

[An Approach to Integrate Sustainable Urban Mobility into Sustainable City Planning - BRT as an example]

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Abstract:

Most cities' land use policies today are explicitly geared toward limiting traffic growth significantly. The way cities promote accessibility through their urban forms and transportation networks has a direct impact on various indicators of human well-being. More than 60% of all kilometres travelled worldwide now take place in urban areas (Van Audenhove, Korniiichuk et al. 2014), making them the biggest local source of urban air pollution and the biggest global source of carbon emissions related to transportation. In addition, it is thought that a key tool for facilitating long-term change is the expansion of public transportation to make it a more predominant system for individual transit. According to Hull (2008), reducing the use of private vehicles while increasing the dependency on public transportation services requires integrating land use planning and transportation planning. These arguments are closely related to issues with climate change and initiatives to lower greenhouse gas emissions.

The paper is organised into three sections. The first section provides a brief introduction to the idea of sustainable city development planning and focuses on the idea of combining sustainable urban planning with sustainable urban mobility, in accordance with the 2030 Agenda for Sustainable Development.

In the second section, case studies pertaining to sustainable mobility and its connection to city planning for creating a sustainable city are presented. Finally, the paper concluded with key lessons for cities in developing countries by drawing on examples of adopted policies that integrated sustainable city planning and sustainable urban mobility systems.

Keywords: Mobility, Sustainability, Sustainable transportation, Land-use/transport integration, Sustainable development, BRT (Bus rapid transit).

ملخص البحث:

تتجه سياسات تخطيط الأراضي في معظم المدن اليوم نحو الحد من نمو حركة المرور بشكل كبير. إن الطريقة التي تعزز بها المدن إمكانية الوصول من خلال أشكالها وأنماطها الحضرية وشبكات النقل المختلفة لها تأثير مباشر على مختلف مؤشرات جودة الحياة. إن أكثر من 60% من جميع الكيلومترات المقطوعة في جميع أنحاء العالم تحدث الآن في المناطق الحضرية، مما يجعلها أكبر مصدر محلي لتلوث الهواء في المناطق الحضرية وأكبر مصدر عالمي لانبعاثات الكربون المتعلقة بالنقل. (Van Audenhove, Korniiichuk et al. 2014)

بالإضافة إلى ذلك، يعتبر أن الأداة الرئيسية لمعالجة هذا التغيير على المدى الطويل هي توسيع وسائل النقل العام لجعلها نظامًا أكثر انتشارًا من استخدام السيارة الخاصة. وفقًا (Hull (2008) فإن الحد من استخدام المركبات الخاصة مع زيادة الاعتماد على خدمات النقل العام يتطلب دمج تخطيط استخدام الأراضي وتخطيط النقل. ترتبط هذه الحجج ارتباطًا وثيقًا بقضايا تغير المناخ ومبادرات خفض انبعاثات الغازات المسببة للاحتباس الحراري.

تنقسم هذه الورقة البحثية إلى ثلاثة أقسام. يقدم القسم الأول مقدمة موجزة لفكرة تخطيط التنمية المستدامة للمدينة مع التركيز على الدمج بين التخطيط الحضري المستدام والتنقل الحضري المستدام في إطار مخرجات خطة التنمية المستدامة لعام 2030. في القسم الثاني، يتم عرض امثلة للتنقل المستدام وعلاقته بتخطيط مدينة مستدامة. أخيراً، اختتمت الورقة البحثية بدروس رئيسية يمكن للمدن في البلدان النامية من اعتمادها لتحقيق الدمج الناجح بين التخطيط المستدام وأنظمة التنقل الحضري المستدامة. **الكلمات الرئيسية:** التنقل ، الاستدامة ، النقل المستدام ، استخدام الأراضي / تكامل النقل ، التنمية المستدامة ، BRT (النقل السريع بالحافلات)

1. Introduction

Today, cities can be planned on a variety of transportation and urban form combinations, each with varying degrees of accessibility. According to Glaeser and Kahn (2004), these combinations can range from small, walkable cities that rely on public transportation to enormous, car-centric cities, and different varieties can be found around the world at various stages of development. As The focus of this paper is on how an integrated sustainability approach to transportation planning frames the task of developing general planning strategies as a task that radiates out into different policies for directing investments in settlement development and physical infrastructure, putting in place technical solutions (including digitalization measures), intervening for mobility management, and mobility management strategies for behaviour modification. The issue of planning for sustainable land use and transportation varies depending on the level of infrastructure and economic development in a city.

Integrating sustainable urban mobility within sustainable city planning is essential for creating cities that are designed and managed with the long-term health of the environment, economy, and society in mind. One example of this approach is the implementation of Bus Rapid Transit (BRT) systems, which can reduce congestion and air pollution, improve mobility for all citizens, and lead to more liveable cities. As cities all over the world become increasingly more populated, the need for sustainable urban mobility is becoming a critical issue. Climate change is heavily impacted by the negative implications of the various types of transportation, and yet cities in developing countries are the main target for the increasing ownership of personal fossil-fuelled vehicles. This paper attempts to explore how cities can integrate sustainable urban mobility into their sustainable city planning, with a particular focus on the use of Bus Rapid Transit (BRT) as an example. It discusses the most recent developments in sustainable mobility, including public transportation, non-motorized facilities, strategies for managing travel demand, more environmentally friendly technologies, and different forms of transportation. The potential advantages of BRT for cities will also be examined, along with the difficulties that must be overcome to successfully implement BRT. It will then consider how this strategy may affect future sustainable cities.

2. Concept of Sustainable Land-use Development

By incorporating sustainable development principles into urban planning strategies, policies, programs, and projects, sustainable urban mobility is achievable. Based on the recurring connection between land use and transportation systems, new transportation infrastructure improves connectivity and growth. The Global Report on Human Settlements (2013) emphasized the significance of this integration. As a result, the nearby land is put to more intensive use, increasing the network's need for new traveller volume. While grasping this fundamental relationship is simple, developing public policy that uses this dynamic relationship between land use and transportation demand for advantageous social, economic, and environmental ends takes concerted effort.

According to Tumlin (2012), sustainable city design starts with the human body and its needs; public health for the human body depends on walking 10,000 steps a day. Thus, the first principle for a sustainable city is that walking should be delightful (Tumlin, P.37).

The Global Report on Human Settlements from UN-Habitat in 2016, also examined the connection between mobility and urban form and urged the development of smaller, more effective cities in the future. This highlighted the importance of urban planning in the creation of sustainable cities where non-motorized travel and public transportation serve as the main modes of transportation. In Habitat 3, (P. 14), rather than just lengthening the length of the urban transportation infrastructure, urban planning and development should focus on how the development of communities will bring people and places together based on connectivity. Another important factor is the urban form and functionality of the city, which emphasizes the importance of integrated land use and transport planning (Habitat 3, P.41). Many authors addressed the issue of sustainable cities through a review of sustainable mobility in recent publications. This reviews the relevant literature on four key components, namely: (Kennedy, C., E. Miller. A. Shalaby. Maclean, H., and J. Coleman, pp. 393-414, 2005).

- (1) Establishing efficient organizations for integrated land-use transportation planning.
- (2) Creating efficient, effective, and long-lasting funding sources.
- (3) Investing strategically in important infrastructure; and.
- (4) Fostering investments through regional planning.

The 2013 UN-Habitat Global Settlements Report discussed a range of solutions to issues with public transportation around the world while outlining trends and developments. Additionally, it examined the connection between urban form and mobility and advocated for a more compact, efficient city in the future (UN-Habitat, 2013).

Barnett outlined four interconnected steps in 2015 for developing an eco-design framework that can guide the development of cities and suburbs. (J. Barnett, and L. Beasley, 2015):

- (1) Adapting development to already-inevitable climate change while preserving the environment for the long term.
- (2) Maintaining a balance between different forms of transportation in order to reduce traffic congestion and support towns that are smaller and more efficiently run.
- (3) Replacing outdated government incentives and development rules that continue to influence urban growth negatively.

The potential of this public domain is explored to shape the public realm for the environment, including reshaping streets, public spaces, and public buildings to make a liveable environment accessible to everyone, rather than just wealthy people living in a few select areas.

3. Literature Review on Mobility, Accessibility, Eco-mobility, and Land-use

As two of the primary elements of the transportation system, accessibility and mobility have received plenty of attention in the currently available literature, Salomon, and Patricia (1998, pp.129-140) defined mobility as a demand for goods or services, where the price is an essential component of the requirement. Travelling for pleasure and satisfaction qualifies as an activity, whereas travelling for a specific purpose qualifies as a derived demand. Sustainable mobility is defined in broad terms by the World Business Council for Sustainable Development (WBCSD) in 2001 as "the ability to meet the needs of society to move freely, gain access, communicate, trade, and establish relationships without sacrificing other essential human or ecological values, today or in the future" (WBCSD, 2001). Although Chawla (pp. 14-20, 2012), identified travel choices based on place of residence, place of employment, and place of activity. It is also a tangible result of interactions between a society's physical requirements, cultural backgrounds, and historical land availability. Therefore, the movement of people or objects is referred to as mobility. This acknowledges both driving and using public transportation but continues to treat the movement as a means rather than an end. It frequently considers accessibility-affecting land-use factors or non-motorized modes of transportation.

(Litman, 2003)

While accessibility is described as "the extent to which the land-use and transportation systems enable (groups of) individuals to reach activities or destinations" (Geurs and Wee, 2004; p. 128). Accessibility also refers to the capability of obtaining desired goods, services, activities, and destinations (collectively referred to as opportunities). The physical concentration of people, services, economic activity, and trade is the main principle of achieving accessibility in cities. The key distinguishing features in this regard are residential and workspace density; the division of services and level of mixed-use, the degree of centralization, and local-level urban planning. Greater accessibility frequently makes for denser, more compact cities, or "smart growth," which is one way to describe this phenomenon. Creating accessibility based on physical accessibility necessitates a special focus on human-scale planning, design, construction, and urban management. This viewpoint presupposes that there may be numerous ways to enhance transportation, including enhanced mobility, enhanced land-use accessibility (which shortens the travel time between destinations), or enhanced mobility substitutes like delivery services or telecommunications.

Accessibility also reflects land-use patterns, which determine where activities are conducted, as well as mobility, which refers to a person's capacity for travel. This viewpoint takes into account accessible land-use patterns and non-motorized transportation options. Greater compactness, mixed-use, walkable communities, and other factors that cut down on the distances that people must travel to get where they're going tend to optimize accessibility.

The above definition identifies accessibility as a more sustainable form of travel than mobility but has recently been revised to define mobility as a combination of the above components of a transportation system. (Litman, 2003)

On the other hand, Eco-mobility, is a policy for developing and managing local areas and cities that support practical, low-pollution, environmentally friendly mobility, as well as the living environment. Eco-mobility is the practice of moving around using integrated, socially inclusive, and environmentally friendly modes of transportation, with a focus on shared mobility, walking and bicycling, and public transportation. It is a crucial component of low-carbon, sustainable urban transportation and has numerous positive effects on the economy, society, and the environment. (WBCSD, 2004)

In contrast, the definition of eco-mobility in the literature can be broken down into three main themes. One could be referred to as an economist's definition in its most literal sense. A total of two cases were on display at the landmark OECD International Conference on Sustainable Transportation, which took place in Vancouver in 1996. According to Nelson and Shalow, eco-mobility is when all future discounted per-capita social costs associated with the transportation system are equal to or lower than the costs in a chosen reference year. The authors of this definition claim that the key component of their definition is "increased costs are not passed to succeeding generations."

The alternative definition example put forth by Schipper reads, "Transportation where the beneficiaries pay their full social costs, including those paid by future generations, is sustainable." (OECD Proceedings, 1996)

The second type of definition focuses on environmentally friendly transportation (EST). The Organization for Economic Cooperation and Development (OECD), as part of its project on environmentally sustainable transportation, has put forth two different versions of this type of definition. The briefer version is: (Gilbert, 2005)

'An accessible transportation system that is environmentally sustainable uses renewable resources at rates below those of their regeneration and non-renewable resources at rates below those of the development of renewable substitutes. It also does not endanger human health or ecosystems.'

Finally, the goal of "eco-mobility" is to safeguard both the environment and human health without reducing the need for travel. Reaching the goal of sustainable mobility assumes that the proportion of automobiles in urban daily travel is decreased, as cities serve as an appropriate scale for the application of sustainable policies. (Camagni et al., 1998, p103).

According to this viewpoint, the quality of transportation is equally influenced by land use as it is by mobility, and various land-use patterns encourage various forms of accessibility.

4. The sustainable urban mobility

The work of Banister, who in 2008 introduced "The Sustainable Mobility Paradigm," serves as a guide when examining the potential for sustainable urban mobility. This idea presents an argument that is still very relevant today and has striking similarities to the avoid/shift/improve correlation. With its focus on mobility, Banister's paper adopts a social perspective. It suggests that the creation of sustainable urban mobility be framed within an all-encompassing strategy that includes mobility management interventions, land use planning, regulatory development, and technology use strategies (Banister, 2008, p73). These four components continue to be key components of current strategies for the advancement of sustainable transportation. The World Bank Council for Sustainable Development (WBCSD, 2001), for instance, defines sustainable urban mobility as "the ability to meet the needs of society to move freely, gain access, communicate, trade, and establish relationships without sacrificing other essential human or ecological values today or in the future".

According to Litman (2003, p. 28), a settlement's travel demand is influenced by several variables, including its population makeup, level of economic activity, cost of vehicle ownership and maintenance, accessibility to and cost of public transportation, level of traffic congestion, availability of non-motorized transportation options, vehicle sharing options, land use development patterns, and health and environmental concerns. Sustainability is inherently unstable because the future will be impacted by the choices we make and the actions we take today. To change the connections between transportation and land use and to better understand the complex movement needs of people and goods in cities, sustainable urban mobility offers an alternative concept. For this alternate strategy, the future of cities in relation to current infrastructure (i. e., reality), desirability (what are the community's needs and expectations?), and the contribution of transportation to achieving the aforementioned goals of the city (Banister, 2008). Finally, the Brundtland Commission Report's definition of "sustainability" for transportation is "a set of transport activities together with relevant infrastructure that collectively do not leave problems or costs for future generations to solve or bear." Here, the cost does not only include environmental degradation but also the social and economic impacts of transportation.

4.1 The Principles of sustainable urban mobility

One of the main questions raised in the literature review is, 'Is it possible to incorporate the principles of sustainable urban mobility into the operation of modern cities?' To answer this question, we need to identify the principles of sustainable mobility, which are arranged under four guiding parts as shown in table (1).

Table (1), Guiding Parts for Sustainable Mobility

| Access | People and Communities | Environmental Quality | Economies Viability |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>The social and economic well-being of communities depends on having access to things like people, places, goods, and services.</p> <p>Access can be attained through different means, not just transportation.</p> <p>Communities have access to effective. Infrastructure needs to be carefully expanded to improve the transportation system.</p> | <p>The environment's limited ability to absorb waste can be overloaded by human activity, which can also physically alter or destroy habitats and use resources more quickly than they can be replenished or replaced. It is necessary to make efforts to create transportation systems that reduce physical and biological stress while respecting other people's needs for habitat and the assimilative and reparative capacities of ecosystems.</p> | <p>A strong economy depends on effective transportation systems, which can also directly improve a community's sense of belonging and quality of life.</p> | <p>Cost-effectiveness is a requirement for sustainable transportation systems.</p> <p>if moving toward more sustainable model results in adjustment costs. Just as current costs ought to be distributed more fairly, so too should transportation systems.</p> |

Source: Adapted from (OECD International Conference, Vancouver Canada, 24-27 March 1996)

5. Sustainable Urban mobility in the 2030 Agenda for Sustainable Development

A shared document for the prosperity of people and the planet, both now and in the future, is provided by the 2030 Agenda for Sustainable Development, which was adopted by all United Nations Member States in 2015. The 17 Sustainable Development Goals (SDGs), which are an urgent call for action by all nations, developed and developing, in a global partnership, form the foundation of this movement. These goals highlight that to combat climate change, improve health and education, lessen inequality, and promote economic growth, we must also work to preserve our forests and oceans while also eradicating poverty and other forms of deprivation.

The Sustainable Development Goals (SDGs) serve as the central tenet of the 2030 Agenda for Sustainable Development and as the blueprint for all national, regional, and international development

initiatives through 2030. Sustainable transportation is integrated across many SDGs and targets in the 2030 Agenda for Sustainable Development. Goal 11's commitment to making cities and human settlements inclusive, safe, resilient, and sustainable offers a once-in-a-lifetime opportunity to achieve both collective and inclusive progress and global sustainable development.

5.1 Sustainable Development Goal (11)

Cities' spatial organization is guided by and determined by their transportation infrastructure. Growth can be accommodated without enlarging urban areas by integrating transportation and land-use planning. As research has repeatedly shown, the world's most unsustainable communities are sprawling cities. The fact that Goal 11 of the 17 Sustainable Development Goals (SDGs), which were endorsed by the United Nations in 2015, includes making cities sustainable is therefore no coincidence. The eleventh goal, "Make cities and human settlements inclusive, safe, resilient, and sustainable," was included in the list of 169 goals, which included 10 goals to be accomplished by 2030. Concerning the sustainable transportation system Target 11.2 states, "By 2030, ensure that everyone has access to safe, affordable, accessible, and sustainable transportation systems, improving road safety, particularly by boosting public transportation, and paying particular attention to the needs of those who are most at risks, such as women, children, people with disabilities, and older people". (SDGs, 2015),

First acknowledged at the 1992 United Nations Earth Summit, the role of transportation in sustainable development was later reaffirmed in Agenda 21, the summit's outcome document. The UN General Assembly further noted that over the following twenty years, transportation would be expected to be the major driving force behind a growing global demand for energy (In fact, it is currently the largest end-use of energy in developed countries and the fastest-growing one in most developing countries). This was done as part of the five-year review of the implementation of Agenda 21 during its nineteenth Special Session in 1997. Furthermore, the Johannesburg Plan of Implementation (JPOI), which was the outcome document of the 2002 World Summit on Sustainable Development, once again reflected the importance of transportation. In terms of infrastructure, public transportation systems, networks for the delivery of goods, affordability, effectiveness, and convenience of transportation, as well as an improvement in urban air quality and health and a reduction in greenhouse gas emissions, JPOI provided numerous anchor points for sustainable transport.

Recently, transportation has continued to receive attention on a global scale. The 2012 United Nations Conference on Sustainable Development (Rio 20) brought together world leaders whom all agreed that transportation and mobility are essential to sustainable development. Accessibility can be increased, and economic growth can be boosted by sustainable transportation. Better economic integration is achieved through sustainable transportation while still protecting the environment. enhancing social equity, health, city resilience, links between the urban and rural areas, and rural productivity.

Later, the UN Secretary-General named transportation as a key element of sustainable development as part of his Five-Year Action Agenda. To accomplish this, the Secretary-General created and launched the High-Level Advisory Group on Sustainable Transport (HLAG-ST) in August 2014. This group includes representatives from all modes of transportation, including road, rail, aviation, marine, ferry, and urban public transportation providers. At the inaugural Global Sustainable Transport Conference in November 2016, the Advisory Group's policy recommendations were presented to the Secretary-General in a report on the state of sustainable transport worldwide titled "Mobilizing Sustainable Transport for Development". (SDGs, 2015)

6. Integrated sustainable urban mobility and Sustainable Land-use Planning

Cities are developing and expanding quickly, and as the population grows, so do the demands for more diverse types of housing, jobs, and services. This leads to a growth in the usage of transportation means and the number of vehicles on the roads. Any city's patterns of urban growth are inextricably linked to the advancement of urban mobility and transportation. Similar to how urban form cannot be understood in isolation, neither can urban transportation (Newman and Kenworthy 1989; ECOTEC 1993; Houghton 1995; Newman and Kenworthy 1996; Knoflacher, Rode et al. (2008), Dimitriou and Gakenheimer (2009), and UN-Habitat (2013)).

The sum of these elements enhances accessibility⁴ within metropolitan areas, resulting in economies of scale, agglomeration effects, and networking advantages. Recognizing the interdependence between transportation and urban form is especially crucial at a time of unparalleled urban expansion. According to some projections, the total area of urbanized land may quadruple between 2000 and 2030 (Seto, Güneralp et al. 2012), and the number of urban miles travelled may triple by 2050 (Van Audenhove, Kornichuk, and colleagues (2014)). Such a drastic transition would carry enormous risks related to maintaining energy-intensive patterns of accessibility and urban form for decades to come. Since land use and transportation are both interdependent, it is crucial to achieving integrated planning for both. Urban design and urban planning are interconnected, complex systems that include urban mobility and transportation. Town planning plays an important role in helping to change land-use patterns, reduce or increase vehicle dependence, and sustain land-use and urban development to incorporate a combination of integrated uses and public transport systems. The provision of transportation systems, according to Escobar (2011), "has a large influence on the form of the built environment and people's quality of life.". However, reducing the use of private cars requires a set of planning and fiscal policies with a comprehensive transport strategy. Land-use policies can exacerbate environmental problems and air pollution impacts. High car ownership has encouraged development outside towns even in places where public transport is not accessible. As a result, people and businesses have been redistributed away from the original urban areas. In contrast, sustainable planning strategies must promote healthy urban development, the redevelopment of underutilized urban land, and the reuse of already existing land. Where transportation and planning must be closely related to one another. An important element in the integration of sustainable land-use planning and sustainable urban mobility process is the ability to analyse the effect of various policy tools in an integrated matter (figure 3). Thus, smart growth is a must policy tool for a sustainable city by its very nature since sustainable smart growth deals with both sustainable land use and sustainable urban mobility.

Newman and Kenworthy (1989) contend in their book that the evolution of urban transportation and mobility is inextricably linked to patterns of urban development in any city. Furthermore, it is impossible to separate sustainable land-use planning from sustainable mobility. The fundamental thesis of the book is the necessity of reinforcing the significance of those who plan transportation infrastructure and land use in cities as a means of addressing the crucial issue of how to make a city less dependent on the automobile. Combining the two makes metropolitan areas more accessible, which leads to increased economies of scale, agglomeration effects, and networking benefits. Understanding the connection between urban mobility and land-use planning is especially crucial at a time of unprecedented urban expansion. The total amount of urbanized land may triple between 2000 and 2030, according to recent studies (Seto, Güneralp, et al. 2012). By 2050, the amount of urban travel could triple (van Audenhove, Kornichuk, et al., 2014). By continuing with energy-intensive connectivity practices and expanding land use (densities, land use patterns, and linkages), which serve as mobility generators and create the spatial framework for sustainable mobility on a human scale, this massive transition will pose enormous threats for decades to come (Ang and Marchal, 2013). The urban form results from the functional

relationships between the service provider of the urban environment and the needs of the daily households, while Newman and Corn (both) showed that the shape of the city is determined by the size and structure of urban centres. Stead and Marchal, 2001, emphasized that the urban form results from the level of access between the destinations represented in two dimensions, the first through the scale of the spatial structure and the second are the pattern of mobility. While Moughtin explained the relationship between the design of urban space and the nature of use and how individuals will reach these spaces, emphasizing the human scale in the sustainability of the spatial structure of the urban environment. As well, as patterns of urban form concerning transport through the main features of the urban form and its capacity to absorb the large number of passenger and cargo traffic between and within cities. [Moughtin, p165]

The debate about whether particular urban forms, in terms of their shape and density, can have an impact on the sustainability of cities has a relatively long discussion academically and in practice, especially on the impact of urban form on many elements of sustainability, such as social equity, transport, and mobility, ecology, economic performance, pollution, and health.

This requires urban planning to move away from the strict zoning regulations that have resulted in the physical separation of activities from functions, expanding the need for travel and commuting. To promote social diversity and functional diversity, cities should promote mixed land use. Success in this area is crucial for developing equitable, healthy, and productive urban living spaces that are beneficial to both people and their environment. It is also crucial for developing sustainable cities and urban transport systems. Van den Berg explained that sustainable mobility by walking is the basis of the city's appeal that meets the requirements of aesthetic values of spatial characteristics that are relevant to users to shift from perceived space to aware space by following the logic of spatial relations by applying the mechanism of accessibility within the local boundaries of the human scale and modes of sustainable mobility by walking. Cycling and the integration with other sustainable transport modes such as trams, metro, and buses, is a strategy adopted in the creation of modern sustainable mobility modes. [Van den Berg, pp42-76]



Figure (2) different combination of urban mobility

Source: <http://mmmgrouplimited.com/mmm-sustainable-mobility-healthy-communities-summit/>

Nowadays, there are a variety of ways to base urban agglomerations on urban forms and transportation, each of which offers varying degrees of access. These variations range from large car-oriented

communities to walkable, small towns that rely on public transportation (Glaeser and Kahn 2004). Various types can be observed at various stages of development in various regions of the world. To support sustainable growth, cities must adopt integrated mobility strategies. The existing transportation systems are largely to blame for the problems that plague contemporary cities and pose a threat to their viability.

Much of the problems that plague contemporary cities and jeopardize their sustainability can be attributed to the existing transportation systems, making it important to achieve sustainability in urban planning and urban transportation. Scott and Joseph (2011) claim that the land-use system and sustainable urban transportation should take into account the following factors: (Scott A. and E. Ben-Joseph 2011)

- Enables all urban residents to have effective access to goods and services.
- Preserves the biodiversity, cultural legacy, and environment for the current generation.
- It does not endanger the chances of future generations to enjoy, at the very least, the same standard of living as those who are currently alive, including their connection to the natural world and cultural heritage.

A. Hadenius, however, likewise, J. Ericson. (2006) claim that a variety of thematic areas may reflect these factors.

- Coordinating land use and transportation planning to cut down on driving.
- Managing the demand for automobile traffic in other ways.
- Constructing infrastructure for non-motorized transportation, like bicycle lanes.
- Promoting the availability and utilization of public transportation.
- Increasing the efficiency of fuel and vehicle technologies.
- Currently, a variety of design standards are being used at local, urban, regional, and national levels to achieve the goals of sustainable transport.
- A district with dense planning and a mix of compatible uses.
- Cities should plan for efficient public transportation, affordable housing, and compact, thriving sub-centres.
- Regional: urban renewal, demand management for transportation, economic incentives and disincentives, and regulations.
- At the national level, investments, and coherent policy frameworks. The Tianjin Eco-city, created by the Tianjin Urban Planning Institute and the China Academy of Urban Planning and Design, is an intriguing example of integrated land-use and transportation planning for sustainable urban development. The modular "Eco-cell" concept is used to plan the Eco-city. - Each cell is roughly 400 m by 400 m in size, which is generally regarded as a convenient walking distance. An eco-neighbourhood made up of four eco cells is called an eco-neighbourhood. An eco-district is made up of many eco neighbourhoods. (Tianjin Eco-City, Singapore, 2012)

How this might be done is shown in Figure (3). The right and left columns, respectively, outline typical land-use planning and transportation outcomes. The integration of land use and transportation, however, is most likely to be important for economic development in urban areas and regional areas where it is possible to locate industrial and commercial development to reduce the need for transportation. Planning for transportation and land use that does not directly contribute to the desired outcome for transportation and land use is referred to as coordination.

Although it is possible to locate industrial and commercial development to reduce the need for transportation, urban settlements and regional areas are most likely to be relevant to land use and

transport integration. Planning for transportation and land use that does not directly contribute to the

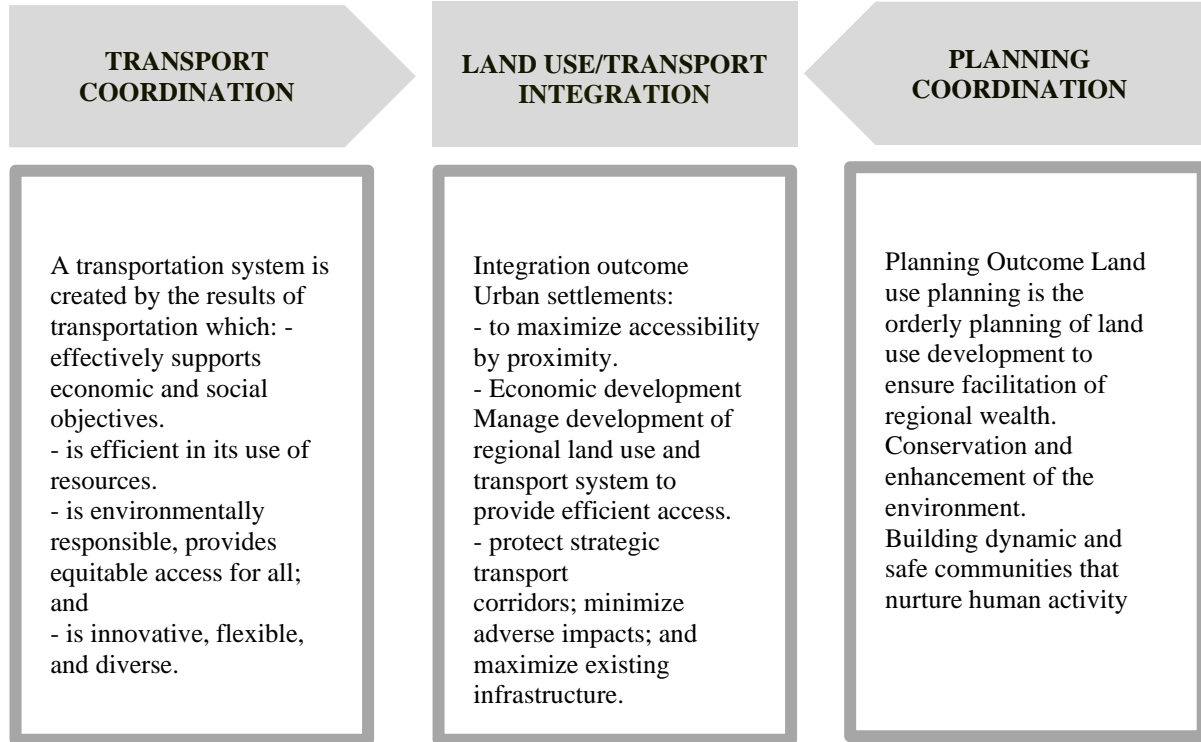


Figure (3) Integration of Land-use and Transport outcomes

Source: An institutional model for land-use and transport integration Urban Policy and Research 22(3) September 2004:277-297

desired outcome for transportation and land use is referred to as coordination

7. BRT as an Example of a Sustainable Urban Transportation

A BRT system is described in the BRT standard (2013 edition) as "a section of a road or contiguous roads served by a bus route or multiple bus routes that have dedicated lanes with a minimum length of 4 km.". BRT is widely used because it is easy to implement and doesn't cost a lot of money. Fundamental urban transportation technologies have not changed significantly in recent decades, and the development of urban mobility has been largely fueled by the inventive use of already-existing technologies. One of the best examples is bus rapid transit (BRT), which has transformed conventional bus technology into a high-capacity urban transportation system. The possibilities for bus-based public transportation services have been transformed, and the status quo has been challenged by reallocating road space above private vehicles in favour of buses. Dedicated lanes, pre-boarding ticketing, and specially designed bus terminals have all contributed to this. By transforming them into high-capacity public transportation corridors, BRT can solve the crucial problem of urban highway lock-in. The first BRT system was put into place in Curitiba, Brazil, and it works in tandem with the improved bike and pedestrian infrastructure. BRT was first implemented in Curitiba, Brazil, where it was combined with better cycling, pedestrian, and land-use policies to reduce both gasoline consumption and income spent on transportation (only 10% of the average citizen's income is spent on transportation, one of the lowest in the country) and resulted in the city having one of the lowest accident rates in Brazil (Efroymsen and

Rahman 2005). Following Bogota's successful scaling up of BRT, the service is now in use in more than 166 cities worldwide (Embarq 2013).

8. Case Studies

This section of the paper will identify the solutions and measures implemented in different regions that addressed the integration of sustainable land use and sustainable mobility. Many cities across the world have implemented public transportation enhancement plans based on BRT technology that include current paratransit operations. Latin America, in particular (Curitiba, Brazil), has witnessed major investment in the progressive implementation of urban BRT networks that either partially or absorb paratransit operations. The planned BRT networks in Dar es Salaam build on this tradition, and challenges that have arisen in areas where BRT was brought into a system that previously relied on paratransit operations may be instructive in how BRT is approached. Greater Cairo's new BRT is an ambitious project that is underway to integrate public transportation sustainably. These examples may assist to temper high expectations about what can be accomplished when incorporating paratransit into BRT systems.

8.1 Greater Cairo, Egypt

One of the most populated nations in both Africa and the Middle East is Egypt. Egypt's current population, based on the most recent UN estimates, places it at the 14th position on the list of nations by population (Egypt population, Worldmeters; 2022)

Egypt's capital city, Cairo, has a population of 12 million people, according to estimates from 2016, and a total of 20.5 million people live there, making it the largest metropolis in Africa and the Middle East and the 17th largest in the world (Cairo Population 2018). accessible from.

Due to the development of new communities nearby, Greater Cairo is growing in size. One of the highest population consistencies in the world is caused by both population growth and the high rates of migration from rural to urban areas. High levels of pollution and commercial traffic are caused by this high viscosity. Because it was concerned over this issue, the Egyptian government is expanding its road infrastructure to lessen business traffic. Elkaramany noted that in 2015 over 97 per cent of Egyptians used other forms of public transportation and that not everyone in Egypt can purchase a car. Given that their jobs, educational institutions, and services are located in various locations, people's maturity depends on being able to travel between locations using public transportation. When a person's income rises in Egypt and she/he can purchase a private car with cash or with inaugurations, she/he will choose to drive rather than take public transportation when the available public transportation is poor quality, unsafe, unreliable, and uncomfortable.

Consequently, investments in public transportation have risen and diversified, including a proposed Bus-Rapid-Transit (BRT) system on the Ring Road (100km).

These initiatives will considerably improve accessibility and expand the population's ability to connect to the network. The network itself will grow more valuable to utilize as it expands.

Investments in the road network, which include the construction of significant new interstate highways and the enlargement of inner-city boulevards, are changing the urban environment in favour of car-centric streets.

While this increases availability, concerns have been voiced about whether the reduction in traffic congestion will endure as long as road safety concerns exist.

These new investments, however, represent a substantial departure in Egypt's urban planning paradigm. Unlike in the past, when all eight NUCs in the GCR were simply connected to the city by a road network, new developments are increasingly developed and executed around the expanding transit network. With regard to new construction, transit-oriented development promotes maximizing the amount of residential, commercial, and recreational space that can be reached by foot from public transportation.

It is widely recognized as a top technique for urban planning. Aside from revolutionizing public transportation, the BRT project has the potential to significantly improve pedestrian and cycling conditions. Because many BRT passengers will walk, corridor designs should facilitate safe access for non-motorized transport (NMT) users. Corridors necessitate unobstructed, uninterrupted, shaded, and well-lit walkways. BRT lines also necessitate high-quality bicycle infrastructure. This paper evaluates current street conditions for NMT users in six major areas along the eastern and western BRT circuits.



Figure (4), Locations of the BRT stations, GCR Ring Road and First BRT to be built in GCR

8.2 Dar es Salaam, Tanzania

One of the cities with the most rapid growth worldwide is Dar es Salaam, the capital and largest city of Tanzania. By 2030, its population is projected to more than double, reaching 10 million. It is imperative to create effective transportation systems as Dar es Salaam and other African cities continue to grow. Dar and other African cities have struggled to reach higher levels of investment and development because of a lack of formal public transportation, expanding sprawl, and severe traffic congestion, which is all exacerbated by the difficulties posed by complicated and disjointed institutional structures.

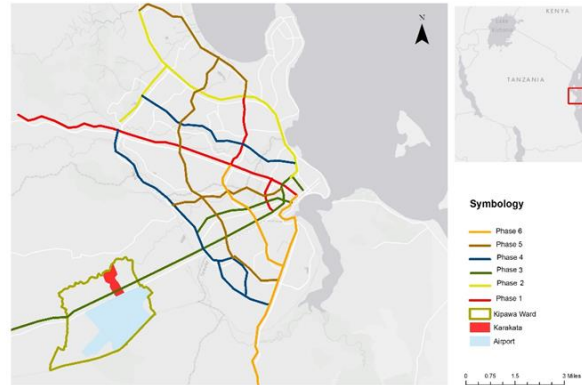


Figure 2, BRT expansion by phases in relation to the community of Karakata, Dar es Salaam

Source: <https://urbancataloged.wordpress.com/maps-and-graphics/>

The first phase of a BRT network that has the potential to revolutionize rapid transit in African cities, the Dar es Salaam bus rapid transit system, opened on May 16, 2016. The first top-notch BRT in East Africa consists of a 21-kilometre trunk route that connects residential areas to the city centre. 140 buses are used to transport more than 160,000 passengers each day at speeds, comfort levels, and reliability which rival the best rapid transit systems in other parts of the world. In particular, in the city centre, the system's dedicated busway makes the best use of the most competitive and limited urban space. The system is anticipated to carry roughly 400,000 passengers per day by the middle of 2018, when the first phase, which includes more than 300 buses, becomes operational. For residents who previously spent up to four hours per day stuck in traffic, commute times have been cut in half or more. Some bus fleets offer express service to important destinations at stations with passing lanes, saving even more time.

Cycle paths, sidewalks, and increased pedestrian safety are all features of a planned corridor, which also has at-grade pedestrian crossings that are thoughtfully designed and adhere to the universal access principles. The project, which is being carried out in six stages, will provide the entire city with top-notch BRT service as well as the infrastructure needed for walking and bicycling. The second phase of DART, on which work is slated to start this year, is supported by the African Development Bank, and the third and fourth phases are supported by the World Bank. The government is collaborating with a wide range of stakeholders to develop a Corridor Development Strategy (CDS) as part of the Dar es Salaam Metropolitan Development Project (DMDP), which is funded by the Nordic Development Fund and the World Bank. The primary goal of the CDS is to create an integrated land-use and transportation plan that includes guidelines for detailed development, densification, and a BRT network. Additionally, suggestions for TOD and plans for upcoming BRT intersections for pedestrian-oriented development (POD) will be included. Mid-2018 saw the completion of the CDS. The development of specific proposals for the corridor, including guidelines for urban planning and design, suggestions for pilot TOD nodes, implementation strategies, and potential business models for securing private financing, will take place in the project's next phase.

As a result, Tanzania's Dar es Salaam is given the 2018 Sustainable Transport Award. Michael Kodransky, Chair of the Sustainable Transport Award Committee, called this initiative "revolutionary" and "inspiring" for other African cities building sustainable urban transportation systems. (ITDP, 2017)

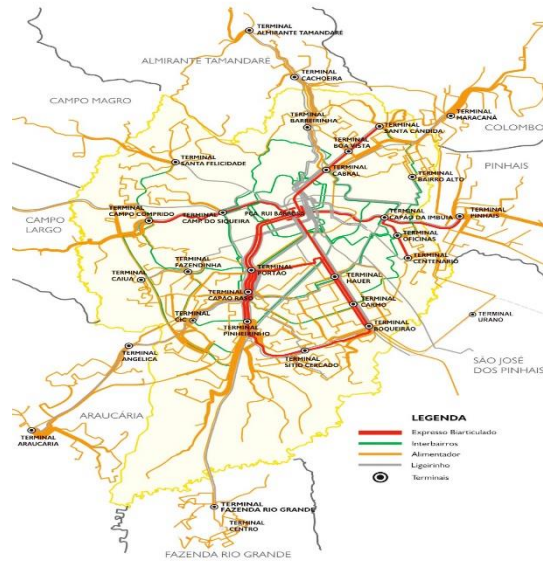


Figure (6) Curitiba city map
 Source: Efficient transportation for successful urban planning in Curitiba, Brazil
<https://www.solutions-site.org/node/83>

8.3 Integrated transportation planning in Curitiba, Brazil:

Curitiba was able to absorb large population growth without spoiling the urban environment or losing its economic effectiveness by dividing it into regions, public housing policies for growth, corridor design, and public transit services. This program is based on the use of existing organic patterns of land use to create a clear street structure that identifies the functions of the city streets, considering the types of transportation used in each route. The city has also created priorities and road rights for public transportation separate from private transport to allow for maximum operational efficiency of public transport routes and to encourage increased public transport passengers. In addition, structural axes have been created based on the city's growth pattern, so that these axes combine population and commercial activities along the general transit line. Each axis consists of two blocks or two clusters of high-density areas close to three major transport corridors, each assigned a particular mode of public transport (ICLEI, 2002)

Curitiba has integrated considerations for the sustainability of transportation, and this is reflected in its plans for either business development, street infrastructure development, or community development. The city first drew up an urban master plan and a structural plan in 1965, which was aimed primarily at identifying the growth of the centre's area and encouraging the growth of the service and trade sector along two main arteries of the southern northbound traffic, which graduated from the city centre. The structural plan's goal is to increase economic support for urban development through the creation of industrial zones, which will encourage residents to become self-sufficient and offer all facets of the city sufficient parking, health care, recreation, and education. In order to accomplish its goals and maintain the flexibility of setting up a centre for urban research and planning in the city to coordinate, modify, and oversee the preparation of the plan, the plan also called for the integration of traffic management, transportation, and land-use planning (Crest, 1993). The following are considered:

- (1) **Regions and land use:** The development of the master plan provides some guidelines for the flexibility of movement and land use, which must be shared if the design of the future city is to succeed. The officials of the city have developed a land and transportation policy that requires high-density development of multiple uses along the main north-south arterial road to find the necessary number of people to support public transportation using them, so that residential development focuses on arterial roads, taking into consideration services such as water, drainage, and public transport, in addition to additional housing development occurring in four areas designed to develop development within bus routes and proximity.
- (2) **Planning the street infrastructure:** By 1982, the city's arterial street network extended in three east-west directions into five arterial streets. These new streets, which penetrate the city's commercial centre, were created on already existing streets in line with demographic growth trends. A ring road around the city centre has been developed to allow movement between parts of the city without passing through its main arterial street design area. To achieve the objectives of the master plan, these arteries have changed over time to give priority to public transport.

Each of these five routes has a one-way bus route track or internal line and is either: a local car lane or a one-way high-capacity track for both vehicle and bus use. The separation of the types of cars and the creation of bus routes in the arterial streets have helped to create characteristics of the city's transport system, which include the creation of a real, safe and efficient bus service that operates without the problems associated with the bus service resulting from the mixing of traffic and intensifying development along the bus routes.

- (3) **Bus system:** About 1100 buses are carrying about 12,500 trips a day and serving 3.1 million passengers, equivalent to 55% of the total demand for transportation in the city. Five different types of buses have been operated in the city. These include buses express or buses, and bus routes. The second type is buses rapid, which are fast buses working on arterial roads and other main streets in the city and changing routes depending on demand. These buses can carry 110 passengers and stop at the bus stops in the form of channels to protect from the weather and to facilitate the entry and exit of buses (suitable for people with disabilities) Type III bus "articulated-bi new form of express buses and occupy the high-capacity external tracks. Three buses, connected to two joints and capable of transporting 270 passengers, have been built and developed in Curitiba to serve five tubular waiting stations, and the city offers 27 of these buses as an alternative to the train rail light. Type IV: Buses within the regions, which bring passengers between the parts of the city and are located between the arteries and also serve the roads cross



Figure (7), Bus System in Curitiba

Source: http://www.c40.org/blog_posts/curitiba-a-leader-in-transport-innovation

express and articulated routes, and operate on the ring road surrounding the city centre business. The fifth type is the Feeder, a bus that mixes with the traffic in all the other streets of the city and brings passengers to the Terminals District, where commercial activities and local urban development flourish. By 1989, this transportation system covered 70% of the daily average of city-level flights, increasing the passenger rate and increasing the efficiency of the system, thus operating public transport services at a comfortable level and allowing the city government to operate the system in cooperation with private transport operators (ICLEI, 2002). Ten companies that share the city's routes and effectively divide the city into segments privately own city buses.

A special administrative body of the city manages these companies. With this public and private participation, security, accessibility, and efficiency that the public sector aims to include the objectives of the private sector, which concerns maintenance and operating expenses.

Therefore, more than 50 times as many people use city buses today than there were 20 years ago, but users only spend 10% of their annual income on transportation. As a result, the city's consumption of gasoline per person is 30% less than the eight comparable Brazilian cities (although it has the second-highest per-capita car ownership per car). Along with the quality of the living environment and pedestrian facilities, other outcomes include low levels of pollution and congestion. As a result of the policy of promoting additional development along the five major thoroughfares, traffic has been diverted away from the city centre, which has reduced congestion and promoted other forms of travel there. A network of footpaths has also been established by the city, encompassing roughly 50 residential complexes in the city's core.

The implementation of an efficient, contemporary public transportation system will significantly improve a city's reputation, draw in new investments, and improve the quality of life for residents, according to the integrated transportation planning in Curitiba, Brazil. Dedicated busways, stations, pedestrian access facilities, and terminals are used to provide an effective public transportation system in the brief overview provided of the public transportation systems of Curitiba. Reference is also made to the political regime, the history of public transportation development, the land-use development approach used, and the political dispensation. Through the creation of high-density activity corridors and a land-use masterplan, urban growth can be controlled. Curitiba has had great success creating dense corridors alongside transportation corridors in terms of integrating land use and public transportation planning. Because of the short walking distances (easy access) and high passenger density, this type of land-use development supports public transportation, which greatly enhances the system's ability to generate revenue.

9. Conclusions and Recommendations

The paper concludes that effective sustainable urban mobility plans are a crucial sustainability element in the city's sustainable land use plans. To give access to people, goods, and services, each city has created its land use structure and transportation system. It does, still, emphasize the essential generalities of the effective and provident use of land and the increase of land use effectiveness in the city's central area. Additionally, it is stated in the plans that urban activities should take the flexibility of the transportation system and proximity to the city centre into account.

The main approach for achieving sustainable mobility has been public transportation. The BRT, currently under construction, is viewed as a significant sustainability measure in the Greater Cairo Region. The main argument in favour of the BRT is that it won't be possible to meet the increasing mobility needs of GCR residents through ring road development alone because the structure stock suggests that there won't be enough space available for that. Although some restrictions on the use of buses have been proposed (road pricing, parking programs, environmental zones), so far not much of

this has been implemented. In the transport policy, increasing road capacity has also been included, though the sustainability justifications are not complete. Significantly excluding current or anticipated traffic has been the justification for road design. However, among planners, opinions on this matter are less united.

To sum up, the primary applications of sustainable urban mobility investigated in the prior global cases, which were meticulously examined in numerous documents, are summarized for the primary aspects that serve as the foundation of sustainable urban mobility, as per the following points shown in (Table 2).

Table 2. Sustainable Transport and TOD Policies

| Implemented Tactics | Greater Cairo Egypt | Dar es Salaam Tanzania | Curitiba Brazil |
|----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| integration of all forms of public transportation. | The patchwork solutions to the urban were composed of the integration of reform projects and initiatives from local, national, and international actors. mobility issues in the Greater Cairo Region. | rapid bus corridors and corridors for corridor development are integrated. | The BRT concept stood for a thorough integration system. |
| combining land use and transportation planning. | Expanding the mixed-use area around the BRT station on the GCR ring road. | To achieve coordinated land use and transportation planning, give new development top priority. | One of the primary objectives of the master plan was to integrate the planning of land use and transportation. |
| improving the conditions for cycling and walking. | A 40 km/h speed limit was implemented on some streets, giving cyclists and pedestrians the same rights as drivers. | There were local options for accessibility by walking or biking by utilizing small blocks and avoiding mobility barriers. | The municipality also improved the opportunities for people to ride bicycles inside the city by building corridors that encouraged walking and cycling. |
| preventing the expansion of private motorized. | increasing the cost of gasoline, levies on financed vehicles, and driver's license fees while providing | In comparison to Europe, there were few regulations limiting reliance on personal vehicles. | There were very few restrictions on the dependence on personal vehicles. |

| | | | |
|-------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| | more incentives for electric vehicles. | | |
| encouraging the use of accessible and affordable public transportation. | In addition to enhancing all forms of public transportation since 2014, the underground metro network has been expanded to six lanes. | Rail expansion initiatives will reduce travel times for both carpools and vanpools. | expansion of the ternary road system and bi-articulated buses alongside another system to cover the majority of the city. |
| Parking management | To be more productive, parking management still requires regulations. | The City Council was urged to adopt Parking management by the planning commission. | There were lax parking rules. |
| Fare Policy Discounting. | Student, senior, and handicapped categories are just a few of the rules for discounted transit tickets. | The policy on discounting fares has been expanded to cover electronic payments and the majority of residents. | The cost of a ticket can be combined into a single fare for use on public transportation. |

Source: The author draws from a variety of literary works.

The following conclusions are therefore drawn from the above observations:

- The case studies that have been presented can help us learn important lessons. This does not imply that we should use the same systems as those that were put in place there; rather, we should think about adopting the principles that were used.
- In both the land use and transportation, integrated policies perform better than standalone ones. The world's mobility policies and practices are at a crossroads, and citizens everywhere, particularly in developing-countries cities, struggle with issues like limited access to respectable mobility that could improve their quality of life, wasting money and time in congested traffic, and harming and polluting the environment.
- There are various perspectives on what should happen when land use and transportation are integrated, finding a better balance between the use of different transport modes is what integration is intended to achieve. This is accomplished through the use of land, including a rise in the number of quick walks and bike rides and a choice of locations that improve the effectiveness of public transportation.
- Successful applications in the discussed cities show that the process of sustainable mobility is applicable in varied economic, political, and cultural conditions. Cities can cope sustainably with increasing mobility demand as they are faced with rapidly rising populations, changing patterns of shopping, leisure, and work, and growing environmental concerns.

- Through the review of the case studies, it is important to note not only the importance of urban planning to achieve sustainable development, but also the role of management given that most of these cases adopted either association or council to manage transit modes.
- Many cities are interested in concepts such as vehicle-sharing schemes, traffic management systems, and improved integration of different transport modes. Efficiency in urban mobility promotes social integration, economic growth, and easier access to markets, services, culture, and leisure activities. Cities with strong collective, door-to-door public transportation systems, in particular, can generate benefits for residents, businesses, tourists, and government agencies that far outweigh the costs of their operation.
- Sustainable cities depend on transportation to encourage the efficient, effective, and pollution-free flow of people and services, providing everyone with accessible, equitable, and integrated mobility.
- The use of public transportation has greatly decreased the number of trips made by car, which has decreased the number of trips made on the streets. In contrast, there has been a trend to increase the networks of bicycle and pedestrian routes.
- An integrated set of measures aimed at avoiding needless travel, shortening travel times, offering the most environmentally friendly means of transport for people and goods, and increasing the effectiveness of transportation systems through technological advancements and alternative technologies, is the only approach that has a real chance of succeeding. Strategies to influence public opinion and promote acceptance of sustainable modes of transportation are crucial.
- A collective learning process and a mindset shift are necessary for the acceptance of sustainable modes of transportation. A modal shift to appealing, low-carbon transport services should be encouraged by targeted information and advertising campaigns, which must be widely accessible.
- Distances travelled, the number of trips made, and the switch to more environmentally friendly, sustainable modes like car sharing, local public transportation, cycling, or walking.
- All case studies adopted policies to raise the parking toll, increased taxes on private vehicles, and develop policies to reduce the cost of using buses to limit the number and use of cars.
- It is important to establish a public transport authority that determines the establishment of bus routes, passenger fares, parking stations, performance, and operation monitoring.
- Reduce dependence on vehicles through good land-use planning, which reduces reliance on individual vehicles, thus reducing the distance travelled by the vehicle, and improving the quality of the environment.
- The different use of land determines the patterns and scale of trips within the transport system and the change or shift in the path affect the accessibility and makes areas easier to access than others make and thus stimulating development in areas at the expense of others and using new roads more than planned.

10. Recommendations

It can be said that the sustainable planning process for both transport and land use is an integrated process whose various aspects are mutually exclusive. We cannot sustain transport, for example, without cost sustainability and sustainability in planning, so there must be a holistic view and coherent policies of sustainable planning. Sustainable urban transport is closely linked to urban land development, which affects urban growth negatively or positively and must be seen as part of integrated urban strategies to take account of the interests of all users. The majority of developing cities have a population density that allows for both the use of bicycles and public transportation. The expansion of roads encourages the use of more of these cars, and the solution to reduce congestion by increasing the areas of roads but

making good use of the road area and managing the pyramid to separate traffic flows for different purposes. To achieve this, the the following guiding strategies is recommended:

10.1 Ways to Reduce Travel Distance and Time.

- Adopting integrating land-use and transportation planning practices with pertinent local, regional, and national institutional frameworks.
- At the national level, develop supportive institutional, legal, and regulatory frameworks for effective, sustainable transportation.
- Use effective land-use regulations to plan developments with medium to high densities and mixed-use components.
- When putting in place new public transportation infrastructure, provide local access that is centered on the needs of the people and actively promote collective development that is public transportation-oriented.
- In order to reduce travel, implement policies, programs, and initiatives that support ICT, such as internet access, teleconferencing, and telecommuting.

10.2 Strategies to Switch to More Sustainable Mobility Options.

- Include the creation of intermodal hubs in the sustainable urban mobility plan, with fair and simple access provided for all transport modes - urban and interurban, road and rail, public and private - to them.
- Reduce the proportion of private motor vehicles in public transportation by implementing Mobility Demand Management strategies, such as pricing plans that account for the costs of traffic, safety, and pollution as well as those that aim to gradually eliminate demand distortions that either directly or indirectly encourage traffic, motorization, and urban sprawl.
- Aim to achieve significant shifts in intercity passenger transportation toward more environmentally friendly modes, such as by giving priority to high-calibre, long-distance bus and coach transportation services.

10.3 Improvements to Transportation Technologies and Practices.

- Standards for the quality of fuel, fuel efficiency, and exhaust emissions for all kinds of vehicles, including new and used cars are needed. This will help us save money and improve the environment.
- The government, financial institutions, and the private sector are all have to working together to come up with plans for the replacement of commercial fleets. These plans should be specifically tailored to the needs of businesses in developing countries.

10.4 Policies for sustainable mobility

According to the idea of sustainable mobility, transportation policies should aim to cut down on travel requirements and trip lengths, encourage a switch to sustainable modes, and improve the sustainability of all modes. The identified policy instruments can be used in a wider context in addition to reducing carbon emissions because of the co-benefits. Planning, regulation, technological advances, financial incentives, and information are examples of policy instruments.

Observations for taking into account transport policies in developing countries: governance and national as well as regional institutions play a key role in transportation policy, and the effects of policy decisions are long-lasting and difficult to reverse. Therefore, developing countries' options for helping to develop and transitional states could include consulting institutions and capacity-building. An important topic in transportation policy is infrastructure financing. Transportation infrastructure frequently resembles a public good or natural monopoly, which is a general economic problem.

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