
URBAN SUSTAINABLE TRANSPORTATION PLANNING / CONCEPTUAL FRAMEWORK

The emergence of the industrial revolution in the late nineteenth century was accompanied by an increasing growth in the size and expansion of cities as a result of the migration of the population from the countryside to the urban and the accompanying unexpected increase in the number of the population. As the economic activity progressed, the rates of movement increased from one place to another as they increased. Individuals owning vehicles.

Using non-renewable energy supplies to overcome this growth in transport demand is draining resources and hurting public health. This problem is most evident in urban areas and causes significant environmental and social costs .

The research in this chapter deals with clarifying what is related to the concepts of sustainable transport and transport planning in cities and the most important studies and previous experiences.

urban planning and city planning

Cities arise and grow as a result of geographical factors, whether natural or human, as they go through stages of development and each of them has a functional or urban character to be a reflection of the social and economic conditions that the city went through, through the street patterns and the prevailing urban character that is affected by the job the city performs.

We can say that the definition of the city differs according to the angle from which we look at it, as it is the main engines of growth and it brings people together for social and economic purposes. The word city is related to the idea of urbanization and there is no global standard for classifying cities, so the concepts differ from one country to another, as they may differ within the same country with passing Time, some of them classify it according to the population density or the work of the people who live in it .

As for the concept of urbanization, it is the movement of people from rural to urban areas in search of a better life (un, 2008). However, rapid urbanization is often at the expense of aging ecosystems and valuable lands to meet urban requirements. Studies indicate that 70% of the population The world will settle in urban areas by the year 2050 (un, 2015), and the accompanying problems of air pollution, traffic congestion, waste management problems and energy waste.

Here, the need for city planning arose by adopting a scientific and practical method directed towards a clear and sustainable future, to develop appropriate solutions to existing problems and to avoid the emergence of new problems

The objectives of urban planning

Cities are the epitome of history of urban life, and a reflection of the reality of people, transportation, economy, art and architecture, and it is the truest expression of peoples' culture and the wisdom of their policies.

City planning aims to improve life, exploit resources, and pay attention to various developmental aspects, the most important of which are:

First: urban development

Equitable distribution of resources.

Separating residential neighborhoods from sources of noise.

Providing green spaces between residential neighborhoods.

Securing and developing the transportation network between the various urban sectors.

Paying attention to allocating suitable places for worship, health and educational services.

–Merging land uses to reduce the need for transportation (Abdul

Second: economic development

Providing suitable job opportunities for the population.

Allocating suitable places for commercial gatherings and car parks.

–Increase commercial activity in the city according to the appropriate planning vision.

Third: Infrastructures

Providing cities with integrated lighting networks

–Providing a qualified sewage network for the city and paying attention to the delivery of safe water to homes.

Providing the city with an integrated wired and wireless communication network

Fourth: social and health development

Supporting social relations among the population through adequate planning of residential neighborhoods.

Providing health, social and cultural centers.

Avoid pollutants such as vehicle exhaust, factories and industrial areas, and isolate them from the places designated for housing.

And that the elements of the urban plan must be based on a specific and clear goal and be flexible that can benefit from the available resources and take into account future changes (Sabry, 2009.)

–Sustainable development and sustainable city planning

The concept of sustainable development was introduced by the International Union for the Conservation of Natural Heritage (IUCN) in 1980, but it did not become light until after the report prepared by the World Commission for Development and Environment (our common future) in 1987 .The basis for subsequent discussions is that “the needs of the present are met without compromising the ability of subsequent generations to meet their needs”

In the 1990s, Dali defined the concept of sustainable development as development that must meet the following conditions (Dally, 1991:)

- 1) That the rates of use of renewable resources do not exceed the rates of their renewal.
- 2) That the rates of using non-renewable resources do not exceed the rates of developing sustainable and renewable alternatives.
- 3) That the emission rates of pollutants do not exceed the environmental absorption capacity.

Conclusions such as these prompted the 1992 Reaudi Declaration on Sustainable Development. And then the Agenda of the 21st Century, which stipulated the joint responsibility of all sectors (such as transport, energy, water supply and sanitation) to contribute to achieving the goals of sustainable development. However, these discussions did not specify the relative level of sustainability that each sector is concerned with achieving. Leave it open to the reality of cities, their potential, and the extent of the population's response.

Cities play a fundamental role in combating climate change and energy waste, and technological development has contributed to the emergence of a number of global experiences of sustainable cities, as has the concept of smart or digital cities, which are characterized by the development of technology and informatics Sustainable planning for cities is the application of the scientific method in policymaking, and the development of a comprehensive plan to face future events for gatherings, or to change Achieving goals during limited periods of time). It must be flexible, in line with the dynamics of life, and within a sound intellectual framework). The word sustainability means sustainability and sustainability . Architectural dimensions, civil design and architectural

beautification, which is responsible for the final form of the infrastructure, industrial and architectural centers in the city . It is an important tool for community leaders in achieving sustainable development, as it helps to formulate medium and long-term goals. For resources, and to organize them rationally to serve the city ((un, 2004), and to make a balance between the requirements of growth and the need to protect the environment and combat excessive urbanization, the increase in population and economic, social and educational progress must be accompanied by prior and orderly planning

Among the most important characteristics of sustainable cities:

- 1) That the city is distinguished by its compact urban form.
- 2) Efficiency of land uses, environmental protection, biodiversity and food-producing areas.
- 3) That the natural environment permeates the areas of the city.
- 4) Focusing on environmentally friendly transportation.
- 5) The widespread use of technology.
- 6) Equity in the distribution of resources and good political governance.
- 7) The city's high economic performance and job opportunities.
- 8) Planning for the future of the city by relying on the facts of reality and avoiding unstudied predictions.
- 9) Bringing all decision-making processes into line with the city's sustainable development goals and integrating economic, social and environmental considerations.
- 10) Solid waste management and reduction of water and air pollution**

Dimensions of sustainable development

The concept of sustainable development is not limited to concern for the environmental aspect only, but also includes social, economic and environmental aspects. It is a development with three interconnected dimensions in an interactive framework that is characterized by precisely and regulated.

The dimensions of sustainable development consist of:

First: the economic system

Sustainable development is concerned with the economic aspect of the city to meet the basic needs of the population and their increasing numbers, especially in developing countries, and is also concerned with combating poverty in those cities through.

Sustainable economic growth.

Satisfying basic needs.

Capital efficiency.

Economic justice.

Second: the social system

It is social development or community development that deals with educational, health and extension services. Residents are responsible for pollution, infrastructure degradation and resource depletion, and they are responsible for preserving and sustaining these resources through:(

Equality and social justice.

Active social participation.

Social mobility.

– cultural diversity.

Corporate Sustainability.

Third: the environmental system

One of the most important goals of sustainable development is the preservation of natural environmental resources. There is no existence of sustainability unless it is associated with preserving natural resources and the cleanliness of ecosystems by preserving:

Non-renewable energy

– Biodiversity

Biological productivity

Adaptability

Moving away and minimizing the sources of environmental pollution as much as possible

Transportation planning

Transportation is a service to connect the various urban gathering points, and it is specialized in transporting people and goods from one

location to another. Hans Adler, a transportation expert at the International Bank for Reconstruction and Development, defines it as “a service for connecting production centers to consumption centers” (Moussaoui, 2015.)

Transport plays a critical role in urban development, in providing individuals with access to education centers, markets, employment, entertainment and other basic services

Transportation planning is a systematic process for people's future needs. It is a combination of science and creativity in solving purification problems, and it must be combined with other aspects of planning, especially land use planning.

The transportation planning process began in 1950 with the aim of predicting future traffic levels, which included simple population extrapolations, and then the Mitchell and Rapkin theory appeared in 1954, which provided the theory that urban traffic is a reflection of the land use in it.

The Federal State of Urban Transportation was established in the United States in 1962, and this work marked the cornerstone of two decades of experiments in the evolution of urban transportation.

The transport system has two main characteristics:

First: the spatial perception of the transportation system, where the variables in each of the transport trips are taken into consideration from its starting point to the destination

Second: The institutional framework for transport, as transport services, including construction, maintenance and others, are the responsibility of the governments in most countries

Phases of Transportation Planning

Transportation planning is the process of surveying and determining people's needs and preferences in a decision. It occurs at different levels, starting from the daily decisions taken by individuals and families, to the decisions taken by governments and institutions that have the greatest impact on society

The transportation planning process goes through two main stages:

First: the information gathering stage

This stage includes defining the study area and then dividing it into external and internal traffic sectors depending on land uses such as housing or recreation or the presence of some natural obstacles such as rivers and railway lines, and the sectors must be of homogeneous use in order to give a similar pattern for trips in them. This is followed by the stage of collecting the information and data required through the surveys, which are classified into two types inside the external environment. As for the other type of surveys, they are perimeter surveys to find out the number of trips entering the study area (Hobbs , 1974.(

Among the most important types of surveys:

Home– interview survey.

Road side interview survey.

Scan postcards (Vehicle Tag system.)

Direct interviews method.

The traffic survey process usually takes 12–16 hours per day, for each of the survey points, and it usually takes place from six in the morning until ten in the evening

Second: The stage of future forecasting of the population and land uses, and preparing trips for the target year

It is a series of mathematical models that attempt to simulate human behavior while traveling. The demand for transport is related to the relationship between human activities and different land uses (Bruton, 1975). The process of forecasting transport demand includes four stages:

Trip Generation

It is used to predict the demand for future transportation in specific areas as it represents the number of trips that people make in the housing unit. It is usually influenced by land use, family size, vehicle ownership, type of housing unit in addition to family income

Trip Distribution

It is the stage of analysis of the number of trips produced and attracted to each sector of the city imposed and affected

This stage is often constrained by constraints such as time, distance, and cost (Bruton, 1975.)

–The stage of distribution of flights, according to the modal split.

The mode of transport, whether private or public, is determined according to a number of determinants, the most important of which are the characteristics of the manufacturer

The trip, such as household size, vehicle ownership, and income level. And the characteristics of the trip, such as time, cost, and distance

It is also affected by the transportation system, its efficiency and accessibility

–Trip Assignment phase.

At this stage, the trips are distributed after coding and determining the lengths and average time of each trip, according to the routes connecting the sectors), and this stage is usually affected by comfort, cost and flight time by adding to the services provided by the route exclusively

In order to study the movement of people within the region before developing plans and programs in planning transportation, the types of daily trips must be identified according to the purpose of the trip

First: Daily business trips, which are trips that start and end at home, and the return and departure times are at the most crowded times, known as peak times.

Second: The daily education trips have a significant and clear effect in increasing the problem of transportation in the classroom, while it becomes non-existent on holidays.

Third: Daily shopping trips, and these trips take place when shopping is needed, and they are not limited to a specific time.

Fourth: Recreational and social trips and communication trips between friends, often in the evening or on holidays and events.

Fifth: The scattered daily trips, which are trips that do not start or end in residential units, and are not limited to specific times.

In the past years, a lot of research has appeared in the field of participation and transport planning, and with the technological development of societies, GIS has become an effective tool in the analysis and planning of transportation. It has been widely used in various applications related to monitoring land cover and changing land uses in a variety of time scales Spatial and this is what has been adopted in our studies.

Types Of Transport

There are several criteria for classifying the types of transport, including:

First: Classification according to the field of operation

–Domestic transport within the scope of the state.

External or international transport, which is movement between countries.

–Urban transport within the city limits, which is intended in our study.

Second: Classification according to the path

River or sea transport.

Land transport of all kinds.

Air Transport

Third: Classification according to the driving forces

Muscular by humans, animals, bicycles and vehicles.

Nature forces such as water currents and winds.

Energy is like electricity and all kinds of fuel

Fourth: Classification according to the type of service

Intended for the transport of passengers only or goods only.

–Joint to transport goods and passengers together.

Fifth: Classification according to the nature of the means of service

– Public transport.

Private transportation

–The importance of transport and its objectives

Means of transportation affect the lives of individuals through two angles:

- 1) It is considered a factor that influences the choice of individuals and their families for the appropriate place of residence and work.
- 2) The means of transportation affect the personal capabilities of individuals in securing the prices of the goods that have been transported. On the other hand, the transportation costs of raw materials and intermediate goods affect the selling prices of these products

The streets are classified according to their rank and capacity into:

- a. Free streets: have high speeds and large scales, and serve long international as well as regional flights.
- b. Express streets: they usually serve urban and regional flights, with high speeds and long distances.
- c. Arterial streets: serving cities and their surrounding suburbs.
- d. Combined streets: they serve short trips at the city level and work to collect traffic from the local city streets and distribute them on the main transport network in the city at high speed.
- e. Local streets: They are the streets designated for short trips with little capacity to reach and with little speed.

Morphological classification classifies streets into:

- 1- Fast streets: the aim of which is to facilitate traffic movement, and to connect cities with external roads. And there are no intersections or light signals.

- 2- Main streets: they are intended to serve traffic in the city and the surrounding lands, and at speeds less than highways.
- 3- Collective streets: aim to collect traffic and transfer it to the main streets.
- 4- Local streets: These are the streets that extend a