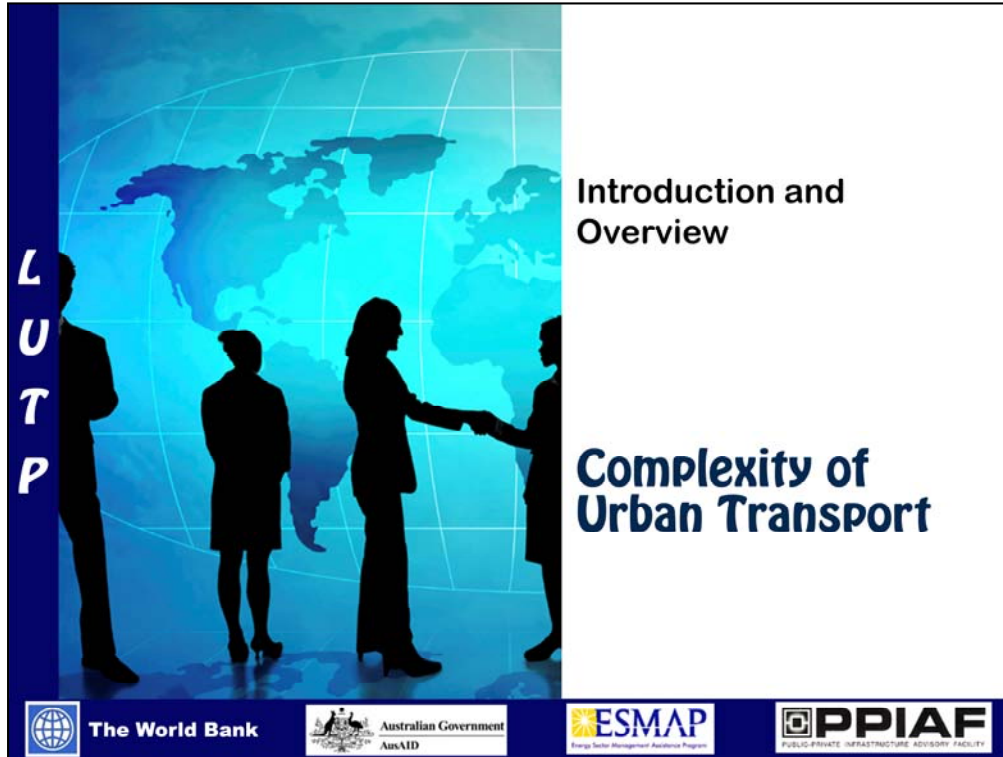


101010



INTRODUCTION AND  
OVERVIEW

# COMPLEXITY OF URBAN TRANSPORT

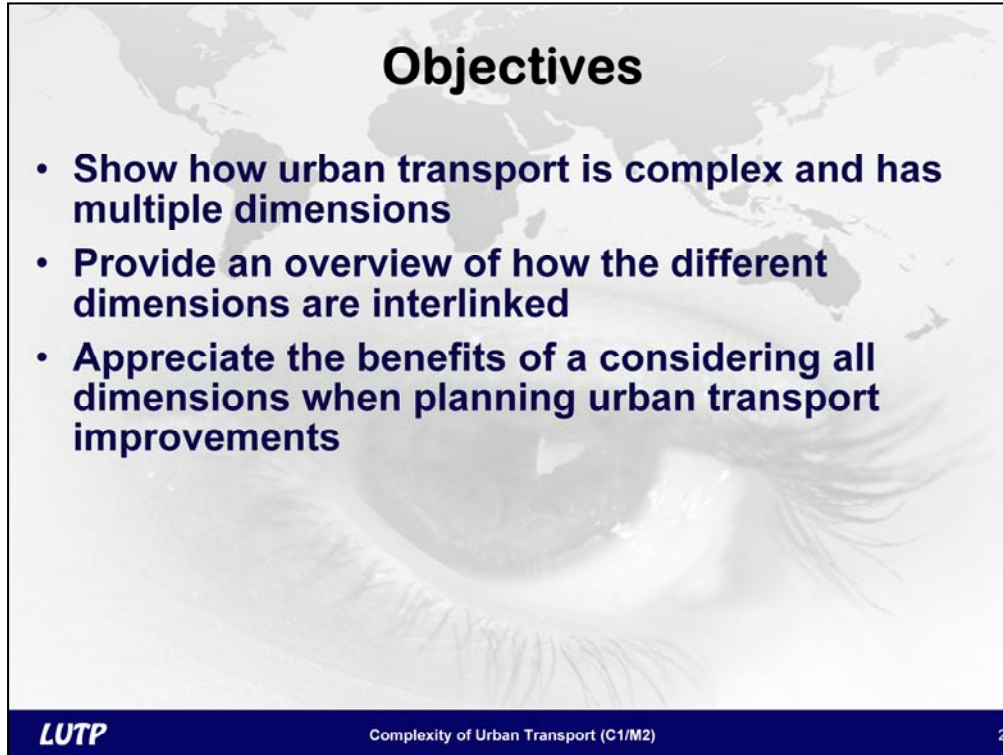


Cluster 1/Module 2 (C1/M2): Complexity of Urban Transport.

This presentation is one of the support materials prepared for the capacity building program *Building Leaders in Urban Transport Planning (LUTP)*.

Support for LUTP was provided by:

- The World Bank
- Australian Agency for International Development Aid
- The Energy Sector Management Assistance Program (ESMAP), and
- Public-Private Infrastructure Advisory Facility (PPIAF).

The slide features a background with a faint world map at the top and a close-up of a human eye looking forward. The text is overlaid on this background.

## Objectives

- **Show how urban transport is complex and has multiple dimensions**
- **Provide an overview of how the different dimensions are interlinked**
- **Appreciate the benefits of a considering all dimensions when planning urban transport improvements**

**LUTP** Complexity of Urban Transport (C1/M2) 2

The key messages that will be conveyed in this module are the different dimensions that need to be kept in mind when planning for urban transport. We will show how urban transport is complex and has multiple dimensions. We will provide an overview of the linkages to land use, the environment, energy use, affordability and other similar issues.

After completing this short presentation, you will appreciate the benefits of a considering all dimensions when planning urban transport improvements. In the next module we will look at a comprehensive framework for such planning.



## Opening Exercise Corridor Problem



- **Problem corridor in your city**
  - Severely congested
  - High pollution and accident levels
  - Everyone agrees transportation system wholly inadequate
- **What factors / impacts should be considered in determining how to address these problems?**
  - Please think beyond transportation considerations to other aspects of the urban environment such as health

Our opening exercise is designed to get you to start thinking about the complexities involved in urban transport.

There is a corridor in your city that is severely congested. Pollution and accident levels are high. Everyone agrees that the transportation system is wholly inadequate.

What factors or impacts should be considered in determining how to address these problems? Please think beyond transportation considerations and consider how transport impacts other aspects of the urban environment such as health.

Take about 5 minutes to do this exercise.



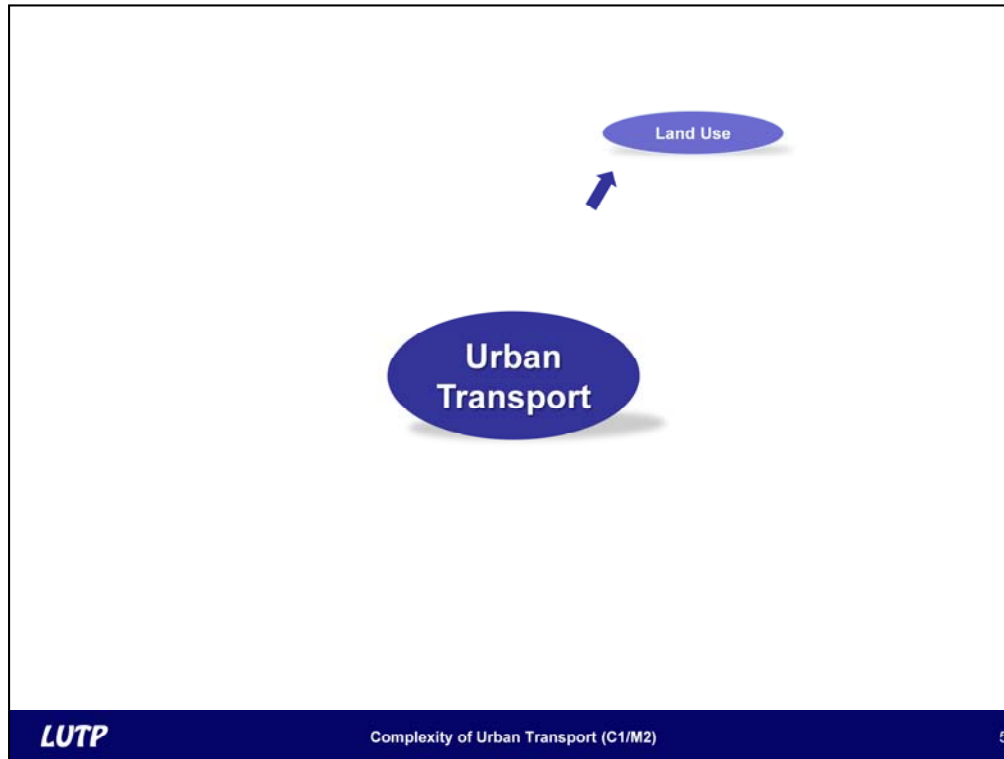


In the last module, we saw how urban transport was becoming a major problem in cities. Not only is it increasingly difficult to travel from place to place, but it is also increasingly time-consuming to do so because of congestion. There is a growing preference for motor vehicles, which means that more fuel is being consumed. This, in turn, releases a greater amount of pollutants into the air we breathe. The number of accidents is also increasing. Several countries are faced with a rapidly increasing import bill, largely on account of the increased reliance on imported petroleum fuels. Thus, the preference for motor vehicles has adverse effects on people's health, their ability to travel, and the economic efficiency of cities.

In this module, we will see that urban transport is extremely complex. It has many dimensions, all of which need to be taken into account if a comprehensive solution is to be found. It is not just a matter of building a highway or building a metro rail system. There must also be an assessment of several other factors.

Inter-city transport is comparatively far less complex.





First, we will examine the link between urban transport and land use.

Most planned cities have a master plan that lays out how the land in different parts of the city will be used. There are some parts which are primarily business districts and some which are largely residential areas. Most well-planned cities also have parts that have trees, plants, and other green cover.

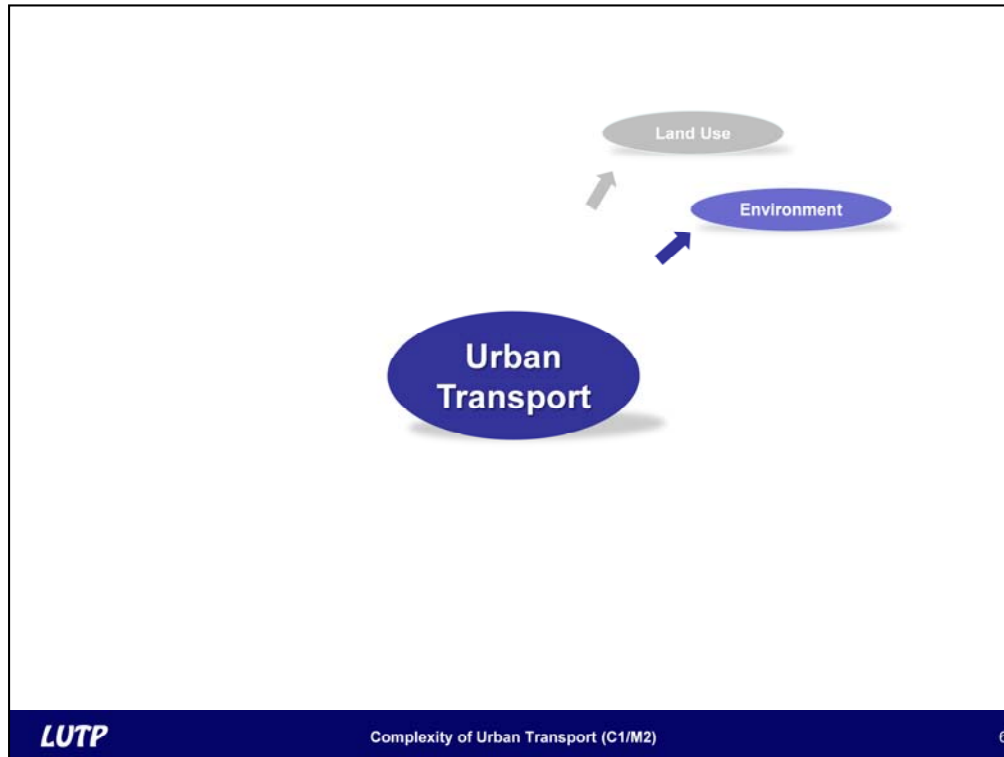
Some cities are sprawling and spread out over a large area, whereas others are more compact and dense. Cities with heavily segregated residential and business districts have longer travel distances. Similarly, sprawling cities have long travel distances. In both cases, providing transportation systems requires significant infrastructure investments when compared to the requirements in more compact cities.

Many cities have adopted planning where business and residential districts are more closely interspersed. This is known as mixed-use planning. This type of planning tends to reduce travel distances. Shorter travel distances often mean that the trips can be undertaken by walking or cycling instead of using motorized modes. This, in turn, results in lower energy use and less pollutants.

Similarly, people usually want to live and work close to mass transit systems. As a result, high-density business and residential areas tend to develop close to mass transit systems.

Thus, there is a close linkage between transport needs and the land-use planning philosophy that is adopted. There is also a linkage between the kind of transport systems we have and the kind of land use that emerges.

Slide 6



There is also a close linkage between transport systems and the environment, especially air quality.

Cities with a high level of dependence on personal motor vehicles have a higher level of emissions and worse air quality.

Cities with a higher share of public transport or non-motorized transport use have a lower level of emissions, and thus benefit from cleaner air.

Cities that have policies to ensure that their vehicle fleets are better maintained tend to have less pollution.

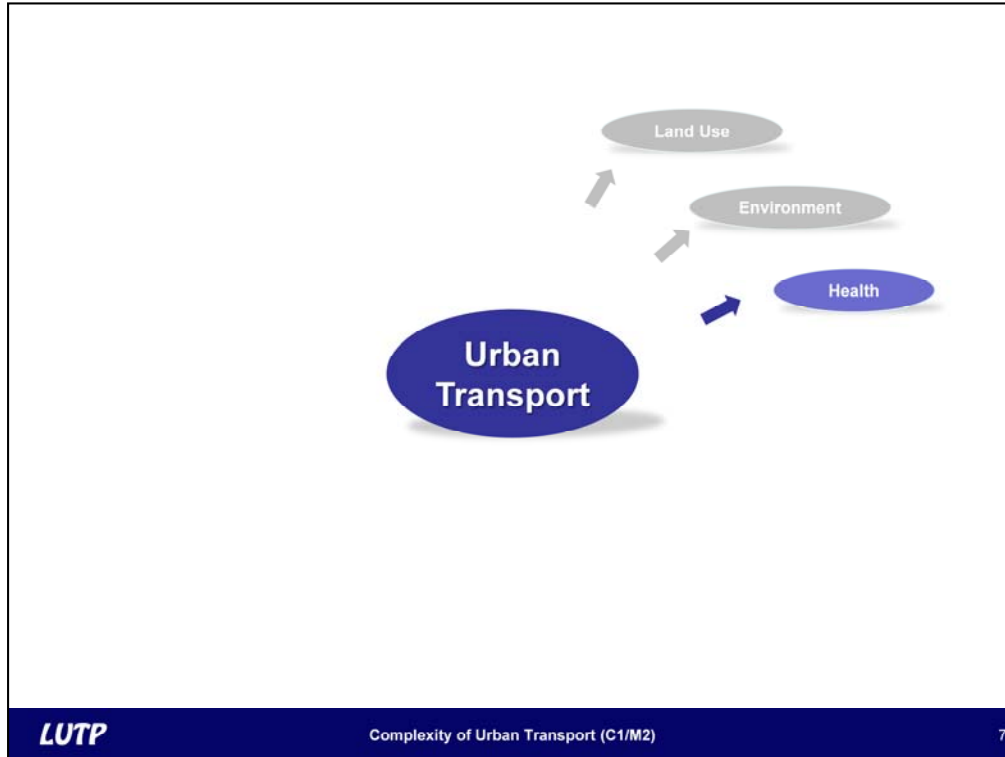
Policies regarding fuel quality and regulations relating to the extent of emissions from a motor vehicle can also impact the environment. The major pollutants from motor vehicle exhausts, namely sulfur oxides, nitrogen oxides and particulate matter, have all been a concern in large cities, though the intensity of impact has varied, across countries and across pollutants.

Today, climate change is becoming a global concern. Transport accounts for around 14 % of the human-created greenhouse gas emissions. This emissions contribute substantially to global climate change.

Unfortunately, most fuels used in meeting the transport demand are carbon-based fuels. Thus, urban mobility is becoming a growing contributor to greenhouse gas emissions and climate change.



Slide 7



Air quality has a substantial impact on human health.

Breathing polluted air negatively impacts lungs, which can lead to health problems like bronchitis. Estimates by the World Health Organization show that polluted air is responsible for approximately 800,000 deaths in urban areas every year. These impacts tend to be more severe on the poor, who are more exposed to the polluted air, as they often live on foot paths and walk or cycle to meet their travel needs.



The World Bank



Australian Government  
AusAID



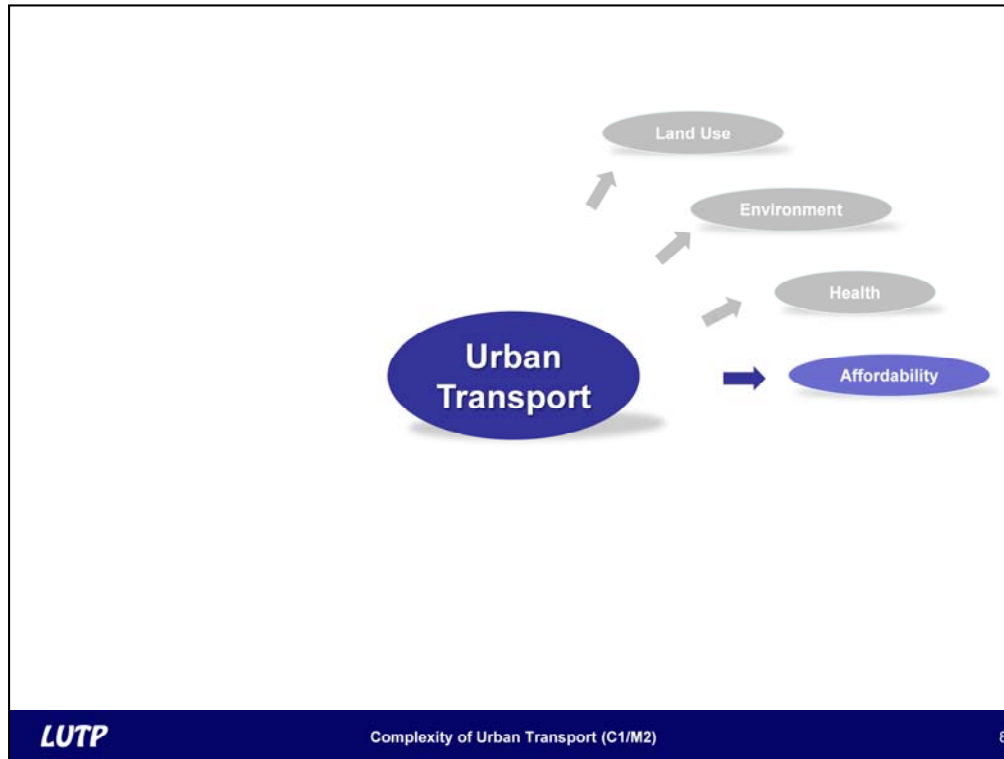
ESMAP  
Energy Sector Management Assistance Program



PPIAF  
PUBLIC-PRIVATE INFRASTRUCTURE ADVISORY FACILITY



## Slide 8

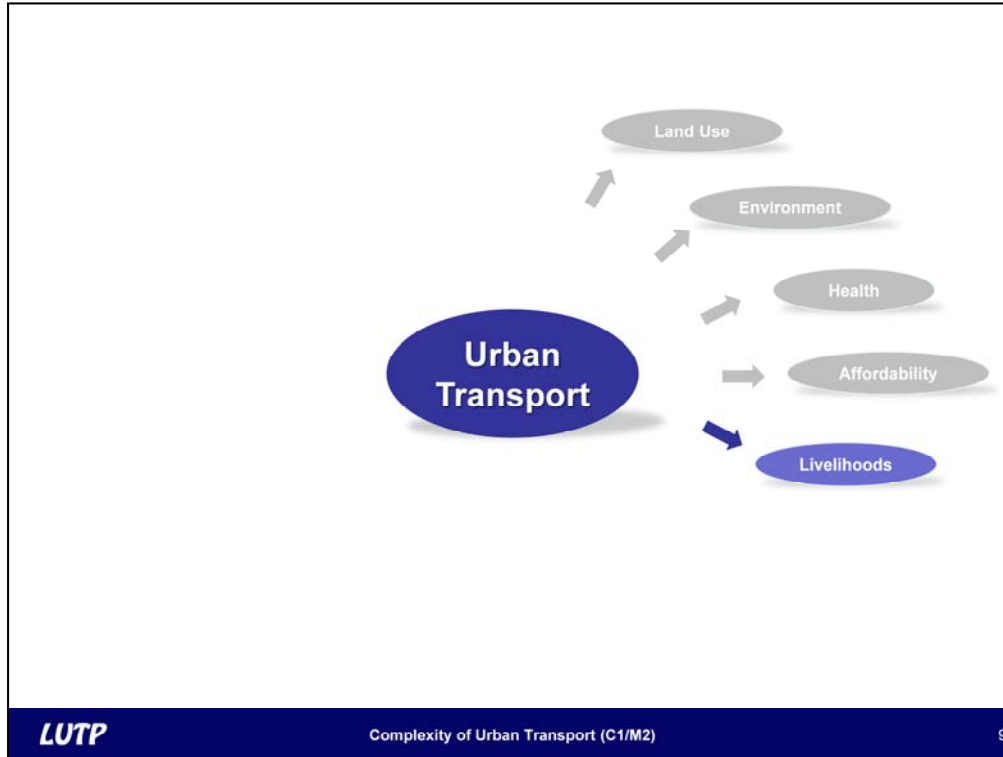


Unlike inter-city transport, people need to use urban transport every day. They need it to reach their work places or educational institutions.

The cost of transport systems, and therefore affordability, becomes an important factor in urban transport planning because people use the system daily. Cities with relatively lower per-capita income cannot afford to have expensive systems.

Further, the systems need to be so designed that those who are extremely poor can use walking or cycling as a means to reach their work places. If this is not the case, public transport fares will have to be affordable, even if it means that the full operating costs are not recovered from such fares.

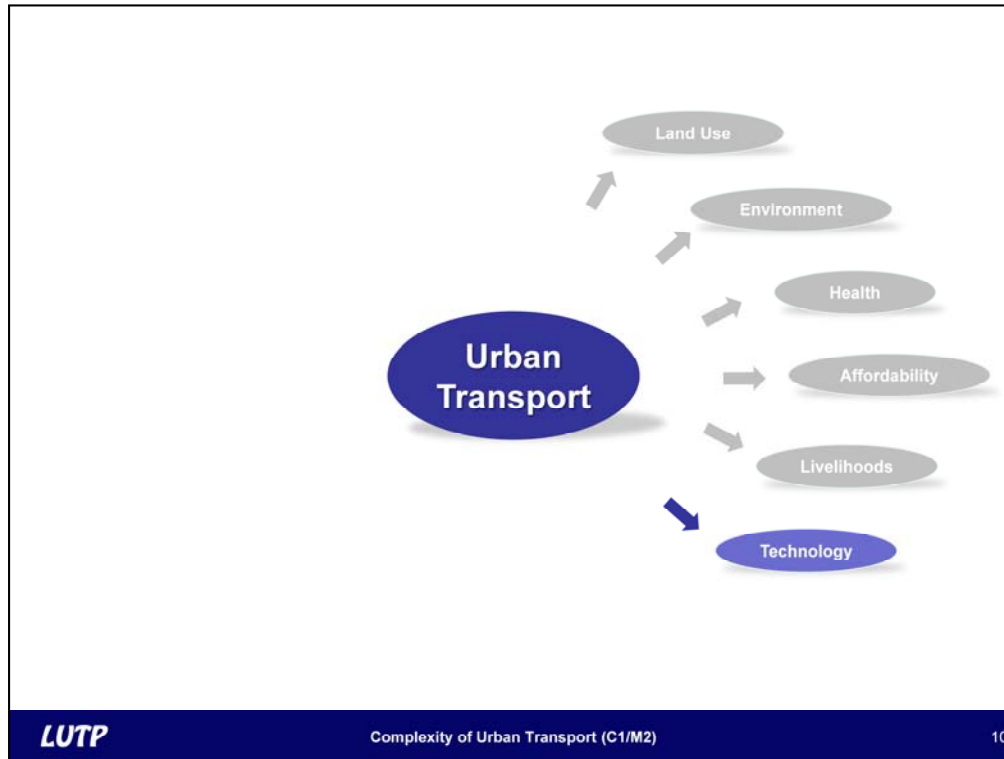




Affordability of urban transport is very important to livelihoods because many trips in urban areas are made for the purpose of people reaching their place of work.

If transport costs are high, people are able to seek jobs only within a limited area. Lower transport costs allow them to look at more widely.

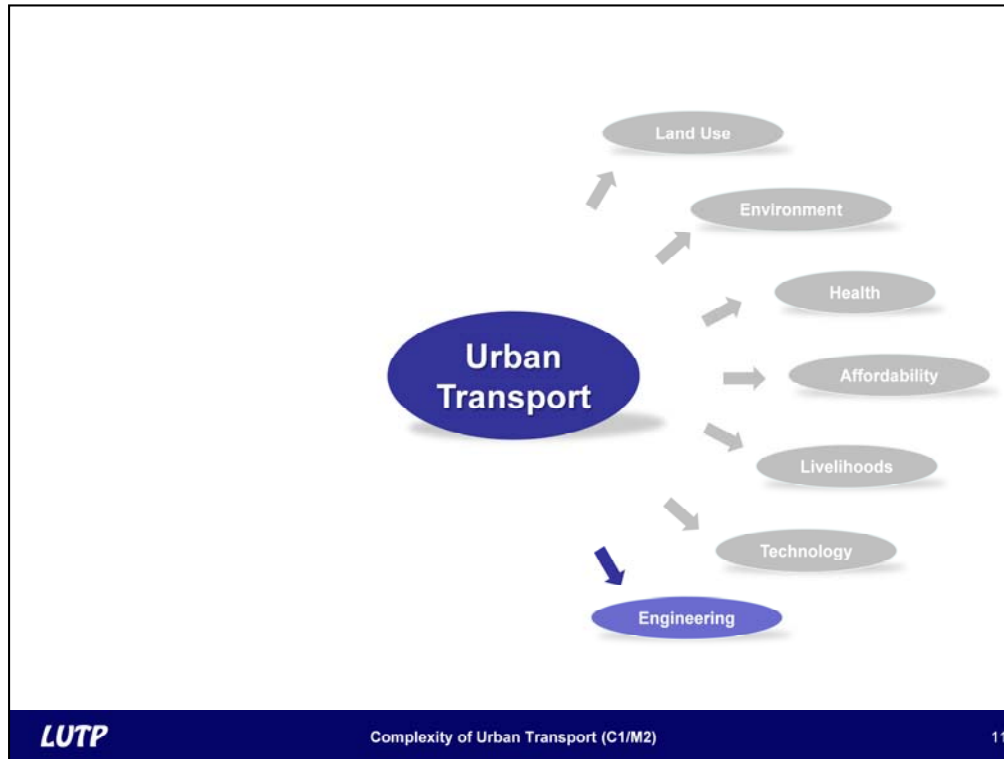
The kind of transport systems that are in use also impacts the number of employment. For example, large and extensive bus systems tend to employ more people than metro rail systems.



Urban transport often involves a choice between multiple technology options.

For example, public transport systems have a wide range of choices. The spectrum runs from buses sharing road space with cars and bicycles, to heavy rail underground metro systems. Choices among technology options need to be made on the basis of several factors, such as the spatial pattern, load factor, life cycle costs, and environmental sensitivity.

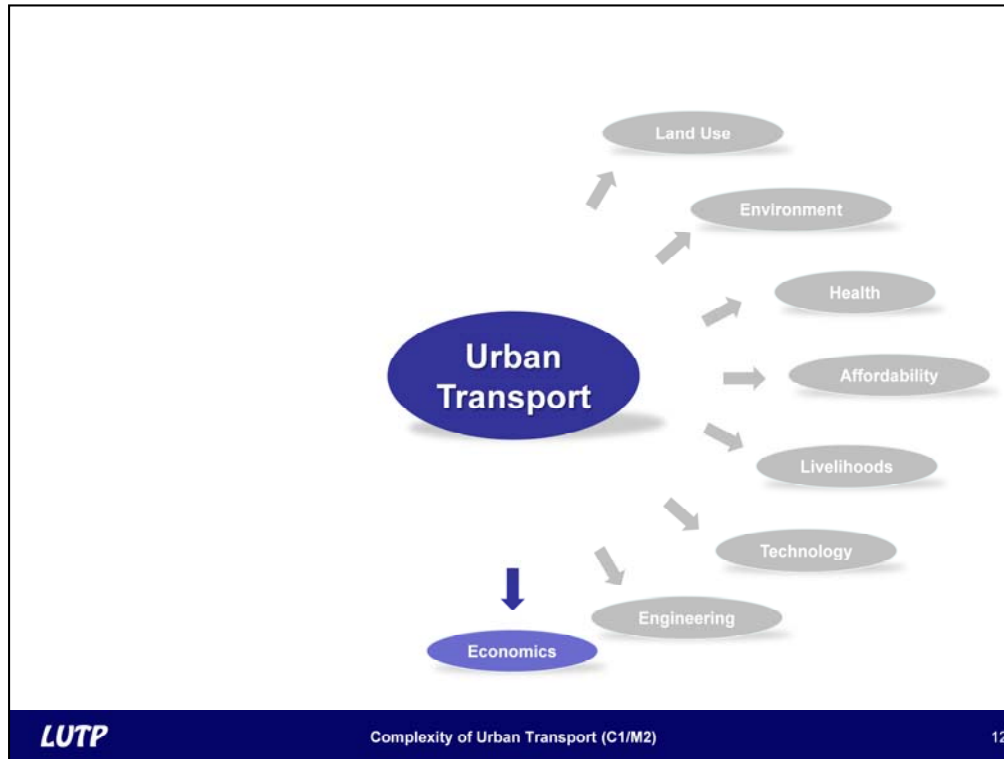
Technology choices also need to be made about the fuel type, the kind of vehicle, etc. Hence, technology is yet another dimension to urban transport planning.



There is a need for several infrastructure facilities to be built in order to meet the travel demand.

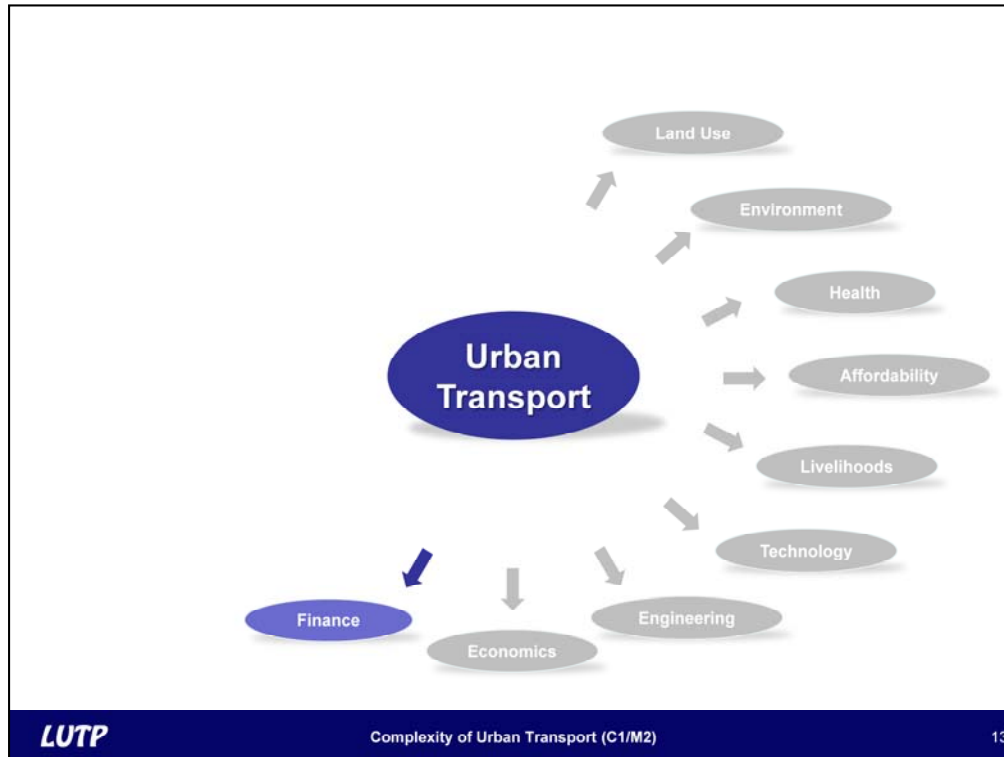
Roads, bridges, flyovers, metro-rail systems, side-walks, and pedestrian underpasses are some physical facilities that are often required.

Thus, the availability of sound engineering and project management capabilities is another dimension to urban transport planning.



Urban transport also has economics dimension.

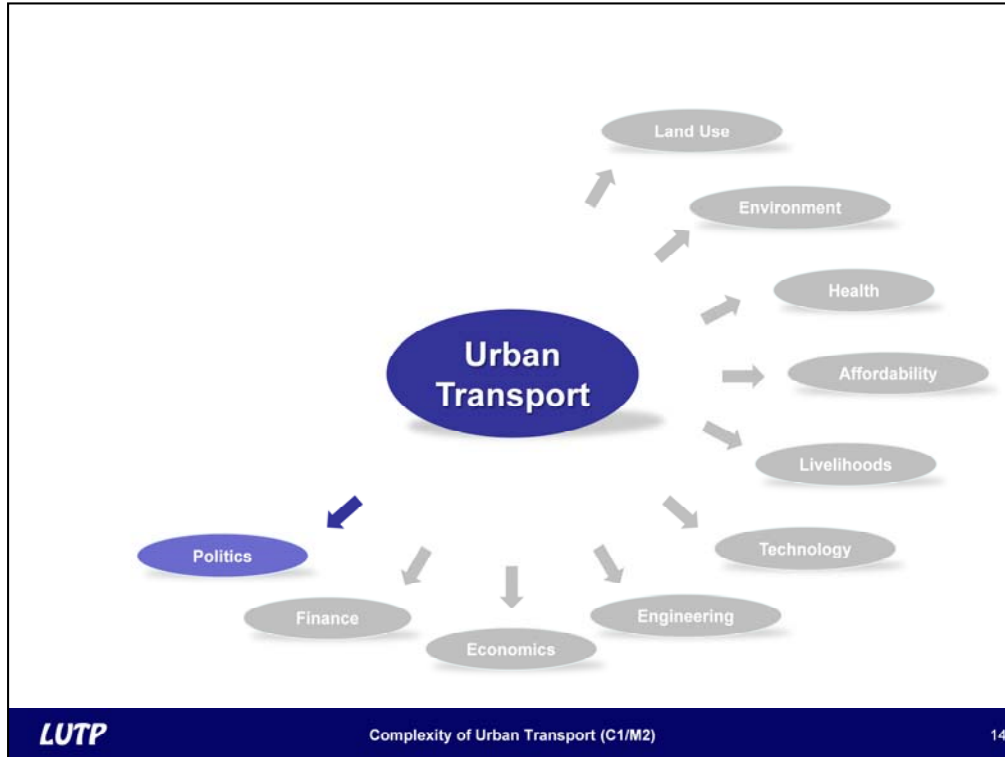
What makes economic sense and what does not? What is the value to society as a whole rather than just the users? Questions such as these need to be answered.



Money and financing are also important factors.

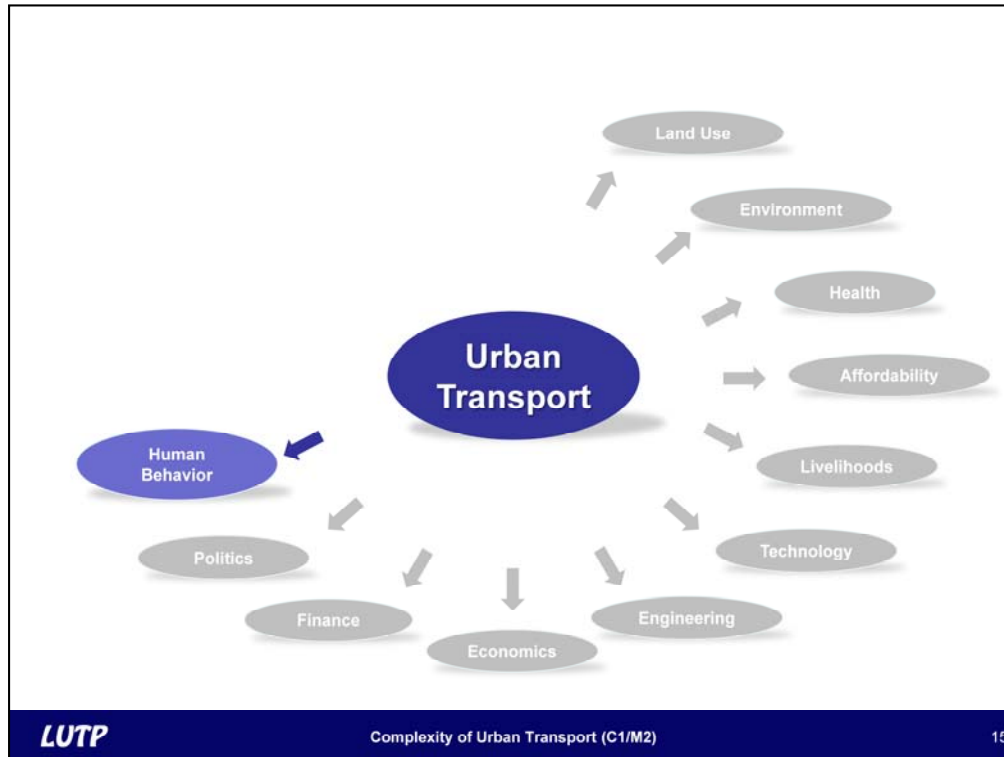
- How will capital costs be met?
- How will the year-to-year operating costs be met?
- Are there financial returns that would enable funds to be raised or would the public budget have to finance the costs?
- What kind of taxes?
- What other revenue streams exist?
- Who should pay for these investments?
- At what point of time should these investments be made?

These are all questions that will need to be answered as a part of the urban transport planning process.



Politics plays an important part in urban transport planning.

This is especially true in democracies. The current government will tend to be attracted towards investments that can help them in upcoming elections, even if it means a larger-than-necessary expenditure on the facility to be created. Large and visible projects have often helped candidates to win elections.



LUTP

Complexity of Urban Transport (C1/M2)

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Human behavior and social image are also important factors to be taken into account in the planning process.

In some countries, cycling and travelling by bus are viewed as modes of transport for the poor. Therefore, anyone who has the necessary income would acquire and use a personal motor vehicle, as a status symbol to demonstrate their higher income.

In other countries, people like to be in their own cars, even if they are stuck in traffic for long hours.

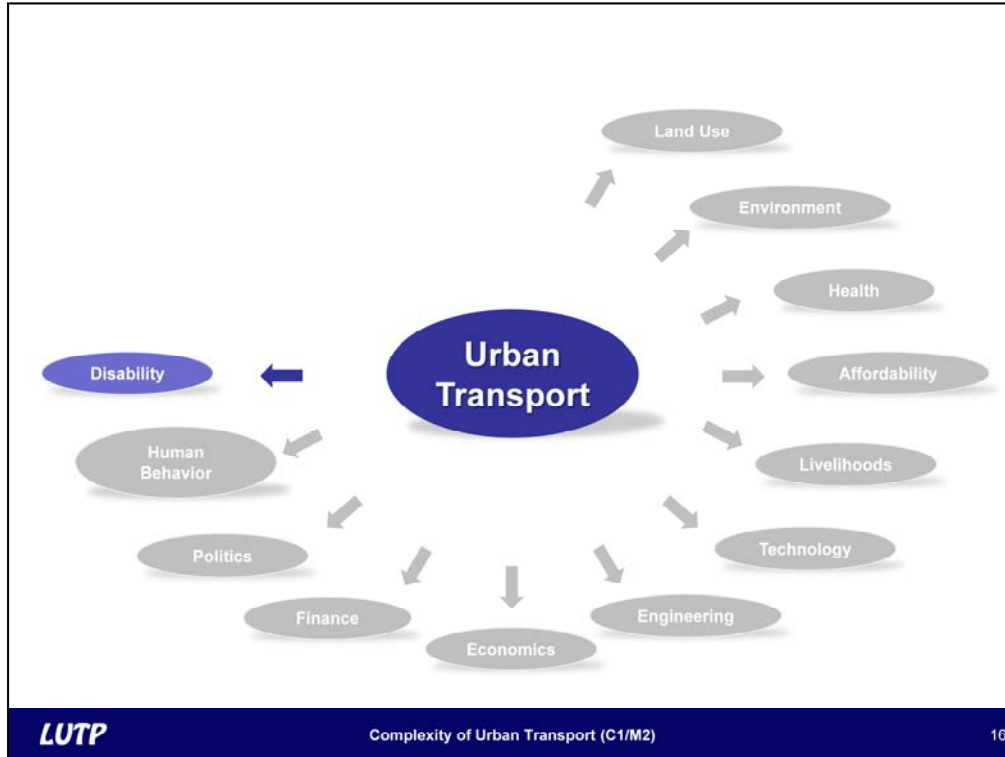
In yet others, cycling and walking are fashionable and viewed as healthy modes of travel.

Human behavior issues also become important when deciding factors like how far are people willing to walk to reach a public transport station, how much trouble are they willing to take in finding parking space, how much are they willing to pay for the use of facilities, and how much they value the physical exercise of walking.

These are all human behavior issues that become an important part of the urban transport planning process.



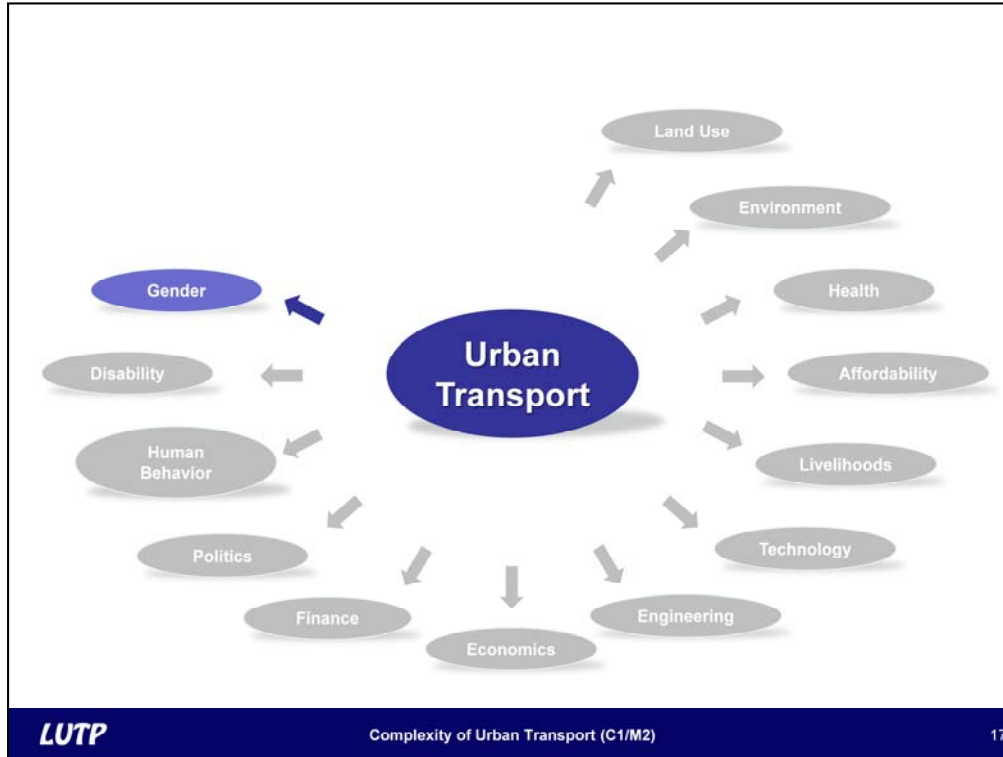




In any city, many people have inherent disadvantages in travelling.

They may have a physical disability, be elderly, or be very young. Similarly, women carrying babies in their arms need special care. The transport system cannot ignore the needs of these populations.

All persons with special needs must have those needs addressed in order to have their transport needs met.

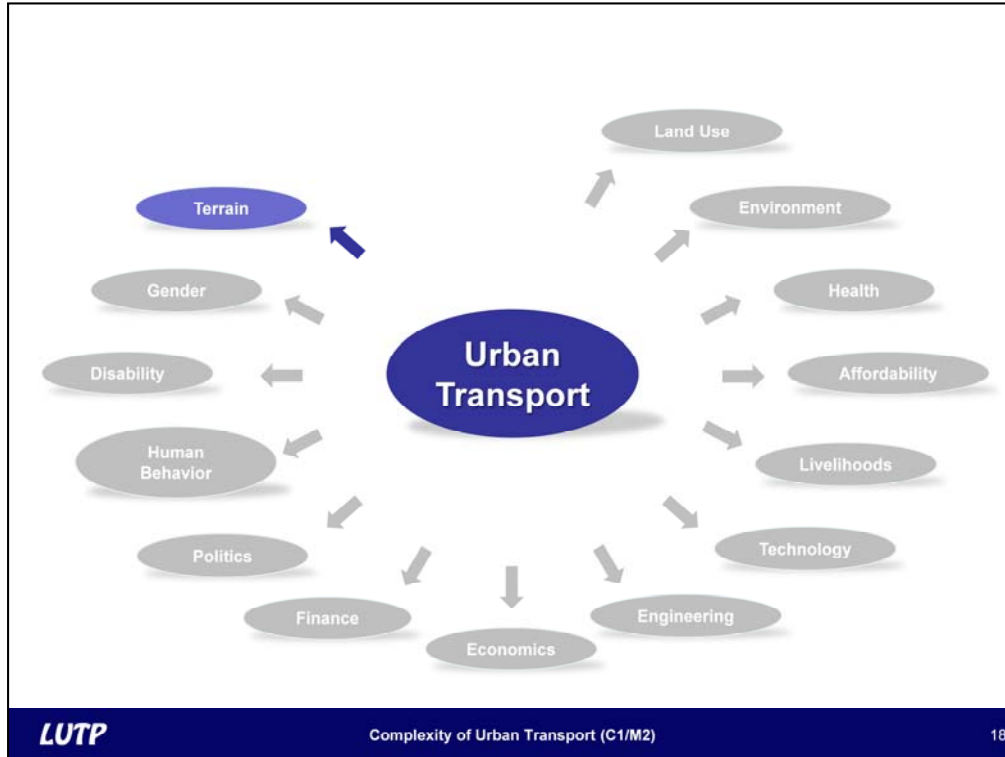


In addition, women have very different travel needs from men.

Studies have shown that the both the travel times of women and the nature of their trips are different from those of men. These needs should to be taken into account.

In some societies, women need to be protected from harassment. In others, social customs require that women not share seats with men.

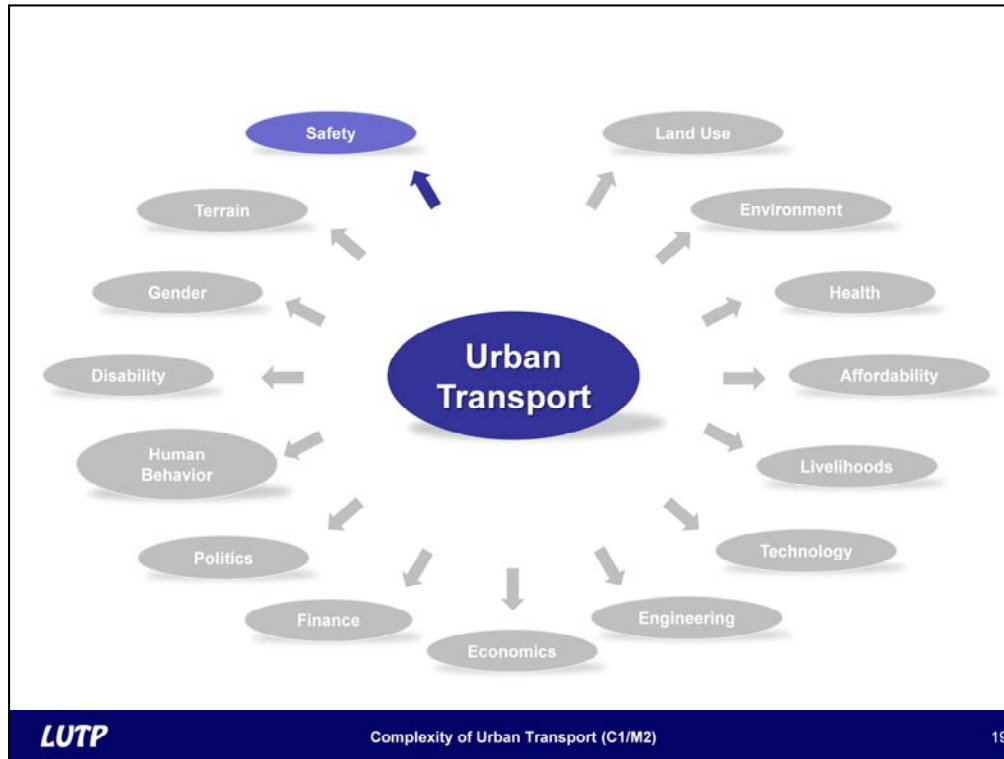
Thus, gender is an important dimension in urban transport planning.



Terrain is another important factor in determining the kind of transport system in a city.

Most cities have a flat terrain, and therefore have a wide range of options. Other cities have a hilly terrain, and therefore have limited options. Some cities are constrained by certain geographical features, such as a sea, river, or hills, and therefore have limitations on how their transport systems are designed.

Thus, terrain is important to the urban transport planning process.

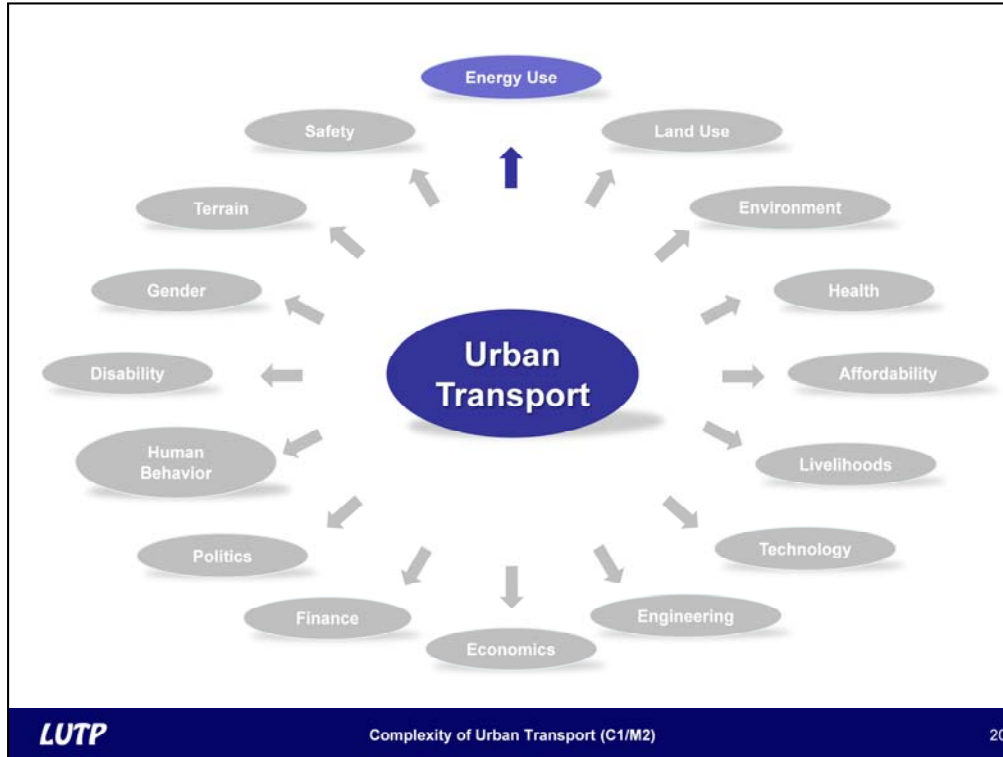


There is a rapidly increasing incidence of accidents in cities, resulting in the deaths and injuries of many people.

Safety has been an important concern in many parts of the world. Road crashes cause 1.2 million deaths worldwide annually. Around the globe, about 40 people below the age of 25 are estimated to die in road accidents every hour. Nearly 3,500 people die in road accidents every day, making road-accident deaths among the highest causes of death in the world. The poor and vulnerable tend to be the most affected by accident.

Therefore, the design of urban transport facilities needs to ensure that the systems are safe for people to use.

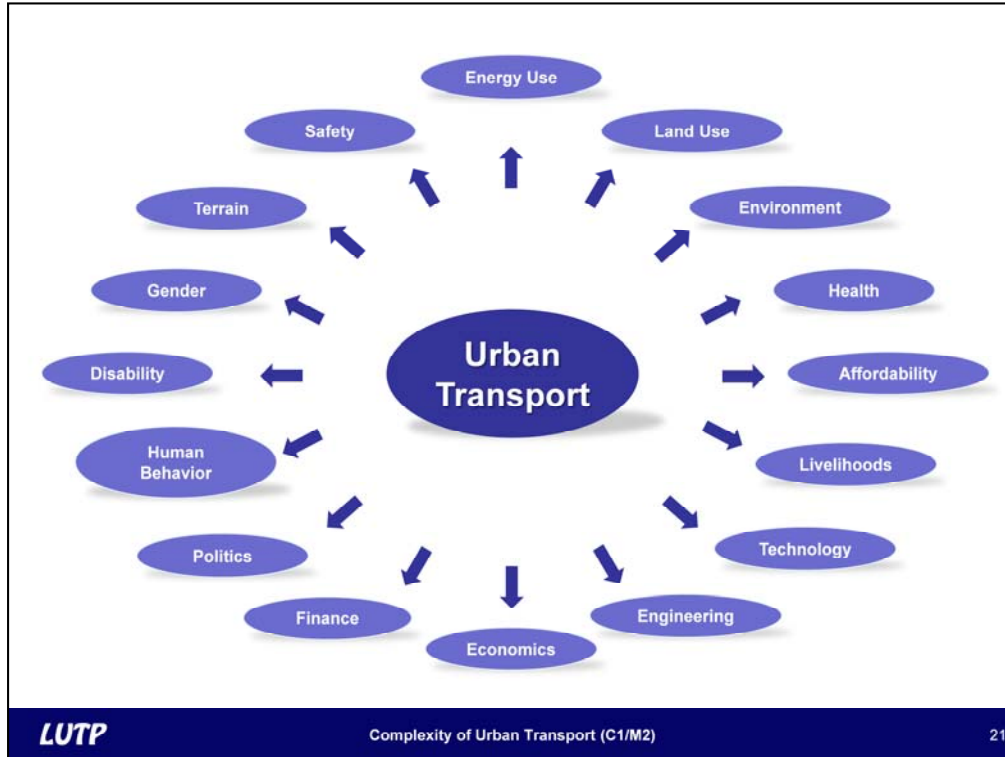




Finally, and very importantly, transport systems are large consumers of energy.

Any intervention that is chosen relates to energy use, whether it is the choice of land use patterns, the mode of travel that is preferred, the technologies adopted for public transport, policies relating to fuel price, or various demand management strategies.

Energy use is an important consideration during urban transport planning.



Now we see the entire picture.



## Summary



- **Urban transport is complex**
- **Needs a holistic and comprehensive approach**
- **Piecemeal solutions do not help**

All of these elements demonstrate the complexity of urban transport systems.

Often, cities have made the mistake of dealing with only one or two aspects. These cities have not been able to realize the full benefits of a comprehensively planned system.

A comprehensive planning process will not only involve supply side measures, such as creating the necessary infrastructure, but will also involve demand side measures that seek to reduce the need to travel, such as the need to travel by less fuel-efficient modes that emit more pollutants, occupy more road space, and cause more accidents.

In the next module, we will look at a comprehensive framework for such planning.

