11 Validity and Reliability of the Data

For the validity and reliability of the knowledge, the questionnaire was not filled out by the respondents themselves but rather by the researcher and 6 additional data collectors. Since the study was conducted with different ideas from the interviews and field observations, the result of the study would reflect the particular situation of the road vendors on the walkways along the study routes, thus, the study result would valid and reliable.

3.12 Ethical Consideration

Before beginning data collection, different participants were provided a consent letter to conduct the research. The study was extremely sensitive to the emotions, opinions, and dignity of the participants. The study purpose was thoroughly stated to the participants, together with how the data obtained from them was employed in this study. The knowledge gathered from the participants was only used for this specific research, and therefore the study kept the confidentiality of all individuals who participated in the study.

3.13 Summary of methods

Table 7: Summary of methods.

Specific objective	Data used	Source of data	Collection method	Instrument used	Analysis software
To assess the existing pedestrian facilities of the study area	City structural plan	Municipality and the existing situation in the area	Observation method PLOS analysis method	Measuring tape Tally records Samsung M20	GIS and AutoCAD2007 SPSS Microsoft Word 2016 and Excel 2016
To identify the effects of street vendors on pedestrian walkability in the study area	The existing situation in the study area Responses of the residents based on the prepared questionnaire Secondary data	Sampled residents	questionnaire survey and interview	A4 Paper Cell phone Notebook	
To develop strategies that enhance pedestrian facilities of the study area	Urban planning norms and standard City-wide structural plan.	Addis Ababa urban planning norms and standards. Sebeta town city-wide structural plan	Interview Secondary data assessment Googling	Computer	

(Source: Own design, 2022)

CHAPTER FOUR

RESULT AND DISCUSSION

This chapter was organized per the objectives and research questions, moreover, because the methods and approach want to attain the precise goals laid out in the preceding chapters. The background of the chosen site and also the existing condition of the world were described in this chapter. Frequent street users, Professionals were examined and analyzed through questionnaires for pedestrians, and interviews with professionals and street vendors and direct site observations were discussed during this chapter.

4.1 Demographic characteristics of respondents

Table 8:Sex categories of the respondents.

Sex of respondents					
		Frequency	Percent	Valid Percent	Cumulative Percent
	Male	214	67.5	67.5	67.5
	Female	103	32.5	32.5	100.0
	Total	**317**	**100.0**	**100.0**	

A total of 384 participants, 214 (67.5%) male and 103 (32.5%) female willing pedestrians participated in the questionnaire survey.

Table 9: Age categories of the respondents

Age of respondent					
		Frequency	Percent	Valid Percent	Cumulative Percent
Age group	10-20	32	10.1	10.1	10.1
	20-30	125	39.4	39.4	49.5
	30-40	107	33.8	33.8	83.3
	40-50	46	14.5	14.5	97.8
	>50	7	2.2	2.2	100.0
	Total	**317**	**100.0**	**100.0**	

Table 9 illustrated the age categories of respondents. 10.1%, of the total respondents, were under the age of <10-20, 39.4 % were between the age of 20-30, 33.8% in between 30-40,14.5% in between 40-50, and finally, 2.2% % of respondents were 50 and above. The result clearly shows that starting from youth up to middle age societies frequently use the street.

Table 10:pedestrian walking behavior by sex

		Frequency				
		Frequently	Occasionally	Sometimes	Rarely	Total
Sex	Male	124 39.1%	57 18.0%	30 9.5%	3 0.9%	214 67.5%
	Female	57 18.0%	28 8.8%	18 5.7%	0 1.2%	103 32.5%
		181	85	48	3	317
	Total	**57.1%**	**26.8%**	**15.1%**	**0.9%**	**100.0 %**

(Source: Field Survey data,2022)

Table 10 illustrates pedestrian walking behaviors by sex. Among a total of 67.5% male and 32.5% female respondents, male pedestrians have a high percentage of walking experiences. Among 68.2% of male respondents, 39.1% of them commute by walking frequently, 18.0% of them walk occasionally, 9.5% of them walk sometimes, and 0.9% of commute by walking rarely in descending order respectively. Correspondingly, among 32.5% of female respondents, 18.0% of them commute by walking frequently, 8.8% of them use walking occasionally, 5.7% walk sometimes, and 1.2% of them commute by walking rarely in descending order respectively.

4.2 Current physical characteristics and condition of pedestrian walkways

I. Existing Street assessment based on observation checklist.

This chapter was organized per the objectives and research questions, further because of the methods and approaches accustomed to attaining the precise goals laid out in the preceding chapters. The background of the chosen site and also the existing condition of the realm were described in this chapter. Frequent street users, Professionals were examined and analyzed through

questionnaires for pedestrians, and interviews with professionals and street vendors and direct site observations were discussed during this chapter.

4.2.1 Sidewalks condition analysis.

Sidewalk in a study area lacks street amenities and are obstructed by different factors like street vendors, illegal parking, light poles, etc. The average score of sidewalk condition indicates that the sidewalks were dirty and poor condition, and not walkable.

Table 11: Sidewalks condition analysis

Element	Attributes	Context								Grand Total Score
		Right side			Score	Left side			Score	
		Yes	No	Need Repa		Yes	No	Need Repa		
Sidewalks	Have no street furniture (sittings, traffic lights, street lights, dust bins….)	✓			1	✓			1	6.5
	Sidewalks are blocked by overgrown landscaping, vendor, signs, plants, vehicles, etc.	✓			1	✓			1	
	The sidewalk is not continuous	✓			1	✓			2	
	The sidewalk is not wide enough (people cannot easily walk together side-by-side)	✓			1	✓			1	
	Have no buffer between pedestrian and vehicle roadway that separate sidewalks from the street	✓			1		✓		1	
	Have no planted shade-producing street trees	✓			1	✓			1	
	Total Score				6				7	

Source: (Field Survey data,2022)

Figure 6:sidewalk condition of the study area.

Table 11 and figure 6 illustrate the condition of the sidewalks along kenter Street by examining the walking environment features with rating scores. Hence, both the proper and left side walkways have scored 6 and eight points respectively, and either side of the walkways has a median score of 6.5 points which suggests that the sidewalks are a disaster for walking.

4.2.2 Safety and comfort of the sidewalk for pedestrians.

The safety and comfort of the sidewalk in the area are at the risk due to the following elements.

Table 12:Safety and comfort of the sidewalk for pedestrians

Element	Attributes	Context				Grand Total Score
		Yes	No	Need Repair	Score	
Safety and Comfort	Vehicle speeds are too fast	✓		✓	1	10
	There's too much traffic	✓		✓	1	
	Streetlights are few or not present	✓		✓	1	
	There are people on the street who seem threatening				1	
	Unleashed dogs or other loose intimidating animals are present	✓		✓	2	

	There is not enough shade from trees	✓			1	
	There are few or no street trees or other landscaping	✓			1	
	There are vacant lots or rundown buildings	✓			1	
	The street has benches and places to rest		✓		1	
Total Score					10	

Source: (Field Survey data,2022)

Table 12 illustrates the protection and luxury of the zebra crossing situation on kenter Street. The walkways from each side do not seem to be safe and cozy for pedestrians due to; the shortage of shading trees, vendors' domination, poor surface material, the extent of the sidewalks being below the amount of the vehicle way, and lack of a buffer between the sidewalks and vehicle way, parking on the sideways, lack of traffic light and high speed of cars. Thus, the protection and luxury of the road for pedestrians from each side have scored 10 points, which means that the walkways are a disaster for walking.

4.2.3 Pedestrian walkway amenity analysis.

Street amenities are the most important elements for connectivity and bring a walkable environment to the communities. But the study area lacks street amenities and fills with different walkable obstructions.

Table 13: Pedestrian walkway amenity analysis of kenter street

Element	Attributes	Context								Grand Total Score
		Right side			Score	Left side			Score	
		Yes	No	Need Repair		Yes	No	Need Repair		
Street Amenities	Do the sidewalks have green elements?		✓		1		✓		1	5
	Do the available plants complement the built environment?		✓		1				1	
	Does the street have streetlights?	✓		✓	2	✓		✓	2	
	Do the sidewalks have sittings and dust bins?		✓		1		✓		1	
Total Score					5				5	

Source: (Field Survey data,2022)

Table 13 illustrates the street amenity situation of kenter Street. The walkways are not pedestrian and environmentally friendly due to; the lack of green elements, street lights, shading trees, sitting areas, dust bins, signage, and buffers. However, both the right and left side street amenity situations have scored 5 and 7 points respectively, both sides of the walkways have an average score of 5 points which implies that the sidewalks lack street amenities and it is a disaster for pedestrians walking.

4.2.4 On-street and off-street parking analysis along both sides of the walkways.

Based on-site observation evidence both off-street parking and on-street parking in the study area are absent and the street is obstructed by illegal parking and causing traffic problems.

Table 14:On-street and off-street parking analysis along both sides of the walkways.

Element	Attributes	Context								Grand Total Score
		Right side			Score	Left side			Score	
		Yes	No	Need Repai		Yes	No	Need Repai		
On-street and Off-street parking	Does the roadway have on-street parking?		✓		2		✓		2	5
	Have a buffer between on-street parking and the roadway?		✓		1		✓		1	
	Do they park cars on the sidewalks?	✓			2	✓			2	
	Does the off-street parking hinder the continuity of sidewalks?	-	-	-	-	-	-	-	-	
Total Score					5				5	

Source: (Field Survey data,2022)

Figure 7:parking condition in the study area

Table 14 and figure 7 illustrate the parking condition of kenter Street. The street lacks proper on-street and off-street parking; hence, vehicles are parked on sidewalks along both sides of the street. However, both the right and left side parking situations have scored 6 and 7 points respectively, and both sides of the walkways have an average score of 5 points which implies that the sidewalks are blocked by vehicles and it is a disaster for walking.

4.2.5 Utility analysis of kenter street.

The existence of street utility and connectivity of each other's with the town center is poor in the study area.

Table 15: Utility analysis of kenter street

Element	Attributes	Context				Grand Total Score
		Yes	No	Need Repair	Score	
Utilities	Good drainage, away from entrances and walkways		✓	✓	2	5
	Do utilities have visual and environmental quality?		✓	✓	1	
	Do utility lines installed appropriately?		✓	✓	2	
Total Score					5	

Source: (Field Survey data,2022)

Figure 8:utility condition in the study area

Table 15 and figure 8 illustrate the situation of utilities along both sides of kenter Street. Thus, the utilities from both sides of the street are not pedestrian-friendly due to; open and unpleasant smell ditches, improperly installed utilities, lack of visual and environmental qualities, and physically obsolete electric power. Hence, the utility condition of the street from both sides has scored 5 points, which implies that the utilities are a disaster to pedestrians for walking.

4.2.7 Analysis of connectivity

The assessment of connectivity between Urban facilities and attractions in the town center is poor within the study area. The walkways are not well connected with shopping areas, offices, recreation areas, and other city center facilities. Observation surveys revealed that the discontinuity of walkway pavements and therefore the presence of potholes, patches, and broken surfaces on sidewalks make the walkers uncomfortable. Thus, the connectivity from either side of the road is not integrated due to; the shortage of public toilets, lack of shopping facilities, lack of sitting chairs, and absence of shading trees are the key problem within the study area.

Table 16:Street connectivity.

Element	Attributes	Context				Grand Total Score
		Yes	No	Need Repair	Score	
Connectivity of sidewalk	Existence of public toilets on walkways		✓			5
	Shopping facilities	✓			2	
	Sitting chair		✓	-		
	Shades		✓		1	
Total Score					3	

Source: (Field Survey data,2022)

Table 16 illustrates the connectivity of the sidewalk along both sides of kenter Street. Hence, the connectivity of the sidewalk of the street from both sides has scored 5 points, which implies that the sidewalk is a disaster to pedestrians for walking.

4.2.8 Existing sidewalk width with master plan and standards.

The existing sidewalk width in the study area is not wide enough when compared with the proposed master plan and sidewalk standards.

Table 17:Existing sidewalk width

Study Area	Existing walkway width (m)	Master plans walkway width	Standard walkway width /ADA/	Average sidewalk width
	2.5	3	3	2.75

Source: (Field Survey data,2022)

Table 17 illustrates the existing sidewalk width is not wide enough when compared with the city structural plan and with the standard walkway width. The existing sidewalk width on the ground and the master plan are not fit and this resulted in discouraging walking in the area.

4.2.9 The main problems that pedestrians encounter on the roadside walkways.

Based on on-site observation and pedestrian perception table 19 shows different problems that exist in the study area orderly.

Table 18: The main problems that pedestrians encounter on the roadside walkways

Problems	**Respondents**		**ranking of the main problems from high to low**	
	Frequency	Percentage	Respondent's response	Field observation
Street vending	89	28%	1st	1st
Illegal parking	76	24%	2nd	2nd
Safety	65	21%	3rd	3rd
Poor lighting	48	15%	4th	4th
other	39	12 %	5th	5th
Total	**317**	**100**		

Source: (Field Survey data,2022)

Table 18 describes prioritizing the main problem pedestrians faced on kenter Street. Based on field observation and pedestrian perception connectivity problems has the main problem that pedestrians face in the area. among pedestrian respondents, 28% face problems with street vending problems, 24% with illegal parking,21% face safety problems,15% face problems with poor lighting, and finally, 12% face other problems.

4.2.10 Informal Business Occupancy on the sidewalk

Based on the sector information and data obtained from key informants, many informal business shops are occupying the road yet as on the footpath of the study area. Differing types of outlets are concentrated on these are cloth, food, ornaments, fruit, and blacksmith. These business shops created different problems for vehicular additionally as pedestrian movement. The physical scenario of the roads reveals pedestrian movement is interrupted thanks to a footpath that is almost blocked. The footpath is additionally blocked by the shopkeepers and market owners. They often

keep their instruments on the footpath. The walkway is sort of blocked because of illegal vendors that operate informal businesses. This case deteriorates the protection and convenience of the walkers on the walkway surface, too.

Figure 9:street vendor on the sidewalk

4.1.11 Pedestrian conflict with another street user in the study area.

Street vending is physically manifested in street along with setbacks and on vehicular lanes during traffic jams and hold-ups, attachment of sheds to building frontages with goods spilling over to roadsides, noisy audio media advertisements, and issues with cleanliness and hygiene. When the sidewalks are too crowded, people are forced to step onto the road to walk, risking many lives. Drivers and other road users dislike them for their road encroachment.

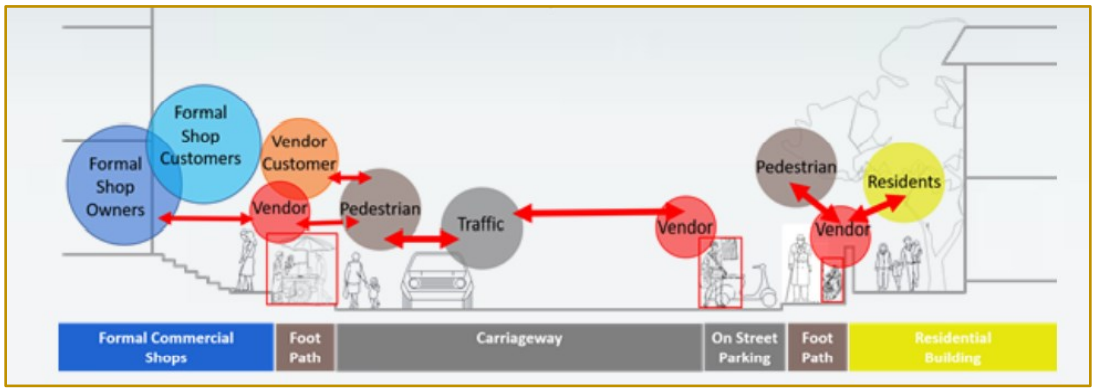


Figure 10:street vendor conflict with other road users

Figure 10 shows pedestrian conflict with street vendors. Of the total of 317 respondents, 70 females from 103 answered that there is a high conflict with a street vendor and 181 males from 214 responded there is a high conflict with a street vendor. From site observation, while pedestrians walk on the sidewalk many informal activities are employed on the sidewalk and this led the pedestrian to conflicts with vendors, vendors customers, formal shop customers even also with other pedestrians. This resulted in traffic congestion, walkway width minimization, traffic accidents any other problems in the area.

4.2.12 Pedestrian perception of walking obstruction.

To pedestrian perception and observation analysis, both street vendors and illegal parking is the most pedestrian obstruction in the area.

Table 19:Pedestrian perception of walking obstruction

		Frequency			
		Street vendors	Illegal parking	Trees and poles	Total
Sex	Male	151 47.6%	56 17.7%	7 2.2%	214 67.5%
	Female	76 24.0%	25 7.9%	2 0.6%	103 32.5%
		227	81	9	317
	Total	**71.6%**	**25.6%**	**2.8%**	**100.0 %**

(Source: Field Survey data,2022)

Table 19 illustrates the pedestrian perceptions of walking obstruction. Among the 67.5% male and 32.5% female respondents, they all stated that they are not walk freely due to different existence of different obstructions. Of 67.5% of male respondents, 47.6 % of them due to illegal street vendors, 17.7% of them due to illegal parking, and 2.2% of them due to improper design of poles and trees were the major obstruction to walking respectively. Correspondingly, from 32.5% of female respondents, 24.0% of them due to due to vendors, 7.9% of them due to illegal parking, and 0.6 % of them due trees were the major obstruction for a pedestrian while walking respectively.

4.2.13 Pedestrian volume analysis

The volume of street vending activity in this area is different on different days. When it is market day the vending activity has high volumes while on normal days this activity becomes low when compared to the market day but still there were high volumes of street vending activities.

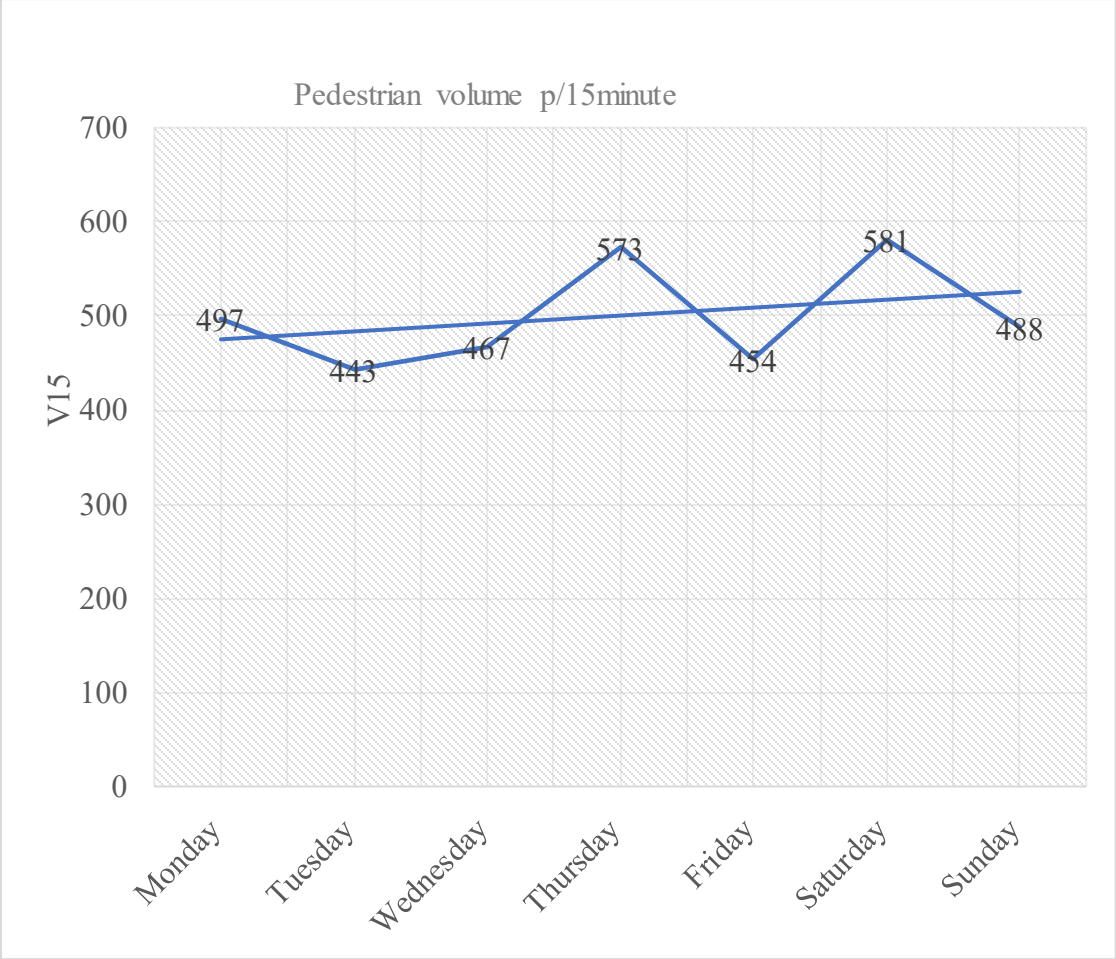


Figure 11: Pedestrian volume analysis (Source: Field Survey data,2022)

Figure 11 illustrates pedestrian volume in the study area. From the graph above, Saturday had the highest number of pedestrians movement (581) since Saturday is market day. Among the pedestrian counted on a different day Monday 497, Tuesday 443, Wednesday 467, Thursday 573, Friday 454 Saturday 581, and Sunday has 443 pedestrians counted for 15min in descending order respectively.

4.2.14 Pedestrian traveling time analysis.

The graph shows how the number of street vendors on the sidewalk influences the walking time of pedestrians.

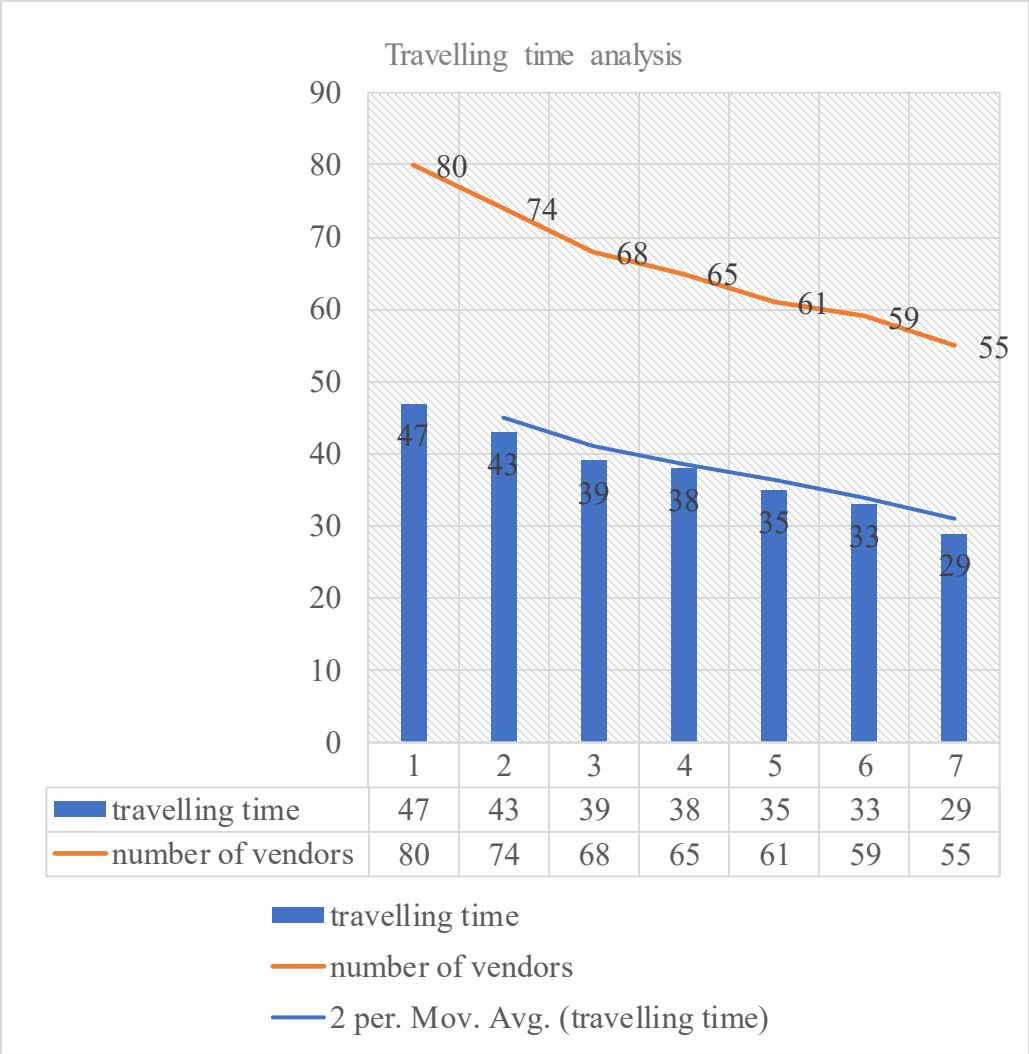


Figure 12:Pedestrian traveling time analysis (Source: Field Survey data,2022).

Graphs were used to analyze the traveling time of pedestrians in relatives to street vendor density for a 20-meter walking distance in Figure 12. From the graph above, the highest traveling and the lowest traveling time of pedestrians are 47second when vendors' numbers are 80 and 29 seconds when vendors' numbers are 55 respectively. This implies that when the volume of street vendors is high in the walking area it takes more time for the walker to reach its destination area, and if the number of street vendors is low in the area the pedestrian will walk easily and reach where they want in a short period.

4.2.15 Existing pedestrian sidewalk evaluation based on PLOS.

Pedestrian count result for site one

Table 20:Pedestrian count for 15 minutes during peak hour

Day's	Random count in 15 min			Effective width(m)
	Morning	Night	Average	
Monday	497	523	510	
Thursday	573	606	589	1.1m
Saturday	596	618	607	
Sunday	512	475	493	

(Source: Field Survey data,2022)

Table 20 above illustrated the 15-minute pedestrian count result of site one on different days in the morning and night. The average pedestrian count on Monday, Thursday, Saturday, and Sunday is 510,589,607 and 493 respectively. From this result, the study observed there is a high number of pedestrian movements on Saturday morning and night. The total width of the sidewalk on selected site one is 2.4 m total to get effective width we have to subtract shy distances including hawkers, curbs, trash bins, poles in the middle of the sidewalk and resulting in 1.1m in total. This shows the sidewalks are full of obstacles and narrow the existing sidewalk.

Table 21:Pedestrian flow result for the first site

Monday	**Thursday**	**Saturday**	**Sunday**
PF =No pedestrian/ min	PF = No pedestrian/ min	PF=No pedestrian/ min	PF = No pedestrian/ min
510 ped /15 min	589 ped /15 min	607ped /15 min	493 ped /15 min
34 ped/min	39.3ped/min	40.4 ped/min	32.8 ped/min

(Source: Field Survey data,2022)

Table 21 above illustrated the pedestrian flow result by dividing the average number of pedestrians by the time elapsed to pass the sidewalks on three different days. Pedestrian flow on Monday Thursday Saturday and Sunday was 34,39.3,40.4,32.8 pedestrians per 15 min respectively. There

was a high pedestrian flow on Saturday. The result is necessary to determine the pedestrian flow rate.

Table 22:Pedestrian flow rate

Monday	**Thursday**	**Saturday**	**Sunday**
PFR = Pedestrian flow/ We 34 ped / 0.2m 30.9 ped/m/min	PF = pedestrian flow/ We 39.3ped/1.1m 35.7 ped/m/min	Pedestrian flow/ We 40.4 ped/ 1.1m 36.7 ped/m/min	Pedestrian flow/ We 32.8 ped/min / 1m 29.8 ped/m/min

(Source: Field Survey data,2022)

Table 22 above illustrated the pedestrian flow rate result by dividing the pedestrian flow of pedestrians by the effective width of the sidewalk. The result of the pedestrian flow rate on Monday, Thursday, Saturday, and Sunday is 30.9, 35.7, 36.7, and 29.8 ped /m/min respectively. According to the LOS criteria table, the average pedestrian traffic rate is 33.3 ped/m/min, resulting in a pedestrian level of service **E**. According to HCM level of service criteria, the LOS result shows us the walking environment is not convenient and comfortable to walk and individual walking speed and bypassing other pedestrians are restricted according to the criteria, therefore, these are sidewalks that need to upgrade their levels.

Pedestrian count result for site two.

Table 23:Pedestrians counted for 15 minutes during peak hour for site 2

Day's	**Random count in 15 min**			**Effective width(m)**
	Morning	Night	Average	
Monday	501	529	515	
Thursday	567	598	583	0.7m
Saturday	598	623	615	
Sunday	483	499	491	

(Source: Field Survey data,2022)

Table 23 illustrated the 15-minute pedestrian count result of site two on different days in the morning and night. The average pedestrian count on Monday, Thursday, Saturday, and Sunday is 515,583,615 and 491 respectively. From this result, the study observed there is a high number of pedestrian movements on Saturday morning and night. The total width of the sidewalk on selected site one is 2.4 m total to get effective width we have to subtract shy distances including hawkers, curbs, trash bins, poles in the middle of the sidewalk and resulting in 0.7m in total. This shows the sidewalks are full of obstacles and narrow the existing sidewalk.

Table 24:Pedestrian flow for the second selected site

Monday	**Thursday**	**Saturday**	**Sunday**
PF=No pedestrian/ min	PF = No pedestrian/ min	PF=No pedestrian/ min	PF = No pedestrian/ min
515 ped /15 min	583 ped /15 min	615ped /15 min	491 ped /15 min
34.3 ped/min	38.9ped/min	41 ped/min	32.7 ped/min

(Source: Field Survey data,2022)

Table 24 above illustrated the pedestrian flow result by dividing the average number of pedestrians by the time elapsed to pass the sidewalks on three different days. Pedestrian flow on Monday Thursday Saturday and Sunday was 34.3,38.9,41,32.7 pedestrians per 15 min respectively. There was a high pedestrian flow on Saturday. The result is necessary to determine the pedestrian flow rate.

Table 25:Pedestrian flow rate for the second selected site

Monday	**Thursday**	**Saturday**	**Sunday**
PFR = Pedestrian flow/ We	PF = pedestrian flow/ We	Pedestrian flow/ We	Pedestrian flow/ We
34.3ped / 0.7m	38.9ped/0.7m	41 ped/ 0.7m	32.7 ped/min / 1m
49 ped/m/min	55.7 ped/m/min	58.6 ped/m/min	46.7ped/m/min

(Source: Field Survey data,2022)

Table 25 above illustrated the pedestrian flow rate result by dividing the pedestrian flow of pedestrians by the effective width of the sidewalk. The result of the pedestrian flow rate on Monday, Thursday, Saturday, and Sunday is 49, 55.7, 58.6, and 46.7 ped /m/min respectively. According to the LOS criteria table, the average pedestrian traffic rate is 52.5 ped/m/min, resulting in a pedestrian level of service **D**. According to the HCM level of service criteria the LOS result shows us the walking environment is not convenient and comfortable to walk and individual walking speed and bypassing other pedestrians are restricted according to the criteria, therefore, these are sidewalks that need to upgrade their levels.

Pedestrian level of service for the third site.

Table 26:Pedestrians counted for 15 minutes during peak hour for the third site.

Day's	**Random count in 15 min**			**Sidewalk width(m)**
	Morning	Night	Average	
Monday	467	534	501	
Thursday	512	567	540	0.4m
Saturday	554	602	578	
Sunday	455	501	478	

(Source: Field Survey data,2022)

Table 26 above illustrated the 15-minute pedestrian count result of site three on different days in the morning and night. The average pedestrian count on Monday, Thursday, Saturday, and Sunday is 501,540,578 and 478 respectively. From this result, the study observed there is a high number of pedestrian movements on Saturday morning and night. The total width of the sidewalk on selected site one is 2.4 m total to get effective width we have to subtract shy distances including hawkers, curbs, trash bins, poles in the middle of the sidewalk and resulting in 0.4m in total. This shows the sidewalks are full of obstacles and narrow the existing sidewalk.

Table 27:Pedestrian flow for the third selected site

Monday	Thursday	Saturday	Sunday
PF=No pedestrian/ min	PF = No pedestrian/ min	PF=No pedestrian/ min	PF = No pedestrian/ min
501 ped /15 min	540ped /15 min	578ped /15 min	478 ped /15 min
33.4 ped/min	36ped/min	38.5 ped/min	32ped/min

Table 27 above illustrated the pedestrian flow result by dividing the average number of pedestrians by the time elapsed to pass the sidewalks on three different days. Pedestrian flow on Monday Thursday Saturday and Sunday 33.4,36.,38.5,32 pedestrians per 15 min respectively. There was a high pedestrian flow on Saturday. The result is necessary to determine the pedestrian flow rate.

Table 28:Pedestrian flow rate for the third selected site.

Monday	Thursday	Saturday	Sunday
PFR = Pedestrian flow/ We	PF = pedestrian flow/ We	Pedestrian flow/ We	Pedestrian flow/ We
33.4ped / 0.4m	36ped/0.4m	38.5 ped/ 0.4m	32 ped/min /0.4m
83.5 ped/m/min	90 ped/m/min	96.5 ped/m/min	80ped/m/min

(Source: Field Survey data,2022)

Table 28 above illustrated the pedestrian flow rate result by dividing the pedestrian flow of pedestrians by the effective width of the sidewalk. The result of pedestrian flow rates on Monday, Thursday, Saturday, and Sunday are 83.5, 90, 96.5, and 80 ped /m/min respectively. According to the LOS criteria table, the average pedestrian traffic rate is 87.5 ped/m/min, resulting in a pedestrian level of service **E**. According to HCM level of service criteria, the LOS result shows us the walking environment is not convenient and comfortable to walk and individual walking speed and bypassing other pedestrians are restricted according to the criteria, therefore, these are sidewalks that need to upgrade their levels.

4.2.16 Walkability index for the study area.

Table 29 calculates the walkability score of the study area based on different physical parameters to identify whether the area is walkable or not.

Table 29:Pedestrian Walkability index analysis for the study area

S. No	Parameters to be considered	values	P	PWI for the study area
1	Footpath surface	2	0.15	
2	Footpath width	3	0.23	
3	Continuity	2	0.15	
4	Footpath width encroachment	2	0.15	0.112
5	Obstructions	2	0.15	
6	Cleanliness and maintenance	1	0.07	
7	Comfort and walking environment	1	0.07	
8	Lighting facilities along the footpath	2	0.15	
9	Crossing facilities	1	0.07	
10	**Pedestrian count**	**38**	**Average score=0.112**	

Table 29 illustrates the walkability index. The walkability index of this area was mostly found to be very bad which indicates below the standard (0.112) see appendix 3. The field observation shows that it has a serious shortage of pedestrian facilities. All stretches had inadequate width, the footpath surface has to be improved, and barricading has to be done. The stretches had inadequate width of the footpath, poor footpath surface, and a lot of obstructions that need to be improved. These stretches have an acute shortage of footpath widths and more than 50% of the pedestrians were found walking on the main roadway. They also had poor footpath surfaces, no crossing

facilities, no Lighting facilities, and disaster for walking. Hence all the stretches should be provided with adequate width of footpaths, proper crossing facilities, and Lighting along the footpath. Proper improvement has to be provided to avoid pedestrian-vehicle conflict. By providing these suggestive measures, the pedestrian walkability index can be improved.

4.3 Effects of street vendors on pedestrian walkability in the study area.

The presence of high-street vendors complicates issues such as narrowing road access for vehicles and pedestrians, as well as illegal parking, causing road conditions to become increasingly irregular. This phenomenon reduces the quality of cleanliness, beauty, security, and safety for road users to move freely while feeling secure and comfortable. It has an impact on the decline in public welfare in terms of access to public spaces.

4.3.1 Street vendor's location

Street vendors in the kenter street Area tend to occupy available public spaces such as road bodies, sidewalks, the side of the shop, and the parking lot.

Table 30:street vendor locations

Num	Location of Street Vendors	Frequency	Percentage (%)
1.	Carriageway	97	30
2.	Sidewalks	167	56
3.	Side of the Shop	9	2
4.	Parking lot	44	12
	Total	**317**	**100**

(Source: Field Survey data,2022)

Based on Table 30 it can be seen that in conducting their business activities, street vendors dominate selling on the sidewalk in the kenter street Area with a total percentage of 56%. Furthermore, the carriageway become the second 30%, and the parking lot became the third order to be the location of the street vendors in the area 12%, Usually, street vendors who use sidewalks and carriageway as their business service locations use physical facilities that require ample space such as street vendors that sell food, accessories.

4.3.2 Lessened pedestrian paths due to street vendors.

Most of the pedestrians respond that the street width narrowed due to street vendors (see table 33)

Table 31:narrowed pedestrian path due to street vendor

	Frequency	Percent
No	6	2.0
Yes	311	98.0
Total	**317**	**100.0**

Table 31 illustrates about pedestrian paths are reduced due to street vendors. According to the survey, only 2% of respondents believe that pedestrian pathways are not narrowed along the street, while the remaining 98% believe that pedestrian pathway is narrowed due to street vendors. The study also observed that there the sidewalk width is blocked due to the high density of street vendors in the area.

4.3.3 Status of Sidewalk quality due to street vendors.

The quality of the sidewalk walk deteriorated and dirt due to street vendors' activities

Table 32:pedestrian perception on sidewalk quality due to street vendors.

		Frequency				
		Highly dissatisfied	Slightly dissatisfied	Moderate	Satisfied	Total
Sex	Male	128 40.4%	9 2.8%	41 12.9%	36 11.4%	214 67.5%
	Female	69 21.8%	1 0.3%	20 6.3%	13 4.1%	103 32.5%
Total		197 **62.1%**	10 **3.2%**	61 **19.2%**	49 **15.5%**	317 **100.0%**

(Source: Field Survey data,2022)

Table 32 illustrates the pedestrian perceptions of sidewalk quality due to street vendors. Among the 67.5% male respondents and 32.5% female respondents, most of them are not satisfied with

the existing quality of the sidewalk. Among the 67.5% male respondents, 40.4% are highly dissatisfied,2.8% are slightly dissatisfied,12.9% are neutral and 11.4% are satisfied in descending order respectively. accordingly, of 32.5% of male respondents, 21.8 % are highly dissatisfied, 0.3% are slightly satisfied,6.3% are neutral and 4.1% are satisfied in descending order respectively.

4.3.4 Pedestrian perception of traffic congestion due to street vendors

The study area is highly congested and not walkable because of street vendors' activities as pedestrian perception and observation were made.

Table 33:Congestion due to street vendors

		Frequency				
		very high	high	medium	low	Total
Sex	Male	81 25.6%	93 29.3%	37 11.7%	3 0.9%	214 67.5%
	Female	48 15.1%	35 11.0%	20 6.3%	0 0.0%	103 32.5%
		129	128	57	3	317
Total		**40.7%**	**40.4%**	**18.0%**	**0.9%**	**100.0%**

(Source: Field Survey data,2022)

Table 33 illustrates the pedestrian perceptions of the congestion due to vendors. Among the 67.5% male respondents and 32.5% female respondents, most of them are forwarded that there is high congestion because of street vendors. Among the 67.5% of male respondents, 25.6% responded very high,29.3 % responded high,11.7% responded medium and 0.9% responded low in descending order respectively. Correspondingly, from 32.5% of male respondents, 15.1 % are very high, 11.0% are high, and 6.3% are medium in descending order respectively.

4.3.5 Pedestrian perception of Safety Analysis

Street vendors leave little space for pedestrians passing through which has completely blocked the sidewalk thoroughfare, causing foot traffic to use the roadway and bringing disorder and thus a fertile environment for crime and accidents.

Table 34: pedestrian Safety analysis

Pedestrians Accident types		
	Frequency	Percent
While walking along the Roadway	71	24.4%
While waiting for a taxi beside a walkway	52	16.4%
while vendors occupied the sidewalk	83	26.2%
Collide with non-motorized Vehicles	26	8.2%
Accident by a moving Vehicles	36	11.4%
Collide with other Walkers	16	5.0%
intersection Rush	27	8.5%
Others	6	1.9%
Total	**317**	**100.0**

(Source: Field Survey data,2022)

Table 34 illustrates pedestrian perception of safety analysis. The safety criterion is evaluated in terms of the availability of buffers, sight distance, and accident types. Based on the observational survey and respondents' responses, there are no buffers and sight distance in the study area. The sight distance is absent in the study area and the pedestrian collides with bicycles, motorcycles, vehicles, and with other pedestrians. These decrease the safety of the walkers and exposed them to different types of accidents. Among 317 respondents 83(26.2%) responded that there are high accidents in the area due to street vendors on the sidewalk.

4.3.5 Pedestrian discomfort due to street vendors.

Pedestrians are not feeling comfortable walking on the sidewalk because the street vendor occupies the area and enforce pedestrians to share the carriageway.

Table 35:Pedestrian discomfort due to street vendors

	Frequency				
		Very high	High	Medium	Low	Total
	Male	74 23.3%	106 33.4%	26 8.2%	8 2.5%	214 67.5%

Sex	Female	32 10.1% 106	56 17.7% 162	15 4.7% 41	0 0.0% 8	103 32.5% 317
	Total	**33.4%**	**51.1%**	**12.9%**	**2.5%**	**100.0 %**

(Source: Field Survey data,2022)

Table 35 illustrates the pedestrian discomfort due to street vendors. Among the 67.5% of male respondents, 23.3% are feeling very high discomfort,33.4% are high,8.2% are medium and 2.5 are low in descending order respectively. Among 32.5% of female respondents, 10.1% feel very high discomfort, 17.7% feel high discomfort, and 4.7% are feels medium in descending order respectively.

4.3.6 Pedestrian perception of street vending activities on the sidewalk.

Street vendors cover the area which is not provided for them and enforce pedestrians. Table 38 describes there are high-street vendor activities in the area from pedestrian perception.

Table 36:Street vending activities on the sidewalk

		Frequency				
		Very high	High	Medium	Low	Total
Sex	Male	79 27.1%	98 31.9%	30 4.5%	7 2.0 %	214 67.5%
	Female	35 10.4 %	54 19.8%	14 1.4%	0 0.9%	103 32.5%
		114	152	44	7	317
Total		**36.0%**	**47.9%**	**13.9%**	**2.2%**	**100.0%**

(Source: Field Survey data,2022)

Table 36 illustrates the street vending activities on the sidewalk. to the pedestrian perception of 67.5% of male respondents and 32.5 female respondents, there is a high number of street vendors on the sidewalk. among 67.5% of male respondents, 27.1% responded with a very high number of street vendors,31.9% responded with a high number of street vendors,4.5% medium number of

street vendors, and 2.0 % a low number of street vendors available along the sidewalk. among 32.5 female respondents, 10.4 % responded with a very high number of street vendors,19.8 % responded with a high number of street vendors,1.4 % responded with a medium number of street vendors, and 0.9 % a low number of street vendors are available along the sidewalk.

4.3.7 Challenges of vendors in pedestrian movement.

Pedestrian movement in the area is at high risk due to street vendors' activities (see table 39).

Table 37:challenges of street vendors on pedestrian movement

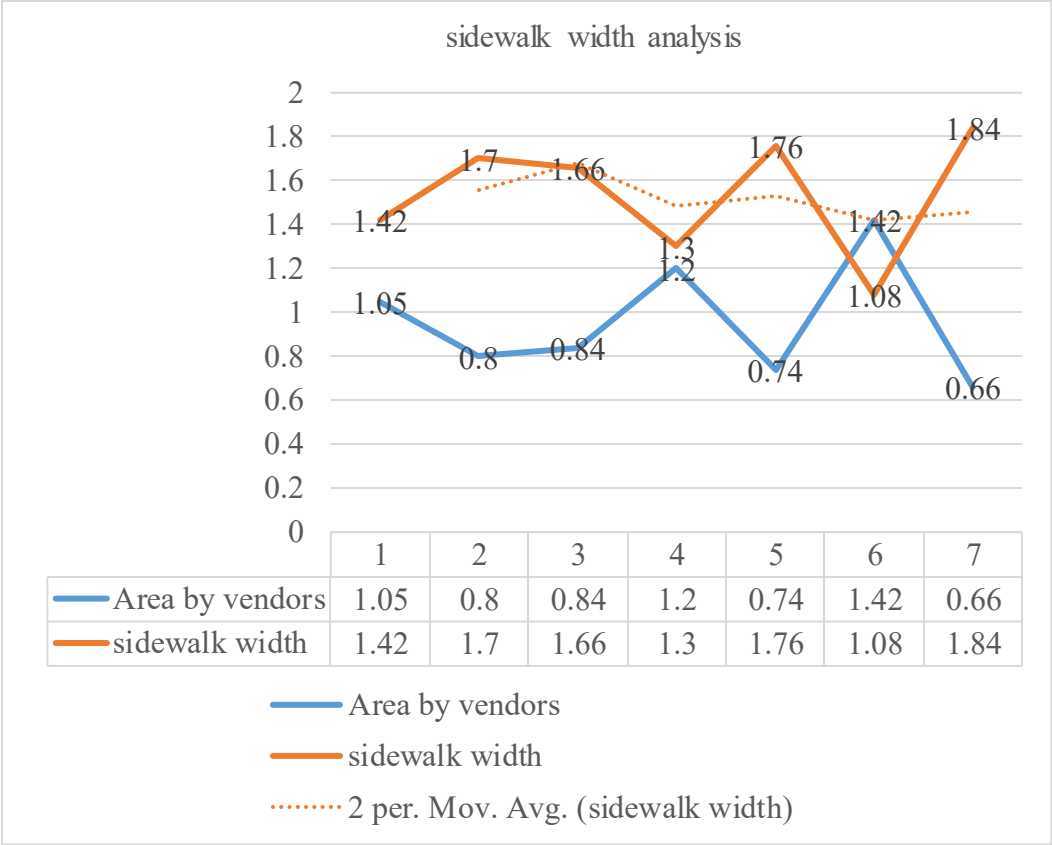
		Frequency				
		Very high	High	Medium	Low	Total
Sex	Male	93	81	35	5	214
		21%	30.9%	9.5%	6.1 %	67.5%
	Female	56	43	4	0	103
		13%	14 %	4.3%	1.2 %	32.5%
		149	124	39	5	317
	Total	**47.0%**	**39.1%**	**12.3%**	**1.6%**	**100.0%**

(Source: Field Survey data,2022)

Table 37 illustrates the street vending activities on the sidewalk. There is a high number of street vendors on the sidewalk. Among 67.5% of male respondents, 21 % responded there is a very high number of street vendors,30.9% responded there is a high number of street vendors,9.5% medium number of street vendors, and 6.1 % a low number of street vendors available along the sidewalk. Among 32.5 female respondents,13 % responded there is a very high number of street vendors,14% responded there is a high number of street vendors,4.3 % responded with a medium number of street vendors, and 1.2% a low number of street vendors are available along the sidewalk.

4.3.8 Effects of the street vendor on sidewalk width.

Street vendors are the main causes of the reduction of sidewalk width because they occupy the space which is not provided for them and resulting in the narrowed roadway width.



	1	2	3	4	5	6	7
Area by vendors	1.05	0.8	0.84	1.2	0.74	1.42	0.66
sidewalk width	1.42	1.7	1.66	1.3	1.76	1.08	1.84

(Source: Field Survey data,2022)

Figure 13:Sidewalk width concerning the area occupied by vendors

Figure 13 illustrates the reduction of sidewalk width due to street vendors. From the above graph, the maximum sidewalk width is 1.84m due to vendors has not taken more space on Sunday since Sunday is the rest day and the minimum sidewalk width area is 1.08m due to vendors taking more space on Saturday since Saturday is the market day in the area. time. this implies that the higher the street vendors the more they occupy the whole width of the sidewalk.

4.3.9 Safety of pedestrians on the sidewalk due to street vendor

Table 38:Safety of a pedestrian on the sidewalk due to street vendors during daytime

	Frequency	Percent
Safe	27	26.0%
Unsafe	280	74.0%
Total	**317**	**100.0**

As can be seen from the above table, the majority of the pedestrians (74.0 %) do not feel safe while using this sidewalk during the daytime, having the reason that they are highly exposed to different problems due to street vendors.

Table 39:Safety of a pedestrian on the sidewalk due to street vendors at night time

	Frequency	Percent
Safe	27	17.9%
Unsafe	280	82.1%
Total	**317**	**100.0**

As can be seen from the above table, 82.1 % of the pedestrians do not feel safe at night time and reason that they are highly exposed to different problems where there are no lighting and a high number of street vendors. In addition, from the general safety issue of the sidewalk, the level of being unsafe is high at night as compared to the daytime.

4.3.10 Crime due to street vendor on the sidewalk

Table 40:crime due to the street vendor on the sidewalk.

	Frequency	Percent
Yes	211	81.0%
No	106	19.0%
Total	**317**	**100.0**

Table 40 shows crime because of the street vendor in the study area. Of the total respondents, 211 or 81.0% of respondents believe that there is a high crime or responded yes while 106 or 19.0 % of respondents responded no. since most of the respondents responded yes there is a high crime due to informal business in the area.

4.3.11 Street vendor's activities in the pedestrian zones

Street vendors carry out commercial activities in a pedestrian zone and influence the pedestrian to divert their place to another direction that is not provided for them.

Table 41:The current condition of street vendors in the pedestrian zone.

Description	Permanent street vendor		Semi-perm street vendor	Non-permanent street vendor
Material component	Occupied	Sidewalk	Sidewalk and Green line	Side Road
	Floor	Wooden board	Wooden board	×
	Wall	Plywood with zinc	×	×
	Roof	Plastic tent and zinc	Plastic tent	×
	Room	Wooden board	×	×
Area	Width	2.8m	2m	1.5m
	Length	3.6m	2.7m	1.5m
Business facilities	kitchen	□	□	×
	pushcart	×	□	□
	Table	□	□	×
	Chairs	□	□	□
	Electric utility	□	□	×
	Water Utility	□	□	×

Source: (Field Survey data,2022)

Table 41 illustrates the existing condition of street vendors in pedestrian zones. Three different types of street vendors are there in the area. Permanent, semi-permanent, and mobile vendors. Permanent street vendors occupied more space in reality for both sem-permanent and mobiles.

Space occupied by each type of vendor is 2.8mx3.6m, semi-permanent 2mx2.7m, and mobile vendors 1.5mx1.5 respectively. Those types of vendors use different materials to sell their products such as a table, pushcart, and different plastic to provide shade. This implies that not only vendors obstruct pedestrian movement but also the material they used and their products are the main obstruction to pedestrian mobility in the area.

4.3.12 Effects of Street Vendors on Roadway Width

Based on the site observation, The existence of street vendors on the study road segment trespasses the carriageway's effective width. Road encroachment due to the existence of street vendors reduces the intended street performance. Traffic malfunctioning from dynamic impedance was relatively higher than those from static ones. That is why the study tried to assess the traffic turbulence by considering the dynamic nature of the street vendors rather than direct measurement of the effective roadway width reduction by those actors of road friction under investigation. the study showed that there is a measurable decrease in the Capacity of a lane width below 1.5 m. But there is no measurable decrease in urban street capacity when through lane widths are narrowed from 2.5 m to 1.5 m. On the peak hour of the pick day of street vendors' existence on the study road links almost 1.5m of the carriageway from the curb of the street was occupied by street vendors. Thus, it's empirical to deduce that the safety, speed, and capacity of the urban arterial road were significantly reduced.

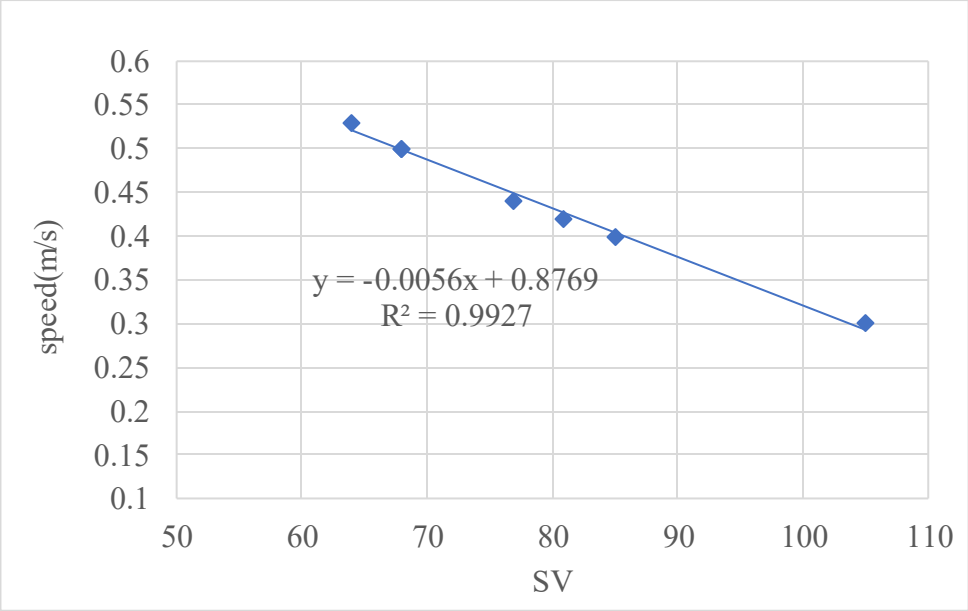
Figure 14:Vendor on the roadway

Figure 14 illustrates the roadway with the street vendor. As figure 18 indicates Vending takes up street space, blocking pavement and parking spaces and causing congestion for other road user. Street trading is carried out in public spaces that are not specifically designated for trade, and thus results in competition with other urban services and uses such as traffic flow, access to buildings, and other commercial activities in the city. Informal trading streets are mostly linear public spaces i.e., streets, including the niches and street corners that are appropriated and occupied by street traders

4.3.13 Effects of street vending on the average travel speed of the pedestrian.

Street vending is found in the streets and they are disrupting the movement or the mobility of the people who have using this street. a lot of street vending activities take place by blocking pedestrian and vehicular ways. This resulted in the reduction of pedestrian speed at the study area for the specific site.

Travel speed and street vendor relation

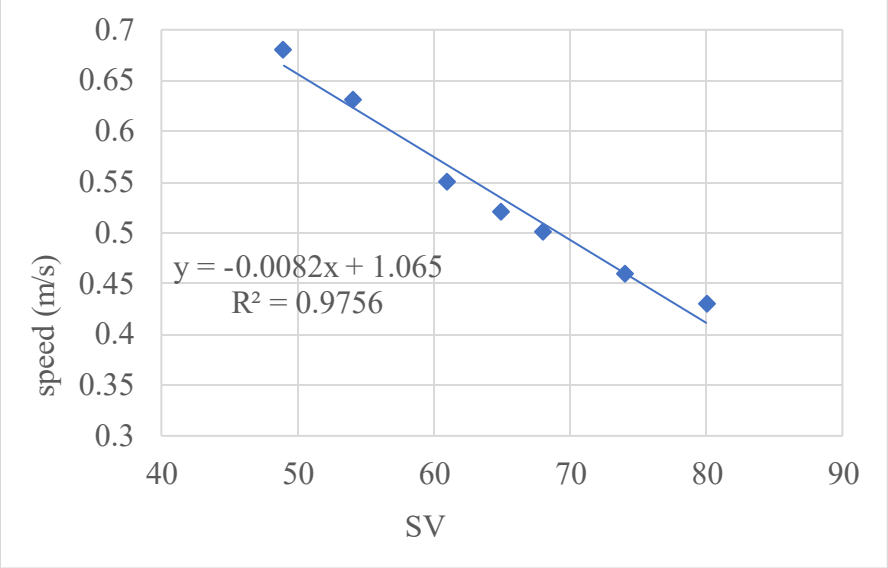


Source: (Field Survey data,2022)

Figure 15:travel speed due to SV

Figure 15 indicates the relationship between average travel speed and the number of street vendors. The possible range of values for the correlation coefficient is -1.0 to 1.0. In other words, the values cannot exceed 1.0 or be less than -1.0. A correlation of -1.0 indicates a perfect negative correlation, and a correlation of 1.0 indicates a perfect positive correlation. As figure 19 indicates a correlation

coefficient is < zero (0.9927), which indicates a negative relationship between the two variables in the selected area.



Source: (Field Survey data,2022)

Figure 16:travel speed due to SV for the second site.

Figure 16 indicates the relationship between average travel speed and the number of street vendors. The possible range of values for the correlation coefficient is -1.0 to 1.0. In other words, the values cannot exceed 1.0 or be less than -1.0. A correlation of -1.0 indicates a perfect negative correlation, and a correlation of 1.0 indicates a perfect positive correlation. As figure 19 indicates a correlation coefficient is < zero (0.9756), which indicates a negative relationship between the two variables in the selected area. The figure also explains the variation of the observed speed due to SV in the study site. It was indicated that speed declined as SV levels increased, and this was more pronounced in Figures 19 and 20 as shown in the figures above. since the variation gap of speed between low and high SV levels was relatively higher. To estimate the impact on mean travel speed due to different volumes of SV levels, the trendline equation found between the speed and SV specified in Figures 19 and 20 was used.

4.3.14 Effects of Static Vendors on PLOS.

For the sake of showing the impacts from a pedestrian perspective, the peak existence of static vendors was taken. The effective walkway width (WE) at both conditions was computed as per the HCM-2010 empirically using the field-measured input data. Typically, a walkway operational

analysis evaluates the portion of the walkway with the narrowest effective width. At the peak existence of static vendors, the minimum effective width that was maintained along the length of the walkway was taken. These were preferred to assess the worst-case scenario for pedestrian satisfaction and subsequently show the reason why pedestrians were relegated to walking on the street. Since the total walkway width (WT) was encroached upon from both directions by static vendors, little space was left for pedestrians to negotiate.

Table 42:Plos analysis with the static street vendor

No static vendor				**A high volume of static vendor**		
Site	Space (m^2/p)	LOS score for Link	PLOS	Space (m^2/p)	LOS score for Link	PLOS
Segment 1	3.8	1.83	B	1.1	1.83	D
Segment 2	2.1	2.09	C	0.75	2.09	E
Segment 3	2.6	1.98	C	0.98	9.98	E

Table 42 indicates the pedestrian level of service of the sidewalk with and without street vendor existence. As shown in the table when the street vendors are not occupying the sidewalk the PLOS accommodates walking behavior on the sidewalk with a high volume of static street vendors.

4.3.15 Pedestrian density and speed analysis

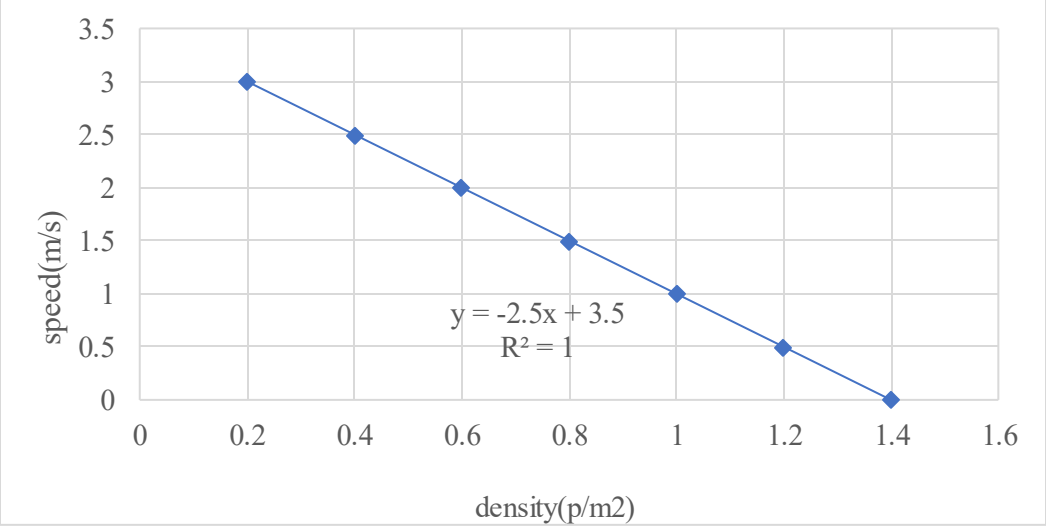


Figure 17: correlation between pedestrian density and speed

Figure 17 directs the relationship between pedestrian density and speed. As figure 22 indicates a correlation coefficient is negative, which indicates a negative relationship between the speed and pedestrian density variables. Therefore, the negative value implies that as pedestrian density increases the pedestrian walking speed goes down. They have an inverse relationship.

4.4 Correlation (Cronbach's Alpha) Inter-Factor Correlation

Pearson's r varies between +1 and -1. The strength of the relationship between variables is strong 0.7 and above, moderate 0.4-0.69, week 0.1-.39, and no relationship if the value is 0 to 0.1. In the below table, the relationship under their variable category is highlighted.

Table 43:Correlations between scores of variables (Cronbach's Alpha)

Correlation			
		traveling time	number of street vendors in the area
traveling time	Pearson Correlation	1	.992**
	Sig. (2-tailed)		000
	N	6	6
number of street vendors in the area	Pearson Correlation	.992**	1
	Sig. (2-tailed)	.000	
	N	**6**	**6**

**. Correlation is significant at the 0.01 level (2-tailed).

Cause and effect analysis

Table 44:Regression predicting traveling time.

Model Summary									
	R	R Square	Adjusted R Square	Std. An error in the Estimate	Change Statistics				
Model 1					R Square Change	F Change	df1	df2	Sig. F Change
Total	**.992[a]**	**.984**	**.980**	**.324**	**.984**	**252.136**	**1**	**4**	**.000**

The ANOVA table below is a test where the above R2 is significantly greater than zero.

The overall regression model was significant, F (3,1352) =324.964, p<0.001, R^2=0.98

The **R** results of 0.992(99.2%) imply that there is a strong positive relationship between a street vendor and pedestrian traveling time. as the number of street vendor get bigger the pedestrian traveling time also get bigger since the value of R is >0

The $\mathbf{R^2}$ result of 0.98(98.4%) implies how much the nature of the independent variable affects the dependent variable. The street vendor affected the pedestrian traveling time by (98.4%).

Table 45:Anova test for traveling time

Anova						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	26.414	1	26.414	252.136	.000[b]
	Residual	.419	4	.105		
	Total	**26.833**	**5**			

a. Dependent Variable: traveling time

b. Predictors: (Constant), number of street vendors in the area

The Anova test (0.000[b]) implies that there is a significant impact of street vendors on pedestrian traveling time.

Table 46:Beta coefficients of traveling time

Coefficients							
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B
		B	Std. Error	Beta			Lower Bound / Upper Bound
1	(Constant)	-.467	.301		-1.549	.196	-1.303 / .370

number of street vendors in the area	1.229	.077	.992	15.879	.000	1.014	1.443

dependent variable: traveling time

4.5 Pedestrian perception on the sidewalk to be improved

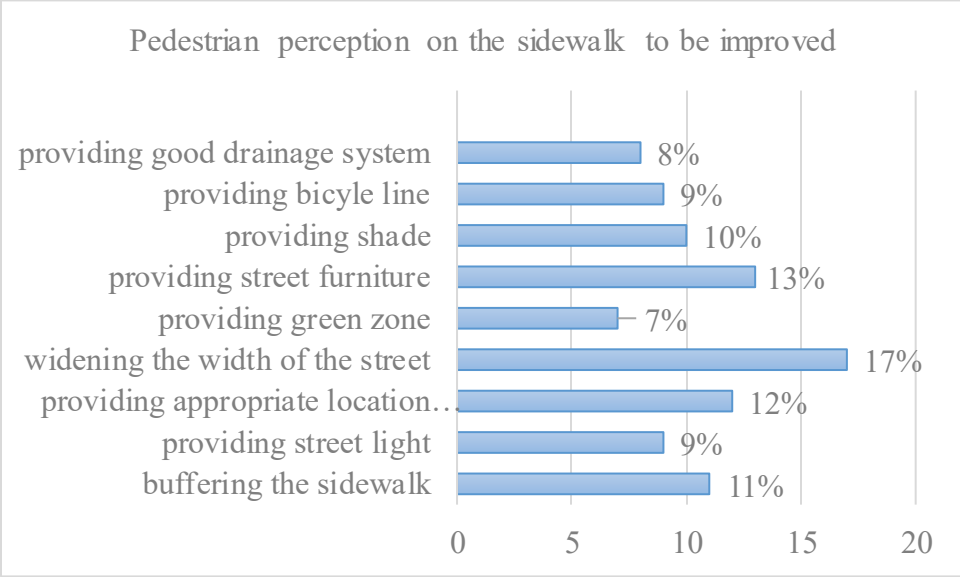


Figure 18:Pedestrian perception on the sidewalk to be improved

Figure 18 illustrates the pedestrian recommendations for the sidewalks to be improved. A total of 68.2% of male and 31.8% of female respondents stated their point of view for the sidewalks to be improved. Among the forwarded recommendations with a high percentage from both sex, categories are 11% of them buffering the sidewalks, 10% of them providing shading trees, 17% of them widening the width of the sidewalks, 9% of them providing street lights, 13% of them providing street furniture 9% of them providing bicycle line, 12% of them providing an appropriate location for a street vendor, 8% of them providing good drainage system 10% of them providing green infrastructures are the major pedestrian improvement ideas for the sidewalks respectively.

4.6 Discussion of the Existing condition of the pedestrian facility in the study area.

There is an explicit shortage of pedestrian facilities within the populated area and also pedestrians are subjected to high risk which is clear from the pedestrian responses. This study has used the checklist to watch the road amenities and pedestrian facilities found within the study area. The fundamental elements of walking facilities like street lights for pedestrians and vehicular drivers are less obtainable within the study area. On other hand, the prevailing street also lacks a green zone, street signage, shades, pedestrian and traffic lighting, rush cans, public toilets, and bicycle facilities. This means that the connectivity of the road with amenities is found in low condition. The absence of control devices, pedestrian circulation lane, crossover, and buffer between traffic and pedestrian lane contributes to a traffic accident. Transport options, vehicular stops, waiting areas parking, pedestrian crossings, and traffic calming design don't seem to be located within the respected places. (Liu-Ambrose, 2006) has reported that if the surface of the walkways isn't well maintained if the effectiveness of the walkway width isn't continuous and if the walkways are filled with waste and hindrances, pedestrians don't feel comfortable walking. Therefore, smooth walking with quick access may be a desirable criterion while designing the walkways. Barrier-free walkways and walker's friendly walkways can allow pedestrians a high level of comfort (Zupan, 1980). The study area completely lost its reference to society further because it the physically disconnected from its surroundings because there were no transport options, convenient sidewalks, and bicycling. There are not any traffic signs, zebra crossings, or street amenities. Congestion is growing because thanks to unmanaged physical activities and informal business which are occurring mainly on the road and sidewalk and causing problems. Overall participants know and understand this street as a method of problems, not as a possibility or something else. The pedestrian sidewalk is blocked by the various street users which are mainly stated as informal activities. The absence of the above basic and defining elements on the road contributes to making difficulties for the society which are using the road in terms of getting appropriate service at a suitable place. The PLOS and walkability index results from three sites clearly show that the present sidewalks aren't capable of accommodating all of their users and wish to enhance to higher levels. The PLOS result puts both sites PLOS E, PLOS D, and PLOS C on a very cheap level of criteria. And walkability index analysis results show that the realm could be a disaster for walking and also the walkability index result (0.112) is below the quality.

4.7 Discussion on the effects of the street vendor on pedestrian walkability.

Based on the observation, the existence of street vendors affects the physical and visual quality of sidewalk occupation. Sidewalks, as a public spaces, are now highly efficient and effective trading spaces for street vendors within the study area. Results of the study on sidewalk vendors showed that the common density increased with a rise within the width of vending space, the presence of pedestrians interacting with a vendor, and an increase in pedestrian flow. This has resulted in the reduction of pedestrian average travel speed and minimizing the roadway width within the study area as shown in Figures 18 and 19. At the identical time, the results agreed with the findings that indicated a rise in vending activity reduces PLOS. Sidewalk vendors and customers look forward to service by taking some space on the sidewalks. Most of the respondents elaborate that street vendors are dominating the sidewalk and using it for their purpose and this resulted in a decreased level of service, narrowed sidewalk width, decrease movement of the people, and declined sidewalk quality.

CHAPTER: FIVE

CONCLUSION AND RECOMMENDATION

5.1 Conclusion

The Existing walkways were mostly obsessed with illegal parking, street vending, solid waste, and construction dumping. The pedestrian conflict with other modes and conflict between pedestrians were found in bad and extremely bad conditions respectively. The results confirm that street vendors, lack of pedestrian walkway maintenance and on-street parking, and car-loading shop materials were the leading reason for conflict between pedestrians and other modes. Pedestrians use the carriageway instead because the walkways don't seem to be enough width during peak hours. The surface of the walkways was damaged and offered a dusty and muddy environment, especially during the dry and rainy seasons respectively. There was also an absence of pedestrian amenities like public toilets, and passenger or pedestrian sheds which resulted in low connectivity of sidewalk streets.

The study results show an increase in average pedestrian density with the presence of a sidewalk vendor. Customers looking forward to service from sidewalk vendors have also increased the common pedestrian density. The pedestrian level of service of the realm resulted in E (33.3ped/m/min), D (52.5ped/m/min, and, C (87.5ped/m/min level of service respectively which indicates that virtually all pedestrians restrict their normal walking speed, frequently adjusting their gait. At the lower range, forward movement is feasible only by shuffling. Space isn't sufficient for passing slower pedestrians. Cross- or reverse-flow movements are possible only with extreme difficulties. Design volumes approach the limit of walkway capacity, with stoppages and interruptions to flow.

There aren't any designated places for street traders so they use spaces, which are meant for other purposes. This ends up in contestations and conflicts with urban authorities. There was also an intense struggle for space between the traders and therefore the pedestrians are forced to run on the streets, leading to a conflict between vehicular and traffic, and that also resulted in the decline in pedestrian walking speed, pedestrian level of service, and roadway width. At the study area, it was observed that there was high pedestrian congestion where there's also public transportation terminal for Anbessa bus and taxi stations and also the number of street vendors was large making walking very difficult. Pedestrian way concepts for the sidewalks to be improved are buffering the

sidewalks, providing street amenities and providing an appropriate location for informal traders, widening the width of the sidewalks and separating parking, improving the sidewalk's surface material and street lights, and also providing sitting areas along the sidewalks are among the majors.

Generally, the conducted qualitative studies on pedestrian perceptions about the walking environment, quantitative studies on the built environment of the sidewalks through checklists, and also the correlation analysis with different variable and linear regression analysis resulted that the study walkways are not pedestrian-friendly and it is dangerous for pedestrians for walking.

5.2 Recommendation

As per the findings of the research, the current street has numerous negative issues. A well-designed and complete street reflects an urban growth and improvement strategy not only by making streets accessible and safer but also attractive places to be that are economically vibrant. Thus, the inclusion of street vendors in the planning and implementation of the urban street was vital. So, dynamic thinking of advancing road management has always been in the mind of the executive governing body. Therefore, the following recommendations were devised from the research

- The town should develop policies and strategies that support funding and resource devoted to pedestrian planning to make the town pedestrian-friendly.
- In designing or planning a physical space it is essential to accommodate the experiences of the space used to identify possible events that may arise. In determining the activity space of street vendors, it should be based on factors and characteristics that influence the activities of street vendors in the area, by knowing the appropriate space and place of trade for the activity, the pattern of street vendors, the time of street vendors, and the type of commodities.
- In addition to street vending other informal activities like parking dumped building materials, informal encroachment of ROW by formal traders, etc. were among the side frictions peculiar to Sebeta town. Thus, the road performance evaluation of the city had to cover all those conditions of side friction.

- Recommended issues for street vendors by the Federal Democratic Republic of Ethiopian Urban Development and Housing has to be implemented in the existing situation.
- To overcome the negative impacts of street vending the whole stakeholders like the government, community and NGOs should work cooperatively in shaping urban spatial problems such as reducing the problem of congestion and blocking of foot walkers, and government should set suitable markets instead of denying their livelihood. If vendors are planned or arranged in appropriate places, it enables minimizing the occurrence of negative effects.

Design recommendation.

Depending on the result and discussion the following Design recommendation was made. the development of the design is based on the sebeta town structural plan. Depending on the land use 40-meter-wide street design for the area.

Table 47:Design program

No	Programs	Size in meters (m)
1	8 *3 vehicular transit lane	24
2	Building frontage zone	1.5 (each side)
3	Pedestrian clear zone	2.5 (each side)
4	Landscape and furniture zone	2 (each side)
5	Bike lane	1.5 (each side)
6	Median	2
7	Vendors zone	1.2 (each side)
8		
	Total	40 m

Proposed 2D Inclusive Street Design (Prototype)

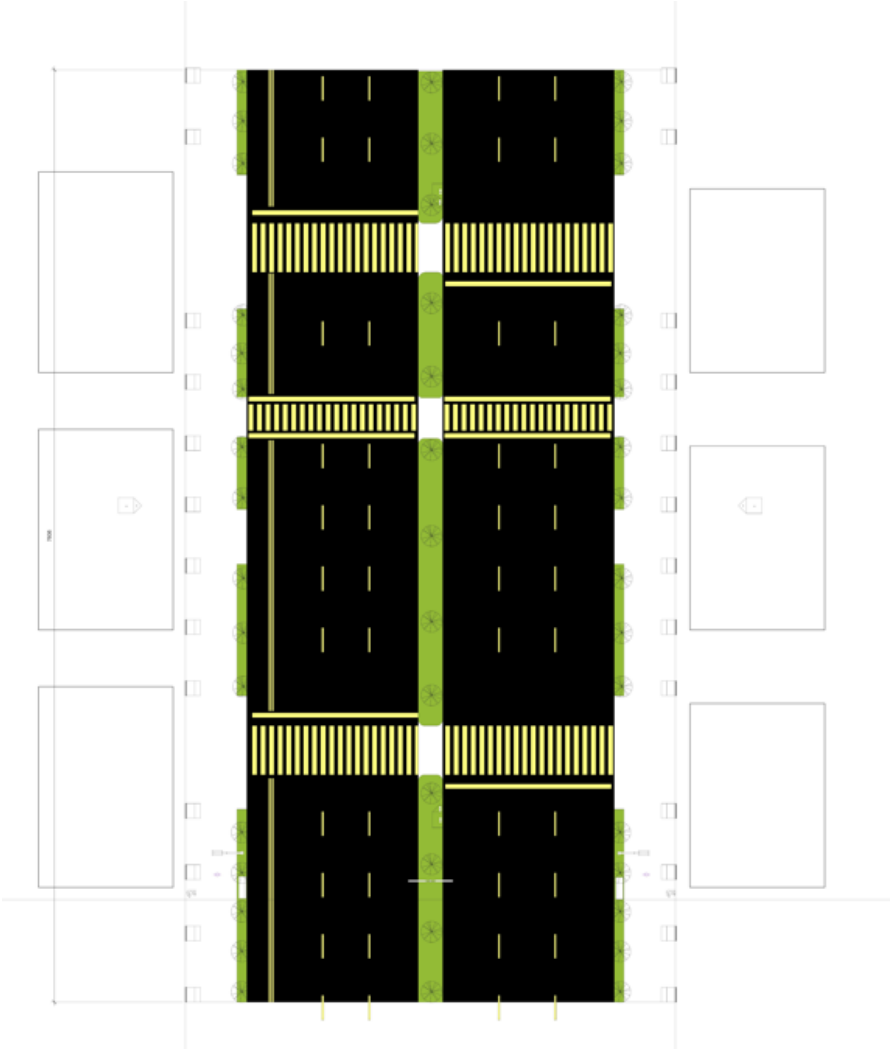


Figure 19:Proposed 2D Inclusive Street Design

Street section

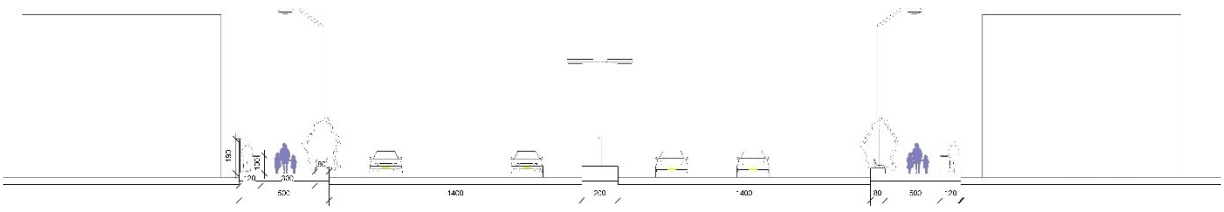


Figure 20:Street section

3D Illustration of Proposed Inclusive Street Design

Figure 21: pedestrian and vendor zone

Figure 22:Bicycle zone

Furniture zone

Overall view of proposed street

Figure 23: Overall view of proposed street

References

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APPENDIX

Appendix 1- Questioners for pedestrians

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Questionnaires for selected Pedestrians

My name is **Misganu Sisay**, I'm an Assistant lecturer at DambiDollo university in the department of Urban and Regional Planning and I am currently studying for a master's in urban planning and design at Adama science technology university. I am researching **"The Impacts of street vending on the pedestrian walkability in the case of sebeta town".** The study area covers Arterial Road from Butajara round to the kenter condominium or Addis safer which is a total of 1.6 km**.** The questionnaire consists of 20 questions and it will take no longer than 5-10 minutes to complete. All responses will be kept anonymous and no one will be identifiable in the research.

Personal information of respondents

Age?

……..

Gender

Male ☐ Female ☐

Questioner's

1. Trip purpose

going to work ☐ going to Market ☐ going to School ☐

2. How frequently do you use this sidewalk?

Frequently ☐ Occasionally ☐ Very Rarely ☐ Never ☐

3. Do you think the pedestrian's sidewalk is wide enough?) A) Yes ☐ B) No ☐

4. Do you think the sidewalk has all-street amenities? A) Yes ☐ B) No ☐

5. Do you think that the sidewalk is separated from vehicle movement?

A) Yes ☐ B) No ☐

6. Do the sidewalks have green elements? A) Yes ☐ B) No ☐

7. How do you rate the footpath width and its accessibility entire the town?

A) Very bad ☐ B) Bad ☐ C) Fair ☐ D) Good ☐ E) Very good ☐

8. At what time do the street vendors use the street walkways for their purpose?

A) Morning ☐ B) Mid-day ☐ C) Night ☐ D) all the day ☐

9. How do you rate the congestion due to street vendors' pedestrian mobility?

A) very high ☐ B) high ☐ C) medium ☐ D) low ☐ E) Very low ☐

10. Do you feel comfortable walking through this sidewalk in the presence of street vendors?

very uncomfortable ☐ slightly uncomfortable ☐ comfortable ☐ very comfortable ☐

11. How much time do you spend relaxing, walking, working, going to school, and resting on the sidewalk on kenter street?

Day by day ☐

Days a week ☐

For 1-4 days ☐

Once every two weeks ☐

12. How is the pedestrian traffic around the sidewalk?

Very high activity ☐ High Activity ☐ Low activity ☐

13. Are you interested in goods sold by vendors along this sidewalk? Very uninterested ☐ Uninterested ☐ Neutral ☐ Interested ☐ Very interested ☐

14. What are the activities on the sidewalk you find discomforting?

Street foods vending ☐ Bicycling on the sidewalk ☐ Street retailing ☐ Motor vehicles parking on the sidewalk ☐

15. How do you rate the congestion you face on pedestrian mobility due to the narrowness of pedestrian width?

A) Very bad ☐ B) Bad ☐ C) Fair ☐ D) Good ☐ E) Very good ☐

16. Sidewalk during the morning? A) Safe ☐ B) unsafe C) neutral

17. Sidewalk during the day? A) Safe ☐ B) unsafe ☐ C) neutral ☐

18. Sidewalk at the night? A) Safe ☐ B) unsafe ☐ C) neutral ☐

19. What is your recommendation for the sidewalks to be improved?

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20. What is your big role in protecting sidewalk facilities for pedestrians and do you think that protecting the existing facilities can improve the sidewalk?

Appendix 2.: Auditing the physical walking environment (checklist)

Elements to Check	Features to Check	yes	No	Need Repair	Rating	Remarks
1. Sidewalks	Have no street furniture (sittings, traffic lights, street lights, dust bins….)					
	Sidewalks are blocked by overgrown landscaping, poles, signs, plants, vehicles, etc.					
	The sidewalk is not continuous					
	The sidewalk is not wide enough (two people Cannot easily walk together side-by-side)					
	Have no buffer between pedestrian and vehicle roadway that separates sidewalks from the street					
2. Utilities	Good drainage, away from entrances and walkways					
	Do utilities have visual and environmental quality?					
	Do utility lines installed appropriately?					
Other problems						

3. On-street parking	Have a buffer between on-street parking and the roadway?					
	Does the roadway have on-street parking?					
	Do they park cars on the sidewalks?					
Other problems						
4 Off-street parking	Does the off-street parking hinder the continuity of sidewalks?					
Other problems						
5. Landscaping	Do the sidewalks have green elements?					
	Do the available plants complement the built environment?					
Other problems						