Urban Clean Mobility and Transit in Ethiopia

By Wondimu Abeje

Introduction

Urban transportation has been one of the major ingredients in the formation of cities, including in both their morphological setup and functioning. It is a critical element of urban life in the dynamically growing and urbanizing world. African cities are facing critical urban challenges related to urban mobility characterized by high traffic congestion, high rates of traffic accidents, and alarming rates of air pollution. Today, urban mobility is a multifaceted issue which affects socioeconomic development, the environment, and the climatic conditions of not only cities but the world in general through its carbon emissions and influence on climate change.

Sustainable and clean urban transportation is a current and critical urban issue the world over, aiming to ensure better and healthier means of transportation that meet individual and community mobility needs while reducing the social and environmental impacts of such mobility. It targets the promotion of urban transport systems with clean energy consumption, fuel-efficient technologies, and space-saving designs to minimize congestion in the transportation of people and goods.

Urbanization in Ethiopia has for a long time been characterized by a low level of planning. Ethiopia, though one of the least urbanized countries in the world (at just 20 percent urbanization), has one of the fastest rates of urbanization (4.86 percent per year), higher than the average annual growth rate of sub-Saharan Africa (3.95 percent). In light of this rapid urbanization, the demand for urban transportation is tremendous, and its sustainability is paramount.

The aim of this paper is to examine and analyze how Ethiopian urban transportation is responding to the objective of clean urban transport. More precisely, the paper will strive to examine the practice or initiatives of urban transport in Ethiopia by responding to the following questions:

a. How are the current modes of urban transport responding to the demands of urban mobility and the urban economy in the rapidly growing cities of Ethiopia?

b. What are the success stories and their positive carbon emission reduction and decarbonization impacts?

c. Which potential future success stories are likely to help achieve clean urban transport in the coming decade?

The paper will base its analysis on major Ethiopian cities and give special focus to Addis Ababa, the only city in the country with a population exceeding 1 million. The analysis focuses on two modes of urban transport, non-motorized transport (NMT) and mass rapid transit (MRT), and analyzes their success stories. These two cases were selected because they are two critical elements of clean and sustainable urban transport. Moreover, these two cases account for major projects implemented in the last decade in Addis Ababa. It is therefore worthwhile to examine their outcomes and draw lessons for the improvement of future efforts. The paper will then identify and propose life-improving clean strategies and solutions to achieve clean urban transit in the coming decade in the major cities of Ethiopia.

**Urban Growth and Transport Demand in Ethiopia**

Ethiopia's urban population is growing rapidly, with a high annual growth of about 4.8 percent, and is estimated to number nearly 21 million in 2019, as per the projection of the Central Statistical Agency of Ethiopia. The country still has low urbanization, with a 20 percent urbanization rate (almost half of the sub-Saharan average rate). According to the World Bank's *Urbanization Review of Ethiopia*, Ethiopia is expected to reach 30 percent urbanization in 2028, with a projected yearly urban growth rate of 5.4 percent. The urban system of Ethiopia is dominated by small urban centers, with about 90 percent of urban centers having a population of fewer than 20,000 inhabitants. Though the country is still heavily rural, representing 43 percent of the GDP and 80 percent of the population, the urban sector is contributing substantially to the national economy.

Ethiopia has witnessed rapid economic growth in the last two decades, with real GDP growth averaging 10 to 11 percent, which enabled an increase in real GDP per capita from $197.40 in 2000 to $602.20 in 2019. For 2019, nominal GDP per capita was $857.50. The country is targeting becoming a lower-middle-income country by 2025 and should double its current GDP per capita to $1,045 by that time. As observed in most countries which have reached a middle-income economy, the urbanization rate should reach at least 30 percent and the economy should be diversified through an increase in manufacturing.

Ethiopia aims to achieve middle-income status through a green economy. To do so, it has developed the Climate-Resilient Green Economy (CRGE) strategy. This strategy aims to ensure sustainable and financially achievable development, particularly by reducing fuel consumption and increasing use of renewable energy.
energy. The country aims to limit its greenhouse gas (GHG) emissions so as not to exceed 150-250 Mt CO₂e (metric tons of carbon dioxide equivalents). This strategy is expected to make considerable contributions, as emissions could reach as high as 400 Mt CO₂e by 2030 if a conventional route were followed.

The green economy plan is based on four pillars: (1) improving crop and livestock production practices; (2) protecting and re-establishing forests; (3) expanding electricity generation from renewable sources; and (4) leapfrogging to modern and energy-efficient technologies in transport, industrial sectors, and buildings. The last pillar is critically important since the transport and industry sectors are responsible for 88 percent of GHG emissions in Ethiopia.7

The expected growth of the country will require urban infrastructure development, with transport standing as the main facilitator of the economy. Currently, urban transport demand is very high in Addis Ababa—the only city in the country with more than 1 million inhabitants. The problem is already critical, with long queuing, long transportation times, and high rates of congestion and accidents. As seen in Table 1, the next-largest cities of Ethiopia have around 300,000 inhabitants, and their transportation demand is lower for the time being. However, with the high urban growth of the country, Ethiopia is expected to have about nine cities with a population of 500,000 to 1 million inhabitants in 2050. By then, Addis Ababa will reach a population of 5 million per this projection.

Table 1: Major Ethiopian Cities and Their Projected Population

<table>
<thead>
<tr>
<th>City</th>
<th>2015</th>
<th>2025</th>
<th>2050</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Addis Ababa</td>
<td>3,195,000</td>
<td>4,105,000</td>
<td>5,086,000</td>
</tr>
<tr>
<td>2. Adama</td>
<td>308,526</td>
<td>529,281</td>
<td>1,322,290</td>
</tr>
<tr>
<td>3. Gondar</td>
<td>306,246</td>
<td>532,674</td>
<td>1,252,837</td>
</tr>
<tr>
<td>4. Haw assa</td>
<td>285,785</td>
<td>485,845</td>
<td>1,001,600</td>
</tr>
<tr>
<td>5. Dire Daw a</td>
<td>268,000</td>
<td>378,000</td>
<td>606,604</td>
</tr>
<tr>
<td>6. Bahir Dar</td>
<td>266,667</td>
<td>463,832</td>
<td>1,090,921</td>
</tr>
<tr>
<td>7. Dessie</td>
<td>177,688</td>
<td>309,065</td>
<td>726,913</td>
</tr>
<tr>
<td>8. Jimma</td>
<td>169,446</td>
<td>290,687</td>
<td>726,217</td>
</tr>
<tr>
<td>9. Jigjiga</td>
<td>154,183</td>
<td>216,422</td>
<td>347,500</td>
</tr>
<tr>
<td>10. Shashemene</td>
<td>140,717</td>
<td>241,402</td>
<td>603,089</td>
</tr>
<tr>
<td>11. Bishof tu</td>
<td>140,039</td>
<td>240,239</td>
<td>600,183</td>
</tr>
<tr>
<td>12. Mek’ele</td>
<td>131,020</td>
<td>224,372</td>
<td>470,895</td>
</tr>
<tr>
<td>13. Harar</td>
<td>125,000</td>
<td>171,000</td>
<td>259,485</td>
</tr>
<tr>
<td>14. Gambela</td>
<td>62,093</td>
<td>114,171</td>
<td>253,927</td>
</tr>
<tr>
<td>15. Assosa</td>
<td>43203</td>
<td>82063</td>
<td>189249</td>
</tr>
</tbody>
</table>


The demand for urban travel in Ethiopian cities is increasing alongside the country’s economic and population growth. Urban transport will be the major challenge of 12 largest Ethiopian cities in the next five years as they reach population sizes of more than 200,000. This is therefore an important time to shape their mobility with the objective of clean and sustainable transport.

Currently, limited public transportation means such as minibuses and three-wheeled taxis are the major means of motorized transport in Ethiopian urban centers. Minibus taxis with 11 seats (numbering about 10,203 in 2018) account for 68 percent of the passengers transported in Addis Ababa.8 Three-wheeled taxis with 3-seat capacity (bajaj) are the main urban transportation in all secondary cities. In Dire Dawa, one of the secondary cities of Ethiopia, 1,700 bajajs were registered in 2008 and have likely doubled in number by now. These bajajs, though fast, flexible, and convenient for small towns and the hot climate, are blamed in part for the high traffic congestion and accident rate.9 Buses are available mainly in the larger cities, particularly in Addis Ababa.

Addis Ababa is a unique case as the primary city of Ethiopia. Currently, Addis Ababa is estimated to have 7.73 million trips per day in 2020.10 Forty-five percent of trips involve walking, and 2.2 to 2.8 million people are using public transport per day, with an estimated 3.6 million total trips on public transportation on a daily basis.11

<table>
<thead>
<tr>
<th>Mode</th>
<th>Percent of Total Travel</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walking</td>
<td>45%</td>
<td></td>
</tr>
<tr>
<td>Vehicle</td>
<td>55%</td>
<td></td>
</tr>
<tr>
<td>-Private transport</td>
<td>9%</td>
<td></td>
</tr>
<tr>
<td>-Public transport</td>
<td>46%</td>
<td>The respective shares of public transport are 58% for minibuses and 42% for city buses.</td>
</tr>
</tbody>
</table>


In Addis Ababa, there are several types of public transport, but their synergy, capacity, and efficiency are inadequate to respond to the ever-growing public transport need. Public transport is provided mainly through 9,207 minibuses, 889 city buses, and 374 mid-sized buses, with passenger transportation shares of 68.2 percent, 25.4 percent, and 6.4 percent, respectively.12 The city buses include public and private buses as well as some civil servant buses used as taxis during off hours (see Table 3). The buses of Addis Ababa have an average operation of 178 km per day per bus, which is 75 percent less than the international average.13

10. ERA, CES and Saba Engineering, Urban Transport Study and Preparation of Pilot Project for Addis.
### Table 3: Public Transport in Addis Ababa in 2019

<table>
<thead>
<tr>
<th>Public Transport Operators</th>
<th>Status</th>
<th>Year of Establishment</th>
<th>Capacity</th>
<th>Fleet Size, 2019\textsuperscript{14}</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anbessa Bus</td>
<td>Public operator</td>
<td>1945</td>
<td>100</td>
<td>456</td>
<td>Mostly 30 seat and 70 hangers</td>
</tr>
<tr>
<td>Shegere Bus</td>
<td>Public operator</td>
<td>2016</td>
<td>100</td>
<td>227</td>
<td>Mostly 40 seat and 60 hangers</td>
</tr>
<tr>
<td>Alliance Bus</td>
<td>Private share company</td>
<td>2013</td>
<td>100</td>
<td>62</td>
<td>Mostly 40 seat and 60 hangers</td>
</tr>
<tr>
<td>Medium-sized Bus</td>
<td>Private</td>
<td>2007</td>
<td>25 seats</td>
<td>374</td>
<td>Higer and ISUZU</td>
</tr>
<tr>
<td>Minibus Code 3</td>
<td>Private</td>
<td>2010</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minibus Code 1</td>
<td>Private</td>
<td>1980</td>
<td>12 seats</td>
<td>3,119</td>
<td></td>
</tr>
<tr>
<td>Public Service Bus</td>
<td>Public</td>
<td>2016</td>
<td></td>
<td>450</td>
<td>Provide transportation for civil servants free of charge; and also taxi services off hours</td>
</tr>
<tr>
<td>Light Rail Transit (LRT)</td>
<td>Ethiopia Rail Cooperation, Shenzhen Metro Group</td>
<td>2015</td>
<td>317\textsuperscript{15}</td>
<td>2 lines and 41 vehicles</td>
<td></td>
</tr>
</tbody>
</table>

There are also institutional buses providing transport services for their employees, without which transportation problems would be worse. Public transportation in Addis Ababa only meets half of demand. The active means of transportation are mainly small in size (a cause for traffic congestion) and have limited synergy and efficiency. This mismatch between travel demand and available public transport is creating recurrent transportation problems during peak hours. One can spend up to two hours crossing the city, including a waiting time of 30 minutes to one hour.

The city has been planning to implement a mass transit transportation system for two decades, starting with the Addis Ababa Master Plan of 2002–2012. The transport plan was focused on BRT but was not realized except for a few lane segregation works using surface coloring.

**Clean Urban Mobility to Decarbonize Cities**

Cities are the engine of development as the centers for innovation. They are also major sources of carbon emissions contributing to climate change, particularly through urban mobility. They are at the front line of the climate change because of their energy consumption, pollution, and high vulnerability. They consume

\textsuperscript{14} Addis Ababa Transport Authority, Annual Report 2018.

over two-thirds of the world’s energy and are responsible for more than 70 percent of global CO₂ emissions. Since 90 percent of the world’s urban areas are located on coastlines, they are at high risk of impacts from climate change. Unsustainable urban mobility plays a significant role in GHG emissions, and cities can play an important role in curbing climate change through clean mobility.

In the coming 30 years, the demand for urban passenger transport is expected to grow by 60 to 70 percent alongside population growth, economic development, and intensive urbanization. Projections show that the number of cars on city roads will continue to grow, especially in fast-developing economies, and total motorized mobility in cities will almost double (growing by 94 percent) between 2015 and 2050. Even with the use of new low- and zero-carbon technologies, urban mobility is expected to cause a 26 percent increase in CO₂ emissions by 2050.

Though developing countries such as Ethiopia are comparatively a victim rather than a producer of carbon emissions, their future development may cause significant GHG emissions and may aggravate global and local warming if sustainable solutions are not devised in the early stages of urban development. Cities should therefore strive to accompany their fast growth with sustainable urban mobility to bring about efficient development without compromising the environment. This should be a critical element through all stages of city development.

Clean urban transport is the result of synergetic integration of NMT (walking and cycling), mass transit technologies, and clean and energy efficient vehicles. These modes of clean transport are considered to make an important contribution toward decarbonizing cities but also to decreasing congestion, which in turn increases the efficiency and safety of urban life.

**Non-motorized Transport in Ethiopia**

**HIGH NMT POTENTIAL, BUT LIMITED FACILITIES**

NMT, which typically includes walking and biking, can be one of the major factors in developing clean cities. Urban mobility in Ethiopia is mainly achieved by walking. In Addis Ababa, where the availability of motorized transport is relatively higher, walking is still the predominant mode of transport, as shown in Table 2.

Walking is estimated to account for 45 percent of total urban mobility in Addis Ababa, according to the Ethiopian Roads Authority projection for 2020 (see Table 2). In a modal split study conducted in 2004, 60.5 percent of travel occurred by walking, 10.9 percent occurred by bus, 20.6 percent occurred by taxi, and 5 percent occurred by private car.

Walking is more common in other cities because the availability of mass and public transport is generally lower than in Addis Ababa and because such cities have relatively smaller spatial dimensions. In cities with flat topography, such as Bahirdar, Awassa, and Dire Dawa, the use of bicycles accounts for an important share of transport. In Bahirdar, walking accounted for 43.7 percent of trips, while cycling accounted for 40.8 percent. Cars, taxis, minibuses, and city buses account only for 3.7 percent, 7.6 percent, 3.3 percent, and 2 percent of trips, respectively.

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18. Ibid.
percent, and 0.9 percent, respectively. In the past 15 years, the proportion has increased in favor of motorized transport since one of the effects of economic growth has been the creation of employment and high mobility of the population within and outside of cities. Walking will retain an important share in secondary cities, and it should be encouraged through NMT facilities, especially for short distances.

The high rate of walking has many explanations, including:

- The relatively high unemployment rate (24 percent) and importance of the informal economy;
- The proximity and diversity of activities, which was one of the qualities of Addis Ababa and many Ethiopian cities that has been highly affected by the vast renewal projects conducted in the last 15 years; and
- Poor urban transportation with long queuing and waiting times.

NMT is dependent on road quality. Historically, one of the characterizing features of cities in Ethiopia was the low level of road coverage due to the lack of planning, gaps in plan implementation, and prevalence of slums in its urban history. Road networks have been improved in the last decade in most Ethiopian cities, with increased coverage in asphalt and cobblestone facilitating better urban mobility. However, most of these networks lack well-developed or adequate pedestrian facilities, excluding some recent NMT development in Addis Ababa and regional capitals that offer improved pedestrian options.

Pedestrians are facing many challenges, including narrow footpaths, dangerous crossings and paths, uncovered utility manholes, and inadequate or absent illumination. Accordingly, urban streets in Ethiopia currently have low levels of inclusiveness, creating inhospitable and life-threatening burdens for the disabled, elderly, and children. About 65 percent of the road network in Addis Ababa lacks pedestrian walkways. Neglecting pedestrian movement in Ethiopia would mean neglecting the majority of the urban traffic and mobility. In effect, pedestrian discomfort (e.g., traffic congestion, accidents, obstacles, and lack of green spaces) can lead people to adopt motorized transport to cover distances less than 1 km.

Road safety has been a longtime major challenge in Ethiopia, with 64 fatalities per 100,000 vehicles annually on Ethiopian roads. In 2016, there were 463 road crash fatalities in Addis Ababa, with about 14 deaths per 100,000 people. Pedestrians accounted for 80 percent of all road deaths, with only 14 percent of city roads rated as acceptable for pedestrian safety. In Dire Dawa, 1,246 accidents have been recorded between 2001 and 2007, among which 562 accidents (44 percent) involved pedestrians.

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25. AATBO, 2006-2010 Strategic Plan.
27. Wondimu Consult, "Local Development Plan of Kezira, Dire Dawa."
Success Stories: The Case of Addis Ababa

Though the city of Addis Ababa has many problems related to NMT, there are important achievements which can be considered successes and a good basis for future improvement.

Urban Road Development: The improvement of road coverage in the city is one the basic determinant factors for success of NMT and sustainable mobility. Road coverage in Addis Ababa has been improved, with remarkable increases in the last 15 years. Road coverage was about 3.7 percent in 1992, 7 percent in 2006, 13 percent in 2011, and 22 percent in 2019. Most of the asphalt road built in the last 10 years has pedestrian walkways (with a width of 2.5 to 13 m), though some of them fail to be pedestrian friendly due to issues such as obstacles and drainage problems. In the last decade, increases in road coverage have been mirrored by increases in city congestion. The case of Addis Ababa is a good lesson that shows improving road network coverage alone cannot sustainably improve mobility.

There are three major success factors contributing to these improvements:

▪ The autonomous status of the Addis Ababa City Road Authority, which was established in 2004 to develop and manage the road network of the city;

▪ The continuous and incremental commitment of the city administration to allocating the lion’s share of its budget to the road sector. For the last five years, the budget allocated to the roads was 4 billion birr, 1.5 billion birr, 3.9 billion birr, 5.7 billion birr, and 5.8 billion birr. In the last budget year (July 2018–June 2019), 416 km of road development was completed in Addis Ababa. For the same year, the road budget accounted for 15.5 percent of the city’s total budget of 35.4 billion birr; and

▪ The remarkable joint effort of the local community and local administration (Woreda) in the development of local roads with cobblestone.

NMT Strategies in Place for 2019–2028: Addis Ababa has adopted an NMT strategy as a framework for its road development over the coming 10 years with the following vision: “Addis Ababa will provide safe, efficient, and accessible pedestrian and cycling networks to improve access to opportunities and mobility for all residents, foster equitable allocation of street space, and create a dignified walking and cycling environment.” The strategy has impactful plans, and its implementation can bring substantial change in the landscape and the mobility of the city, with sustainable and clean outcomes. The 10-year targets of the NMT strategy include:

▪ Walkway development of 600 km of new and existing streets to ensure a continuous pedestrian realm with high-quality footpaths, safe at-grade crossings, adequate street lighting, and safe pedestrian access to all schools;


• Readjustment of all intersections on the arterial road for pedestrian and cyclist safety; and

• Development of 200 km of cycle tracks and 10,000 shared bicycles to serve short trips and improve last-mile connectivity to public transport.

Currently the city has no cycle lanes, and the development of such NMT infrastructure requires urgent attention in the street development of the city. Cycle lanes are an important part of cities’ transport infrastructure. For example, the city of Lyon (France) had 618 km of cycle lanes in 2015 for a population half the size of Addis Ababa and planned to attain 900 km by 2020.31 The planned 200 km for Addis Ababa of cycle lanes is the minimum necessary to bring some substantial change toward low-cost and clean urban mobility.

Walkway Improvement: Some walkway works can be mentioned as success stories, namely those which have been redeveloped on the main corridors and central business district (CBD) of Addis Ababa (see Figure 2). In the last budget year (July 2018–June 2019), 26.6 km of pedestrian walkways were redeveloped in Addis Ababa.32 Some pilot retrofitting of curves and intersections are also a good start and should be encouraged in areas such as Lagare and Lion Zoo Park (see Figure 3).

The recent attention given to walkways, as well as the reorganization of the Addis Ababa Transport Bureau into three autonomous entities (Transport Operation Authority, Traffic Management Agency, and Vehicle and Drivers Authority), can be mentioned as success factors that have contributed to improved consideration for NMTs in the last few years.

Urban Mass Transit

The Addis Ababa Light Rail Transit (LRT), developed from 2012 to 2015, is the first urban mass transit system in Ethiopia. Addis Ababa currently has two LRT lines crossing the city from north to south and east to west which have been operational for the last five years. They cover a total length of 31.6 km and have a shared track of about 2.7 km. The LRT has a designed capacity of 200,000 riders per day. It therefore covers only about 4 percent of the public transport travel demand of Addis Ababa when compared to the daily 3.6 million public transport trips.

The LRT was developed for a total of $475 million, of which 15 percent is covered by the Ethiopian government and 85 percent is covered by a Chinese loan from the China Exim Bank. A total of between 110,000 and 150,000 passengers are transported per day, and each tram contains 317 passengers on average. A survey conducted in 2017 shows that the LRT is a mobility solution for the low-income portion of society and is widely used by construction workers. Nearly half of the passengers (48 percent) interviewed use the LRT occasionally, 38 percent use it daily, and 14 percent use it one to several times per week. Though crowded during peak hours, passengers are satisfied with this new, fast, and affordable means of transport and found it ideal to reach their destinations.33

The Addis Ababa LRT started with a total of 41 vehicles, but today the operational fleet capacity is lower for technical reasons, including a lack of spare parts.34 This was predicted by a comparative study of mass transit options, which rated the LRT option to be the most demanding of imports and recommended BRT as the most appropriate mode of mass rapid transit for Addis Ababa. BRT is one of the mass transit means

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that can support the LRT system and bring substantial change to the city’s clean urban transport. It can also have a better transit capacity of 18 to 25 km per hour per direction with one-third of the investment cost of LRT.35

The LRT of Addis Ababa has been put in place through the involvement and leading role of the federal government as part of the rail development of the country and as an image-building project. It is administered by Addis Ababa Rail Transport Cooperation, which is accountable to the Ethiopian Rail Cooperation.

Though the Addis Ababa LRT covers only a small share of public transportation demand, it is liked by its users. The impact of the Addis Ababa LRT can be improved if it is extended to the suburbs of Addis Ababa and if it is well connected with other modalities of transport. The LRT required substantial investment and, for the time being, has a limited contribution to the mass rapid transit needs of the city. It has also occupied a substantial part of the road space with lower transit capacity. Hence, it contributes to the traffic congestion unless it attracts individual car and taxi users.

**Elements for Clean Urban Mobility and Transit in Ethiopia**

Clean urban mobility is the result of well-integrated planning and development to ensure efficient and low-carbon transport. Ethiopian cities are rapidly growing, and their urban mobility demand is growing even faster. The mobility problems of Ethiopian cities are multilayered, involving the planning level (inadequate mobility planning, lack of pedestrian responsive planning); infrastructure level (inadequate street network, drainage problems, street light blackouts, lack of parking); facility level (low level of mass transport, lack of coordination, inefficiency); and traffic management level.36

Guiding the rapid urbanization of Ethiopia with clean urban mobility strategies will be paramount for sustainable development, competitiveness, and attractiveness to investment. To accomplish these goals, this paper proposes the following three strategies for the future success of clean urban mobility and transit in Ethiopia over the coming decade:

- Urban mix to reduce travel;
- BRT development for real mass rapid transit in Addis Ababa; and
- NMT promotion and development in Addis Ababa and regional capitals.

**Urban Mix to Reduce Travel**

Large cities are losing their land-use mix amid fast urbanization. Addis Ababa is losing its efficient land use and socioeconomic mix, with massive housing developments at the periphery and businesses monopolizing renewal of the CBD. The city segregation has generated millions of kilometers of additional trips per day and raised the need for private cars for hundreds of thousands of residents. It is therefore important to bring back the land-use mix of Addis Ababa with the presence of residential apartments and flats in the CBD, where the important share of businesses and services are located.

Moreover, the city congestion is aggravated due to a lack of well-developed secondary and tertiary centers. Most of the sub-centers are not business- and mobility-friendly, which creates a burden of congestion on the CBD.


The urban land-use mix of Ethiopian cities should be brought back. For this, land-use mix guidelines and enforcement should be in place to closely follow the mixed development of the city. This would bring multiple benefits, including travel reduction, decongestion, and greater compactness of the city. This requires also devising incentives to convince and motivate developers to invest in sub- and tertiary centers as well as to develop mixed-use buildings in the CBD. The city government’s role in developing and encouraging the residentialization of the CBD is crucial and urgent.

**BRT DEVELOPMENT FOR REAL MASS RAPID TRANSIT IN ADDIS ABABA**

BRT has been one of the major modes of clean urban transit practiced worldwide for the last 50 years. It provides 11,000 to 15,000 passengers per hour per direction (pphpd) without special operational measures. In Porto Allegre, this technology has attained 26,000 pphpd. Most of the transport plan studies of Addis Ababa have advocated for BRT over the last 20 years. According to a comparative study conducted in 2007 on different mass transit options for Addis Ababa, BRT (1+1BRT and passing lanes at stations) can have a better transit capacity, of 18 to 25 km per hour per direction, with one-third of the investment cost of LRT at grade.\(^{37}\) BRT is not merely a segregated lane. It consists of a high-quality bus-based rapid transit system with comfort and efficiency comparable to rail-based systems at a much lower cost which most cities can afford: $4–6 million per kilometer.\(^{38}\)

BRT can be implemented in the major corridors of the city to connect the recently developed residential areas (Jemmo in south, Abado in the east) with the CBD. BRT development can bring a substantial change in easing the transport stress of the city and reducing CO\(_2\) emissions. It should be implemented with well-organized infrastructure (corridors and stations), advanced bus and fare collection technologies, operational integration for boarding and feeders, a modern business and organizational structure, and savvy marketing and customer management.

The funding for BRT development can be generated through a private-public modality, with shares held by both the city and private investors. This modality can combine the financial efficiency of the private sector and the facilitating role of city government.

**NMT PROMOTION AND DEVELOPMENT IN ADDIS ABABA AND SECONDARY CITIES**

Ethiopian cities have a high potential for NMT, with walking already widely practiced and accounting for the lion's share of urban mobility. It is therefore important to maintain and enhance existing NMT practices with better facilities. This can be achieved by taking the following measures to enable future NMT success stories, all of which can contribute to clean and safe urban mobility in Ethiopian cities:

- Promote cycling in the mobility of Addis Ababa, which is currently very low;
- Support the existing cycling practice in regional capitals with NMT strategies; and
- Ensure quality workmanship in walkway facility development.

The implementation of such strategies demands thorough planning and committed leadership to envision, implement, promote, and manage NMT facilities as part of the urban transport of Ethiopian Urban Centers.

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37. BRT segregated lanes, with one bus lane in each direction with stations which allow buses to overtake each other at station to enhance their performance.

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