

# BASIS FOR SUSTAINABLE DEVELOPMENT IN ROAD TRANSPORTATION

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## **Abstract**

The development of road infrastructure brings many negative consequences. The basic consequences are the increase of impurities and dust in the air or increasing the noise, which adversely affects the quality of life. In turn, sustainable transport allows for the most severe effects to be mitigated. It is known that transport policy is not the only affecting factor in the development of the road networks. A significant factor in this matter is planning the deployment of basic services, which residents use every day. The key is to provide an environment in which they can live without having to get behind the wheel in order to run errands or to get where they need to be in the city. For society this is a very important factor that is often overlooked in this day and age. Development needs social and economic progress in order to improve mobility. Many people cannot imagine functioning without a car. Elderly people or young people commuting to schools still mainly use public transportation. It is beneficial for society to make a more sustainable form of transportation that is also more appealing and more popular. A good start would be in developing cycling transportation and providing opportunities for cyclists to get around safely. Afterwards, developing more advanced technologies such as electric cars, which are gaining popularity in developed Western countries.

**Keywords:** road infrastructure, public transport, sustainable transport, social development, road network

## **Influence of transport infrastructure on surroundings**

Technical infrastructure, including road infrastructure, significantly affects the environment on a larger scale. National infrastructure is an important element in socio-economic development. The more developed a country's road infrastructure is, the better it supports its socio-economic state.

Road infrastructure allows for the physical flow of people and goods from the starting point to the destination. Road infrastructure is fundamental for the economy of a country. Investing in such infrastructure is costly and a lengthy process. At the same time, it is a permanent element that serves a long-term purpose; therefore developing road networks should be planned in accordance to the future development plans of the country.

There are many benefits in building and using more innovative roads, such as: allowing for fast, efficient, and safe travels, positive influence on the development of tourism, and the ability to create new jobs for the local community.

However, road development also has some negative elements, those mainly being: an increase in the pollution of air, soil, and groundwater, an increase in noise pollution, interfering with the environment, as well as being a significant financial burden for local government, specifically for the state budget<sup>57</sup>.

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57 Chrabąszcz K., *Cechy regionalne a rozwój krajowej infrastruktury drogowej na przykładzie autostrady A4*, [in:] Research Papers Collection Małoposka School of Economics in Tarnow, v. 20, no 1, June 2012, p. 40.

The accelerated rate of transport development within the last decades is not only an important factor in the economic development, but also causes a lot of difficulties, particularly at the local level (usually in urban areas).

The negative consequences are most noticeable when looking at the environment and society. The development of the public transport sector allowed for the crossing of various barriers in the evolution of civilization, however its effects tend to be diverse and are dependent on the level of use and advancement within the sectors of transportation, economic development, climate and geographical location and the degree of influence on the elements of the environment<sup>58</sup>.

Road transport is one of the main emitting sources of air pollution, which is a health risk for not only humans but also the environment. The result of the fuel combustion causes the emission of substances such as: nitrogen oxides, carbon monoxide, hydrocarbons (such as aromatic hydrocarbons), heavy metals and particles<sup>59</sup>.

The emission of pollutants contributes to the increased risk in developing cardiovascular and respiratory ailments, especially for those who commute locally everyday<sup>60</sup>.

In Poland, during 2005-2006, the country's capital ran its first study in evaluating the risk in having a respiratory issue as a result to living near a busy street<sup>61</sup>. The study was a comparison in lung capacity (spirometry testing) between people living near a busy street and a control group that consisted of people who lived in non-urban areas, characterized by having a lower level of pollution. Based on the study results, the conclusion was that people living near a busy street were nearly three times (nonsmokers more than four times) more at risk of bronchoconstriction or disturbances occurring in the air flow through the bronchi. This is the primary symptom of chronic obstructive pulmonary disease, COPD.

Car transportation, which contributes to the emission of pollutants, is also the source of smog periods and the acidification of soil<sup>62</sup>. In fact, the volume of pollutants depends on several factors, including the type of fuel being burned. For example, the use of unleaded petrol reduces the emission of harmful compounds into the atmosphere. Other proportions and varying pollutants that are produced by combusted gas LPG, fuel oil and gasoline types. A big impact on the volume of exhaust emissions is based on the age of the vehicle, its technical condition, the type of engine, the fuel system or the state of the exhaust system (the use of a catalytic converter). Another factor is the structure of the traffic, including traffic volume, vehicle speed, and fluidity of movement<sup>63</sup>.

There are various factors that contribute to the acidification of soil: sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>) and ammonia (NH<sub>3</sub>)<sup>64</sup>. Emitted by road transport, nitrogen oxides induce the deposition of pollutants that cause adverse effects on the flora (mainly forests, generally alpine), concrete foundations, steel structures, and components made of limestone and sandstone.

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58 Badyda A., *Zagrożenia środowiskowe ze strony transportu*, [in:] NAUKA 4/2010, p. 115.

59 Ibidem, p. 116.

60 Ibidem, p. 117.

61 Badyda A., Lubiński W., *The Influence of Air Pollution on Pulmonary Function Test Results in People Living Close to Busy Roads*. „*Polish Journal of Environmental Studies*” vol. 18, No. 3A, 2009, p. 7-12.

62 Babisch W., Ising H., Gallacher J., *Health status as a potential effect modifier of the relation between noise annoyance and incidence of ischaemic heart disease*. „*Occupational and Environmental Medicine*”, 2003, p. 739-745.

63 *Parametry wpływające na zanieczyszczenia powietrza emitowane przez ruch drogowy*, [in:] edroga.pl/ochrona-srodowiska/parametry-wplywajace-na-zanieczyszczenia-powietrza-emitowane-przez-ruch-drogowy-041211248, [accessed: 20 May 2015]

64 Juda-Rezler K., *Oddziaływanie zanieczyszczeń powietrza na środowisko*, Official Publisher of the Warsaw Institute of Technology; Warsaw 2000.

Moreover the transport sector contributes to the greenhouse effect through the emission of greenhouse gases, which include carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxides (NO<sub>x</sub>), nitrous oxide (N<sub>2</sub>O), tropospheric ozone (O<sub>3</sub>), as well as volatile organic compounds (VOC). Carbon dioxide emissions from road transport during 1991-2007 in Poland have increased by almost 31%.

Additionally, the traffic noise that more and more people encounter causes sleep disturbances, interference of peace during work or leisure, which potentially lead to states of neurosis. Furthermore, traffic noise makes it impossible to regenerate the auditory organs that are crucial for its proper functioning. As a result, the ongoing deepening of the hearing threshold leads to a weakening of hearing<sup>65</sup>.

The continuous noise plays a factor in cardiovascular diseases. Moreover, a study conducted on a group of males, who had not yet suffered any circulatory diseases, linking the levels of anxiety and annoyance caused by traffic noise along with heart disease, showed that these disorders can occur up to 1.7 to 3 times more often among people exposed to traffic noise versus those who are less exposed.

The road network also plays a key factor in influencing the state of spatial development in not only cities but also rural areas. On many occasions, it is necessary to consider the various elements in order to build transportation routes in a desired location. For example, for every one kilometer of highway there is an allocated area of 6 to 7 hectares, and for expressways that allocated space is 4 to 5 hectares. Additionally, roads require accompanying infrastructure such as parking, gas stations, rest stations, or highway shoulders, which all take up several dozen hectares. A good example is the Stryków highway interchange, which combines the A1 and A2 highways and takes up about 80 hectares of space<sup>66</sup>.

In 2014, the total length of public road layout in Poland was over 415 thousand kilometers<sup>67</sup>.

Apart from the air pollution or the traffic noise, there is also the hazardous chemical degradation of soil near busy roads. Dust and gas pollution even cause a three-stage degradation of soil as well as the vegetation that consists of about the width of approximately 500 meters from the roadside, specifically the 150 meter area. In Poland, 50% of the country's terrain is subjected to roadside pollution.

On the other hand, vegetation found within 50 meters of a roadside is so heavily polluted that it is not fit for animal grazing<sup>68</sup>. Dust pollution plays a big role in this contamination, which coat the plants with a layer of dust and consequently limits the plant's sunlight exposure and therefore disrupting the photosynthesis process and other metabolic functions<sup>69</sup>. As a result, transportation not only negatively impacts animals directly but also through the contamination of ingested plants. Furthermore, animals are frightened and scared by the traffic noise. Road networks also interfere with their migration patterns and divide their existing habitat. Many car accidents are caused by animal collisions, which also contributes to their death. Such situations predominantly involve elk, deer, doe, and wild boar as well as small amphibians, reptiles, and foxes, rabbits and birds<sup>70</sup>.

The principle advantage of sustainable road transportation is that it is the basis for economic development as well as allowing for international co-operation, but causes many external costs.

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65 Babisch W., Ising H., Gallacher J.: *Health status as...*, p. 739-745.

66 Gronowicz J., *Ochrona środowiska w...*

67 [www.gddkia.gov.pl/pl/a/6610/dane-statystyczne](http://www.gddkia.gov.pl/pl/a/6610/dane-statystyczne), [accessed: 20 May 2015].

68 Gronowicz J., *Ochrona środowiska w...*

69 Juda-Rezler K., *Oddziaływanie zanieczyszczeń powietrza...*

70 Badyda A., *Zagrożenia środowiskowe...*, p. 119.

## Sustainable transport

The last decades of road development have negatively impacted natural habitats. A noticeable lack of balance during the twentieth and twenty-first century in this area has become one of the conditions affecting the progress of sustainable development in human activity, particularly in the way in which we transport goods and people. The steady increase in the number of automobiles on the road as well as their frequent use all contribute to the reduction of natural resources, including oil. Major problems in using motor engines are the frequent automobile collisions and harmful levels of noise pollution. New patterns of zoning have started to conflict with neighborhood layouts and ecosystem integration<sup>71</sup>.

The continuous economic development and wealth of a society contributes to the ongoing increase in the usage of automobiles on the road. Getting around has become an essential part of everyday, especially in larger cities. Access to automobiles is becoming much simpler and our travels are getting longer, whether that is for professional or recreational purposes.

The European continent during the 80s of the twentieth century noticed that increasing the number of automobile trips to meet the needs for mobility would ultimately end in failure. It was determined that the road capacity did not need to be improved (by increasing the number of parking spaces and roads) in order to meet the increasing demands which resulted from more automobile usage. The conclusion suggested an opposite approach, to limit the growing demand by shortening the length of travel or finding alternative methods of transportation that did not rely on an automobile.

In 1987, the World Commission on Environment and Development released a report called “Our Common Future”, also known as the Brundtland Report. It establishes that sustainable development is one that aims to meet the developmental plans of the existing generation and provide opportunities for the future generations<sup>72</sup>.

Sustainable development is a multidimensional issue, requiring the input and expertise of various professional fields, such as: economics, philosophy, ecology, law or political science<sup>73</sup>. The Organization for Economic Co-Operation and Development (OECD) defines sustainable development as transportation “that does not endanger a person’s health or the ecosystem, while also allowing to meet the transportation needs through the sustainable use of renewable resources at a slower rate than their rate of renewal and the use of nonrenewable resources at a lower rate than the rate of development for renewable substitutes”<sup>74</sup>.

The observation can be made that the majority of definitions for sustainable development focus on three main categories: economics, society and ecology. Therefore, transportation needs differ according to the following variables<sup>75</sup>:

- “Meets the mobility needs of the current generation;
- guarantees an improved quality of life for citizens;
- it does not endanger human health or the ecosystem;
- effectively uses renewable and nonrenewable resources;
- the means of transportation is accessible and diverse;
- meets the acceptable level of hazardous chemical pollution and noise pollution;

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71 Miłaszewicz D., Ostapowicz B., *Warunki zrównoważonego rozwoju transportu w świetle dokumentów UE*, Study and Work of the Faculty of Economics and Management no 24, University of Szczecin 2011, p. 104.

72 Brzeziński A., *Czym może być zrównoważony transport miejski*, Warsaw Institute of Technology, Faculty of Roads and Bridges, 2014, p. 1.

73 Brzustewicz P., *Zrównoważone rozwiązania w transporcie miejskim – kierunki rozwoju*, Academic Journals of the Nicolas Copernicus University in Torun, Journal 413, Toruń 2013, p. 86.

74 OECD, *Toward Sustainable Transportation, the Vancouver Conference 24–27 March*, Vancouver, British Columbia, 1996, p 12.

75 Brzustewicz P., *Zrównoważone rozwiązania...*, p. 87.

- minimizes the need for land use;
- it is affordable and supports the competitive strength of the region and the economy”.

While on the topic of sustainable transportation, it is important to also mention the document created by the European Commission in 2011 titled “White Paper. Roadmap to a Single European Transport Area- Towards a competitive and resource efficient transport system”. It outlines a balanced and competitive transport system focusing on the accessibility, quality and reliability of transportation services, specifically city transportation<sup>76</sup>.

Furthermore, since 2002 the Directorate-General for Mobility and Transport of the European Commission has been running a campaign called European Mobility Week. The goal of this campaign is to encourage local government to promote and implement sustainable transportation. Additionally, it aims to encourage residents to reconsider using their automobiles and try using bicycles, public transportation or walking as a means of transportation<sup>77</sup>.

Such events have the intention of demonstrating the mistakes that are made at the planning stage of new transport roads. Among the bad practices is the example of neighbourhood streets encouraging a speed that is greater than 30km/h, narrow sidewalks on which often there are parked cars, as well as not taking into account a senior population, children and people with disabilities when planning new roads<sup>78</sup>.

The concept of sustainable transportation started in Poland in 1993 in Krakow, and 1995 in Warsaw. Following these cities, other areas started implementing new transport policies based on sustainable development. This became a sign for a more modern approach and a call to take on municipal transportation, although at the same time dealing with a transforming economy that had been suppressed for many years after the war<sup>79</sup>. Currently, implementing the principles of sustainable development is dependent on receiving transport project funding from the European Union budget.

It is widely noted that the majority of city decisions revolve around projects relating to road layouts or public transportation. A much smaller priority is reducing the dependence on automobiles and commuting as well as eliminating its negative side effects. Often, the basic principles of sustainable development are forgotten, existing resources such as informing people about the flow of traffic, controlling the flow of traffic, a main control system, restricting access to certain areas of the city, immediate emergency response, or giving privilege to public transportation, are all good ways are reinforcing sustainable development.

Meanwhile, it is important to increase the appeal of public transportation by promoting alternative travel methods, developing bike lanes and pedestrian paths. Spatial planning is also an important element, which can be properly implemented when designing functional urban areas, allowing for easy access to services for residents, counteracting suburbanization or developing areas that are well serviced by public transportation.

A good tool in developing sustainable transportation is implementing a fiscal policy. This type of policy allows for the regulation of parking fees, fines for driving in congested city areas, introducing a vehicle tax (which currently is used in the Netherlands), or providing cost effective public transportation fares. Implementing such regulations should be an investment for transportation infrastructure<sup>80</sup>.

The traffic management system is practically non functional. For example, parking fees are not implemented with the purpose of limiting car usage or to discourage drivers from

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<sup>76</sup> Ibidem, p. 87.

<sup>77</sup> Musiatowicz K., *Weekend bez samochodu*, 2013, [in:] [www.zm.org.pl/?a=etzt\\_zm-139](http://www.zm.org.pl/?a=etzt_zm-139), [accessed: 11 June 2015]

<sup>78</sup> [wybieramrower.org/zrownowazony-rozwoj-i-zrownowazony-transport/](http://wybieramrower.org/zrownowazony-rozwoj-i-zrownowazony-transport/), [accessed: 11 June 2015]

<sup>79</sup> Brzeziński A., *Czym może być...*, p. 3.

<sup>80</sup> [Ibidem](#) p. 4.

leaving their cars for a long period of time, but rather as a primary source of income for the municipality. Often many initiatives end at the declaration stage, because residents who rely on driving to their destination, often regard the issues of restricted access to city areas, limiting parking lots, or the closing of selected streets for automobile access as unreasonable, preventing them from working effectively. That is why an important part of this process is educating residents on transportation and raising public awareness about the dangers resulting from an increase of automobiles, which would ultimately help in understanding the reasons for change within the city's transportation policy<sup>81</sup>. Some of the changes that should occur<sup>82</sup>:

- “Higher use of public transportation;
- separating the management of public transportation and private transportation companies;
- implementing special zone tariffs (an example being Warsaw and their integrated public transit tickets for city and suburban areas);
- modernizing infrastructure (for example, tram rails);
- strong improvement in the quality of rolling stock;
- develop a preference in ground public transportation;
- develop cycle paths and bike parking;
- creating systems: P+R (Park&Ride- park your automobile and transfer onto public transit) and B+R (Bike&Ride- park your bicycle and transfer onto public transit);
- The first examples of traffic management”.

Intelligent Transportation Systems (ITS) are based on a wide range of tools that enable faster travel time for passengers and the efficient management of transportation infrastructure, such as<sup>83</sup>:

- informational technologies (GIS);
- wireless communication (GPS, Bluetooth, Wi-Fi);
- in-vehicle electronics;
- monitors and sensors.

Intelligent transportation systems are used in traffic management; public transportation, freight transportation, road and emergency services, road safety, and electronic road toll collection or information rest stops. Additionally implemented in advanced and newer driving technologies<sup>84</sup>.

The effects of implementing intelligent transportation systems are: increased street flow, decrease the amount of time wasted on roads, improving traffic safety, improving the function of emergency services and limiting the negative impact on the environment<sup>85</sup>.

The focus should not just be on the number of automobiles on the road, but rather a person's reason for using an automobile as their primary method of transportation. There are many other projects other than just investing in infrastructure that could show positive outcomes in a short span of time. The most important changes in the functioning of the transportation systems as well as the quality of public city places include<sup>86</sup>:

- “Manage the system from the metropolitan area level;
- preventing the disintegration of space (the diffusion of a city);
- stimulate and control the building of passageways that are used by public transportation;
- counteract the increase in motor vehicles;

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81 [Ibidem](#), p. 5.

82 [Ibidem](#), p. 6.

83 Poskrobko T., *Zrównoważony transport. Zarządzanie zrównoważonym rozwojem*, [in:] studentom.tposkrobko.pl, [accessed: 11 June 2015]

84 [Ibidem](#), p. 35.

85 [Ibidem](#), p. 37.

86 Brzeziński A., *Czym może być...*, p. 7.

- stability of plan development (political/financial);
- plan spending (with a limited budget/ using a cost-benefit analysis (CBA));
- influencing the behaviour rather than focusing on the financial investment;
- modify the purpose of a car (especially in downtown city areas);
- develop cycling transportation;
- increase the competitiveness of public transportation;
- improve traffic safety;
- manage the transportation of cargo and utility services;
- change the laws (fines, rules of traffic, etc.);
- the quality of communication with the public- consultation on projects- collecting the public opinion;
- reconcile the varying interests of many social groups”.

The topic of sustainable transportation is very wide. There is no way to create only one ideal resolution that is applicable to all cities, however there do exist many factors that should be implemented by political authorities. As its primary function to develop, but also support viable economic programs, that additionally control and regulate emitted pollutants, it is worth making the change so that transportation systems are adapted to the local conditions as well as take under consideration the element of safety<sup>87</sup>.

## Urban transport

Discussions on the topic of city transportation have taken place in Poland much more frequently after the 90s of the twentieth century. Dynamic changes in urban transportation development make this still a relevant topic. The European Union promotes the idea of sustainable development and therefore supports the research and analysis of the current solutions in urban transportation that allows for developing new and more innovative systems, which benefit society and the environment<sup>88</sup>.

While examining urban transportation, it is also worth mentioning that this topic has been discussed in regards to its spatial needs and functionality, but also in shaping certain operational and economical factors based on the needs of the passenger. Due to this, city transportation is often associated with travelling passengers.

Urban transportation not only applies to the core city areas but also the suburbs, which are connected to it. The relationship is determined by the passenger traffic in the suburbs and its added functional value for the city. The residents living in city suburbs also play a key role in the functionality of a city. Additionally, the city suburbs are usually industrial areas, where a lot of city residents are hired to work or they are areas with recreational buildings for residents to use.

The functional reach of city transportation is much greater when combined and developed with neighbouring cities, resulting in an agglomeration and conurbation. Taking into account that city transportation allows the area to become one joined unit that serves the purpose of allowing passengers to travel throughout the city.

Apart from city transportation there are many other departments that stem from it, such as<sup>89</sup>:

- Road transportation: automobiles, buses, trolley buses

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<sup>87</sup> Lorek E., *Problemy wdrażania zrównoważonego rozwoju transportu w warunkach gospodarki polskiej*, [w:] Słodczyk J., Rajchel D. (red.) *Przekształcenia strukturalne miast i zrównoważony rozwój gospodarki miejskiej*, Opole University, Opole 2008, p. 139.

<sup>88</sup> Brzustewicz P., *Zrównoważone rozwiązania...*, p. 86.

<sup>89</sup> Wyszomirski O., *Transport miejski*, [w:] Rydykowski W., Wojewódzka-Król K. (red.), *Transport*, PWN, Warszawa 1997, p. 221.

- Rail transportation: streetcars, light rail and subways
- Additionally, city transportation also includes: pedestrians, cyclists and water taxis<sup>90</sup>.

The public transportation infrastructure includes<sup>91</sup>:

- road and streets allowing for pedestrians and automobile use;
- street car rails, train and subway;
- electrical networks which power street cars, railways, trolley buses, and the subway;
- electrical power supplies;
- streetcar, trolley bus, and bus depots;
- stops, junctions and transfer stations;
- parking.

When discussing the topic of urban transportation, it is also important to mention its history. The early beginnings of city transportation go as far back as 1819 in Paris. In Poland, a horse-drawn bus was introduced in Krakow, 56 years later. The earliest method of city transportation was a trolley bus, which was first introduced in Hollywood in 1910, and it later appeared in Poland 20 years later in the city of Poznan.

The least developed method of city transportation in Poland is the subway system, which is heavily relied on in many other European cities.

There still are many barriers in developing transportation in urban areas. The most difficult barrier in the development is the lack of space, particularly in the downtown city areas, where all the surface area is of prime economic value. There needs to be a very rational approach to its usage, in order to avoid any conflicts between the ability to drive in the city and to park your vehicle. There is also the issue with having narrow sidewalks, especially when vehicles parking on part them, therefore resulting in a conflict with the functionality of city streets<sup>92</sup>. Another large barrier in development pertains to the environment, and its tendency to increase pollution and cause additional noise pollution in the city<sup>93</sup>. The social-historical association with certain buildings and locations in a city are also a barrier in development, as these places cannot be tampered with or cannot be modified due to their additional commercial functions<sup>94</sup>. Obstacles in the urbanization process also include: suburbanization or service relocation, which contribute to increased traffic between cities and suburbs or in the industrial areas of a suburb. This consequently hinders the functionality of public transportation and increases the use of personal vehicles<sup>95</sup>.

The increasing demands and needs of society allowed for the growth and transformation of public transportation. Unless there was a crisis in the transportation system, which would be caused by<sup>96</sup>:

- “Adjusting the size of the infrastructure based on the size of the traffic; under the “induced traffic” effect, it would result in an increase in the flow of traffic;
- constructing new public transportation systems only increase the cost of its maintenance; residents do not easily resign from using their personal vehicles as a means of transportation that is reliable and safe;
- creating more strict laws regarding emission and noise pollution does not improve the environmental situation but rather by decreasing the use of motorized transportation methods”.

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<sup>90</sup> Poskrobko T., *Zrównoważony transport. Zarządzanie...*

<sup>91</sup> Wyszomirski O., *Transport miejski...*, p. 221.

<sup>92</sup> Poskrobko T., *Zrównoważony transport. Zarządzanie...*, p. 48.

<sup>93</sup> Ibidem, p. 49.

<sup>94</sup> Ibidem, p. 50.

<sup>95</sup> Ibidem, p. 51.

<sup>96</sup> Ibidem, p. 52.

Due to globalization and transformations, the transportation methods in a city have also changed. Currently, the goal of transportation in a city is to increase the quality of life for the residents.

The five pillars of city transportation development include public transportation, cycling and pedestrian traffic, relieving traffic, new company car usage and parking fees. Apart from these solutions, there are also solutions for organizing traffic.

Urban transportation is still evolving and changing. Not only do the users demand for the transformation but also the developing world. Innovative solutions allow for the implementation of more eco friendly and energy efficient transportation alternatives. It is important to remember that the goal of all of this is to improve the quality of life for the residents, as there is no city without its inhabitants. For them, the city provides access to basic services and recreational facilities. City planning should be done in such a way that it allows residents to move around in a much more efficient manner, and without creating any needless transportation requirements.

## Summary

The development of road infrastructure brings many negative consequences. The basic consequences are the increase of impurities and dust in the air or increasing the noise, which adversely affects the quality of life. In turn, sustainable transport allows for the most severe effects to be mitigated

It is known that transport policy is not the only affecting factor in the development of the road networks. A significant factor in this matter is planning the deployment of basic services, which residents use every day. The key is to provide an environment in which they can live without having to get behind the wheel in order to run errands or to get where they need to be in the city.

For society this is a very important factor that is often overlooked in this day and age. Development needs social and economic progress in order to improve mobility. Many people cannot imagine functioning without a car.

Elderly people or young people commuting to schools still mainly use public transportation. It is beneficial for society to make a more sustainable form of transportation that is also more appealing and more popular. A good start would be in developing cycling transportation and providing opportunities for cyclists to get around safely. Afterwards, developing more advanced technologies such as electric cars, which are gaining popularity in developed Western countries.

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