

## TRENDS, TECHNOLOGICAL INNOVATIONS AND DIGITALIZATION IN TRANSPORT, ECOLOGY AND LOGISTICS IN THE SUSTAINABLE DEVELOPMENT FUNCTION

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**Summary:** The most commonly cited definition of sustainable development is certainly from the Brundtland Report, which describes sustainable development as “development that meets the needs of current generations without compromising the needs of future generations”. Understanding the transport system requires an integrative intermodal approach and knowledge of the basic principles of sustainable development. The deployment of new intelligent transport technologies across all branches of transport will reduce costs, increase energy efficiency and improve protection, and provide new services to citizens, such as real-time traffic and tracking capabilities. When looking at a transport company, digitalization should contribute to eliminating all obstacles on transport routes, reducing traffic accidents, and reducing the presence of driver activity in the traffic process. The environmental dimension of sustainable development relates to environmental issues. In Europe, over 60% of the population generates about 85% of the European Union's gross domestic product (GDP) in cities. Logistics can be defined as managing the flow of goods and raw materials, the processes of manufacturing finished products and associated information from the point of source to the point of end use according to the needs of the customer. Logistic activities in the city, and above all urban freight transport, are not sustainable. It is necessary to raise awareness of all stakeholders about the importance of exploring and defining different initiatives and concepts of city logistics that would enable sustainable urban development.

**Keywords:** transport, ecology, logistics, sustainable development, digitization, new technologies, environmental protection, urban sustainability

### Introduction

The main topic of the XVII International Conference "Trends, Technological Innovations and Digitization in Transport, Ecology and Logistics in the Function of Sustainable Development", held on May 11 and 12, 2018 at Vlasice, organized by the Faculty of Transport Travnik and the Faculty of Ecology Travnik, International University Travnik in cooperation with academic partners Rezekne University of Latvia, Janusz Korczak University of Poland and Udine University of Italy is crucial for all, academic staff and students studying in one of these three fields, for employees in the sectors of transport,

ecology or logistics, for the competent authorities, more specifically for line ministries, and finally for each individual. From the beginnings of human civilization to the present day, man has strived for progress and development, constantly working to adapt nature to himself, in order to carry out his daily tasks as easily as possible, to work, to produce, and ultimately to provide a life that meets all his needs. Transport, in simple terms the transportation of passengers from one point to another, appeared together with the advent of the first wheel, and at the most primitive stage of its development was

crucial for the development of human civilization in terms of connecting man, both with places where he can find food or raw materials, so with other people and customs. Over time, the means of transport improved, the space barriers collapsed, and the traffic itself grew into a significant economic branch, that is, the most important activity in the tertiary sector of the economy, as the basic social activity of a society.

Along with traffic, the business of transporting goods and logistics has developed as an activity of managing the flow of goods and raw materials, processes of production of finished products and associated information from the point of source to the point of end use in accordance with the needs of the customer.

New technologies, automation and digitization are significantly changing the quality of life, but we all sometimes wonder if the constant innovations and the emergence of smart devices bring benefits or harm to humanity? There are fewer and fewer areas of life in which human presence is required, and the question is how this will affect human life and future generations.

How do we relate to nature and have we reached that stage of technological and civilizational development in which nature has begun to shine on us? More specifically, whether the continued development of technology will improve or endanger the lives of future generations, that is, whether such development has the characteristics of what we call sustainable development.

In this connection, there are inevitable questions about ecology, environmental conservation and urban overcrowding. This paper will address three areas; transport, ecology and logistics, and highlighting the advantages and disadvantages of new trends and technological innovations, and above all digitalisation, answer the question

of whether and to what extent sustainable development is possible that will not endanger humanity.

## **I PART - TRAFFIC**

### **1. The role and importance of transport in the European Union**

Transport is an extremely important factor in the overall economic and social development of each country. Transport connects the ends of the country, integrates all sectors of production. Without traffic, there is no economic development or connection with the rest of the world. Good, efficient and cheap traffic has the effect of reducing production costs and making products more competitive in the world market. In addition, traffic employs a large number of workers. Bosnia and Herzegovina's transport network is still underdeveloped, and there is a strong interest from neighboring countries for a faster connection between Central Europe and the Adriatic, and investing in transport would trigger the overall economic development of Bosnia and Herzegovina. Road infrastructure, which suffered extensive damage during the war, has been largely rebuilt, thus enabling normal traffic in BiH. Road construction in Bosnia and Herzegovina is still in its infancy, but significant efforts are being made to accelerate the process as there is a great need and interest for this. As road construction requires considerable resources, efforts are being made to find interested partners for financing and construction. Road construction encourages the development of other segments of the economy.

There would be no free movement without good traffic connections and transport networks. Therefore, EU transport policy has always been aimed at overcoming obstacles between Member States and

creating a single European transport space in which fair market conditions exist within, and between, different modes of transport: road, rail, air and water.

In recent decades, changes in European transport policy have contributed to the expansion of the EU internal market by opening up national markets that were previously dominated by public monopolies, as was the case in air and rail.

In the last 60 years, the development of transport in the EU has progressed significantly and transport is still of great importance for the well-being and employment in Europe. The transport industry now employs 10 million people, representing 4.5% of the total number of EU employees. Transport contributes to the economy with 4.8% of total EU-28 gross value added (EUR 548 billion).

Good transport links are very important for the EU economy and in terms of exports - transport accounts for 90% of EU foreign trade. Many European companies are world leaders in infrastructure, logistics and manufacturing of transport equipment. Currently, EU households spend 13.5% of their income on transport-related products and services, making traffic the second largest item in household budgets after home spending.

## **2. The basics of transport policy in the European Union**

The place and role of transport policy are primarily determined by the importance of transport for the overall socio-economic development. It follows that transport policy is part of the general economic policy, whether expressed in a separate document or not. Therefore, the objectives, instruments and other factors of transport policy must be complementary to those in force in the European Union.

Therefore, the objective of transport policy

is to improve the functioning of the internal market by ensuring the safety, efficiency, availability and quality of transport services, protecting the interests of users of those services and protecting the environment. As one of the first areas of common policies of the European Union, transport was considered crucial to the exercise of three of the four freedoms of the common market set out in the Treaty of Rome of 1957: freedom of movement for persons, services and goods.

Therefore, the objective of transport policy is set by the framework conditions for the various branches of transport, to enable the rational transport of goods and passengers within the EU as well as internationally, which further removes restrictions between countries, which contributes to a more balanced development of the EU economy as well as to its expansion, stability. prices, improving passenger transportation comfort and living standards.

The EU seeks to integrate the various transport sectors into effective logistics chains in order to optimize their use, as well as to respect environmental standards within the EU transport system. Transport networks are at the center of the supply chain and are the basis of each country's economy. They enable efficient distribution of goods and travel of people. They make places more accessible, make it easier to connect and connect people, and provide a high quality of life.

The aim of the European Commission is to develop and promote effective, safe and sustainable transport policies that will create the conditions for a competitive industry, jobs and prosperity.

The EU is gradually removing barriers to access to the single market, that is, unnecessary differences in technical and administrative standards and distortions of competition in EU countries - prices, taxes and other charges, which are all part of the

process of creating a true single European transport space in all modes of travel. The expansion, modernization and harmonization of infrastructure across the EU are fundamental to creating cross-border networks without obstacles to different types of travel. For this reason, the trans-European networks policy is embedded in the 1992 Maastricht Treaty. In addition, the Treaty incorporates environmental protection requirements into transport policy to help complete the internal market.

The purpose of EU transport policy is to help and protect people while traveling. One of her accomplishments was the protection and protection of passengers' rights. Now, when delays occur, passengers do not have to find out what happened. They have a right to the information and know that they can request it from their transportation company. In addition, special attention must be paid to disabled passengers and passengers with reduced mobility. The EU is the first and only region in the world whose passengers enjoy comprehensive and integrated fundamental rights in all modes of transport. As part of the project to complete the European internal market, it is essential to connect the roads across all 28 Member States that make up the European Union.

The ultimate goal is to create a single European transport space to help Europe remain competitive by increasing the efficiency of the entire transport sector for the common good.

### 3. Transport Policy in BiH

The Framework Transport Policy of Bosnia and Herzegovina for the period from 2015 to 2030 is a framework and basic document on the basis of which, in the process of progress and development of the transport sector, the development strategy, regulations, programs, plans and other acts

will be adopted and decide on development directions, action plans, priorities at the level of Bosnia and Herzegovina and its entities and the Brcko District of BiH, in accordance with the Constitution of BiH.

The overall objective of the BiH Framework Transport Policy is the sustainable development of the transport system of the country, entities, and the Brcko District of BiH, based on the expected economic and social development of the country, meeting the needs for improved mobility of freight and people, physical access to markets, jobs, educational centers and other social and economic demands, increasing the mobility of freight, capital and people in the new processes of globalization, deregulation, free markets, integration and more in the field of transport.

Achieving the overall objective requires that all forms of traffic, including intermodal and combined traffic, contribute to the achievement of the following objectives:

- to meet social and economic demand;
- to provide the highest level of service at the lowest possible cost;
- to meet information system and security requirements;
- be financially sustainable and, on the basis of major sources of funding ranging from user charges, general budgetary resources to the private sector, meet the needs of maintaining, improving and developing transport infrastructure;
- to be regulated in accordance with EU standards and regulations and the Constitution of BiH;
- that it has the minimum permissible negative environmental impact and
- to ensure the development of transport in the function of European integration of Bosnia and Herzegovina.

## 4. Traffic safety

Traffic accidents in the European Union cost \$ 518 billion annually globally, and individually each country will cost about 1-2% of their annual GDP. In low- and middle-income countries, road accidents are projected to cause monetary losses of around 5% of GDP. In Bosnia and Herzegovina, road accidents cost the country about 5.8% of GDP.

Road safety statistics for 2015, published by the European Commission, confirm that European roads remain the safest in the world, despite delays in reducing road deaths. 26,000 people lost their lives on EU roads in 2016, down 5,500 from 2010. However, there has been no improvement at EU level since 2014. In addition, the Commission estimates that 135,000 people have been seriously injured on EU roads. It is estimated that the social costs (rehabilitation, health care, material damage, etc.) incurred as a result of fatalities and injuries on the roads amount to at least EUR 100 billion. In 2017, 25,300 people were killed on EU roads, down 2% from 2016.

### 4.1. Traffic safety in Bosnia and Herzegovina from 2011 to 2020 and 2050; BiH Traffic Safety Strategy

BIHAMK's annual report showed that in 2015, 341 people were killed in traffic in BiH, while in 2016, a total of 39,543 traffic accidents occurred on BiH roads, of which 321 were killed and 11,188 were injured, of which 1,809 persons were seriously injured, while 9,379 suffered minor injuries. In 2016, 884 accidents were registered more than in 2015, which as a percentage shows an increase in the total number of traffic accidents by 2.29%. The number of traffic accidents with fatalities / injuries was also increased by 89 traffic accidents or 1.17%.

If we compare these figures with the population of 3.53 million, according to the recently published census results, it turns out that in BiH 96 people per million population are killed. In other words, nearly twice as many people per million inhabitants are killed in BiH than the European average (52).

In 2017, according to BIHAMK data, there were a total of 37,628 traffic accidents in BiH, of which 7,135 were accidents involving fatalities and injuries. In these accidents, 298 people lost their lives, while 10,229 were seriously injured or injured.

Bosnia and Herzegovina is Europe's most dangerous country after Bulgaria. If one accepts the well-known fact that there are far fewer inhabitants in BiH at present than the enumerated 3.5 million, we would very likely come to the conclusion that BiH would exceed the alarming figure of 100 casualties per million inhabitants.

#### 4.1.1. Decade of Action - FBiH Traffic Safety Strategy 2011 - 2020.

FBiH Traffic Safety Strategy 2011-2020. it is designed to be in line with the new recommendations of the United Nations Assembly and best international practice, and the recommendations for developing countries by the World Health Organization (WHO) that govern the implementation of the UN Decade of Action on Transport Security. Bosnia and Herzegovina, as a member of the United Nations, along with other members, is a signatory to the UN Assembly Declaration for the Decade of Action (DoA) for Transportation Security 2011-2020. As a member of the UN, Bosnia and Herzegovina, together with other members, must report to the United Nations through UN regional commissions and WHO, based on periodic surveys of successes over the decade, on the issue of traffic security allocation, partnerships and patronage successes, activities undertaken and data that indicate the successes or failures of efforts to improve traffic safety.

This new strategy and action plan will address these weaknesses and provide a more effective working framework for action. This is realistic and achievable if the FBiH implements a follow-up action plan based on 5 pillars of the UN Decade of Action's recommendations that will cover the following aspects:

– **Pillar 1: Security Management**

Strengthening institutional capacities for traffic safety management at all levels (FBiH, cantons and municipalities)

– **Pillar 2: Safer Roads and Mobility**

Improve the safety of road networks for the benefit of all road users, especially the most vulnerable: pedestrians, cyclists and motorcyclists.

– **Pillar 3: Safer vehicles**

Improve vehicle safety by encouraging compliance with relevant global standards and mechanisms to accelerate the adoption of new technologies that have a positive impact on safety.

– **Pillar 4: Safer road users**

Develop a comprehensive program to improve the behavior of road users.

– **Pillar 5: Action after collision**

This strategy and accompanying action plan are designed to meet the needs of the FBiH and its 10 cantons, but also to reflect and incorporate into the plans at the lower hierarchical levels of administration in the Federation, in accordance with their respective responsibilities and responsibilities. Therefore, this strategy supports all levels of autonomy, in order to guarantee the validity and implementation of the strategy at the entity and cantonal levels, enabling it to fit into the overall national Strategy on Transport Security for BiH.

The objective of the strategy is to reduce the number of deaths on the roads of Bosnia and Herzegovina by 50% by 2020. The FBiH traffic safety strategy is based on a specific vision, and that vision is safe and efficient road transport, which contributes to economic growth and development. This vision is achieved through: establishing a safer road network, improving the behavior of road users and coordinated activities of different entities (economy, government, non-governmental and other organizations, at entity and cantonal level), through targeted interventions, to reduce the number of deaths and injuries .

In order to achieve the set goals and to make the vision of this Strategy a reality in the future, political entities need to be guided by a specific mission, which is to exert strong political will and commitment on all traffic participants, using an approach based on the five pillars of the UN Decade of Action recommendations already discussed.

The key objectives of the Traffic Safety

PODRUČJE	UKUPAN BROJ SAOBRAĆAJNIH/PROMETNIH NEZGODA(SI)				BROJ SI SA POGINULIM/POVRJEDENIM/OZL. LICIMA/O SOBAMA				BROJ SI SA MATERIJALNOM ŠTETOM			
	2014	2015	2016	2017	2014	2015	2016	2017	2014	2015	2016	2017
FEDERACIJA BIH	27.210	28.960	29.477	27.689	4.834	5.084	5.150	4.731	23.011	23.876	24.227	22.958
REPUBLIKA SRPSKA	8.581	9.295	9.783	9.637	2.162	2.396	2.439	2.244	6.419	6.899	7.344	7.393
BRČKO DISTRIKT	434	404	283	302	110	147	127	160	324	257	156	142
<b>UKUPNO</b>	<b>36.225</b>	<b>38.659</b>	<b>39.543</b>	<b>37.628</b>	<b>7.106</b>	<b>7.627</b>	<b>7.716</b>	<b>7.135</b>	<b>29.754</b>	<b>31.032</b>	<b>31.827</b>	<b>30.493</b>

Strategy are:

1. Reduction for at least 7% of road fatalities each year, compared to the previous year, so that the total reduction is about 50% for 10 years;
2. Reduction in the number of accidents causing speed, by 7% each year, compared to the previous year;
3. Increase seat belt usage rate to 80% by 2013 and 90% by 2015;
4. Reducing the share of pedestrians among the dead to 30% by the end of 2015 and 17% by the end of

2020, and

5. Reduction in the number of accidents involving drivers under the influence of alcohol by 7% each year, compared to the previous year.

The implementation of the Traffic Safety Strategy would generate potential savings in 2011-2020, saving: 735 lives saved, 11,025 prevented serious injuries and 44,100 prevented minor injuries, while the total prevented economic loss would amount to EUR 1,252 billion. Investing in traffic safety is considered an "investment" and not a "cost". Sustainable funding sources need to be put in place to reduce the cost of the € 400 million a year that the FBiH is currently losing.

#### **4.1.2. Consequences of traffic accidents in BiH**

An increase in the total number of traffic accidents in BiH in 2016 led to a significant increase in the number of seriously injured by 131 persons, or 7.8%, as well as in the number of seriously injured by 1,193 persons, or by 14.6%, while the death toll in road accidents on the roads of Bosnia and Herzegovina it decreased by 20 persons, or 5.87%. In 2017, there is a decrease in the number of traffic accidents with fatalities and injuries. A detailed overview of the number of accidents with consequences is given in the following table:

*Table 1: Comparative overview of traffic accident statistics in BiH from 2014-2017. Years*

#### **4.2. Traffic safety strategy in the European Union**

The objective of the European Union is to achieve a European road safety area during the decade 2010-2020. Competence in this area is predominantly national, with EU measures focused on the condition of vehicles, the transport of dangerous goods

and the safety of road infrastructure. CHAPTER VI. The Treaty of Lisbon, and in particular Article 91 of the Treaty on the Functioning of the European Union (TFEU), is the legal basis for the creation of this road safety area, which aims to improve road safety and contribute to sustainable mobility. In 2010, the European Union renewed its commitment to improve road safety and, by 2020, set a 50% reduction in road mortality compared to 2010. To achieve the EU 2020 target, an annual reduction of 6.7%. However, since 2010, road mortality in the EU has fallen by 19%, an annual decrease of only 3.4%. Due to the unsuccessful reduction of road mortality at the desired speed, road mortality needs to be reduced by 11.4% annually between 2017 and 2020 in order to reach the final target. According to a report from the European Road Safety Council for 2017, there were 25,670 road deaths in the EU in 2016 (530 less than in 2015, a decrease of only 2%).

The EU average mortality rate was 51.5 road deaths per one million inhabitants in 2015, similar to the last two years. This slowdown, which followed a significant decrease of 8% in 2012 and 2013, was compounded by several factors, such as greater interaction between unprotected and motorized traffic participants in our cities. Endangered road users (pedestrians, cyclists, etc.) make up a large proportion of 135,000 people.

Country statistics show that the number of deaths continues to vary widely across the EU, although the gap is narrowing every year. Some countries that have traditionally had a good effect have made less progress, and in three Member States where the highest number of fatalities have been reported, road safety has improved.

*Table 2: Number of deaths per million population - preliminary statistics by*

				2014. - 2015.	2010. - 2015.
Belgija	77	65	67	4 %	-10 %
Bugarska	105	91	95	4 %	-12 %
Češka	77	65	70	7 %	-8 %
Danska	46	32	30	-8 %	-35 %
Njemačka	45	42	43	3 %	-5 %
Estonija	59	59	50	-15 %	-16 %
Irska	47	42	36	-15 %	-22 %
Grčka	112	73	74	2 %	-36 %
Španjolska	53	36	36	0 %	-32 %
Francuska	64	53	54	2 %	-13 %
Hrvatska	99	73	82	13 %	-18 %
Italija	70	56	56	1 %	-17 %
Cipar	73	52	66	27 %	-5 %
Latvija	103	106	94	-11 %	-14 %
Litva	95	91	82	-10 %	-19 %
Luksemburg	64	64	58	-9 %	0 %
Mađarska	74	63	66	3 %	-13 %
Malta	36	24	26	10 %	-27 %
Nizozemska	32	28	28	0 %	-12 %
Austrija	66	51	56	10 %	-14 %
Poljska	102	84	77	-8 %	-25 %
Portugal	80	61	60	-2 %	-33 %
Rumunjska	117	91	95	4 %	-21 %
Slovenija	67	52	58	11 %	-13 %
Slovačka	65	48	51	6 %	-22 %
Finska	51	42	48	15 %	-3 %
Svedska	28	28	27	-2 %	0 %
Ujedinjena Kraljevina	30	29	29	-1 %	-4 %
EU	63	51	51,5	1 %	-17 %

country for 2015

Country statistics show that there are still large differences in the number of road fatalities in different parts of the EU. On average, there are 52 road deaths per million people in the EU. The countries with the least number of fatal accidents are the United Kingdom, Sweden, the Netherlands and Denmark, which accounts for about 30 deaths per million inhabitants. Significant progress has been made by Spain, Germany and Slovakia, which have joined the countries whose routes are traditionally considered to be the safest.

The European Road Safety Action Program 2011-2020 sets out demanding plans to reduce the number of deaths on European roads by half in the next ten years. It contains ambitious proposals for improving vehicles and infrastructure and improving the behavior of road users. Existing key initiatives relate to the introduction of a new European driving license and the entry into force of a cross-border implementing directive, which will allow the prosecution of cross-border traffic offenders. The

European Parliament has put forward a proposal to introduce more advanced roadworthiness tests for cars, and a major step forward has been made in relation to a strategy to reduce the number of road accident victims.

### 4.3. Road traffic safety

#### 4.3.1. United Nations data on worldwide traffic accidents

Acknowledging the enormous burden of mortality and road injuries as a global problem, the United Nations General Assembly, by resolution 64/255 of 2 March 2010, declared 2011-2020 a decade of action on road safety, with a view to prioritizing prevention and traffic safety over the next decade to save millions of lives and prevent millions of injuries and disabilities.

The UN Assembly adopts a text proclaiming the Decade of Road Safety Activities (2011-2020) with the aim of reducing deaths and injuries resulting from road accidents. The decade of action is a continuation of the Make Roads Safe campaign - campaigns to increase road safety around the world.

Ten reasons for 10 years of action on the roads:

1. 1.3 million people are killed every year on the roads in the world;
2. Car crashes in traffic on the roads of the world kill more people annually than die from malaria;
3. 50 million people are injured in these accidents and many people become disabled;
4. 90% of these victims are in developing countries;
5. It is projected that by 2020, if such trends continue, 1.9 million people will be killed per year on world roads;
6. Traffic accidents are the number one cause of death for young people in the world;



7. By 2015, traffic distress will be a leading health problem for children over five in developing countries;
8. Accident costs in developing countries exceed \$ 100 million annually;
9. The cost of injury in road accidents is a huge burden on the hospitals and health care systems of these countries and
10. Traffic accidents should be prevented and prevented.

#### **4.4. Analysis of the influence of active elements on traffic safety**

##### **4.4.1. Traffic safety factors**

The basic factors of traffic safety are, as already mentioned, man, vehicle and road. The above factors of safety (man, vehicle and road) are not the only ones affecting the safe flow of traffic, and two additional factors are needed; the road traffic factor and the incident factor, which we may collectively call an additional factor of road safety.

Therefore, we can conclude that the risk of accidents becomes a function of the five factors that make up the system, namely:

- Man,
- Vehicle,
- Road,
- road traffic and
- incident factor.

#### **4.5. Effects of implementation of the new Law on Traffic Safety in BiH**

The amended Law on Traffic Safety in Bosnia and Herzegovina, which has been in force for almost a year, has brought positive progress in much of our country. This is evidenced by the number of traffic accidents reported by almost all BiH interior ministries.

Most BiH interior ministries point out that the new law has had positive effects, but

that enhanced activities of police officers have also contributed to a better traffic safety on Bosnia and Herzegovina's roads. At the beginning of last year, drivers in BiH not only grumbled about large increases in fines for speeding or drunk driving, but also rigorous penalties for squeaking tires, using a cell phone, driving a drunk passenger, etc. We have not been able to collect accurate data on how many such offenses were recorded in 2017 because numerous MIAs do not keep detailed records of the offenses committed. According to data from several MUPs, we learn that more than a hundred pedestrians and cyclists have been penalized in the past year for using their headsets and cell phones in traffic. Dozens of drivers have been fined for squeaking tires and thousands for using their cell phones while driving.

#### **5. Transportation of passengers in cities**

The growth of urban transport is putting a lot of pressure on urban space, which is a consequence of the steady growth in the multipurpose use of private cars. One of the quality long-term solutions in the development of urban transport is a system of local public passenger transport in which all public transport vehicles (trains, buses, trams, subways, ships) are integrated into a common transport system of a particular region. This form of transport organization is based on the systems already used by developed countries of the European Union and the world. The system most commonly uses the timetable at regular intervals, ie departures from each stop are every 10, 20, 30, 60 minutes, etc. In such a system there are a number of common terminals at which different types of public transport are stopped and thus enable fast changeover. The timetables in the system are harmonized and allow a quick continuation of the journey after the changeover. This system is based on trains because of their environmental, energy and infrastructure

advantages, and other public transport vehicles (buses) serve as an aid to rail systems.

The advantages of such public transport over personal transport are:

- much less polluting the environment per passenger transported;
- consumes many times less energy resources per transported passenger;
- is several times safer than personal transportation and
- occupies much less space than private ones (long car columns, parking space, etc.)

It is necessary to organize integrated passenger transport in a specific geographical area according to the needs of the population and to determine public transport lines by examining the needs of citizens. The integrated transport organization allows a number of different transport companies to work together in a system of mutual benefit.

## 5.1. New technologies for passenger transportation in cities

### 5.1.1. Use of alternative fuels

The use of renewable energy is becoming more and more significant not only because of the limited fossil fuels, but also because the products generated by combustion are the largest pollutants of the environment. The use of resources from renewable energy sources is no longer a matter of individuals' commitment to contributing to the reduction of emissions from road vehicles by personal example, but is the cornerstone of the advancement and development of the global energy sector. In order to emphasize the importance of such changes, the international agreements set out the goals that are to be achieved in the

future. When setting targets for increasing the use of renewable energy resources, account should be taken of the availability and use of renewable energy in existing rolling stock. Because the fleet is primarily adapted to use conventional fossil fuels, a transitional solution may be to use a mixture of fossil and alternative fuels.

The justification for introducing alternative fuels should be sought in the trends being promoted in the European Union and other developed countries of the world. These trends become significant primarily because fossil fuel sources are shrinking, especially oil, which produces diesel and gasoline.

An example to follow is the SU: GRE (Sustainable Green Fleets) project, which primarily covered all variants of alternative plants and involved almost all EU Member States. This project promoted alternative fuels with a focus on green fleets, though not exclusively on land transport. The aim of the project was to encourage fleet owners to switch to cleaner fuels (biofuels, methane and hybrid HEV or PHEV systems). SU: GRE project had 6 project units, whose task were:

1. managing and coordinating all information activities;
2. quality assurance and financial administration (project management), campaign analysis and results;
3. defining content for three target groups (transport fleets, driving schools, instructors and other fleets);
4. development and evaluation of the concept of educational materials with the help of fleet owners;
5. training / learning of transport and other fleet owners and
6. performing general information tasks (presentations, leaflets, newsletters and online platform).

The results of this project identified the need for Member States of the European Union to create an incentive for public procurement of biofuels vehicles by using tariff and tax systems. This initiative is especially important for fleet owners, given the opportunity to invest in customizing existing vehicles. A good example is the results of the introduction of hydrogen-powered buses in Liechtenstein, which saved over 70,000 liters of diesel and reduced emissions by nearly 200 tonnes. This project accepted that EU Member States should make the most of the opportunities they have to create a stable investment climate for the transition to biofuels. This is especially true for fleet owners who need to increase their investment in vehicle adaptation and the construction of adequate infrastructure, so support measures are required through public tenders as well as infrastructure measures.

### **5.1.2. Next Generation Buses**

In the southern Chinese city of Shenzhen, new-generation buses are equipped with advanced technology and operate urban transport without a driver. These are slightly smaller than the classic buses, which are the work of the National Center for Engineering and Transport and the Shenzhen Bus Group.

China's Xinhua News Agency reports that four smart-buses have been introduced on a trial line in a city known for its numerous technology development companies. In the first phase, smart buses take passengers on a 1.2-kilometer route and stop at three stops in Futian district.

The vehicles are designed to travel at speeds of up to 30 kilometers per hour, stop at planned stops and adapt to driving conditions. All this is provided by the sensor system. In the first phase, the bus will also be seated by drivers who will

observe the ride and take commands in case of an emergency.

Every year, the streets of China become richer for 20 million new drivers, creating unbearable traffic jams, horrible air pollution and an awareness that something must be done sooner. The concept of a bus moving above other road users could be a solution.

Participants in the 19th Beijing International Technology Fair could be convinced of how this futuristic bus model works. It actually works on the principle of "clogging" traffic lanes, and is not dependent on any traffic jams. With a length of more than 60 meters, it can accommodate 1,400 passengers and transport from one place to another without taking up space on the road. In addition, it runs on electricity and would greatly reduce emissions in China. It is a cheaper option than the metro because it does not involve digging below the ground. This fantastic solution has already been considered by several Chinese cities, and Beijing-based Transit Explore Bus is building a full-scale model.

### **5.1.3. The International Union for Public Transport (UITP). Moscow Transportation Award**

UITP is an organization for public transportation authorities and operators, policy makers, scientific institutes and the supply and transportation industry. It was founded on 17 August 1885 in Brussels, Belgium, with the aim of supporting the Belgian tram and steel industry. The purpose and purpose of establishing this organization is to improve public transport and to advocate for sustainable transport. The UITP is an international network of 3,400 members located in 92 countries and covers all forms of public transportation - metro, bus, light rail, regional and suburban rail, regional and suburban rail and water

transport.

The UITP network has one EU headquarters in Brussels and eleven regional and liaison offices worldwide (Abidjan, Bangalore, Canberra, Dubai, Hong Kong, Istanbul, Johannesburg, Moscow, Rome, São Paulo and Tehran).

At the summit of the International Public Transportation Association (UITP) held in Montreal from May 15-17, 2016, Moscow received one of the most prestigious awards for transportation, the so-called "Oscar for Transport" - a special recognition for achievements in urban transport and the development of infrastructure, thus overcoming the many major cities of India, China and Europe. Moscow has been upgrading its transportation system since 2010. In recent years, Moscow residents have witnessed a number of significant changes in the city, from the introduction of a new roundabout to an environmentally friendly public transportation system.

There are five key innovations that have earned Moscow the international Oscar for Transportation award, those are:

1. Introduction of the Moscow Center Ring (MCC),
2. Renewal of public transport,
3. Suburban railway development,
4. Improvement of roads and parking lots i
5. Bicycle friendly environment.

## 6. Entrepreneurship in transport

A traffic company is a business that deals with traffic. The term transport company refers primarily to transport companies, that is, transport and transportation companies. There are companies involved in road maintenance, passenger reception, goods reception and storage, GPS monitoring (Global Positioning System), traffic management (traffic lights), toll collection, driver training, etc.

Transportation companies can be public and private. Transport companies base their business operations on certain principles as follows:

1. The principle of economy of power - that work is done and that less energy and human power is consumed;
2. The principle of economy of speed - to carry out as fast as possible transportation, loading, unloading;
3. Principles of economy of the road - to make transport the shortest way i
4. The principle of safety refers to the safety of road users, the safety of cargo, transportation, infrastructure.

Transport company is a company that deals with the transport of passengers and / or goods and it is its core business. In addition, it can service its vehicles and provide services to a third party.

There are several sectors of such an enterprise:

- Exploitation sector,
- Technical sector,
- Economically computing sector i
- The general sector.

The rational organization of all the above sectors enables fast, efficient, cheap, reliable and affordable use of transport services.

### 6.1. Traffic Management

Since the early 1980s, human resources management has evolved into a science. The emphasis is primarily on the link between the strategy of an organization (strategic planning, strategic management, the introduction of strategic policy) and the way staff are employed as a strategy implementation.

Human resources management offers a clear starting point, but very little leadership when it comes to "common"

management skills. It is only recently that the question of strategy and the problems that arise is increasingly being raised. However, the most common problem is the lack of a human resources management strategy.

Regardless of the methods used or will be applied for performance appraisal, the performance appraisal system should provide employees with guidance so that they can contribute to organizational success to the greatest extent possible.

By managing the knowledge and satisfaction of the employees of the transport companies, it is possible to directly and significantly contribute to the increase of productivity, profitability and improvement of the quality of the services provided within the limits of the anticipated costs. Increasing productivity at a transportation company increases the amount of transportation services, which lowers cost and increases profits.

## 6.2. Human resources in traffic

In determining the managerial tasks and functions they perform in organizations, there is also a human resource management function (often referred to as "staffing"). Securing quality people, motivating them, educating them and developing them so that they achieve high results and contribute to the achievement of organizational goals becomes a key managerial function and task. Today, it is increasingly emphasized that the most important job of a manager is to find the best people they can, motivate them and let them do the job in their own way.

For successful management, the ability to:

- to select, train and train employees;
- to form and lead meetings of groups of all kinds;
- to manage all kinds of conflicts between strong individuals and

groups;

- to influence and negotiate on an equal basis;
- to integrate the facial efforts of different professional specialties and
- to integrate the facial effort of different professional specialties.

Human resources are a significant expense or expense of operating a transportation company, but without people, no transportation firm can achieve its goals. Human resources must be satisfactory, not only from the quantitative but also from the qualitative standpoint, that is, from the standpoint of personnel who have the appropriate qualifications, knowledge and abilities to perform their organizational tasks. But in addition, even when a company has the human resources that are appropriate in number, in the required knowledge and in its capabilities, that knowledge and those capabilities must be directed.

The most important question is: How can you make the most of your available human resources? In other words: How to achieve high traffic productivity? Transportation firms need to increase labor productivity by increasing employee satisfaction rather than dismissing them. Managing knowledge and employee satisfaction is increasingly becoming a critical component of the competitiveness of transportation firms in the national, regional and global transportation markets.

Human resources in transport drives the whole mechanism of business operations in traffic and for traffic purposes. According to statistics, transportation employs about 10% of the workforce in the US, or 12.3% of workers.

In Europe, looking at Union countries and beyond, it employs more than 9 million workers. Therefore, human resources in

transport represent one of the most important segments of human resource management, either as a science of transport size or managerial practical activity.

## 7. Digitization in traffic

Digitization in industrial enterprises means the transformation of industrial enterprises into digital transformation. When looking at a transport company, digitalization should contribute to eliminating all obstacles on transport routes, reducing traffic accidents, and reducing the presence of driver activity in the traffic process. The basis of digitalization is data. The basis of digital digitization, that is, digitization in the economy is data, then investment in new solutions. All of this requires that business models, visions and new information solutions be launched within the traffic, so that traffic becomes a precursor not only in the EU and BiH. Digitization is less and less demanding for papers and policies that are no longer needed.

### 7.1. A European strategy for cooperative intelligent transport systems. An important step towards cooperative, connected and automated mobility

Important changes in the transport sector will take place in Europe and in other parts of the world. The wave of technological innovations and business models that are driving the change in the market has led to a growing demand for new mobility services. At the same time, the sector is responding to the urgent need for safer, more efficient and more sustainable transport. The consequence of this transformation is the tremendous opportunity in social and economic terms that Europe must immediately cease in order for its citizens and businesses to benefit from this transformation.

Digital technologies are one of the drivers of this process, perhaps the most important. Sharing data between different entities in the transport system means that supply and demand can be answered in real time, leading to more efficient use of resources, whether by car sharing, container or rail network. Digital technologies help reduce human error, by far the biggest cause of traffic accidents. They can also create a true multimodal transport system in which all modes of transport are integrated into a single mobility service, allowing for the smooth transportation of people and goods from door to door. In addition, they can stimulate social innovation and ensure mobility for all, with the emergence of new actors and new forms of value creation such as a collaborative economy.

The European Low Emission Mobility Strategy, adopted in July 2016, highlights the potential to reduce energy consumption and transport emissions by cooperative, connected and automated vehicles. In the Digitalisation Strategy for European Industry, cooperative, connected and automated vehicles have been identified as a priority area for boosting the competitiveness of European industry. Studies have estimated that the market potential of cooperative, connected and automated driving is tens of billions of euros a year, and hundreds of thousands of jobs could be created.

Today's vehicles are already connected in many respects. However, in the very near future, it will interact directly and interact with the road infrastructure. Interaction is the area of Cooperative Intelligent Transport Systems (C-ITS), which will allow road users and traffic managers to share and use information that was previously unavailable and coordinate their activities. This cooperative element, which enables digital connectivity, is expected to significantly increase road safety, traffic efficiency and driving comfort by assisting

the driver in making the right decisions and adjusting to traffic conditions.

Communication between vehicles, infrastructure and other road users is also crucial to increase the safety of automated vehicles and their full integration into the overall transport system. Cooperativeness, connectivity and automation are not only complementary technologies, they are mutually reinforcing and will eventually be fully integrated. Driving a truck in a convoy (trucks automatically communicate with each other and safely follow one another over a very short distance) is a good example: connectivity, co-operation and automation must be combined to make the system work. Co-operation will be even more needed when future automated vehicles need to be able to cope safely and successfully in much more complex traffic situations.

Countries around the world (such as the US, Australia, Japan, Korea, and China) are making rapid progress towards the introduction of digital technology, and C-ITS vehicles and services are already available in some countries. The G78 transport ministers have repeatedly emphasized the need for action. Several Member States have started activities to introduce C-ITS under real conditions through strategic partnerships such as the EU Cooperation Corridor 9 linking Rotterdam with Frankfurt and Vienna, or the Amsterdam Group 10. The Space Strategy for Europe emphasizes the need to encourage the integration of space technologies into strategies on connected cars, primarily with reliance on GALILEO and EGNOS.

This Communication represents an EU strategy for the coordinated introduction of C-ITS in order to avoid a fragmented internal market in the area of C-ITS and to create synergies among different initiatives. This Communication is therefore an

important part of the EU strategy on cooperative, integrated and automated vehicles.

## 7.2. The digital mobility revolution

The EU mobility sector should take advantage of the opportunities provided by digital technologies. Connectivity and social media are changing traditional concepts of mobility. New business models are emerging leading to innovative mobility services including online freight platforms, shared car rides, car or bike sharing services or smartphone applications that offer real-time traffic analysis and data. Digital technologies are changing the vehicles themselves. With the availability of new connected and cooperative services built into vehicles and increased levels of automation, vehicles are becoming smarter. There is a lot of investment in driverless vehicle development right now. Automated vehicles will need to rely on secure data exchange between vehicles and between vehicles and road infrastructure, which will in turn require sufficient and reliable network capacity to allow millions of vehicles to interact at the same time.

Fully automated driving will require new telecommunications and satellite infrastructure, and vehicle positioning and inter-communication services. Fifth-generation (5G) 25 mobile communications technology and Galileo services provide an important capability to meet these needs. Autonomous driving and clean vehicles will require integrated planning and infrastructure investment to equip roads with the necessary telecommunications and charging infrastructure, such as for electric cars, and to provide high-quality road data, such as high-resolution digital maps, and fully interoperable equipment on the vehicle.

Autonomous driving and clean vehicles will require integrated planning and

infrastructure investment to equip roads with the necessary telecommunications and charging infrastructure, such as for electric cars, and to provide high-quality road data, such as high-resolution digital maps, and fully interoperable equipment. on the vehicle. An estimated € 740 billion is needed to complete the core network corridor of the trans-European transport network by 2030, creating a truly unique European transport space, supporting the EU's single market and decarbonisation and taking full advantage of digitization. Total investment in EU transport infrastructure (comprising the comprehensive Trans-European Transport Networks (TEN-T) network and urban transport is estimated at EUR 130 billion annually, largely in line with historic levels of 1% From the very beginning, the Commission has supported the development of batteries as a key development technology for electric mobility and the achievement of the goals of the Energy Union.

### **7.3. Intelligent transport systems in traffic**

Intelligent Transport Systems (ITS) are advanced applications that, while not embodying intelligence as such, aim to provide innovative services related to different modes of transport and traffic management, provide better information to different users, and are safer, more compliant and smarter use of transport networks.

"Intelligent transport systems" or "ITS" means systems in which information and communication technologies are applied in the field of road transport, including infrastructure, vehicles and users, and in traffic management and mobility management, as well as in relation to other modes of transport.

"Interoperability" means the capability of the systems and business processes on

which those systems are based to share data and share information and knowledge.

"ITS user" means all users of ITS applications or services, including passengers, unprotected road users, road users and infrastructure operators, fleet managers and emergency service operators.

"Road data" means information about the characteristics of road infrastructure, including road signs or their prescribed safety features.

The main purpose of implementing an intelligent transport system is to improve the quality of traffic and transport, to improve procedures related to human travel, to exchange goods and services, and to increase overall traffic transparency. The main objective of ITS construction is to integrate systems that will improve travel and transportation through more efficient and safer movement of people and goods, with greater mobility, greater resource efficiency and less environmental pollution. In line with this overarching objective, specific objectives can be defined that more closely describe the breadth of the ITS system: increasing the operational efficiency and capacity of the transport system, increasing the mobility of people and goods, preventing and reducing accidents and damage caused by transport, reduced energy consumption and long-term controlled protection environment.

Intelligent vehicles have additional functionality that enables the collection and processing of data from the environment, as well as automated adjustment to assist or replace drivers. The field of intelligent vehicles is experiencing dynamic growth involving various players from the automotive, public transport and electronics industries. The term intelligent vehicle is a vehicle which can be operated automatically, which can determine the safety clearance, and there is the possibility



of electronic driving of public transport and lorries with a special traffic lane.

#### 7.4. Management of traffic systems

ITS consists of 11 functional areas of activity and 32 services, of which demand management has the greatest impact on the conservation of energy resources in transport through:

- managing public transport tariffs;
- access control of individual urban areas;
- parking pricing management;
- Congestion Pricing and
- the introduction of the High Occupancy Lane Management private lane.

The management of tariffs in public transport can be achieved by increasing the use of public transport by reducing the prices of passenger tickets. More favorable public urban transport would result in at least partial abandonment of the use of private vehicles for the benefit of public transport in everyday traffic, thereby reducing traffic congestion, environmental pollution and the use of energy resources. Access control of individual urban areas is a condition in which the access to the vehicle is fully or partially controlled or restricted by users. The main advantage and purpose of access control is to preserve the capacity, speed, comfort and safety of traffic flow. Parking price management determines parking prices in the inner and wider urban area. Higher pricing policies in the inner city could result in less use of private cars in urban areas. Congestion Contribution Collection is a system of billing for public service users subject to congestion for high demand. It is necessary to introduce an additional charge for drivers of private vehicles that contribute to the creation of negative external influences in the peak of traffic demand because only a small reduction of the vehicles in peak demand would result in more efficient

traffic flow and reduction of harmful gases. The introduction of special lanes for private multi-passenger vehicles can offer travel time savings for those who opt for shared transport, thus directly acting to reduce congestion and energy consumption.

#### 7.5. Application of telematics in vehicles

Road telematics is actually an intelligent combination of control panels and car computers, which take care of traffic and make it safer and more environmentally friendly. Vehicle telematics systems can be used for a variety of purposes, such as collecting driving data, managing transportation processes, tracking the location of vehicles, finding stolen vehicles, and providing information to drivers about vehicle movement trajectories. In terms of telematics equipment, the US is first, then Western Europe, while the telematically least equipped vehicles are found in the Japanese market, although this market is a model in the field of mobile communications and consumer electronics. Many European countries are currently working on developing national telematic systems. Telematics-supported intelligent transport systems are used in multi-level passenger transport systems, intelligent traffic control systems, navigation systems, intelligent transport systems in modern transportation technologies, security systems, and traffic and message signs systems.

#### Mireo Fleet

Mireo Fleet is a telematic fleet management system for remote administration and fleet management. It uses maps and uses GPS and GSM / GPRS (Global System for Mobile Communications / General Packet Radio Service) devices built into the vehicle. The basic information recorded by the device is speed, position and direction.

The Mireo Fleet system is reliable and

efficient in vehicle tracking and fleet management systems, precise in routes and distances traveled. Map data is detailed, up-to-date and accurate with the ability to search for addresses, view locations on a map, calculate distances and create routes. The Mireo Fleet system improves business efficiency and maximizes profits. It is precise in real-time monitoring, messaging and navigation integration, and in-depth reports. Accurate and detailed reports will help you make timely and profitable business decisions. Mireo Fleet has created its own database, which provides access to all vehicle tracking reports. You can see the fuel consumption report, driving speeds, deliveries, sales locations, idle time, how long the drivers are at work. Mireo Fleet has a system in place to ensure that you always know who is operating the vehicle.

### **Mix Telematics**

Mix Telematics provides information and services related to fleet efficiency and fleet management. It deals with security and protection, fleet surveillance and management, GSM resource management and compliance. Mix Fleet Management systems allow the fleet to function optimally and reduce costs. The computer, through the GPS module, collects and directly records detailed positioning information, and thus indirectly, about the speed and direction of vehicle movement over a short period of time. The FM computer built into the vehicle is connected to various modules, such as fuel consumption, engine speed counter, tachograph temperature sensors, door opener sensor, alarm, and records all received data in the memory container. Data is transmitted to your computer using keys, radio, WiFi, satellite or mobile, after which they are ready to process and analyze the report.

### **7.6. Smart devices in vehicles**

Smart watches and bracelets offer many options, but this gadget is special in that it can save your life. Specifically, the AdvicyDrive is a wearable gadget that tracks your heart rate while driving to determine if you are awake or slowly falling asleep. If AdvicyDrive detects a drop in heart rate, it will automatically activate an alarm on your smartphone to wake you up. When a person falls asleep, the heart rate is between 10 and 30 beats per minute.

This gadget with a green LED illuminates the skin, and in relation to the color variation reflected by the skin back, the sensor detects the heart rate. When the number goes to the "red zone", a loud alarm will sound on your smartphone connected to the bracelet, the Telegraph reports. The exact date of the device's appearance, as well as the price, are not yet known.

### **7.7. Smart pedestrian crossings**

In October 2017, a prototype of a futuristic pedestrian crossing was tested in London, with variable LED lights installed in August instead of classic white paint.

The smart pedestrian crossing, which its designers claim is more noticeable than standard and will increase pedestrian safety in traffic other than LED light sources, uses a computer and cameras so that it can modify horizontal pavement signaling in real time, depending on whether there is a pedestrian in front of the street crossing or not. When the system deems it safe to cross the street, a temporary "zebra" will form on the pavement, and a green light bar will appear in front of the pedestrian indicating that pedestrians can step on the road.

Technology is able to recognize different types of vehicles, such as bicycles, so special light signals are triggered on the road. In the event that a pedestrian or child

suddenly runs out into the street, a warning red light will appear on the roadway as a warning to both the pedestrian and the driver. Smart LED signage instead of classic road paint has another advantage as it is more noticeable in nighttime and reduced visibility conditions.

### 7.8. Information technology in traffic

Future solutions will be based on the use of smarter and more environmentally sound vehicles and their connection to infrastructure facilities such as gas stations, parking lots, garages and the like. The widespread use of advanced information technologies, in addition to vehicle communication with infrastructure, will also enable vehicle communication (automatic maintenance of a minimum distance to avoid collisions).

Examples of intelligent transport systems implementation are the integration of traffic control systems:

- traffic flow management,
- traffic lights management,
- variable traffic messages,
- highway access control,
- speed check and
- parking management etc.

Public transport management is the direction of traffic, incident management, identification of offenders, maintenance of transport infrastructure and information for passengers (provision of information). Information provided by modern systems (vehicle tracking, navigation, electronic toll collection, etc.) is most often transmitted over a 3G or 4G mobile network or other communication systems.

One of ITS's services is real-time traffic monitoring, most often implemented as part of a vehicle's location and navigation system. Air travel can make a significant contribution to improving the safety of aircraft and eliminating the causes of possible failures. In the automotive

industry, in addition to monitoring and reporting on the operation of individual parts of the vehicle, it provides information on distances from other road users, road conditions, information on the current state of vehicles and more.

The principle of smart parking is that using a network of sensors (magnetic, ultrasonic wave sensor and ice sensor) checks the availability of parking spaces and information, by message, is forwarded to the user. After receiving the message, the user reserves a vacancy and later parks with the support of the IPA system.

The development of smart vehicles began with electronic fuel injection, control of power distribution for each wheel, computer diagnostics, advanced air-bag systems and satellite navigation all the way to the message center, the possibility of autonomous parking (driverless), etc.

## 8. Transport infrastructure

The most important infrastructure systems are:

- railway infrastructure,
- tavel,
- airport and
- electronic.

The main form of transport infrastructure is road infrastructure, which provides accessibility to all areas of the destination of interest for tourism. Traffic processes in tourism can be defined as the reception and transportation of tourists from one place to another or from broadcasting to receptive destinations. The basic guideline for traffic planning is the good availability of key services while minimizing the negative effects of motor traffic on society and the environment. Solutions for improving mobility are obtained by planning the transport system, without neglecting the connection with spatial planning and socio-economic factors.

## 9. A new European Union infrastructure policy

Europe's transport infrastructure is currently underdeveloped. The aim is to gradually ensure that by 2050 the vast majority of citizens and businesses in Europe are no more than 30 minutes' journey away from that extensive network. In addition to making travel easier and faster, this network will provide a safer journey with less traffic congestion. One of the most impressive success stories of TEN-T is the Oresund Bridge between Malmo and Copenhagen, the longest bridge for combined road and rail traffic in Europe that connects the Nordic countries with Central Europe. This link has contributed to the increase in economic traffic between the two parties and has brought significant benefits to local regional development. Since that bridge opened more than a decade ago, rail traffic has increased by 200%.

The central network will be supported by a comprehensive road network that will contribute to its construction, regionally and nationally. Standards have been set to ensure that trains, ships, planes, trucks and cars can use the infrastructure safely and without technical problems.

As of January 2014, a new transport infrastructure policy has been in place in the EU, within which the continent will connect longitudinally and transversely, east to west and north to south. This policy aims to eliminate the differences between Member States' transport networks and the remaining bottlenecks that impede the functioning of the single market and technical barriers such as incompatible rail standards. The implementation of this policy is funded by the Connecting Europe Facility with a budget of € 26 billion by 2020. Transport funding under the Connecting Europe Facility 2014-2020. it will be directed to the central transport

network.

## PART II - ECOLOGY AND SUSTAINABLE DEVELOPMENT

### 1. The emergence and development of the idea of sustainable development

Economists today are getting closer to the fact that there is no general theory of sustainable development and sustainability, and therefore it is considered more appropriate to talk about different definitions of sustainable development and the related, but superior, notion of sustainability. The most widely cited definition of sustainable development is certainly from the Brundtland Report, which describes sustainable development as "development that meets the needs of current generations without compromising the needs of future generations." In this way, many have accepted sustainable development primarily as a moral obligation.

The economic dimension of sustainable development reflects the search for new answers, "to the challenges of global competition in gaining competitive advantage through more efficient use and increase of productivity of available resources, while eliminating or minimizing negative environmental impacts."

The social dimension of sustainable development reflects the aspiration of modern society to establish fairer relations in the world, which is also a precondition for bridging the gap between developing and developed countries. Environmental problems have sharpened the realization that, on the basis of the current system of unequal, primarily economic, relations, the resulting contradictions cannot be resolved and sustainable development in the

interests of all countries can be ensured.

The environmental dimension of sustainable development relates to environmental issues. As natural resources are a prerequisite for development, so their use and consumption is a prerequisite for achieving sustainable development. Preservation of natural resources is now the subject of special research as well as of specific social measures. Wildlife conservation measures are not aimed at restricting its use, but rather at reasonable uses that do not go beyond the habitat that restores and replaces that same wildlife.

## **2. Transport policy in the function of sustainable development**

Understanding the transport system requires an integrative intermodal approach and knowledge of the basic principles of sustainable development. The methodology of strategic traffic planning is based on a complex of influential factors. The syntagm of sustainable development, which became terminologically entrenched by the actualization of the Rio Declaration and the Kyoto Protocol in the 1990s, is based on the "tree pillar" concept of development, which implies economic growth driven by ecological balance and social progress. and reducing the impact of public administration on various forms of deregulation, decentralization and privatization. The Single Market marked a turning point in the European Union's common transport policy and resulted in the liberalization of the transport sector, while respecting certain social, economic and spatial constraints. The challenges of the Single Market of the enlarged European Union, namely, should be accompanied by a common transport strategy, implemented at national levels by an appropriate transport policy. The deployment of new intelligent transport technologies across all branches of transport will reduce costs,

increase energy efficiency and improve protection, and provide new services to citizens, such as real-time traffic and tracking capabilities.

## **3. Ecology as the basis of modern living**

Urban ecology means to encroach on the relationship between spatial (physical) and ecological, which is the basic preoccupation of urban ecology. From the standpoint of these disciplines, there are several important aspects to consider: the relationship between the human community and its environment, the problem of physical determinism and its critique, the connection between behavior in a space and the built environment.

Cities contain a wealth of social forms and meanings. The city is defined by its geographical, climatic, and ambient location, defined by the common characteristics of its inhabitants; their general ability and activity, not only physical but also mental as well as their awareness of citizenship, which makes it possible to deal with this subject with an interdisciplinary team of experts. Citizens should be more involved in planning the development and organization of their own city, either as individuals or organized into local boards and associations. The city is a "living organism" in which it is necessary to create an urban space comfortable for life. Quality living space, because of its tidiness and content, and even visible community, is attractive to tourists.

## **4. Environmental pollution**

### **4.1. Noise and landscape degradation by damaged vehicles**

What is often overlooked when it comes to the impact of cars on environmental pollution is noise. In this case, "environment" refers to the discomfort and

health of both humans and animals, while plants once again play a regulatory role in protecting humans, creating sound insulation. Just as they are rapidly working to clean the air from carbon dioxide created by cars, especially those old, uncontrolled ones that barely pass the technical inspection. Noise can most easily be presented with a negative impact on human health in the form of increased blood pressure, nervousness and irritability, insomnia and even depression combined with other effects.

## 5. Environmental aspects in the function of sustainable development

The World Summit on Sustainable Development (WSSD), held in Johannesburg in 2002, discussed the results achieved so far in the implementation of Agenda 21 and other Rio documents. Attention was focused on five thematic areas: water and sanitation, energy, human health, agricultural production and productivity, as well as biodiversity and ecosystem management. For the first time at the Summit, about 280 partnership initiatives for sustainable development have been launched, in the form of agreements between national governments, international institutions, business communities, working groups, non-governmental organizations and other participants in the Summit.

## 6. Sustainable transportation

Sustainable transport is defined as transport that contributes positively to the economic and social situation without endangering human health and the environment. Through the integration of the social, economic and environmental dimensions, he:

- It enables basic needs for access and mobility of people, companies and

society to be met in a manner consistent with the protection of human health and ecosystem balance, while promoting intra-generational equity;

- Generates acceptable costs, functions efficiently, offers the choice of transport modes and supports the dynamic development of the economy and region, and
- It limits emissions and noise, uses renewable energy to an extent less than or equal to its regeneration cycle, uses non-renewable energy to an extent less than or equal to the rate of development of renewable alternative sources and minimizes land use.

Therefore, it is very important to look at the problems of city logistics and urban freight transport through the prism of economic, environmental and social sustainability of urban areas. On the other hand, it is necessary to raise awareness of all stakeholders about the importance of exploring and defining different initiatives and concepts of city logistics that would enable the sustainable development of urban areas.

## 7. Sustainability of the urban environment

Cities as dynamic markets for energy and goods affect our lifestyles as well as the way in which entire regions use energy resources. Today, more than 50% of the population lives in smaller and larger cities, and this trend is expected to increase. Namely, further growth of cities and urban centers will be one of the major trends in the coming decades.

The UN Organization predicts that 60% of the total population will live in cities by 2025, while by 2050 residents of cities and towns will make up 70% of the world's total population. This means that by 2030, 90%

of the total population growth will be tied to urban settlements. Such an increase in urban population will greatly burden urban infrastructure and the environment. Already, approximately 60% of drinking water is consumed directly and indirectly in cities; cities use about 75% of their total energy and emit 80% of the greenhouse gas. Therefore, the success of our fight against climate change and environmental pollution will depend on urban settlements.

Many cities have already realized the seriousness of this problem and put environmental protection in their top priorities. However, cities must maintain a complicated balance between environmental protection, quality of life and competitiveness. Unfortunately, environmental care is often neglected to develop the competitiveness of cities. However, medium- and long-term environmental investments pay off many times over. Firstly, they improve the quality of life of the urban population, and secondly, such investments increase the economic efficiency of cities

In cities of earlier epochs, environmental problems were most often related to lack of adequate infrastructure, underdeveloped hygiene, overpopulation, overcrowding and more. In today's environment, environmental problems are much more numerous and reach very complex problems of a technological nature and the psychology of urban living. Adopting and implementing sustainable development is necessary to enable further advancement of the human population. The basic idea of sustainable development is to meet the needs of today's generations, without denying the opportunity for future generations to meet their needs.

To answer the complex question of whether urbanization is a sustainable process, one must first define sustainability and sustainable development, and only then see

what role it plays in defining and implementing a sustainability strategy.

The definition that most closely approximates the operational approach in practice and allows it to build a sustainable development strategy is one jointly developed by IUCN (UNEP) - UNEP (UN Environment Program - United Nations Environment Program) and WWF-I (World Wildlife Fund) in the well-known book *Caring for The Earth, Sustainable Development* it has people in its focus and its goal is to improve the quality of human life. Sustainable development is based on protection, so it is conditioned by the need to respect the concept of nature in order to provide the resources and services needed for life. From this perspective, sustainable development means enhancing the quality of human life within the capacity to sustain the ecosystems that support it ". This definition of sustainable development is a normative concept that includes standards of behavior that must be respected if the human community strives to meet its own survival and well-being needs. The definition includes three basic components, namely the economic, social and environmental components, which form the basis of sustainable development. All three components are interconnected and interdependent and therefore require that everything undertaken in the field of development be consistent with each of them.

Three international events have marked the evolution of sustainable development over the last three decades:

- The 1972 Stockholm Conference,
- Rio de Janeiro Conference in 1992 i
- Johannesburg Conference 2002.

The significance of these conferences on a global scale is that they represent a formal institutionalized result of public requests addressed to governments as a result of the growing environmental crisis.

The concept of urban sustainability is today

largely defined in the range of two divergent settings:

- Globalist stance - according to which urban sustainability is synonymous with sustainable development and management, including market regulation, central planning and new scientific and technological solutions, and
- Localist setting - according to which sustainability is synonymous with sustainable lifestyles and according to which the local context can lead to different and locally adaptable sustainability perspectives, conditions and meanings. Elkin et al define sustainable urban development as follows: " Sustainable urban development must strive to create a user-friendly city with sufficient resources, not only in terms of form and energy efficiency, but also in terms of functions, as a place to live ".

### 7.1. A sustainable city

In order to answer the question of what a sustainable city is, sustainability needs to be viewed in a broader context. This means that one should not only look and talk about the environment in the city itself, but also take into account the role that the city plays in the wider context. Also, sustainable development should not be seen as a closed, absolute concept.

The city is an open ecosystem, so it can never be self-sustaining. The model of a sustainable city, in addition to its strictly defined physical boundaries, reflects the social matrix of the city. This model manifests itself through a myriad of different forms, depending on historical heritage, culture, economic base, climatic, geographic and geopolitical characteristics, to reduce all these forms to just a few variables that determine it. A sustainable

city does not have a 'recipe' for sustainability behavior, but it does need to have defined elements of measuring what has been achieved. A city can only be considered sustainable if its ruling structures view the entire planet as unique. The 'Ecopolis' strategic network, as this study is called, includes three interconnected visions of the city: a responsible city, a livable city and a participatory city.

### 7.2. Responsible city

The term responsible city refers to accountability in managing flows within and outside the city. The basic problem of accountability boils down to the fact that problems in operation are carried forward into the future or to other locations. In the professional community, the term " city metabolism " is often used to define the occurrence of input and output flows, as well as the functioning of the city itself as a system.

### 7.3. City suitable for life

The second vision of Ecopolis refers to a city suitable for life. At the heart of this vision is the environment built and managed, as well as the creation of a healthy environment. A significant aspect of this vision is the effort to utilize the existing local ecological potential in an optimal way. A city, settlement or building cannot and must not simply be " inserted' into an already existing environment, but it must be carefully integrated into that environment. In order for all of these problems to be considered and resolved, it is necessary to establish criteria that planners should apply and respect in the process of planning living-friendly cities. In this planning process, planners should not only dwell on the issues and problems of macro and micro planning of cities, but must also take into account many factors that are important, but which are first and



foremost expanding and largely determining strategic planning (water pollution, air pollution, motor vehicle noise, etc.).

#### 7.4. Participatory city

The third aspect of a sustainable city vision relates to a participatory city. The basic idea behind this vision of the city is based on creating partnerships and necessary partnerships. Reconciling the various interests of the business sector, the environment and community development requires partnerships. The traditional role of services offered by government, social organizations, the private sector, trade unions, religious communities, local communities and families is changing rapidly due to major financial constraints, constitutional solutions, legal changes, resource cuts, environmental demands, globalization of the economy, market liberalization, changing values, new social norms, as well as demographic pressures on cities. As a result of all these problems, local communities are opting for a partnership approach to providing services. Services are increasingly being provided through: consumer associations, trade unions, social organizations, regional and national authorities, and even international development and financial aid organizations. Only when stakeholders agree to develop and implement a common strategy is it certain that the services will be sustainable. From all of the above it can be freely concluded that a responsible city, a livable city and a participatory city are not three different cities. These three visions must be integrated into one single vision in order to be sustainable.

#### 8. Traffic automation and sustainable development

Automation is the process by which something is made automatic, and also the state that results from that process.

Automation means all measures and processes that reduce the share of human labor in modern production, service delivery and traffic. In its broadest sense, it represents a new era in the development of productive forces, finding systems that increasingly replace man, not only as a source of power, but also in the functions of observation, memory and decision-making.

A process that is at a sufficiently high level of mechanization can be automated. Full automation of the traffic process is the last step in the process of increasing mechanization of certain traffic processes, individual traffic subsystems and the entire traffic system. The degree of mechanization of a complex traffic process depends on the degree of mechanization of its individual stages or operations, the extent of mechanization, ie the extent to which certain levels of mechanization are maintained during the transition from one phase of the process to another, and the degree of penetration of mechanization, or the extent to which ancillary operations are mechanized. Children born today will not need a driver's license.

We become aware of what the future brings us. Traffic will be fully electrified, automated and connected. The driver will soon be just the system operator.

At the "Automotive and Engine Technology" event held in Stuttgart on March 14th, visitors and the professional public had a lot to see. Among the leading exhibitors was BOSCH, which introduced to the public at its international symposium its plans and leadership role in the world of motoring. In its futuristic view of the recent future, BOSCH has stepped closer to introducing some systems to the market step by step. Their experts pay the most attention to the topic of increasing traffic safety, which they have outlined as the basic motive for the development of new technologies.

By 2020, automotive technology is expected to be advanced enough to communicate with other road users, share data, or seek assistance.

### 8.1. Automated parking

Bosh will provide drivers with automated parking via smartphones and apps on them. In the future, vehicles will be able to independently search for parking without the presence of drivers in them.

At BOSCH, they point out that the current, gradual development of technology is extremely suited to getting drivers used to using cars in a new way. In six European Union Member States, as many as 59% of respondents to the survey consider this direction of development in the automotive industry to be very good. By 2016, Bosh is planning to invest 1 billion euros in driving assistance systems!

## 9. Environmental education and the creation of environmental awareness

Environmental education is of particular importance to young people, because the experience of other countries has shown that educating young people from an early age creates the necessary level of environmental awareness, and the only strategically reliable way to protect the environment for future generations is to create an environmentally educated and responsible population that is aware of the need to preserve the environment.

It is especially important whether the individual considers himself responsible for the protection and preservation of the environment or the ecological situation and does not perceive them as something alienated, as an obligation of bodies, institutions, collectives, enterprises, inspections and the like. The ultimate goal of ecological education should be that the personality itself attains ecological

education, necessary to be able to properly treat the environment. The degree of environmental education and personality education "is expressed by how well that person knows, can and will actively participate in environmental protection. The relationship with the environment in everyday situations depends on the development of these personality qualities.

Social factors are considered to be the most important factors influencing the environmental education of students, in addition to the immediate environment, family, neighborhood, preschool, school, peers, extracurricular and extracurricular forms of leisure activities, mass media and more. Developing environmental awareness among young people is a prerequisite for a more active involvement in ecology in the future, because living in a healthy and unpolluted environment is one of the basic human rights.

*"Sustainable education enables people to acquire knowledge, adopt values and develop the ability to participate in decision-making ... that will improve the quality of life now without harming the planet in the future."*

Sustainable development is the goal and demand of ecological education and upbringing, but also the social ideal of restoring the balance of all components of life and the undisturbed balance of the environment. Sustainability is doubly binding: to future generations and to nature. In relation to man, sustainability means the quality of life of present generations and the sustainability of the quality of future generations. Sustainability in relation to nature is the operationalization of guidelines and rules relating to nature and natural resources.

In order to maximize the implementation of the idea of sustainable development, as well as environmental education at all levels of

education, the United Nations General Assembly is the period 2005-2014. proclaimed it the *Declaration of Education for Sustainable Development*.

Environmental education varies from country to country. While legal provisions are consistently applied in developed countries, informing the public and including environmental content in the educational process, it is different in developing countries. The focus is on acquiring environmental knowledge, but the realization is slower, partly due to lack of resources and rigidity of the competent authorities, and somewhat due to the large number of problems that accompany developing countries. But despite all these (and other) differences, the common understanding is that environmental education is essential.

Education for sustainable development achieves the following goals:

- Enabling each individual to achieve the awareness, knowledge, skills necessary to play an active role in protecting and enhancing the environment and achieving coherent development;
- Creating new, environmentally desirable behaviors and lifestyles;
- Developing ecological ethics and ecological culture;
- Strengthening environmental education and upbringing for all and
- Improving the quality of life.

Environmental education develops and strengthens the ability of individuals, groups, communities, organizations and countries to make judgments and choices in favor of sustainable development. It can promote a shift in people's thinking and thus enable them to make our world safer, healthier and more prosperous, thereby improving the quality of life.

This is a historic moment when we have to

think about the future and if we think about the future then we must also think about forming an indivisible triangle of ecology, economy and education. Only in their joint action can the expectations and the goal of building a future worthy of a man's life be fulfilled.

## **10. Traffic in the function of economic development**

The transport sector is one of the most important economic sectors contributing 4.8% of total gross value added in the EU-28 (EUR 548 billion) to the economy and generating 11 million jobs in Europe.

The aim of the European Commission is to develop and promote efficient, safe and sustainable transport policies that will create the conditions for a competitive industry, jobs and prosperity.

### **10.1. Major challenges in the European transport sector**

As our society becomes more mobile, the EU seeks to contribute with its transport policy to addressing the problems facing our transport systems:

- road and air traffic congestion costs Europe 1% of its annual GDP and freight and passenger traffic will continue to grow;
- dependency on oil - despite increased energy efficiency, the transport sector remains dependent on oil for 96% of its energy needs. In the future, oil will be less and less supplied from volatile parts of the world. The oil price is expected to double in comparison with the oil price in 2005;
- greenhouse gas emissions - if global warming is to be limited to just 2° C, the EU should reduce its emissions in the transport sector by 60% by 2050 compared to 1990 emissions;

- the quality of infrastructure is uneven across the EU and
- Competition - The EU transport sector is facing increasing competition in the fast-growing transport markets of other regions.

## 10.2. Higher competitiveness

Road Transport - Carriers today can operate outside the country in which they are registered, thus reducing the number of empty round trips. This new flexibility fosters market competition, improves the quality of both freight and passenger transport, lowers costs and makes transportation more efficient, reducing pollution. Harmonized technical standards have also improved safety.

Air - Air travel has become more accessible and cheaper thanks to new airlines, the introduction of new routes and hundreds of connections connecting numerous airports across Europe. The EU Single European Sky initiative will allow this trend to continue. Thanks to the "open skies" agreements, any EU air carrier can fly from any EU airport to the airports of other countries. Open Skies agreements have also been concluded with the US, Canada, Israel, the Balkans, Morocco, Jordan, Georgia and the Republic of Moldova - and agreements with other countries are under preparation.

Railway transport - Any registered railway company today can provide their services throughout the EU. The high-speed rail network has expanded significantly in recent years, saving passengers time and money, and further improvements are under preparation.

Maritime transport - 75% of European trade with other countries and 40% of freight traffic within Europe is carried by sea, with around 400 million passengers using European waterways each year. The opening up of the maritime market has

allowed maritime carriers to move and operate in other countries. In 2014, the Council and the European Parliament agreed to encourage the development of a central network of natural gas supply stations in major seaports, as well as coastal electricity supply by 2025.

## III TRAFFIC AND LOGISTICS

### 1. The importance and role of logistics in the development and operation of traffic

Logistics is a name taken from military terminology in the field of production. The term logistics comes from the Greek word "logistikos" which means to be skilled and experienced in counting, waging war, supplying the military and military formations in the field. The Council of Europe has accepted the definition: logistics can be defined as managing the flow of goods and raw materials, the processes of production of finished products and associated information from point of source to point of end use according to the needs of the customer. More broadly, logistics involves the return and disposal of waste. Logistics is the area with the greatest potential to create savings and improve the business of each company, regardless of its activity, size and market position. If companies were to reduce logistics losses and costs, they would make significant savings, but also improve the competitiveness of their products and services in the market.

The first step along the way is to measure, monitor and manage logistics costs and performance indicators. Once the actual losses and costs are determined, as well as the causes of their deviation from the target values, it is possible to adopt and apply various measures and solutions (technical, technological, organizational and information character), which will enable improvement of logistical processes and activities, ie realization of concrete savings

. World experience and practice show that by improving logistics processes and activities, savings of 15 to 20% of total logistics costs can be achieved.

Unlike manufacturing, where losses are often talked about, losses are rarely mentioned in logistics. Costs in logistics are just as important as costs in any other area of the company. Research and world experience shows that logistics costs in GDP account for between 6% and 20%, depending on the development of individual national economies. Logistics costs account for 25% to 40% of the total costs, and up to 20% of the price of the product, depending on the industry and type of activity. A significant part of the logistics costs is not visible and can be referred to as the so-called. "Hidden" logistics costs.

In fact, 80% of the logistics business is considered to be out of sight of people, indicating that a specific methodology needs to be developed and applied to identify, measure and track logistical costs and losses. The causes and locations of costs and losses are found in different logistics processes and parts of the supply chain. Thus, for example, logistics losses may be related to transport, supplies, storage, packaging, time, administration and knowledge.

Transport represents the largest logistics cost. Often more than 40% of logistics costs are transport costs. Losses also occur due to the poor use of means of transport, due to inadequate planning, organization, management and control of the transport processes and the engagement of means of transport and modes of transport. The overall cost of transport is dominated by three cost categories: energy consumption costs (40-50%), maintenance costs (about 25%) and labor costs (about 20%).

Significant savings can be achieved through:

1. Proper choice of mode of transport

- and type of vehicle;
2. Better planning of transport routes;
3. Real-time monitoring of transport vehicles and
4. Efficient management of vehicles based on real costs and operating parameters.

It is necessary to determine the distance at which profit is obtained, that is, where the limits and the profitability threshold for each asset are. Proper transportation scheduling, dynamic vehicle routing, and real-time monitoring provide significant savings and economical use of vehicles. Losses often occur due to the possession of a larger number of means of transport than realistic requirements and transportation needs, which entails high fixed costs. By applying logistic outsourcing strategies and "make or buy a service" analysis, these costs can be significantly reduced and replaced by variable costs. Transportation costs should always be viewed in conjunction with other logistics costs, as there is an extremely high interdependence of transport costs and other costs, such as inventory, storage, packaging, etc. In other words, the optimization of the complete logistics chain and the entire logistics network should be kept in mind. Often companies make the mistake of focusing solely on transportation, not taking other logistics processes and activities into account. Such partial problem solving never gives real results and full effects.

## 2. Logistic flows and distributions

Distribution includes the flow of finished products from the completion of the production process to final consumption. However, in a logistical context, the distribution of goods has evolved and transcended its original form, as have many other economic concepts, namely that goods are "only" transported. Distribution of goods in urban areas results in traffic congestion, congestion, noise, emission of

gases and traffic accidents created by freight and small vans. City logistics aims to optimize the entire logistics system within the urban area and thus to positively influence the quality of life in the city without significantly affecting the level and quality of distribution.

### 2.1. City logistics

City logistics can be defined as the process of optimizing the logistics and transport activities of individual companies in an urban area, taking into account traffic, environmental and energy factors, that is, the organization of urban transport in order to meet certain criteria. Operational tasks necessary for the efficient supply of urban centers with goods and the removal of materials and various secondary raw materials are covered by the operation of logistics solutions for city logistics.

The four key factors of a city's goods distribution system are:

- Population,
- City administration,
- Senders and receivers, and
- Carriers

Each of these factors has its own requirements and goals, which are very often contradicted, however, all interested parties have an interest in the development of city logistics.

## 3. City logistics

In order to maintain the economic growth of cities and meet the demands of goods flows generators for more frequent deliveries of smaller volumes, there is an increase in delivery vehicles and kilometers traveled, and in this connection all the accompanying negative impacts such as: traffic congestion, time losses, energy consumption, air pollution, noise and the like. The end result is a significant decline in the quality of life in modern cities.

In order to ensure the sustainability of

urban areas and the more efficient realization of logistics activities, urban logistics and urban freight transport should be the subject of planning and policy making of the city. However, despite the well-known trends and negative impacts, local authorities avoid dealing with city logistics, and often ignore problems.

### 3.1. Problems of city logistics

In Europe, over 60% of the population generates about 85% of the European Union's gross domestic product (GDP) in cities. According to some research, these urban areas initiate consumption of about 70% of energy and generate about 80% of greenhouse gas emissions. For movement within cities alone, 32% of energy is consumed. These developments generate 40% of total CO<sub>2</sub> emissions from road transport and up to 70% of other pollutants resulting from transport.

The large concentration of population in a relatively small area, a large number of urban functions and structures, different business strategies, categories of generators and logistics providers generate complex goods and transport flows. These flows have characteristics of partiality, spatial dispersion of generators, diversity in the structure of logistics chains, frequency of multiple smaller deliveries, dynamism, stochasticity, etc. Intense urban freight flows cause congestion on the roads, which are responsible not only for increasing environmental pollution and energy consumption, but also for increasing travel time. Each year, the European economy loses approximately 1% of GDP due to this phenomenon. These factors are also directly related to the health of the population, as emissions of pollutants from transport are responsible for generating 70% of carcinogens and other dangerous substances in the air.

Several empirical studies have confirmed

that 6-18% of all urban trips are made by freight vehicles. These vehicles account for 20-30% of the total mileage, consume 19% of energy and emit 21% of CO<sub>2</sub>, or more than 40% of air pollution and noise emissions.

Based on these data, it can be observed that logistics activities in the city, and above all urban freight transport, are not sustainable. Based on the research, the main groups of problems are defined:

- Problems of traffic flows, congestion: caused by traffic intensity, underdeveloped transport infrastructure and poorly done preparation work;
- Transport Policy Issues: Access restrictions for vehicles, based on the time and / or size and weight of the vehicle;
- Problems with parking and loading and unloading zones: parking restrictions and charges, lack of loading areas and handling problems;
- Issues related to generators, recipients of goods: waiting for delivery and receipt of goods, problems of access and adapting to the requirements of the recipient in terms of delivery conditions, receipt of goods;
- Problems with logistics service providers;
- Other problems.

Sustainable transport is defined as transport that contributes positively to the economic and social situation without endangering human health and the environment. Through the integration of social, economic and environmental dimensions, he:

- It enables basic needs for access and mobility of people, companies and society to be met in a manner consistent with the protection of human health and ecosystem balance, while promoting intra-

- generational equity;
- Generates acceptable costs, functions efficiently, offers the choice of transport modes and supports the dynamic development of the economy and region;
- It limits emissions and noise, uses renewable energy to an extent less than or equal to its regeneration cycle, uses non-renewable energy to an extent less than or equal to the rate of development of renewable alternative sources and minimizes land use.

Therefore, it is very important to look at the problems of city logistics and urban freight transport through the prism of economic, environmental and social sustainability of urban areas. On the other hand, it is necessary to raise awareness of all stakeholders about the importance of exploring and defining different initiatives and concepts of city logistics that would enable the sustainable development of urban areas.

#### 4. Digitization and logistics

There is a 14-letter word that is increasingly used in the transport and logistics industry and soon it will not be possible to imagine vocabulary or business without it. It is about "digitalization". She is undoubtedly increasing her speed more and more. In order to ensure their competitiveness, companies must already start optimizing their own processes. To support more than 110,000 customers, IT service provider TimoCom is expanding its transport platform for another important feature: the Document Upload and Download feature. In addition to this positive time-saving effect, there is another major benefit - users can significantly increase their competitive advantage by uploading documents because the more detailed and content the company profile, the more likely the deal will be closed. It is with digital document sharing

that everyone wants to be able to rely on protecting their information and secure transmission. This is often not guaranteed when sending over public messaging or email services. With the new upload and download feature, TimoCom's clients are safe when it comes to data protection, because their data is subject to strict German data protection laws, and document storage is secure and encrypted.

In addition, they have full control over the visibility of their documents at all times during the entire document setup process, since they are not visible to TimoCom or other TimoCom clients after they are uploaded. Only when a document becomes actively visible can it be seen and downloaded by other participants on the transport platform.

#### **4.1. Green telematics**

Telematics systems would play a major role in monitoring and managing fuel-efficient vehicles and reducing greenhouse gas emissions, thus contributing to environmental conservation. This would also be determined by legislation and standards. European and national directives emphasize the transition to a low carbon society, with telematics systems being necessary. Commercial vehicles largely contribute to global CO<sub>2</sub> emissions, so it is extremely important how they are managed. Acceleration, braking, starting the vehicle and idling are the main factors that increase fuel consumption. Vehicle tracking systems can better control how they drive, and thus bring them closer to eco-driving, reducing fuel consumption and CO<sub>2</sub> emissions. This is also important from a financial point of view, especially for fleet owners and managers, who by changing the habits of technology-controlled drivers can save a lot.

#### **4.2. Driverless cars**

The technology of "driverless cars" that will be networked and able to move without human assistance is a certain future that passionate drivers are sure to dislike. Smart introduced the electric concept Vision EQ Fortwo, which combines all the features of a small urban car of the future. The strategy for the future of individual transportation in major cities in the world involves the increasing use of cars powered by alternative propulsion systems, primarily electric motors, to reduce local environmental pollution. In parallel, this is a "driverless car" technology that will be networked and able to move without human assistance. Such vehicles should further enhance city driving, reduce traffic congestion and crash. The expansion of so-called car-sharing companies is also envisaged, which in the short term rents vehicles to customers and charges for hourly service. The Smart Vision EQ Fortwo concept integrates all of these modern trends into one car - it's a fully autonomous, electrically powered, two-person vehicle that can be used alternately by more people.

### **5. Logistics and Sustainable Development**

In order to sustain the logistics activities in the city area, primarily urban freight transport, various measures and initiatives of city logistics have been defined. By adopting and implementing certain measures, local authorities are trying to get companies to make their activities sustainable. On the other hand, companies are trying to increase business efficiency with some measures, thus contributing to the sustainability of urban freight transport. The success of initiatives can be evaluated according to various criteria that describe: accessibility (vehicle / tkm, number of vehicle starts, driving time, obstacles), environmental conditions (noise,



emissions, traffic accidents), transport efficiency (average load factor per driving, fuel consumption), economic development (size of office space, number of customers, number of outlets, revenues, costs, profits), social support, ie the profits generated by each of the participants in city logistics. The success of city logistics initiatives also depends on the impact on logistics costs, implementation capabilities and practical applicability.

In general, city logistics initiatives can be divided into those that do not require significant changes to the existing urban environment and logistics context and those that do. Initiatives that change the existing urban context are described in more detail below.

### **5.1. Underground logistics systems**

Underground logistics systems belong to the group of the most radical and financially demanding initiatives of city logistics. In addition, the initiative is very innovative considering the complicated system of underground networks, the amount of investment and the high degree of automation. However, the concept of moving part of logistics operations below the surface of the earth has a long history and application. The first system for the underground transport of telegrams and mail from the postal center to branches in London began operations in 1853 and was introduced in other European cities a little later. The development and implementation of underground logistics systems can achieve the almost complete elimination of the negative effects of logistics and freight transport in the city.

### **5.2. Standardization of cargo units**

The development and implementation of standardized cargo distribution units has been fueled by the success of overseas containers. The use of logistic units reduces costs, facilitates and accelerates the

processes of loading, loading, unloading and handling of goods. Loading / unloading operations take a significant share in the timing and cost structure of the transport chain, especially in the final distribution of goods. By using standard logistic units and vehicle loading / unloading equipment, these processes are significantly reduced and accelerated. On the other hand, intermodal, road, rail and water transport technologies, automatic handling, sorting and storage systems in distribution centers require the use of standardized cargo units. Different logistics units are used in the transportation of goods, and their use depends on the characteristics of the flows.

### **5.3. Initiatives related to the reorganization of logistics activities**

This category of initiatives implies a change, that is, reorganization of logistics, and above all transport activities in the city, with the aim of making them more sustainable. Two basic types of initiatives in this category are the freight exchange and intermodal transport. The basic idea of the freight exchange is to improve the efficiency of the transport system by reducing idle time and the number of miles traveled. Under current conditions, vehicles generally return empty to their base after the last delivery on the route. The implementation of the freight exchange system, ie monitoring of deliveries and collection via the Internet, would increase the transparency of transport supply and demand.

This would make it easier to find cargo for a vehicle whose cargo space is otherwise empty in the return journey. The ideal situation is that this cargo is located near the last delivery point of this vehicle in the route, and that its final destination is near the vehicle base. Maximum efficiency is limited by the available cargo space of the vehicle in the return journey. The size of

space available depends on the type of vehicles used in the various market segments. Freight exchanges with two carriers and two suppliers in an imagined urban transport network result in cost savings for shippers / recipients, increased profits for carriers, and positive environmental and social impacts (reduction of emissions, fuel consumption, traffic relief, etc.).

## 6. Logistics Centers

This type of initiative involves the application of appropriate structures (centers) with the aim of consolidating flows that originate outside a particular city or city area and with the aim of integrating transport activities within the zone or city. The initiative requires the cooperation of logistics chain participants. Cooperative models basically have two forms of consolidation: consolidation of goods flows through a logistics center and consolidation of flows on the transport path of vehicles. The basic idea of logistics, consolidation centers is to split freight traffic flows into two parts: flows within a city or city area and flows outside a city zone. The possibility of transshipment and consolidation of flows on the perimeter of a zone, a city, enables the use of all the conveniences of large long-distance freight vehicles outside the zone, the city, without causing negative consequences within that space (for example, emissions of gases or endangering traffic safety).

However, if the factor of loading of goods vehicles bringing goods to the center is large, distribution from the center will require a large number of small delivery vehicles, thus increasing the number of vehicles entering the city. Some initiatives of this type are also considering the use of more environmentally friendly vehicles to deliver the final delivery from the consolidation center to the beneficiary.

Logistics centers play an important role, not only in the supply chain, but also in the planning of logistics and transportation of the city as a whole, and their location has a significant impact on the scheduling of transport flows on the city's transportation network. From a societal point of view, the locations of logistics centers are of particular importance, especially when planning public logistics terminals, which can be an effective initiative for solving city logistics problems. These terminals are being built around major cities to address problems and create a single, efficient logistics system for all companies and the entire community.

Through these consolidation centers, the implementation of advanced information and cooperative transportation systems has practical application. Public logistics terminals can be used by 3PL companies or companies that have cooperative agreements. The implementation of this initiative avoids the implementation of inefficient transport activities in the city, reduces the number of vehicles in the central parts of the city, reduces congestion on the streets, fuel consumption and all negative impacts on the environment (aero-pollution, noise, vibration, etc.), and increases the quality of life in urban areas. Despite the positive impacts, only a few initiatives of this type have been implemented for a long period of time.

Applying the concept of consolidation of flows through a logistics center can bring about positive effects from the aspect of environment and society due to more efficient and environmentally friendly transport operations within the city.

The use of advanced information and communication technologies enables better planning and implementation of logistics operations, improves inventory control, as well as the availability of products and

services to the client. On the other hand, better control and transparency of supply chains can facilitate the transformation of hauled into pushed flows. Also, the concentration of flows gives the opportunity to offer and realize different VAL ("value added logistics") services, and the concept provides the ability to reduce delivery costs and better utilize resources at delivery points.

## Conclusion

As pointed out earlier, new trends, technological innovations, and above all digitalisation, should contribute to removing all obstacles to transport routes, reducing traffic accidents and the diminishing presence of driver activity in the traffic process. All this will contribute to the development as the wave of technological innovations and business models leads to an increasing demand for new mobility services. Recent studies have shown that the market potential of cooperative, connected and automated driving is tens of billions of euros a year, and hundreds of thousands of jobs could be created. Based on all of the above, it can be concluded that there is no room for fear that digitization and innovation will endanger the survival of today and the lives of future generations.

On the other hand, the revolution in autonomous driving can cause automatics to determine the fate of people, which will lead to new problems in unemployment and the loss of a large number of jobs with unprecedented consequences, which necessitates, first of all, a number of problems from the aspect of the loss of jobs so that we do not get into the situation that happened in Japan that 2,500 employees were left without work by the introduction of robotization in one day, and only a small number of people remained in those jobs.

All road users, drivers, pedestrians, police,

law enforcement agencies, car manufacturers, as well as smart devices that contribute to safer driving and, ultimately, the whole society, must be aware that traffic safety is at the forefront and that every effort must be made daily to avoid road accidents. We also need to be aware that some innovations can only endanger the safety of road users, and in that sense we should only accept those innovations that will really benefit us, and reject those that can only destroy a person. We must not accept at all costs every innovation that technology brings.

The European Union has set some targets for reducing road mortality rates, however, the ideal we should all strive for is that road accidents no longer occur in the future. In order to achieve such an end goal, it is necessary for all of us, as individuals and road users, and as members of the social community, to understand the importance of transport, not only from the point of view of innovation and digitization, and safety, but also from the point of view of entrepreneurship in transport, and good and effective management of human resources in transport companies. A good infrastructural network is also required for traffic to ensure good communication and connectivity between people and geographical areas. Only by the tight connection and interplay of the above mentioned aspects of transport, is it possible to achieve the development of this activity, and ultimately sustainable development that will fully meet the needs of both present and future generations.

Ecology and sustainable development have already been discussed before, in which sense it is important to emphasize that environmental education and the creation of environmental awareness are of primary importance for environmental sustainability and the life of future generations. Given that most of the world's population lives in cities nowadays, the

problem of urban sustainability is often emphasized, in which sense the concepts of sustainable, responsible, participatory and liveable city are solutions to the problem of urban sustainability.

It is inevitable to mention the correlation of logistics and sustainable development, that is, in order to sustain the logistical activities in the city area, it is necessary to implement measures of city logistics.

Considering the importance of new trends, innovations, digitization, automation through three very important areas of each individual's life; traffic, ecology and logistics, we need to understand that all newspapers should be of use to man, that is, they should be able to perform their daily activities as well as possible, to make a profit, and ultimately, to have a better and better quality of life.

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