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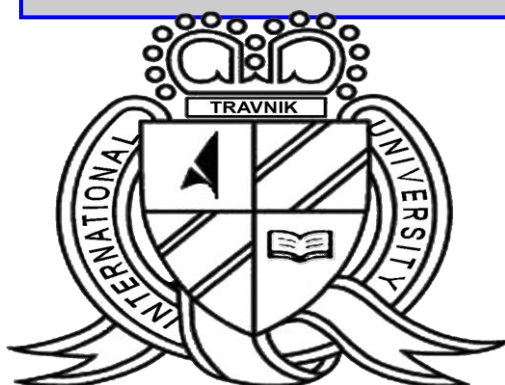
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TRENDS, TECHNOLOGICAL INNOVATIONS AND DIGITALIZATION IN TRANSPORT, ECOLOGY AND LOGISTICS IN THE SUSTAINABLE DEVELOPMENT FUNCTION

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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
UKUPNO	36.225	38.659	39.543	37.628	7.106	7.627	7.716	7.135	29.754	31.032	31.827	30.493

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 CO₂ 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 CO₂, 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 CO₂ 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 CO₂ 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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HIGHER EDUCATION REFORM OF WESTERN BALKANS COUNTRIES WITH TRAFFIC, ECOLOGY AND SUSTAINABLE DEVELOPMENT (Keynote paper)

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Summary: Countries in the Western Balkans subregions have been in transition for more than two decades, with the implementation of the EU accession project being their top priority. The concept of European integration implies a radical transformation in all spheres of society, where highly qualified human resources are the basic driving force behind all positive changes. Human capital and knowledge have made a decisive contribution to revolutionary innovation. Higher education aligned with postmodern tendencies is an essential foundation of development with relevant implications for the future of each creation. Transport and the environment designate areas with drastically disrupted parameters in all competent dimensions of sustainable development. Higher education reform must, among other things, be in the function of improving transport, the environment and implementing a sustainable development strategy.

Keywords: higher education reform, human resources, transport, ecology, sustainable development, European Union, Western Balkans.

INTRODUCTION

The last decade of the twentieth century has witnessed the beginning of a period of globalization, characterized by global competition, the penetration of world market standards and the international orientation of all organizations. Globalization is a set of different processes that basically have the idea of developing and connecting the world. It can be viewed from different angles, so it is often defined as a concept, form and phenomenon that involves multiple and drastic changes in all dimensions of life. It has the ability to create change and to involve the whole world in those changes. The fact is that fewer and fewer benefits are being drawn today from traditional resources: labor, land and capital. **The main producers of wealth of the present have become human knowledge and timely information**, leading to revolutionary changes in many fields, including in higher education. In developed countries, the focus of employee activity is shifting from material processing to information processing, which has a major impact on the education process. **In a globalized world, higher education has become a pillar of society and its future depends on its quality.** However, for education to be productive and quality, it must accompany the accelerated changes in daily life. It is quite clear that knowledge has become the most important potential in today's world, and the development of information and communication technologies has contributed to the increasing reliance of the entire planet on this "intangible" resource. The emerging situation, which entails modernization of governance and leadership, increasing demand for education and research, connectivity and networking, has imposed new challenges for the countries of the Western Balkan region, all of which have a common goal - joining the European Union. The region's interest is evident in its own development

and strengthening of ties with Europe, where higher education can play a significant role in this process. The higher education system must be conceptualized and aligned with the issues of transport, ecology and sustainable development. This is achieved by creating appropriate curricula and involving the members of the academic community in the concrete resolution of the manifested anomalies in the stated spheres of society.

1. HIGHER EDUCATION REFORM IN THE WESTERN BALKAN STATES

Globalization, as the largest planetary phenomenon reflected in megatrends, has a major impact on education, since research into science and education is actually research aimed at finding a new key to the development of a country. Developed countries are most concerned with science, education and teaching, as the key to success. In the modern world, more and more money is being allocated for the development of science, education and staff. Globalization in education involves several key factors, among which the most important are: encouraging lifelong learning and modernizing educational institutions through the use of state-of-the-art learning tools and techniques (Neskovic, 2016). The focus of the teaching should be on the students, not the lecturer. Instead of listening to pre-prepared lectures, students should be active participants in the process. In doing so, they are encouraged to think critically and creatively, to solve problems and to apply knowledge in real life. The consequence of such learning is the knowledge that lasts and is the right preparation for future life and business challenges (Nešković, Jovanović, 2017).

Criteria that modern education must meet:

1. Quality, complex and comprehensive education, which involves a creative blend of theory and practice, as well as a fusion of

- concrete applicable knowledge with general education.
2. High level of professionalism of lecturers, not only in the sphere of a specific subject, but also in all spheres that are dominant in the market.
 3. Modern equipment for schools and colleges, especially when it comes to IT equipment.
 4. A modern educational institution should **encourage and develop** those **talents of students** who, taking into account their individual characteristics and preferences, will be most useful and profitable in the future in practice. If every student's faculty develops exactly what he or she is most talented for, they will create top experts in many fields.
 5. **Creative teaching**, as one of the priorities of modern education, aims to enable students to effectively acquire knowledge through the use of multimedia content, because only through such learning do students actively prepare for the fusion of theory and practice and are in the process of changing the development of new technologies in daily life.
 6. Modern education requires **as many concrete examples as possible, lots of realistic projects, exercises and practices**, because - learning from books only widens students' perspectives and provides them with the necessary information, but it will not be very helpful when they first enter the real work environment.
 7. **Students should be educated in a "harsh" environment** (closest to reality), as this will prepare them for what is expected of them in the real world, outside of the classroom.
 8. New education implies **from the roots a changed role of the professor**. Instead of teaching

- professors, they now take on the role of coordinator, who is there to accompany students in their individual or group work. The professor has a responsible role to teach students, but in modern education he has an even greater responsibility - to motivate them to go through the learning process on their own, to deepen and connect their knowledge themselves, to research and come to conclusions.
9. Modern education **must develop** in interaction with **science, technology and culture** and draw on it knowledge and inspiration.
 10. The number of criteria that society expects from modern education is constantly increasing day by day, and the future will require the fulfillment of even more complex requirements.

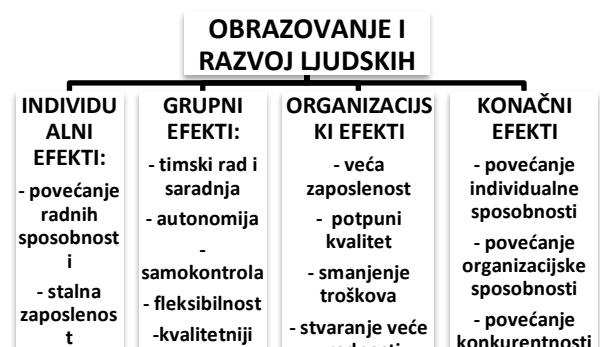


Figure 1. Effects of modern education

Source: Image is the result of an author's research work

The importance of knowledge in human life, living and acting is increasing. It contributes to the expansion and deepening of human knowledge and cognition, improving practical action in all areas of human interest, faster and easier business operations, managing business processes and saving available resources, fuller realization of human rights and freedoms, participation in social and state decision-making and directing the path into the

future. All this affects the motivation of the individual and each community in acquiring more knowledge and developing information and communication skills and culture, especially since information and communication knowledge becomes one of the main conditions for advancement in business, in the profession, in every field of human and economic activities, that is, in the life and work of each individual and community (Barlett, Uvalić, 2013).

The European initiatives of major importance for the higher education of the Western Balkan countries are the Bologna Process, the Lisbon Strategy and the Europe 2020 Document (Neskovic, 2018). In order to secure a sustainable development and a secure future, in 2000 the European Union adopted a development strategy known as the Lisbon Strategy with the strategic goals of making the EU the most competitive and dynamic economy in the world by 2010, knowledge-based and capable of achieving a sustainable economic growth. A key component of this strategy was the development and advancement of knowledge, which entailed greater investment in education and training, scientific and technological research and innovation. However, some of the strategic goals of the Lisbon Strategy have remained unfulfilled, so the EU has begun the process of creating a new strategic framework that has resulted in the Europe 2020 document: a strategy for smart, sustainable and inclusive growth, which aims at EU-based economic development based on sustainability environment, high levels of employment, productivity and social cohesion (Nešković, 2014).

Education is one of the central themes of this strategy, and involves the use of alternative instruments and mechanisms in the implementation of EU policies, such as the Lifelong Learning Program, Tempus, Erasmus Mundus and others. The strategy outlined five goals, two of which relate directly to higher education and research:

min. 3% of GDP should be earmarked for R&D; at least 40% of the younger generation should have a tertiary education or diploma; the proportion of adults (30-34 years of age) with tertiary education should be at least 40%; on average, at least 15% of adults should participate in lifelong learning. This strategy is not only important for EU Member States, but also represents a significant potential for EU candidate countries to which all Western Balkan countries belong, except Croatia (Naidoo, 2012).

The 1999 Bologna Declaration refers to the reform of the European higher education system and underlies the Bologna Process, which includes: adopting a system of recognizable and comparable degrees, adopting a system based on three main study cycles (basic, master and doctoral studies), the introduction of the ECTS (ECST) points system and diploma supplement, improving the mobility of students, teachers and researchers, ensuring the quality of higher education, developing comparable curricula, interinstitutional cooperation, mobility schemes and integrated study, training and research programs. All of these instruments aim to facilitate employment by recognizing the knowledge and competences of graduates across Europe. The ultimate aim of the declaration is to create a single European educational space in which lecturers, researchers and students will be able to move easily and quickly. By joining the Bologna Process, the countries of the Western Balkans have assumed the obligations of this declaration. From a broader, Euro-integration perspective, this implies implementing the necessary higher education reforms in these countries in order to position their universities at European and international level and improve their own quality and competitiveness.

The Lifelong Learning Program is a cooperation program in the field of

European Union education that supports the development of all levels of education. For the time being, Western Balkan countries can participate in certain types of projects only if their educational institutions offer expertise in the subject area of the project and thus contribute to achieving the best possible results. As the LLP is one of the main sources of funding for the development of education in the EU, it is very important that the educational institutions of these countries begin preparations for full participation in this program in a timely manner.

Tempus (Trans-European Mobility Scheme for University Studies) is an EU program that helps reform and modernize higher education in partner countries and is one of the oldest and most successful EU cooperation programs. The program helps partner countries' education systems to gain unobtrusive acceptance of EU higher education development trends stemming from the Lisbon Agenda and the Bologna Process and funds projects involving higher education institutions from the EU and more than 20 partner countries. The Tempus Program was started in 1990 with the main objective of modernizing the higher education sector and facilitating institutional cooperation with Central and Eastern Europe. Yugoslavia joined the Tempus program almost immediately after its inception (in 1991), however, political developments in this area interrupted this cooperation and it took a long time for the newly independent states to rejoin the program.

Erasmus Mundus was launched in 1987 and is a program to support cooperation and mobility in higher education through the promotion of the highest quality European masters and doctoral programs. The program aims to improve the quality of higher education and intercultural understanding through cooperation with partner countries (non-EU countries). It

seeks to increase the attractiveness and recognition of European higher education around the world and the European Union as one of the centers of excellence (Neskovic, 2013). The program works by giving students and teaching staff from all over the world the opportunity to participate in postgraduate studies at higher education institutions of the EU, and vice versa, facilitating the mobility of students and teachers from EU countries to partner countries. The EU provides scholarships for both nationals of partner countries who are admitted to Erasmus Mundus masters and doctoral degrees in EU countries, as well as their nationals studying at partner universities. All countries from the Western Balkan region participate in it.

Globally, countries' competitiveness issues are linked to the functioning of the World Economic Forum (WEF) and its Global Competitiveness Index (GCI). This index is based on twelve pillars of competitiveness organized into three groups. Higher education and training belong to the second group, which shows the factors of efficiency increase of the analyzed country. All data are standardized on a scale of 1 to 7 (1 - worst grade, 7 - best grade), which is also the range of possible values for all indicators, the pillars of competitiveness and even the Global Competitiveness Index (GCI). The importance that the pillars within a group have for an individual country depends on the degree of its development. With all of the above in mind, GCI could be roughly defined as a set of institutions, policies and factors that determine a country's level of productivity. The level of competitiveness expresses the capacity of the national economy to generate sustainable economic growth at the current level of development in the medium term.

Table 1: Comparative overview of socioeconomic data for 2015-2016. g Western Balkan and EU countries with the

most advanced / high quality higher education

2015 /16	Number of citizens (in millions)	GDP (US \$ in billions)	GDP per capita (US \$)	GCI Higher Education and Training 1-7 (worst) 7 (best)	A place of competitiveness for higher education (From 140 countries)
Albania	2,9	11,5	3995,38	4,7	47
BiH	3,9	15,8	4088,21	3,8	97
Montenegro	0,6	4,0	6489,10	4,6	54
Macedonia	2,1	9,9	4786,84	4,8	46
Serbia	7,1	36,5	5119,76	4,3	71
Denmark	5,7	295,0	52114,17	5,8	9
France	64,3	2421,6	37675,01	5,3	25
Finland	5,5	229,7	41973,99	6,1	2
Germany	81,9	3357,6	40996,51	5,6	17
England	65,1	2849,3	43770,69	5,6	18

Source: World Economic Forum, <http://reports.weforum.org/global-competitiveness-report-2015-2016/>

The transition period, structural economic reforms and transformation of the economies of the countries of the Western Balkan region into capitalist ones did not evidently lead to improvement of the living standards of the population of these countries. In addition, the economic crisis has hit the Western Balkan countries hard, which has negatively affected the quality of many segments, and hence higher education. As can be seen in Table 1, some of the main features of this region are still extremely low GDP and significantly lower GDP per capita compared to the EU countries surveyed. Also, in terms of competitiveness, higher education in the countries of this region occupies very low places (from 46th to 97th) of the 140 countries that entered the WEF analysis this year. Of the Western Balkan countries, the highest GCI value in terms of higher education is Macedonia - which ranks 46th, while the lowest ranked Bosnia and Herzegovina - which ranks only 97th. In terms of higher education in EU countries, according to the WEF Global Competitiveness Report 2015-2016, Finland's highest ranking is the highest rated, ranking 2nd out of 140 countries, while other European countries surveyed ranked extremely high in terms of on this issue (9th to 25th).

Table 2. Comparative overview of public investment and human capital competitiveness rankings for 2016 g of the Western Balkans and EU countries with the most developed / top quality higher education

2016	Part of GDP allocated to education	A place of competitiveness for human capital
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	(%)	(from 130 countries)
Albania	3.5	70
BiH	/	/
Montenegro	/	/
Macedonia	/	59
Serbia	4.4	57
Denmark	8.6	7
France	5.5	17
Finland	7.2	1
Germany	5.0	11
England	5.7	19

Source: World Economic Forum, <http://reports.weforum.org/human-capital-report-2016/>

Table 2 shows the WEF data from the 2016 Human Capital Report comparing the Western Balkan countries with the EU countries with the most advanced / top quality higher education. State investments in higher education are presented as well as the rank of competitiveness of human capital, which is directly derived from the level of development of higher education. As can be seen, in the 2016 WEF analysis, only Albania, Serbia and partly Macedonia are taken from the Western Balkans countries, which allocate extremely low percentages for higher education from their GDPs, and therefore the competitiveness of their human capital is low on the competitiveness scale (57, 59 and 70 respectively). 130 countries). Unlike the comparable EU countries whose higher education is considered to be of the highest quality and whose human capital is at the top in terms of global competitiveness (1-19 places out of 130 countries analyzed), this was directly influenced by the high percentages of GDP that these countries allocate for their education systems. It is clear that public investment in higher education is the key to its success and competitiveness.

The numerous changes brought by the era of globalization bring new challenges for companies and countries in terms of maintaining competitiveness, and the future will require the fulfillment of even higher quality requirements. Contemporary global markets are based on completely new competition rules, resulting in changes in the strategies of companies and countries. In order to create and improve competitiveness, the focus on investment in intangible assets is clearly emphasized today. Science and technology are embedded in the foundations of every modern society and permeate all aspects of human life, and the ever-accelerating scientific and technological progress and development in the field of information technologies emphasize the importance and role of human capital. In a "knowledge society", competitive advantage is based on human knowledge and the exploitation of potential opportunities and opportunities for the realization of which human knowledge is necessary. The key factor for improving competitiveness today is human capital, which is increasingly reaching up to 90% of the value of firms, which is a confirmation that knowledge, competences and skills are crucial for a positive competitive position. Land, capital and equipment no longer play a decisive role in the world market. Individuals, companies and even states are increasingly dependent on how they develop their skills and apply their knowledge to achieve their goals.

2. IMPLICATIONS ON TRANSPORT, ECOLOGY AND SUSTAINABLE DEVELOPMENT

The essential role of the higher education system in the Western Balkan countries is to address the negative trends and problems in all areas of human existence. This implies the connection of the academic

community with all spheres of society in the context of finding the most optimal solutions that manifest and hinder the realization of development projects and the inclusion of states in the family of developed countries. The task of science and academic structures is to provide competent answers to all contemporary challenges. Transport and ecology are fields that represent scientific disciplines and professional activities. Accordingly, the higher education system must be directly linked, that is, incorporated in the field of transport, ecology and the concept of sustainable development. This is realized by creating relevant teaching content in the work programs of institutes, colleges and colleges in all study cycles. In addition, it is necessary to ensure the involvement of academics in the aforementioned areas in the conception of strategic documents and implementation of projects at all levels of organization, especially in the context of the requirements of European integration.

The transport development so far has been directly in the function of expanding the infrastructure and transportation industry, especially the automotive industry. Postmodern trends in the development of economy and society, according to theorists, change the concept of traffic and transport development. On the stage there is a so-called. the fifth traffic revolution, that is, the era of personalization and individualization of traffic. This trend is devastatingly devastating current settings and threatening the basic postulates of environmental and sustainability in the broadest sense. The syntagm of sustainable development, which terminologically positions itself with the Rio Declaration and Kyoto Protocol of the 1990s, is based on the concept of economic growth, determined by economic equilibrium and social progress. (Steven, Bradley, 1995).

Although the idea of sustainability has been rudimentally sketched since the so-called. The first "ecological revolutions" of the early 1960s owe their sustainability, today's

significance, to the World Environment Conference, held in 1992 in Rio De Janeiro. According to documents from that conference, sustainable development means qualitative growth, ie development. socioeconomic and cultural developments that are aligned with environmental conditions, constraints and capacity, which should take place in such a way that future survival is not impaired. However, it has quickly emerged that the general principles and categories of the sustainability paradigm are not directly applicable in the preparation, decision making and implementation of strategic development decisions. It is necessary to operationalize (concretize) them, so that they express the criteria and contents of a specific historical-geographical space that encompasses a given planning area and the people who inhabit it. This is where the controversy over the various and different meanings of sustainability originates. Namely, everyone agrees more or less on the interpretation of the concept, general principles and criteria of sustainability, while most often there are different interpretations regarding sustainability at the expense of some others, in which interest aspects play a minor role (Nešković, 2014).

Today, there are serious problems with the implementation of the idea of sustainability, which is reflected in the predominance of neoliberal aspirations over the general interests of humanity and the demographic appearances of politicians who merely declare themselves committed to the principles of sustainability. In line with the "think globally act locally" thesis, proponents of sustainable development theory believe that its principles can be realized if they are first applied in the local environment, and at some later stage sustainability can take over the entire planet. Sustainability strategies should be implemented by nation states, their constituent regions, individual settlements - cities and villages, and even neighborhoods. What is significant is that

sustainable urban development is just coming from developed neighborhoods that have been implementing it for years. In this way, the ideal of sustainability is spread around the world and humanity becomes aware of environmental sustainability. In order to achieve urban sustainability, rational and efficient land use is required, with particular emphasis on the conservation of green spaces. In addition, environmental sustainability is aided by the efficient use of resources achieved through the recycling and proper storage of industrial waste, both large and small companies, and the use of household appliances that save relatively little energy.

Sustainability can be ensured through efficient use of energy and the use of alternative energy sources (Neskovic, 2014). In order to reduce energy loss and increase energy efficiency, the following measures are being implemented: insulation of heated space, replacement of worn-out joinery in heated rooms, replacement of energy-inefficient consumers with efficient ones, installation of metering and regulatory devices for energy consumers, replacement of non-renewable energy sources with renewable energy and introduction tariff systems by distributors that will encourage energy savings. Research results show that representatives of local authorities see the importance of solving the problem of environmental protection behind the problem of unemployment, health and social care and infrastructure construction, ie. environmental problems are considered to be "medium-sized" and the biggest environmental problems for local authorities are the problems of using alternative energy sources, landfill conditions and solid waste removal.

CONCLUSION

The socio-economic changes that accompany accelerated scientific and

technological development, especially the expansion of modern technologies, presuppose highly educated people who are able to function effectively in social processes and use available technology. The competitiveness of the economy in the global market requires a high level of expertise and competence of the workforce, because modern technological processes are based on a highly educated population. Even countries with considerable natural resources cannot enter the global race today to secure further development without educated and innovative people. When it comes to the development and deployment of new technologies, trends in market economies show that education and the creation of highly skilled human resources are at the top of the priorities of national strategies and policies for economic and technological progress. Therefore, postmodern education must entail the development of highly educated staff who can advance national development and adequately respond to the demands of the contemporary environment.

Higher education plays a significant role in the European integration processes and in fostering the economic and social development of the Western Balkan countries. Monitoring global trends and persisting in higher education reform processes are essential, and reforms should be based on advanced knowledge and skills in various fields. With regard to the Western Balkan countries, it can be concluded that, within the European integration process, all major efforts are being made to implement all parts of the Bologna process and to achieve the goals of the Lisbon Strategy and the Europe 2020 document on higher education. All countries in the region have participated in Tempus, Erasmus Mundus and other EU higher education programs, however, the level of achievement of these countries as well as individual national investments in this area are still below the EU average. It is clear that the overall quality of higher

education in the Western Balkans subregion is not yet satisfactory and that further efforts are needed to meet the set goals.

The strategic documents of the higher education reform, the sphere of transport, the living environment and the concept of sustainable development must be in accordance with the contemporary trends and specificities of each national entity. Programs of improvement are a synthesis of practical and professional action on a platform of acquired scientific knowledge, where members of the academic community play a first-rate role. We particularly insist on the cooperation of scientific elites, higher education institutions and the coordinated engagement of competent entities of individual countries of the sub-regions of the Western Balkans. In implementing relevant projects, it is useful to apply the relevant experiences of prosperous European Union countries that have successfully overcome the challenges of the transition process.

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APPLICATION OF THE IOT SMART CITY TECHNOLOGY IN IMPROVING THE TRANSPORT SECURITY IMPROVEMENT (Keynote paper)

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Summary: The Internet of Things (IoT) Smart City solution and functionality described in this paper will offer local communities as well as all road users the completely new functionality of driving assistance and smart community through the implementation of the xZone solution (neXt generation Zone), as well as full interaction with modern digital infrastructure. All vehicles will use driving assistance as an integral part of advanced navigation systems with special reference to anti-collision and traffic density monitoring on key roads using the SAM (Street Activity Monitor) sensor / module. The aforementioned functionalities are just an early stage towards even more attractive services such as V2V (Vehicle to Vehicle), V2I (Vehicle to Infrastructure), I2V (Infrastructure to Vehicle) and AV (Autonomous Vehicle). The consequence of digitized infrastructure in Smart City and Connected Routes environments, as well as the digitization of vehicles, will significantly reduce the number and consequences of collisions, material damage and most importantly, the number of people injured and lives lost.

Keywords: Internet of Things, Smart Cities, Security, Nagel-Shrackerberg

1. INTRODUCTION

The latest technological trend in the process of digitizing infrastructure in all urban and rural areas, as well as the digitization of vehicles themselves, marks the second decade of the 21st century as the beginning of a period of massive implementation of the Internet of Things (IoT) Smart City solution.

The IoT Smart City concepts, solutions and functionalities described in this paper will offer and bring to the local communities as well as all road users completely new driving assistance and smart community functionalities through the implementation of the xZone (neXt generation Zone) solutions and full interaction with modern digital infrastructure.

2. TRAFFIC MONITORING AND MANAGEMENT

There are several approaches to research focused on traffic monitoring and management:

- 1) Treatment of the traffic network in the context of fluid dynamics where individual traffic participants are not seen but the entire traffic network is treated as a pipe system.
- 2) The second approach is a “microscopic” model where traffic is viewed as the interaction of a large number of particles that actually represent traffic participants.

The microscopic model has received a lot of variations in recent decades through the development of numerous models for monitoring, analyzing and planning traffic infrastructure based on the concept of cellular vending machines. Cellular Automata have been especially promoted through the research and papers of Steven Wolfram, Wolfram (1986, 2002).

2.1. Cellular models for monitoring traffic flows

One class of mathematical and computer models for monitoring, planning and analyzing traffic flows and densities on roads are cellular automata. One of the better known cellular automata researchers is Stephen Wolfram, Wolfram (1986). The cellular vending machine model used in traffic research for the xZone Smart City study is based on the **Nagel-Shrackerberg** model (Nagel, Schreckenberg, 1992).

The basic idea of the **Nagel-Shrackerberg (NG-SH)** model is to view the road as a series of cells of a certain width and to define a set of four basic rules to define the behavior of vehicles in normal traffic, in deceleration, in acceleration and in randomization of occurrences in the model. The simplest set of rules was introduced by Nagel and Schreckenberg, (Nagel and Schreckenberg 1992).

To monitor the condition of the street using this cellular vending machine, the street was divided into cells of 7.5m length. This corresponds to the typical space occupied by a standard passenger car plus the distance to the previous car when stopping.

Each cell can be filled. An individual vehicle is described by its current speed v which can have speeds $v = 0, 1, 2, \dots, v_{\max}$. Here is a **v_{\max}** speed limit that is the same for all cars. In variations of the Nagel-Shrackerberg model, these restrictions may differ for different car classes. The usual path configuration for the Nagel-Shrackerberg model is shown in Figure 1.

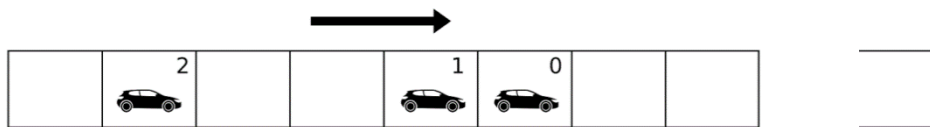


Figure 1, Standard Nagel-Shrackerberg path representation for their cellular vending machine, (xCube Int. Labs)

The list of rules for vehicles in the **Nagel-Shrackerberg** model is as follows:

Step # 1: Accelerate

All cars that have not reached the maximum v_{max} speed are accelerated by one step:

$$v = v + 1$$

Step number 2: Safe distance rule

If the vehicle has d empty cells in front and its speed v (after step 1) is greater than d , then it reduces its speed to d :

$$v = \min \{d, v\}$$

Step # 3: Randomization

With probability p , the velocity decreases by one unit (v after step 2):

$$v = v - 1$$

Step # 4: Driving

After steps 1-3, the new velocity v_n for each car n is preset to v_n in the cells:

$$x_n = x_n + v_n.$$

Traffic density can be increased to the desired level and is based mainly on the choice of stochastic parameters in the module and testing of parameter sets to obtain conditions on the streets of the model as close as possible to real conditions. One of the most famous applications of this model is the monitoring and forecasting of traffic density in the German province of North Rhine-

Westphalia. [6]

2.2. IoT variation of Nagel-Shrackerberg model for Smart City, IoT Cellular Automata (IoT-CA)

With the digitization of infrastructure in the Smart City environment, a large number of digital communication nodes will be implemented that will communicate wirelessly with the environment. Possible technologies are DSRC (Dedicated Short Range Communications), RDS, WiFi, ZigBee.

DSRC is a technology that will work in conjunction with other technologies and the purpose of this technology is to provide a wireless connection between vehicles on the move and devices on the roads. The range is about 300m and operates in the licensed band of 5.96 GHz and the speed is 6 Mbps. DSRC has been accepted as a standard in the USA and EU.

The **IoT Cellular Automata (IoT-CA)** traffic monitoring, forecasting and traffic management model envisions a modified **Nagel-Shrackerberg** cellular automata model so that any traffic can be monitored with as realistic parameters as possible in real time. Each street and road in the **IoT-CA** model has as many lanes as the road being monitored. A **Street Activity Monitor (SAM)** sensor set up at the key points of each monitored road is used to connect real-world data and input it into the **IoT-CA** model (Figure 2).

Each SAM sensor detects the speed and dimensions of the vehicle being introduced into the model (**Figure 3**). Unlike the **NG-SH** model, the **IoT-CA** model also contains information about the dimensions of individual vehicles, making traffic density closer to the real situation on the ground.

SAM main sensors (Figure 5) or virtual SAM sensors are defined on the links of main roads with side streets and roads, statistically generating traffic data commensurate with the statistics of tracked roads, roads and settlements. The denser the SAM sensor network, the more realistic the IoT-CA model reflects the true state of the field.

road, while the IoT-CA model monitors vehicle density in all lanes as it is positioned at key points and roads (Figure 5). For streets where no SAM monitors are installed, randomizers are used.

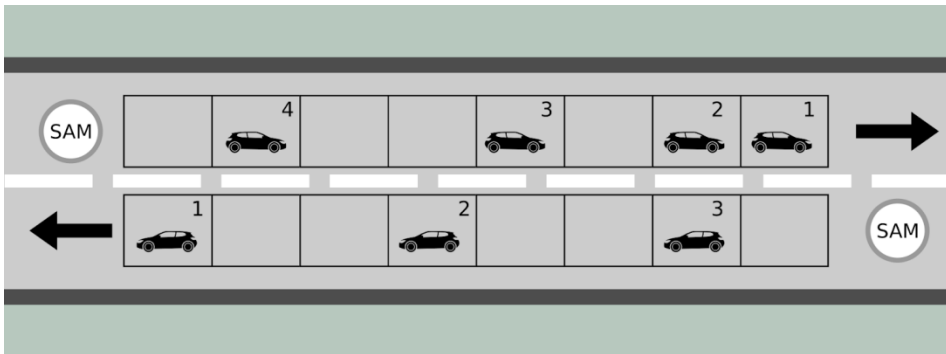


Fig. 2, Modified Nagel-Shrackerberg cellular automaton using input data from SAM sensor (xCube Int. Labs)

An overview of the operation of the SAM sensor in the Smart City environment is shown in Figure 3.

The pilot installation was carried out in early 2015 at Slobodan Bursać Street, Zrenjanin, Republic of Serbia, and testing of the IoT-CA models continued until early 2018.

IoT Street Activity Monitor (SAM) is a replacement of a randomizer from the original NG-SH model so that the actual fits the vehicle speeds and sizes into the model. For passenger cars, a cell of 8 meters size (7.5m in the original model) is used, for buses and trucks a cell size of 18 meters is used which does not exist in the original model. Unlike the original model used by the randomizer, vehicle speed is determined in real time at observed points. The original NG-SH model monitors only the movement of vehicles in a row on the



Figure 3, SAM Sensor, Upper right sensor monitors 4 parking spaces. At the bottom right is an identified passenger vehicle entering the street. (xCube Int. Labs)

In addition to vehicle dimensions data and their speed in the IoT-CA model are entered and micro-meteorological data which in addition temperature, humidity and atmospheric additions provide a list of additional data related to the degree of contamination of micro locations (Figure 4).

All the additional data entered into the model gives enough elements that the IoT-CA model can overlook the occurrence of fog and ice on individual routes and pass

that data to driving assistants in the vehicles themselves, whether they are steered or autonomous vehicles.

3. IMPACT ON TRAFFIC SAFETY

Driving assistant devices in vehicles moving in a Smart City environment and having available a traffic monitoring system based on the IoT-CA model can significantly improve traffic safety and efficiency. With the advent of snow, rain and low temperatures, the coefficient of adhesion of the street changes, so the microclimatic data being inserted into the IoT-CA model as well as the ability to predict fog occurrence will further improve the quality of driving assistant information obtained from the IoT-CA platform. The presence of IoT devices in vehicles with a sensor 3Axis accelerator in Smart City environment where Vehicle to Infrastructure (V2I) communication exists is an additional aspect of research to improve overall road safety.



Figure 4, IoT xZone assistant that provides information on all weather conditions in the area where we are moving. (xCube Int. Labs)

4. DYNAMIC ROUTING

In further development and improvement of digitalisation of the road network based on the IoT-CA model, it is necessary to test the possibilities and effects of application of routing technologies developed for the needs of computer packet networks, since with the application of SAM sensors in the IoT-CA Smart City model we approach the model of routing of traffic on roads. computer networks.

Many sophisticated routing algorithms are used in packet-based computer networks to transmit and route packets through the system. Some of these algorithms use only predefined routing paths, while routing techniques known as "multiple path routing" can also be applied in the IoT-CA module. the potential of this model was used to its full potential. Figure 5 shows the complex traffic that by installing an adequate SAM sensor network can be fully digitized through the IoT-CA model and take full advantage of the extremely high quality algorithms developed for optimal routing of packet computer networks to further improve the efficiency and security of road networks in Smart City environments.

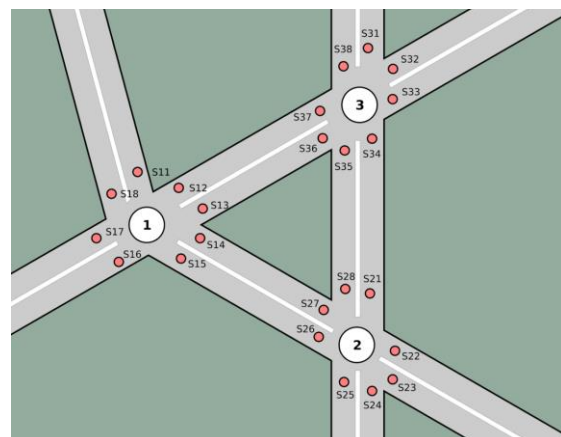


Figure 5, SAM Sensors - street layout in Smart City environment. Sensors S22, S23, S32 (xCube Int. Labs)

5. CONCLUSION

Many authors are exploring the possibility of improving traffic management patterns in order to avoid congestion on the road network and increase road safety. Research and testing conducted during the development of the **IoT Cellular Automata (IoT-CA)** model over a three year period (2015-2018) on a pilot installation showed that the application of IoT technology in cities and its integration with cellular automata models manage the traffic infrastructure in Smart City environments can be raised to a very high level. All vehicles that start using driving assistance as an integral part of advanced navigation systems will enhance their safety by automatically becoming part of the Connected Route system and open to advanced features such as anti-collision. The consequence of digitized infrastructure in Smart City and Connected Routes environments, as well as the digitization of vehicles through driving assistance systems, will significantly reduce the number and consequences of collisions, property damage and most importantly, the number of people injured and lives lost. The aforementioned functionalities and models described are just an early stage towards even more attractive services such as V2V (Vehicle to Vehicle), V2I (Vehicle to Infrastructure), I2V (Infrastructure to Vehicle) and AV (Autonomous Vehicle).

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MONITORING AND PREVENTING ENVIRONMENTAL CRIME IN ACCIDENTAL SITUATIONS WITH PESTICIDES

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Summary: Pesticides are biochemical compounds / mixtures of compounds intended to prevent, destroy, repel or mitigate pests. Pesticides can be classified according to the target organism, chemical structure and physical state. The most common distribution of pesticides is by purpose, that is, the organism they act on. During the production, storage, application of pesticides and waste treatment, significant damage to health, injury, minor and serious illnesses can result in death. Chronic low-dose exposure to these compounds has been shown to be a factor in the cause of various diseases of the nervous and immune systems. The eco-toxicity of a substance can only be considered if the relationship between dose and effect is known. The dose-effect relationship implies the existence of a 'threshold'. Through biochemical analyzes, ecology is trying to find the "answer" and the solution to the numerous problems of eco-crime that are increasingly engaging and surrounding us. Unfortunately, many of the problems of today are of human origin, the result of ignorance, non-compliance with health and safety measures at work. The design of future environmental events must take into account the fact that there is no way of knowing the future of certainty without including risk in the assessment.

Keywords: Pesticides, toxicological effects, eco-crime, monitoring, bioindicators, protection measures, eco-safety

Introduction

Constant and almost unpredictable changes in our country and the environment place challenging eco-demands on business people, at the macro and micro levels, in an effort to secure the survival, growth and development of agriculture, the circular economy, the eco-security system and sustainable development. The use of high-risk technology, pesticides and numerous synthetic inhibitors have created an increased concern for humanity for the future and reinforced the belief that ecology is on the way to becoming an essential business risk factor. In fact, it can be argued with much greater prudence and responsibility today that ecology has become the generator of new, hitherto unknown market demands, especially when it comes to eco-crime. The eco-balance is disturbed as a result of man's work activity, by which man "appropriates" nature, and creates products. Not only does this disrupt ecological balance and ecosystems, but also endanger human integrity and survival. The survival of human communities has, in the past, been very often threatened by natural disasters, epidemics, wars, food scarcity and other impacts, which, however, have always been spatially limited. There have never been more, more efficient human material capacities for the protection of eco-security, and society has never felt more helpless in relation to ec-threat. The careless attitude towards nature has put human civilization at risk of irreversible destruction of the natural environment, and therefore themselves. Mankind has fallen into this perilous situation because of its desire to increase its material wealth without any consideration and to any extent. On the one hand, industrialization can improve the standard of living of a large number of people, while on the other hand it has a negative impact on the quality of the environment and human health. Today, it is considered a serious and widespread problem that must be addressed at

European level.

Environmental crime today

Environmental crime is a particular type of crime that results in environmental pollution on a larger scale or in a wider area, thereby endangering human health or causing large-scale destruction of wildlife. This crime has been particularly relevant in recent years due to the rapid development of science and technology and the introduction of new technologies, the use of new and powerful energy sources, the construction of a large number of industrial plants and the development of large urban areas. The conceptual foundations of combating environmental offenses are much broader than those of so-called criminal offenses. classic crime. In addition to the classical body of repression, various inspections, institutes and other institutions play an important role in combating this crime. Specific features of ecological crime In a large number of production processes, harmful things and waste in gaseous, liquid and solid state also occur to a large extent. Waste landfills also occur as sources of contamination.

In recent years, there has been an increase in techno-technological and traffic disasters, some of which pollute the environment with large quantities of toxic, flammable, explosive and radioactive substances for the health and the human environment. A large part of the chemical plant's industrial facilities is located near residential, water supply and communication facilities, with very sensitive buildings and spaces. In case of major accidents in the form of explosions, fires, spills of toxic substances, etc. environmental contamination occurs. The location of ecological disasters in spatial terms is characterized by a large surface area. In modern agriculture, as well as in public health, the control of plant and animal pests has used a variety of agents,

more or less toxic, commonly known as pesticides. The chemical composition of pesticides is: chlorinated hydrocarbons, organophosphorus products, dinitrophenols, nicotine, arsenic preparations, fumigation, organic compounds of mercury, preparations of coumarin, zinc phosphide, thallium sulfate, sodium fluoroacetate and some solvents.



Figure 1. Application of the back fertilizer in fruit production

2. Pesticides in a living environment

Pesticides are chemical compounds / mixtures designed to control pests in agriculture (microorganisms, insects, weeds, mites, patches, snails, birds, rodents). Pesticides are intended for: 1) the destruction of organisms harmful to plants, animals or plant and animal products, or their protection against such organisms; 2) the destruction of organisms harmful or undesirable to humans, or preventing the occurrence of such organisms; 3) acting on the life processes of plants in a way that is different from the action of nutrients; 4) the destruction of undesirable plants such as weeds; 5) destroying parts of plants or preventing undesirable plant growth. According to the types of control organisms used, pesticides are divided into: insecticides, insect repellents; acaricides for mite control; contaminating nematicides; limacids for the control of snails; rodenticides for controlling rodents (mice, voles, rats and hamsters); bird

repellent corvids; fungicides for the control of fungal diseases; weed-killing herbicides. Herbicides also include growth regulators and physio tropes that act to slow growth, shorten shoot length, breathe and → transpiration of plants, and plant rooting phytohormone → cuttings and additional agents to improve wetting and adherence and enhance herbicide action. from the active substance and the carrier or solvent, depending on the form in which it is manufactured and marketed. Pesticides are very effective in "fighting" plant and animal pests, but there are some that are not without danger to the people who produce, transport, store and apply them, especially when it comes to pesticide waste. Poisoning / toxicity is usually caused by improper handling of pesticides due to a mistake or accident, but cases of intentional poisoning (eco-crime) are known. Pesticides can penetrate the body through the digestive tract through the respiratory system or through the skin. For many pesticides, poisoning is possible on any of these routes, but one of them is still the most common. Signs of poisoning may be different depending on the type of pesticide.

Toxic effects of pesticides include physiological, biochemical and structural disorders that occur in a living organism under the action of a toxic agent.



Figure 2. Pesticide division, positive and negative effects

Mutagenic effect - environmental factors that cause hereditary changes (mutagens)

affect changes in the chemical composition of hereditary matter, in genes directly or indirectly leading to mutations. Carcinogens have substances that cause malignant changes (cancer) of various organs in the body, that is, convert normal cells into cancer cells. Tumor is the multiplication of tissue by cell division. Benign and malignant are distinguished. The causes of carcinogenesis are pesticides, additives, radiation (ionizing, ultraviolet) hormones (estrogen), and malignant tumors are cancer (cancer).

Substances that have the ability to permanently damage the anatomical structures of the embryo have teratogenic effects. These include pesticides, antibiotics, cytostatics, mercury and emulsifiers.

A normal human cell is aerobic (consumes O₂) and maintains normal electrical flow in the cell (ATP 36), vibrates and receives messages. So he receives a message for apoptosis.

The cancerous cell has low levels of O₂ consumption (it is anaerobic) and low electricity flow (about 1 ATP). This cell receives no messages and is unable to carry out apoptosis; on the contrary, it multiplies uncontrollably.

The health and quality of life is a consequence of a complex electro-biochemical process, which occurs throughout the human body and every biomolecule, organelle, cell, tissue, organ and organism. This process is programmed in the body for each cell. Therefore, all cells need to be in solidarity and do exactly what their biological program instructs them to do. Under this program, cells divide and

"die" all the time. In their place are new cells. If these cells drop out of the program, they do not receive the message that the job is done and continue to multiply. Such cells are closed to all messages and do not receive instructions that are transmitted electro-biochemically throughout the body - that they should die.

Deviation from the program creates a "disobedient" cell, which by its uncontrolled behavior can create "chaos" in the body and disrupt it so that the body itself eventually experiences the cessation of all functions-death. These are cancerous cells, which behave in a non-solidarity manner, multiply unnecessarily and excessively, hijack food from other cells and refuse to die out according to a program-what is called apoptosis¹. The reasons for this disobedience are disturbances in the complex electro-biochemical process, that is, impaired metabolic balance.

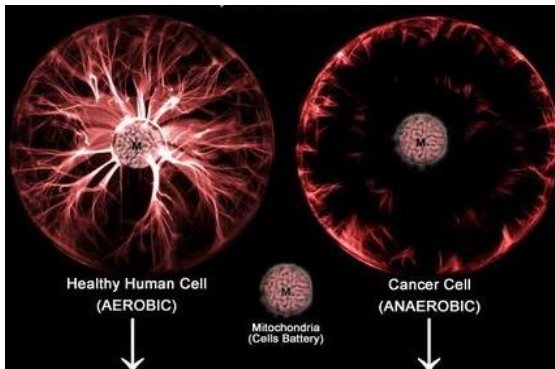
This disorder is caused by the action and toxic substances (pesticides) in the air and food that the cell does not recognize as dangerous, and brings them into itself. Some fatty acids do not provide adequate energy to the cell, however much it is taken with food. The energy from them instead of ending up in the cell remains unused, with fats deposited on the walls of blood vessels, and medicine calls it arteriosclerosis.²

Figure 3. Normal and cancerous human cell with messages

¹Apoptosis is a form of programmed cell death that occurs in physiological and pathological processes in the body. It is limited to single cells when the cell itself executes a programmed death, ie. commits suicide and no inflammatory reaction occurs.

² Arteriosclerosis occurs when the walls of blood vessels that carry blood rich in oxygen and

nutrients from the heart to the rest of the body - the arteries - thicken and become rigid, leading to a reduced diet of the tissues supplied to these blood vessels. Healthy arteries are elastic, but over time the walls become more rigid.



3. Hazards and precautions for pesticide application

The aim of this paper is to investigate the application of plant protection devices to identify the causes of unintended consequences and to educate people who perform the plant protection process and use products in agricultural production. In the production and cultivation of different agricultural crops, man today performs various technological processes such as: tillage, fertilization, plant protection, pruning, etc. Weeds, plant diseases, insects and other pests are factors that significantly reduce the yield and quality of agricultural products. In some cases damage to the entire birth is possible. Against this background, intensive agricultural production without effective plant protection is unthinkable today. So poisoning can be very different depending on the type of pesticide. Most of them, more or less, affect the nervous system and cause headaches, dizziness, paralysis, agitation and other nervous disorders.

Agricultural plant protection products are various chemical compounds that destroy weeds, insects, diseases and other harmful organisms. Most commonly referred to as "pesticides". Devices used for spraying are called sprinklers. Spraying is a process of applying pesticides in liquid state whose droplets have a diameter of 0.05-0.15 mm. Irrigation is a process used in fruit and viticulture production. In order to eliminate mechanical hazards, the following rules

apply when using sprinklers and sprayers: before use, all devices must be checked for correctness, the transmission elements and / or the PTO shaft must be adequately protected as well as the danger mark, the fans used on the sprayers should have a safety net in order to eliminate the danger to the worker, to check all pipeline connections before work, and to carry out precise inspection in the workshop once a year.

The chemicals (pesticides) we use to protect the herbs are toxic to humans, domestic animals, game, bees, fish and birds. When using pesticides, certain precautions must be taken to protect the health and quality of life of workers, especially in greenhouses:

- if it is possible to choose a chemical agent, then those suspicions that are toxic and dangerous to humans and the environment should be applied;
- not to make inventories, but to procure quantities of funds for a short period;
- use the funds in original packaging with undamaged labels;
- Store plant protection products in locked rooms that are properly marked. • Follow the manufacturer's instructions for use (concentration, hectare standard);
- do not take food, drink or smoke while handling pesticides, do not dispose of empty packaging near a well or pumping station, but dispose of it according to the manufacturer's instructions, obey the law on waste.

Different plant protection products must be used when using plant protection products, depending on the method of application and the harmful effects. When preparing and applying protective agents we use:

- rubber or plastic gloves resistant to the action of the agent we use,
- rubber or plastic boots resistant to the agent we use,
- protective clothing resistant to the

- action of the agent we use,
- respirator.

4. Bioindicators of environmental vulnerability

Monitoring is a system of successive observations of environmental elements in space and time. One of the most organized and perfect monitoring systems is meteorological monitoring, which was established in the last century and covers a network of huge number of meteorological stations (I, II, III order) across the globe. An indispensable segment of the monitoring system is biological monitoring, which involves the use of living organisms as bioindicators of environmental changes in space and time.

Physicochemical monitoring methods are an indispensable segment of this system, since they provide accurate data on the presence and distribution of pollutants and the monitoring of pollutant emissions and emissions in general. For methodological reasons, biological monitoring is divided, in relation to which environmental changes are being monitored, to:

- biological monitoring of air pollution (using lichens and mosses as bioindicators);
- biological monitoring of aquatic pollution (bioindicators of altered state are algae, benthic fauna, bacteria, fish);
- biological monitoring of soil pollution (indicator-organisms are more plants, or vegetation).

In biological soil pollution monitoring, vascular plants (species, populations and phytocoenosis) are most commonly used as phyto indicators. Heavy metals are defined as those chemical elements that have metal characteristics and have an atomic number greater than 20. Hyperaccumulators are defined as those species that are capable of depositing (accumulating) metals at concentrations up to 100 times greater than

concentrations that are measured on other plants that do not accumulate heavy metals. Metallophytes store huge amounts of heavy metals (0.5 g / kg, up to 25 g / kg dry weight of the plant), roughly in the amounts in which they adopt the basic macronutrients, which is 1000 times more than the amount of essential microelements. "

Indicators of heavy metals are those types (mosses, lichens, terrestrial and aquatic plants, etc.) Biological monitoring is divided, for methodological reasons, with respect to which environmental changes are monitored, namely air, aquatic and soil pollution. . Potentially, any organic species can be used as a bioindicator of environmental status. Lichen and moss are bioindicators used in air pollution monitoring. Bioindicators of soil pollution are most commonly plants, namely vegetation, microorganisms, bacteria, insects and also animal species.

Bioindication can be performed at all levels of the organization of living systems, starting from molecular, through biochemical-physiological, cellular, individual, population, special, biocenological (ecosystem), biome to biosphere.

In biological monitoring of aquatic pollution, the most common bioindicators of altered conditions are algae, bacteria and fish. The quality of the water in which the fish lives is very important for its survival.

Advantages of phytoremediation:

- phytoremediation is one of the cheaper biotechnologies;
- phytoremediation is a natural technology "environmental friendly", ie its use does not put additional strain on the environment;
- the provision of energy for this biotechnology takes place in a completely natural way (by plants in the process of photosynthesis);
- this biotechnology also achieves some side effects that are of little importance for environmental

conservation.

Microorganisms can oxidatively metabolize aromatic hydrocarbons as well. Phenols and their derivatives are common constituents of wastewater from the paper and oil refineries. Biocatalytic processes are also applied to remove explosives from soil and water

5. Biochemical processes in the human body

Metabolism is a biochemical process in which the modification of chemical compounds in living organisms and cells occurs. It is divided into anabolism, that is, biosynthesis (formation) of complex organic molecules, and catabolism, which is a reverse process from anabolism, which is the breakdown of complex organic compounds into simpler ingredients. The endocrine system has the greatest influence in metabolism. It is a set of chemical transformations that sustain life in cells, and these reactions are catalyzed by enzymes. They allow organisms to grow and reproduce, maintain their structures and "respond" to environmental energy stimuli.

The term metabolism may also refer to all chemical reactions in the presence of toxic pesticides occurring in living organisms, including digestion and transport of substances within and between different cells, when that set of reactions within cells is called intermediate metabolism or cell metabolism.

The normal maintenance and functioning of individual cells, tissues, organs and organisms cannot be imagined without the presence of minerals or ions of certain elements. These inorganic cell and tissue constituents are significant for life manifestations despite the fact that their percentage is very small relative to the total mass.

The content of ions of individual elements ranges over a wide interval. The

physiological importance of ions is great, regardless of their content in individual cells and tissues of a living organism. The significance of these substances is reflected in the following:

- affect the maintenance of a "suitable" environment for normal protoplasmic activity;
- as electrolytes affect the osmotic pressure and the buffering properties of the cytoplasm as a whole;
- affect the maintenance of acid-base balance in cells and tissues;

All elements that make up living cells, tissues and organs are divided into two major groups:

1. a group of macroelements,
2. group of microelements.

In environmental monitoring, bioindicators, such as lichens, birds, and bacteria, are used to provide a realistic picture of the state of the environment. In the quantitative and qualitative assessment of the state of the environment, the key criteria for bioindicators are:

- indicators are useful and reliable in environmental monitoring,
- the indicator is the goal, if it is transparent and reproducible,
- the basic data are characterized by the methodology of collection, the data management systems that are integrally protected, as well as the quality assurance procedure, the data enable the description of changes or indicators of their movement, which are comparable in time and space, with representatives of the target population.

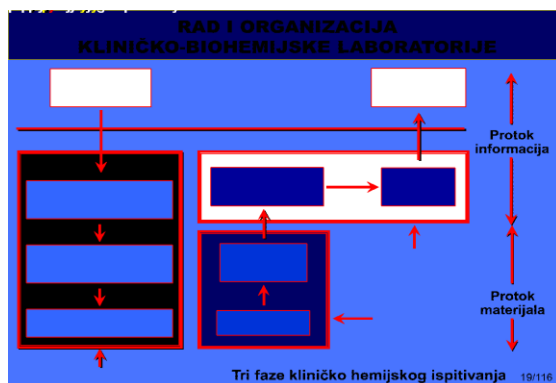


Figure 4. Organization of work of BHM laboratory under contamination conditions

6. Chemical protection under contamination conditions

In the conditions of use of NHB weapons, in the case of NHB accidents and NHB terrorism, in eliminating the consequences of contamination, one of the most important activities is to carry out single, group and final (group) decontamination. For decontamination of substances (in solution with water), calcium hypochlorite, the basic representative of inorganic substances with active chlorine, has the greatest application. In the prescribed solution, calcium hypochlorite meets the requirements (requirements) of efficiency, economy and universality in the decontamination and disinfection process. Obtaining $\text{Ca}(\text{OCI})_2$ solution involves finding and collecting means and raw materials, determining quantity, determining use, developing process space and working devices, producing solution, determining decontamination efficiency and using it to eliminate the effects of chemical and biological contamination. The technological procedure depends on the quantity and quality of the means and equipment available, the ability of the people to work, the organization of work, while observing the prescribed measures of safety at work. Chemistry plays an important role in daily life. The development of chemistry and the chemical

industry over the years has contributed to improving the quality of life of people. Zelenehemija's main goal is to adapt chemical processes and products to environmental protection. Green chemistry involves the development of new chemical reagents and methods that would increase the utilization of a chemical process while reducing the adverse impact on the environment. Green chemistry seeks to develop safer chemical processes, that is, chemical processes that will be harmless to humans and the environment. The processes of "green" chemistry are based on 12 principles, which speak about the reduction or removal of dangerous or harmful substances from the synthesis, production and application of chemical products. Historically, these principles can be recognized in terms such as process utilization, number of synthetic phases required, selectivity, etc. The goals of "green" chemistry in environmental protection and economic profit are achieved through several dominant directions such as catalysis, biocatalysis, use of alternative renewable raw materials (biomass), alternative reaction media (water, ionic liquids, supercritical liquids), alternative reaction conditions (activation microwave radiation) as well as new photocatalytic reactions. In order to maintain the ability to live and act, a balance needs to be struck between the use of natural resources, economic growth and the preservation of the environment. Green chemistry seeks to find and maintain that balance, creating a new generation of researchers and technologists who will analyze economically and on the processes and materials used in production and development while preserving natural resources and the environment.



Figure 5. Industrial symbiosis of sustainability in pesticide production / application

Conclusion

In everyday life and work we encounter many situations. Pesticides are pest control agents and we distinguish many types of pesticides. That is why it is very important that people who come into contact with pesticides are well informed about their purpose and dosage. If not used properly, pesticides can be very dangerous, both for nature and for humans. We live in a time where our environment is very polluted, so we have to take into account how polluted our environment is and what conditions we work under. It is important to determine the extent to which our work environment contains harmful gases and aerosols. One should be aware of the fact that it is very important to take care of the safety and security of the people around him, that is why he should always follow the rules and be careful when dealing with pesticides and control the amount of gases, aerosols and pollution in his environment. about eco-disorders, unfortunately, all these warnings and cries still do not cause too much concern among the population around the world. Everyone who comes into contact with pesticides should be informed in detail about the toxic properties of the preparation, the dangers of careless handling and the precautionary measures. In accordance with health and environmental regulations, persons working with pesticides must use personal protective equipment (protective clothing,

protective footwear, gloves, respirators, safety caps and goggles). Conditions for skin and clothing washing should be provided, with mandatory hand washing before taking food and smoking. Medical pre-employment examinations and periodic health examinations to identify early changes (every 12 months) are important. Breastfeeding women are forbidden to work with pesticides, and diseases of the endocrine, central and peripheral nervous systems, respiratory system, and diseases of the liver, blood, and blood-forming organs are contraindications for working with pesticides. Shortening the contact time with toxic chemicals is of great preventative importance. Chlorinated hydrocarbon poisonings are usually reversible and end in successful healing. If residual poisoning with nervous system damage, hepatitis, and anemia occurs, the worker should be referred to a disability committee to verify altered work ability and risk of disability. Despite the various interpretations that can be found in the literature, this concept today has a central place in considering the second-hand perspective of humanity's survival and progress.

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DIGITALIZATION AND ROAD SAFETY

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Summary: Digitization and technological innovations that offer numerous savings, especially labor savings, are beginning to be felt in the transport sector and in the field of road safety. There are numerous services that are digitized and that facilitate access to users, such as public transport timetables, purchase of digital tickets, travel information, taxi services, delivery of goods, etc. In these digitized services, the challenges in the field of traffic safety are not new, and the key issue is the implementation and replacement of personnel with digitized services. The digitalisation process in the transport sector offers enormous opportunities, through the deployment of Intelligent Transport Systems, the establishment of smart grids, the deployment of smart vehicles, smart infrastructure, automated road safety management, traffic flow management, the introduction of automated driving, etc. That is why the processes of digitization, automation, robotization and the use of artificial intelligence are the future in the field of road safety as well, in order to reduce the number of traffic accidents and the consequences in these accidents. Digital skills and knowledge will play a key role in the future impact on road safety. This will be a basic prerequisite for a greater impact on all future measures in the transport and road safety sectors. These processes will significantly influence the change in behavior of road users, in particular the use of smart systems, autonomous vehicles, road safety management systems and control systems.

Keywords: digitalization, road safety, technological innovation

1. INTRODUCTION

Road safety in the European Union (EU) has been greatly improved over the past decades, thanks to strong and effective action at EU, national and local level to improve the behavior of road users, vehicles and infrastructure. This is why roads in the EU are the safest roads in the world. Active safety features and their technological development result in gradual automation of vehicles. They are considered to be key technologies for improving and supporting vehicle automation, which contributes to the digitization of the internal market.

Therefore, it is a priority of the European Commission (EC) to promote the most effective innovation, the digitalisation of the internal market by fostering safety features that are considered key technologies to improve safety and support the widespread automation of vehicles.

The application of technological innovations, and first and foremost digitalisation in transport, requires defining key questions about what needs to be done to define the necessary steps for digital transformation within a given timeframe. Success can be achieved in an environment that understands this process at all levels of

management and management, which are the drivers of digital initiative associated with corporate strategy. One of the prerequisites for success and understanding of the process is the education and training of the staff who initiate the initiatives and lead the processes of digitization.

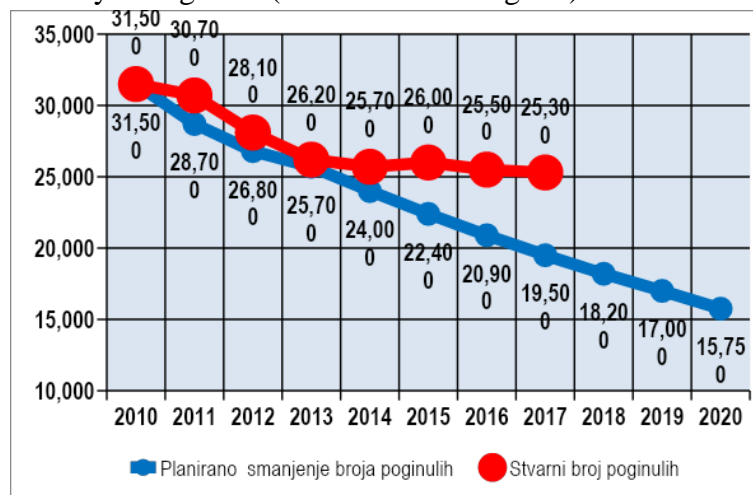
In addition to the digitization process, it is necessary to revise regulations, simplify them and adapt them to new technological innovations and their application. The main problem is the contradiction in the application of regulations, and therefore raises the key question of how to solve it. Digital transformation involves the transformation of an organization based on the application of digital technology, thereby changing the business model of the organization using digital technologies. The start of the digital transformation process has been made possible by several digital technologies, such as: Cloud computing, Big Data, Social Networks, Mobile and Internet of Things. These technologies include robots, drones, artificial intelligence, 3D printing, etc. Changes in individual segments are already being felt, both in the market and in individual systems. Currently, the digital transformation of society is being carried out within and under the influence of Smart City, with a focus on digital processes that are rapidly affecting economic and social development and the development of mobility and transport security.

An example of rapid digital transformation in the transportation market and the massive deployment of a simple mobile app for shared transportation is the case of Uber start-ups. The existing and well-organized transport service system was quickly replaced by a new start-up system, which does not have any vehicles registered in its name. There are other companies whose emergence has been made possible by three new developments in the trend: the Internet and the development of high-speed networks, Big Data. connecting huge

amounts of usable commercial, personal and geographic data through online platforms, and the emergence of new forms of mobile devices - mobile phones, tablets, etc. that give access to the mobile Internet at any time and place.

2. ROAD SAFETY INDICATORS

According to preliminary road safety statistics for 2017 published by the European Commission (EC), for the second consecutive year the number of road accidents fell by only 2%, after a similar decrease in 2016 and an increase of 1% in 2015. Regardless 500 people are killed per week on all EU roads (EU). Based on the analysis of the implementation of the Road Safety Program (4th Action Program)



2011-2020 so far. and the primary goal of reducing mortality by half by 2020, this goal is very unlikely to be achieved. The EU has reduced road deaths by 20% by 2017, but it is well below the 38% required to stay on track to reach the 2020 target.

2.1. Road safety indicators in the European Union

European roads remain the safest in the world, in 2017 the EU had 49 deaths per million people, against 174 deaths per million globally. According to the World Health Organization [1], about 1.3 million people are killed each year on the world's

roads, of which 25,300 lost their lives in the EU last year. According to published statistics on road safety in the EU, progress has been made in 2017, but further action is needed to further advance, in order to achieve the basic objective of reducing the number of deaths by half by 2020. Last year, EU roads were killed. 25 300 persons [2], which is 300 less than in 2016, which is a decrease of 2% and 6 200 less than in 2010, which is a decrease of 20%, Figure 1.

Despite these positive developments, it will be difficult to achieve the stated goal of halving road deaths from 2011 to 2020. In addition, an estimated 135,000 more were seriously injured last year, including a large number of unprotected road users: pedestrians, cyclists and motorcyclists. In addition to casualties, fatalities and injuries in traffic accidents also affect society as a whole. Their average socioeconomic cost is € 120 billion a year. This means that all stakeholders must do more to make Europe's roads safer. National and local authorities are taking most of the day-to-day measures such as enforcement and awareness raising, and the Commission is currently working on a series of concrete measures to encourage even further progress.

Figure 1. Planned and actual death toll on EU roads 2011-2020.

Source: Data processing by authors [1]

With an average of 49 road deaths per one million inhabitants, European roads in 2017 were still arguably the safest in the world. The lowest deaths per hundred thousand people in the EU in 2017 were reported by Sweden (2.5), United Kingdom (2.7), the Netherlands (3.1) and Denmark (3.2), respectively, per million inhabitants of Sweden (25), the United Kingdom (27), the Netherlands (31) and Denmark (32). In comparison with 2016, Estonia and Slovenia recorded the largest decreases in the number of deaths: by 32% Estonia and

by 20% Slovenia. In addition, the efficiency gap between Member States in 2017 narrowed further and only two Member States reported deaths in excess of 8 deaths per hundred thousand inhabitants, Romania (9.8) and Bulgaria (9.6).

In relation to the type of road, only 8% of people died on the highways, as opposed to 55% on roads outside the settlement and 37% on roads in the settlement. According to the structure of traffic participants, 46% of motor vehicle drivers, 8% of passengers and almost half of unprotected participants were killed (21% of pedestrians, 14% of motorcyclists, 8% of motorcyclists and 3% of mopedists). More than 4,500 (4,554) young people die each year in the EU in road accidents. Almost 14% of people between the ages of 18 and 24 have died on EU roads, accounting for only 8% of the population. Due to demographic change in European societies, the death rate of the elderly is steadily increasing, 22% in 2010 and 27% in 2017.

As a follow-up to the Ministerial Declaration on Road Safety of March 2017, the EC is currently working on a new road safety framework for the period 2020-2030 and on a number of concrete measures in this area. The goal is to better respond to new challenges by focusing on closer collaboration between all factors of traffic safety, better monitoring of goal achievement and targeted financing. This new policy framework will be accompanied by a series of concrete measures contributing to safer roads and with strong

EU added value. Activities under consideration include:

- vehicle safety: take into account the latest technological developments such as driver assistance systems to avoid accidents and better protect pedestrians and cyclists,
- infrastructure security management: increasing transparency of operations and working at an equal level of road infrastructure security,
- cooperative, connected and autonomous mobility: a guarantee of a safe transition to these technologies, which offer the potential to reduce driver errors (responsible for about 90% of accidents) but also create new challenges, such as safe interaction with other road users.

Thus, this framework includes a revision of European regulations on vehicle safety and road infrastructure safety management and an initiative to secure the transition to cooperative, integrated and autonomous mobility.

2.2. Road Traffic Safety Indicators in Bosnia and Herzegovina

According to the statistics collected from the competent institutions (FMUP, RS MoI, Brčko District MoI, Cantonal MoI), a total of 37 628 traffic accidents occurred in BiH roads in 2017, down 4.8% from 2016 , Figure 2.

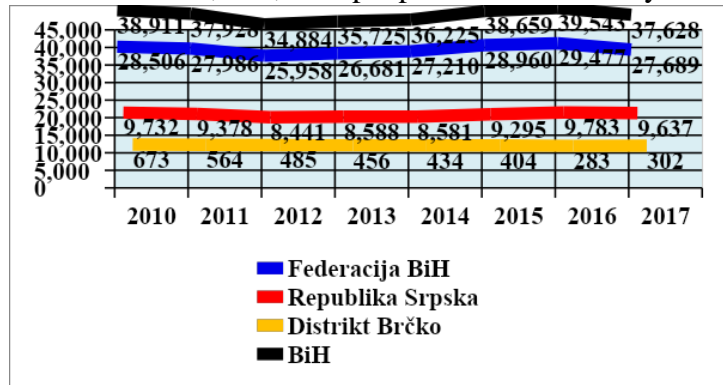
Figure 2. Overview of the number of road accidents on BiH roads from 2010 to 2017

Source: Data processing by authors [3]

Of these, 7,135 accidents were recorded with deaths, down 7.5%. In these accidents, 298 people were killed, 23 less, which is 7.1% less than in 2016.

According to the data in Figure 3, there is a trend of a further decrease in the number of deaths. There were an average of 103 accidents per day in the territory of BiH,

and about 720 accidents a week, with one person being killed almost daily. In addition, 10,229 people were seriously



injured or slightly injured last year, including a significant number of unprotected road users, pedestrians, cyclists and motorcyclists.

According to the available data [3], the largest number of traffic accidents in the Federation of BiH in 2017 occurred in the Sarajevo Canton, with a share of about 37.4%, followed by the Zenica-Doboj Canton with a share of about 15.3%, Central Bosnia canton with a share of 11.8%, Una-Sana canton with a share of about 10.9%, etc. Viewed from the perspective of the total number of traffic accidents by entity, it is noticeable that the mortality rate is lower in the Federation of BiH and amounts to slightly more than 6 deaths per hundred thousand inhabitants, while in the Republic Srpska it is significantly higher and amounts to more than 11 deaths per hundred thousand inhabitants. In Brcko District, there has been a significant deterioration and the mortality rate is just over 36 deaths per hundred thousand inhabitants. Analyzing data by cantons, an increase in the number of fatalities in traffic accidents occurred in the Central Bosnia, Herzegovina-Neretva, Bosnia-Podrinje and Tuzla Cantons, while in other cantons there was a significant decrease in the number of fatalities in road accidents.

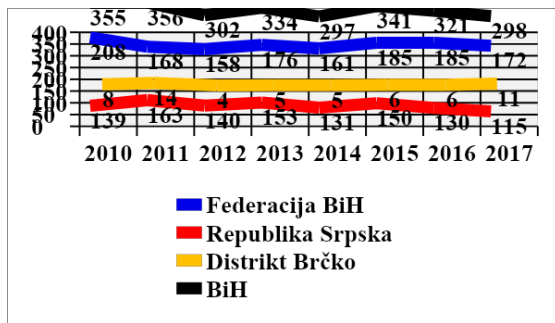


Figure 3. View of death toll on BiH roads 2010-2017.

Source: Data processing by authors [3]

Despite these positive developments, it will be difficult to achieve the set goal in BiH of halving road deaths from 2011 to 2020 (planned 177 deaths), Figure 4.

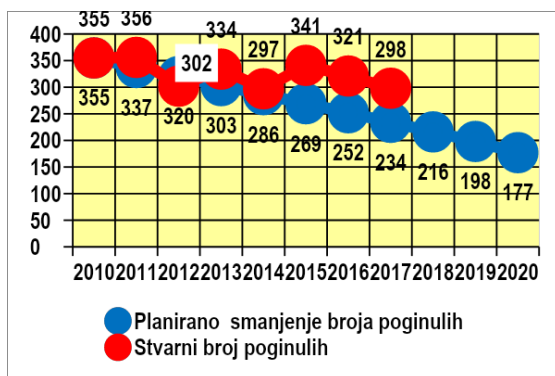


Figure 4. Planned and actual death toll on BiH roads 2011-2020.

Source: Data processing by authors [3]

With an average of 8 deaths per hundred thousand inhabitants in 2017, BiH has a much poorer security situation compared to the EU, which had 4.9 deaths per hundred thousand inhabitants, or 80 deaths compared to 49 deaths per million inhabitants. It belongs to the European Member States with the worst road safety situation.

In general, this state of road safety and the number of traffic accidents, among other things, is the result of non-compliance with traffic rules and regulations, as well as the low level of traffic culture of a large number of road users. Improper speed and unadjusted road conditions are one of the

most common causes of traffic accidents (about 32.7%), followed by accidents resulting from vehicle traffic, followed by alcohol and opiate driving accidents, and other causes they include disregard for traffic signs, adverse road conditions, etc. Among the mistakes made by drivers in urban traffic conditions are the lack of distance between vehicles. The highest number of traffic accidents was recorded in the settlement / city (42.1%), on highways (22.4%), on local roads (9.0%), on regional roads (7.1%), etc.

Considering the above statistical indicators, it can be concluded that with the decrease in the number of traffic accidents, there was a decrease in the consequences, that is, a decrease in the number of casualties by 7.2% compared to 2016 severely injured by 10.6% as well as slightly injured by 8.2%. However, looking at and analyzing these indicators in the context of achieving the primary objective by 2020, despite the fact that the number of traffic accidents and the number of deaths in those accidents occurred last year, it can be reasonably concluded that the state of road traffic remains unsatisfactory.

3. THE IMPACT OF DIGITALIZATION ON ROAD SAFETY

The world economy is rapidly digitizing. Information and communication technologies are no longer a separate sector, but the cornerstone of all modern innovative economic systems. The Internet and digital technologies are changing our way of life and work, at the individual level and in businesses and communities, as they increasingly penetrate all sectors of our economy and society. These changes happen quickly and on a large scale, and they bring many opportunities for innovation, growth and employment. Given the inability to address such issues at national level, a number of issues would be more appropriate to address at European

level. That is why the EC has identified the creation of a digital single market as one of its key priorities. The creation of a digital single market will ensure that the EU maintains a leading position in the world in the digital economy, which will help European businesses to grow globally. It has the capabilities to play a leading role in the global digital economy, but is not fully utilizing them at the moment. Fragments and obstacles that do not exist in the physical single market are slowing down EU progress. Removing these barriers in Europe could add up to an additional EUR 415 billion³ to European GDP. The digital economy can expand markets and provide better services at better prices, offer more choices and create new sources of employment. A unique digital marketplace can create opportunities for start-ups, allowing existing businesses to grow and enjoy the benefits of the market of more than 500 million people [4].

The Digital Single Market Strategy [4] is based on these three pillars:

better access for users and businesses to goods and services on the Internet across Europe - this calls for the urgent removal of key differences between the online and offline environments in order to remove obstacles to cross-border online activities; creating the right conditions for the flourishing of digital networks and services - this requires fast, secure and reliable infrastructure and content services, as well as appropriate regulatory conditions for innovation, investment, fair competition and a level playing field;

harnessing the full growth potential of the European digital economy - this requires investment in infrastructure and information and communication technologies, as well as better public services, inclusiveness and skills.

³ The information is set out in a Commission staff working document A Digital Single Market Strategy for Europe - Analysis and Evidence

3.1. Digital competence and skills

In less than ten years, most economic activity will depend on digital ecosystems, integration of digital infrastructure, computer equipment and programs, applications and data. In order to maintain competitiveness, maintain a strong industrial base and make the transition to a smart manufacturing and services economy, the EU will need to implement digitization in all sectors. Although 75% of the value added of the digital economy comes from traditional industries, not manufacturers in the field of information and communication technologies, the integration of digital technology in enterprises is the weakest point in the process. Only 1.7% of EU businesses make full use of advanced digital technologies, while 41% do not use these technologies at all [4]. Digitization also offers incredible opportunities to other sectors of the economy, such as transport, such as the deployment of Intelligent Transport Systems and Energy, such as smart grids, smart metering, etc. Consequently, it is entirely necessary to implement measures to ensure that the economy has a leading position in the development and exploitation of new technologies, automation, robotics, sustainable production and adequate artificial intelligence for the markets of the future. In addition, the digital economy can make society more inclusive. Citizens and businesses still do not enjoy all the benefits of digital services, from eGovernment and eHealth to e-energy and e-traffic, which should be easily accessible throughout the EU.

Digital skills and knowledge will play a key role in the future impact on road safety. For a better quality impact of digitalisation and a greater impact on all future measures in

”[SWD (2015) 100]. The document also provides more details on the type of challenges outlined and the evidence supporting the strategy.

the transport and road safety sectors, a basic prerequisite is to raise the level of digital competence of staff and labor. Changes are necessary to adapt the education and training system to the ongoing digital revolution. The EC has made this a priority. "Demand for digital skills workers is growing by about 4% annually. The shortage of ICT professionals in the EU could reach 825,000 workers by 2020 unless decisive action is taken." (European Commission 2015).

3.2. Challenges and impact of digitalisation on driving safety

In order to emphasize the complexity and comprehensiveness of the digitalization process, it is important to highlight the impact of particular issues such as: connectivity, open systems, competences and skills, networks, data sharing and collaboration, integration of industries and services through intelligent factories, energy systems, mobility, transport and smart cities; automation, robotics, artificial intelligence, learning machines; innovative services, booming mobile applications to better meet needs; a jobless future; the emergence of large databases; protection of personal data; job cuts and computerization; digital management and process control.

Innovative digitalization technologies and processes are increasingly influencing road safety and future improvements, especially in the areas of active vehicle safety and automated and networked driving. Experts say that approximately 95% of road accidents involve some level of human error, while an estimated 75% of accidents are caused solely by human error. Greater attention should also be paid to the increased use of technologies that use driver-vehicle, vehicle-driver (ITS) interactions, contributing to developments in the digital field in line with the Digital Single Market Strategy. Improving the vehicle's minimum safety standards is one

of the most effective ways to reduce mortality and serious road injuries. The application of these proposed technologies can necessarily have a major impact on security, such as artificial intelligence, computers that operate cars, Figure 5, etc. For example, the prevailing technology that helps drivers maintain their current driving speed is intelligent speed assistance, which is already offered for sale.



Figure 5. Artificial intelligence and computers drive cars in the future [5]

E-learning is becoming increasingly interesting and popular for road safety education. It could potentially complement education, especially when it comes to learning about the risks (fatigue, inattention, alcohol, etc.). Intelligent vehicle systems are designed to alert the driver and include the functions of collision warning, off-roading, vehicle re-routing, pedestrian detection and more. If the driver responds improperly to light or sound alerts, systems can take control of the vehicle's control. Intelligent vehicle solutions include automatic vehicle control, keeping a safe distance, and the electronic management of buses and trucks by special traffic lanes. According to research, the most effective new technologies in the area of active vehicle safety that can be avoided by road accidents can contribute to a significant improvement, especially IntelligentSpeedAssistance-ISA, Autonomous Emergency Braking-AEB, emergency alert Lane Departure Warning (LDW / LCA), driver vigilance and distraction monitoring system, and Alcohol

Interlocks, engine lockdown devices if the driver is under the influence of alcohol.

In the area of passive safety, as a measure to mitigate the effects of road accidents, a seat belt reminder system on all seats, as well as improving pedestrian injuries in the event of a head-on-front impact, and detection of cyclists in the event of an immediate collision, which are feasible as required technologies and already available on the market with effective conditions of use. Other areas of great interest relate to improving direct visibility and removing blind spots on trucks to protect unprotected road users.

4. CONCLUSION

The process of digitalisation and the use of technological innovations in the field of road safety are becoming increasingly prominent. The purpose is to enable simplicity, speed, time, energy and safety. The issue of road safety in the context of the implementation of digitalisation and smart devices plays a key role in the future.

Digital transformation, driving and process automation, robotics and artificial intelligence can all be greatly improved in road safety. The purpose is to enable the driver to drive safely, as well as to perform certain tasks and processes instead of the driver. Therefore, in the future, these processes and technological innovations will play a crucial role in the context of improving road safety. The Internet and digital technologies are changing the way we live and work at all levels. Therefore, creating a single digital market is one of the key priorities.

Digital skills, competencies and knowledge will play a key role in the future impact on road safety. For the better quality impact of digitalization, because changes are necessary, raising the level of digital competence of personnel and workforce is a priority of management.

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CROWD PARTICIPATION IN URBAN DECISION MAKING AND PLANNING: AN EXTENSIVE URBAN CROWDSOURCING LITERATURE REVIEW

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Summary: Urban crowdsourcing has been gaining attention from research communities due to its presumed capability of enabling citizens to be city *prosumers* of data, opinions, and ideas about their city (Lea & Blackstock, 2014). Recently, several urban crowdsourcing investigations and various experiments have been conducted with a view to engaging citizens in order to produce information about their cities and their communities. This article reports on a research based on a systematic analysis of the literature on “urban crowdsourcing” conducted by the authors. Following the general guidelines of the systematic literature review method (Moher et al., 2009), we analysed the current literature available online, searching for combinations of keywords on ISI listed proceedings as well as on databases of leading world publishers. We also used Google scholar to evaluate the popularity of articles, taking account of their citations. The process of identifying and reviewing the literature was conducted in two phases, from September 2017 to February 2018. From our research emerges the potential benefits of crowdsourcing, especially for urban decision making and planning. However, a few of concerns related to crowdsourcing processes have been raised: difficulties in involving people; risks for privacy; quality and accuracy of information gathered.

Keywords: urban crowdsourcing, urban livability, citizen participation, city prosumers

Introduction

Does “the wisdom of the crowd” really exist, or is one more likely to meet the madness of the crowd?

Charles Mackay, who in 1841 published the famous *Extraordinary popular delusion and the Madness of Crowd* (Mackay, 1995 edition) that is considered to be one of the first books to deal with mass psychology, was indubitably persuaded that, in many circumstances, the crowd is characterized by irrational behavior. Such was the case with *tulipomania*, an event that occurred in the Dutch Republic during the 17th century, to which Mackay refers. Around the end of the 16th century, tulips were introduced to the Netherlands from the Ottoman empire (Roding & Theunissen, 1993). By the 1630s, some tulip bulbs were reaching extraordinarily high prices:

Nobles, citizens, farmers, mechanics, seamen, footmen, maidservants, even chimney sweeps and old clothes women, dabbled in tulips. People of all grades converted their property into cash, and invested in flowers (Mackay, 1995 edition, p.94).

In 1635, tulips were even being bought with promissory notes (McClure & Thomas, 2017), but this state of affairs couldn't last long, and their price dramatically collapsed in February 1637. Tulipomania can be considered as an example, not infrequent, of a speculative bubble caused by the irrational exuberance of crowd.

Nowadays, however, a broad number of researchers don't share Mackay's view, and are persuaded that the many are smarter than the few, or in other words, that many heads can be smarter than one. It has been observed that the idea of collective wisdom is at least as old as Aristotle's *Politics* (Landemore, 2012), and the modern principle of democratic collective decision-making is founded on the assumption of a

collective intelligence and a collective wisdom.

According to Surowiecki, the average of answers to a given question provided by a hundred people will often be at least as good as the answer provided by the smartest members:

With most things, the average is mediocrity. With decision making, it's often excellence. You can say it's as if we've been programmed to be collectively smart (Surowiecki, 2004, p. 11).

Recently, the advent of the internet and social networks has created new opportunities to promote citizen participation and involvement in decision-making.

Nowadays, digital technologies can provide a two-way communication between citizens and decision makers that, potentially, empower participatory and collaborative processes.

This article reports on a research conducted by the authors based on a systematic analysis of the literature on “urban crowdsourcing” - a broad topic covering a variety of studies that focus on the development of ICT-based collective and innovative solutions for increased urban livability.

Partner for Livable Communities, a US non-profit organization created at the end of the 1970s with the objective of providing information, leadership, and guidance in order to help communities help themselves, defines livability as:

[...] the sum of the factors that add up to a community's quality of life – including the built and natural environments, economic prosperity, social stability and equity, educational opportunity, and

cultural, entertainment and recreation possibilities.⁴

1. Background

Urban crowdsourcing has increasingly been gaining attention from research communities due to its presumed capability of enabling citizens to be city *prosumers* of data, opinions, and ideas about their city (Lea & Blackstock, 2014).

Urban crowdsourcing is the application of the digital crowdsourcing paradigm to social needs and communities' livability.

Digital crowdsourcing is the use of digital technologies to gather and organize contributions from a multitude of non-professional individuals in order to obtain innovative solutions or products. Although, as Hossain & Kauranen (2015a) reported, the term "crowdsourcing" was only coined in 2006 and is associated with digital technologies, the crowdsourcing paradigm it describes has long been used in the past. For example, in 1714, the British Government offered a prize of £20,000 to anyone who was able to devise a reliable way of computing longitude, whilst, in 1884, 800 readers were engaged by the Oxford English Dictionary to assist in its endeavor to catalog words.

According to the crowdsourcing definition, urban crowdsourcing is the use of digital technologies to gather and organize contributions from citizens in order to improve the urban livability. Thanks to the ubiquity of Wi-Fi connectivity and smart communication devices such as smartphones, phablets, tablets, smartwatches, smart bands, and smart key chains, citizens have become active sensors that can collect data, give advice, and get involved in collaborative activities.

Another term used to address the same scope of urban crowdsourcing is *citizensourcing*.

The term citizensourcing was introduced to refer to the application of the crowdsourcing paradigm to social governance and public policy processes (Lukensmeyer & Torres, 2008).

According to Hilgers & Ihl (2010), citizensourcing can be defined as:

[...] the act of taking a task that is traditionally performed by a designated public agent (usually a civil servant) and outsourcing it to an undefined, generally large group of people in the form of an "open call" (Hilgers & Ihl, 2010, p. 72).

Although the literature on citizensourcing and urban crowdsourcing is not as rich as the literature on crowdsourcing (Hossain & Kauranen, 2015), several investigations and various experiments have been conducted recently with a view to engaging citizens in order to gather information about their cities and their communities.

2. Methodology

In carrying out our review, we followed recommendations made by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) group (Moher, Liberati, Tetzlaff, Altman, & Prisma Group, 2009), whilst also taking into account the methodology adopted in some recent reviews in the crowdsourcing scope (Zhao & Zhu, 2014; Hossain & Kauranen, 2015a). We collected a large number of significant articles published in ISI Web of Science and non-ISI conference proceedings as well as in the databases of leading world publishers. We also used Google Scholar in order to integrate the results and evaluate the popularity of

⁴ <http://livable.org/about-us/what-is-livability>; last accessed on 04.06.2018.

articles, taking account of their citations. Over the last few years, Google Scholar has grown to be a highly scholarly database and has become competitive with other databases such as ISI Web of Science and Scopus (Harzing, 2013; Harzing & Alakangas, 2017). We only considered peer-reviewed articles. The process of identifying and reviewing the literature was conducted in two phases, from September 2017 to March 2018. In the first phase, we searched for relevant articles adopting a simple search criterion. We collected articles that, in their title, abstract, or list of keywords, contained the terms “urban crowdsourcing” or “citizensourcing”. Indeed, searching the full articles would have yielded many irrelevant items, since an article may contain the search terms in their References section. In the second phase, we analyzed the abstracts of the collected articles. From this analysis, we eliminated any items that were inconsistent or that referred to overly generic issues. Finally, we obtained a collection of articles that we analyzed taking into account:

- Empirical or theoretical results
- Reliable experimentation
- Technological architecture
- Applicability

3. Findings

From the first phase we collected a total of 428 items. In the second phase, 132 articles were selected for the abstract analysis. From these, only 82 satisfied the inclusion criteria to be subjected to full text analysis. Figure 1 illustrates the selection process.

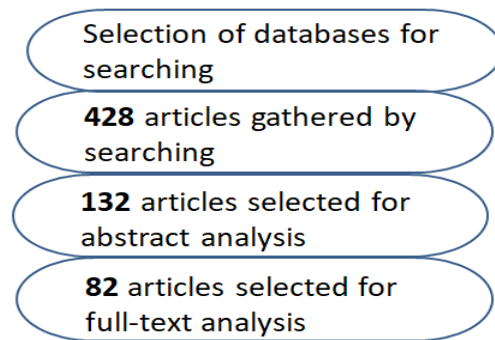


Figure 1. Review flow

Although no limit was set to the survey period, the literature analysis confirmed that the term “citizen sourcing” didn’t appear prior to 2008, whilst the term “urban crowdsourcing” was introduced in 2011 by Zambonelli (2011).

Figure 2 presents the chronological distribution of the analyzed articles.

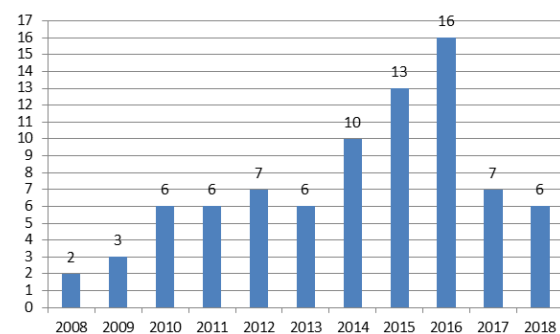


Figure 2. Chronological distribution of the analyzed articles

The selected articles were read in order to identify the various applications of the urban crowdsourcing term, that were grouped depending on whether they were researches, commentaries, or reviews. Figure 3 shows that the majority of articles are commentaries (53%). Indeed, the novelty of the topic favors general analysis and discussion. The high rate of the class “issues/potentiality/challenges” (31%) confirms this aspect.

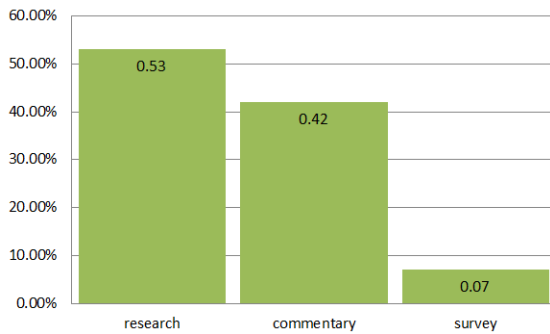


Figure 3. Types of the analyzed articles

We identified the following sectors of application (Figure 4):

- issues/potentialities/challenges
- mobility
- motivation
- participation
- public transport
- urban planning
- urban reporting
- socialization
- urban accessibility
- other

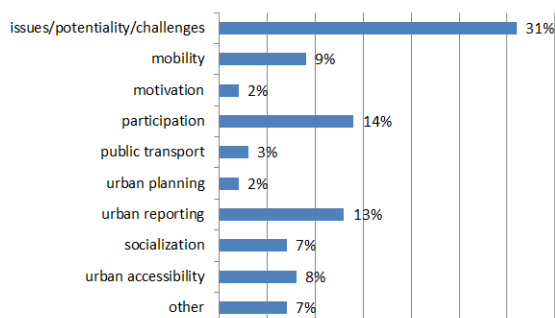


Figure 4. Distribution of sectors of application

4. Principal crowdsourcing applications

From our review, we selected some types of application that appeared relevant for their potentiality.

A. Urban crowdsourcing applications

OpenStreetMap (OSM) emerged as the most famous example of urban crowdsourcing available today (Haklay & Weber, 2008). Registered users can input

spatial content in an open access database, building a free editable map of the world. Spatial contents can be nodes, ways, or relations. Nodes refer to Points of Interest, ways refer to roads, whilst relations group objects together.

B. Urban planning and public participation

It is a widely shared opinion that crowdsourcing can be effective and useful in urban planning projects (Hilgers & Ihl, 2010). Public participation is deemed a key priority in public planning, and crowdsourcing is considered to be a good way of engaging citizens and facilitating an open dialogue between them and urban planners (Bugs, Granell, Fonts, Huerta, & Painho, 2010; Adams, 2011). It is notable that the Obama administration extensively employed crowdsourcing technologies in order to enhance public participation, especially in the scope of community welfare (Nam, 2012). For example, the implementation of crowdsourcing IT has been proposed for gathering and analyzing data on events, issues, and attendance in order to reveal city conditions through multi-dimensional analysis (Motta, You, Sacco, & Ma, 2014).

Nevertheless, the use of crowdsourcing in public planning appears controversial, since some researchers are persuaded that crowdsourcing is more effective than conventional means of citizen engagement (Seltzer & Mahmoudi, 2012), whilst there are others who consider crowdsourcing to be only complementary to traditional participation procedures, and argue that it cannot replace them (Stern, Gudes, & Svoray, 2009).

C. City maintenance and personalized maps

Many experiments and applications have been realized aimed at gathering minute information from citizens that can help in the rescheduling of maintenance activities according to real priorities, as well as for the creation of personalized maps, for

example for users with special or specific needs. These applications allow citizens to notify accessibility barriers and facilities, whilst algorithms have been implemented to filter data and assess its validity (Prandi, Salomoni, Roccetti, Nisi, & Nunes, 2016; Mobasheri, Deister, & Dieterich, 2017; Melis *et al.*, 2018).

D. Emergency monitoring

Crowdsourcing can provide accurate and timely information about natural disasters (Gao, Barbier, & Goolsby, 2011), whilst crowdsourcing platforms are valuable when collecting geographical information via open data, tools, and services (Crampton, 2009).

E. Urban mobility and public transport

Several applications have been proposed for supporting urban mobility (Cairo, Salcedo, & Gutierrez-Garcia, 2015). Many of these should properly be classified as crowd sensing rather than crowdsourcing, since they consider data from traffic sensors, public transport vehicles, and parking machines (Gustarini, Marchanoff, Fanourakis, Tsiourti, & Wac, 2014; Shin, 2016), although they share the idea that adaptive vehicle navigator systems could receive data and advise drivers to take alternative routes (Capra, Chatel, Pathak, & Cardoso, 2013; Palazzi & Bujari, 2016).

F. Urban socialization

The use of crowdsourcing for urban socialization emerges as a topical sector of investigation. This encompasses the use of crowdsourcing to collect data that can be useful for understanding the behavior of urban communities (Rahman, Rahmani, & Kanter, 2014; Palmer & Weber, 2014). Some experimental applications have been realized for promoting communities' engagement in order to collect opinions and attitudes. For example, asking users to identify which demographic group they feel they belong to can allow them to create new

groups and facilitate socialization processes (Santini *et al.*, 2016).

Conclusion

What emerges from our research is the high potentiality of urban crowdsourcing applications to increase the quality of life, security, and the participation of citizens. It has to be noted that all the articles analyzed underline the risks to privacy and the subsequent necessity of realizing applications that reassure citizens in this regard. Finally, the use of crowdsourcing for urban socialization suggests the implementation of applications aimed at guiding appropriation processes in the urban context. Crowdsourcing can be integrated into the various processes of appropriation in the urban context (urban spaces, decision-making procedures, cultural dimensions, etc.), as a component of the negotiation action. Crowdsourcing could contribute to guiding the behavior of the various communities populating urban areas through participatory and guided processes of appropriation.

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QUANTIFICATION OF THE VARIABLES OF THE MEDITERRANEAN CRUISING INFORMATION MODEL FOR 2017

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Summary: In this scientific paper, cruise tourism in the Mediterranean area is explored, with particular emphasis on cruise ships. This paper analyzes the landing data of ships and passengers in the busiest ports for the reception of cruise ships in the Mediterranean area. The trends of passenger traffic from 2012 to 2017 were investigated at five major cruise ports in the Mediterranean: Barcelona, Civitavecchia, Balearic Islands, Venice and Marseille. Based on the mentally verbal knowledge of the aforementioned, the selected model variables were quantified on an index scale of zero to 100, the 2017 Mediterranean Cruise Information Model.

Keywords: nautical tourism, cruising, Mediterranean, ports, cruise ships

1. INTRODUCTION

The Mediterranean is one of the oldest historical hotspots and has played a significant role since the beginning of civilization. Due to its historical, natural, cultural and civilizational aspects, the Mediterranean is one of the most interesting tourist destinations in the world.

The research framework of this scientific work is cruise tourism in the Mediterranean Sea, with particular emphasis on cruise ships. The purpose of the research is to give a broader insight into cruise tourism in the Mediterranean region.

Based on the analysis of the existing literature and statistics, the aim of the study was to investigate the total movements of the number of passengers in leading Mediterranean cruise ports. Based on the aforementioned research, statistics for the period from 2012 to 2017 will be presented in detail, including the total number of passengers for the most important Mediterranean cruise ports: Barcelona, Civitavecchia, Balearic Islands, Venice and Marseille.

The following scientific methods will be used in the paper: the method of analysis and synthesis, the inductive and deductive method, the method of abstraction and concretization, the method of generalization and specialization, the comparative method, and the method of proving and refuting.

The scientific paper will quantify the selection of model variables on the index scale from zero to 100, the information model of Mediterranean cruising for 2017. Zero represents a value that is self-explanatory. The value of 100 is the one that all cruise ports in the world aspire to, and that is, all cruise ships calling at the port use the same as the departure and final ports. The most important variables of this model are: Barcelona, Civitavecchia, Balearic Islands, Venice and Marseille.

2. PORT CRUISE IN THE MEDITERRANEAN

Cruise ports are part of the cruise, and their purpose is to connect the ship to the

mainland, the location for embarking passengers on the cruise ship and completing the contents on board. Cruise ports can be divided into two basic types: home port and port of call. Base ports and port ports are selected by cruise companies and must be met by a number of conditions to be selected.

Base ports are defined as the points of embarkation and / or disembarkation of passengers and the starting and ending points of the journey. Base port terminals must be equipped with all the facilities necessary for the reception and supply of cruisers and passages for the smooth movement of passengers and baggage. With all of these conditions, security conditions are crucial for a port to gain base port status.

MedCruise (2016) states that one of the main conditions you need to have a base port is good transport links with the emission markets, good road and rail connections, proximity to the airports and tourist attractions of the destination. The top five base ports in the Mediterranean are: Barcelona, Civitavecchia, Balearic Islands, Venice and Marseille.

Peručić (2013) states that ports of call are also referred to as ports of call for cruise ships. They are determined by the offer of the tourist destination and the connection with the attractive cities in the vicinity. In order for a port to have the status of a port of call, it must meet conditions such as the development of port infrastructure, large parking lots, adequate equipment and an attraction that is unique, that is, which makes that port different from the rest.

MedCruise (2016), in its statistical report, explains the five main ports of call in the Mediterranean, according to 2015 data are: Civitavecchia (Italy), Balearic Islands-Baelari (Spain), Barcelona (Spain), Kusadasi / Bodrum / Antalya (Turkey) and Piraeus (Greece).

2.1. Barcelona

Strazinic (1996) elaborates that Barcelona is a seaport and the capital of the autonomous province of Catalonia, which is located within Spain. It is located in the southeastern part of the country, 150 km south of the border with France. Barcelona is a shopping center and a major seaport. While Peručić (2013) says that the Port of Barcelona has a modern infrastructure, seven terminals and is well connected to the city and the airport. Also, it has the status of a cruise center-destination because it is tourist attractive, well connected with traffic and has developed infrastructure.

Medcruise (2017) claims that Carnival Corporation and the Carnival Group has invested € 100 million in the construction of the terminal and the improvement of the plant in recent years.

The Barcelona Cruise Terminals are located close to the city (4 km) and the airport (7 km). Due to the capacity of the airport of 40 million passengers, the port of Barcelona is one of the largest departure destinations for cruises in the world. Good rail links allow quick access to other major cities in Spain as well as the rest of Europe.

In 2013 and 2015, Barcelona recorded growth (Table 1). In 2014, the number of passengers decreased by 9.4%, compared to 2013. Barcelona, as the most popular cruise port in the Mediterranean, recorded a 7.9% growth in 2015 compared to the previous year. In 2016, the movement of passengers declined again, but in 2017 there is a 7.4% increase in the number of passengers again, reaching a turnover of over 2.5 million passengers in 2011 and 2013.

Table 1: Total number of passengers and departures at the Port of Barcelona in the period 2012-2017. Mr Günter

Year	Number of passengers (boarded / unloaded)	Number of passengers in transit	Total number of passengers (Boarding / unloading + transit)	of call
2012.	1 265 613	1 084 670	2 350 283	841
2013.	1 499 534	1 157 710	2 657 244	881
2014.	1 438 383	970 251	2 408 634	774
2015.	1 506 286	1 092 966	2 599 232	835
2016.	1 222 487	1 141 805	2 364 292	767
2017.	1 363 754	1 176 548	2 540 302	749

Source:

<http://www.medcruise.com/port/66/barcelona> (26.10.2017.)

The following is a quantification of the Barcelona variable: $1\ 363\ 754 : 2\ 540\ 302 = 53$ on an index scale of zero to 100.

2.2. Civitavecchia

MedCruise, (2016) shows that the port of Civitavecchia is located in Italy, on the coast of the Tyrrhenian Sea and is the second busiest cruise port in the Mediterranean. The port of Civitavecchia is connected by rail, road and air with other parts of Italy and Europe. It is 80 km away from Rome and the Vatican, the most important tourist destinations in Italy. Civitavecchia is the base port in the Mediterranean, has 6 passenger terminals and 28 berths. The goal of the port of Civitavecchia is to become the main cruise port in the Mediterranean.

Over the last 5 years, Civitavecchia has more than two million passengers a year (Table 2).

Table 2. Total number of passenger movements and departures at Civitavecchia in the period 2012-2017.

Mr.

Year	Number of passengers (boarded / unloaded)	Number of passengers in transit	Total number of passengers (Boarding / unloading + transit)	of call
2012.	643 772	1 300 951	1 944 723	900
2013.	972 850	1 604 588	2 577 438	1 002
2014.	920 612	1 472 958	2 393 570	1 040
2015.	989 998	1 548 261	2 538 259	959
2016.	730 938	1 409 101	2 140 039	833
2017.	868 143	1 403 509	2 271 652	794

Source:

http://www.medcruise.com/sites/default/files/cruise_activities_in_medcruise_ports_statistics_2016_final_0.pdf (10.11.2017.)

Over the 5 year period, there is a 16.8% increase in passenger movements, from 1.94 million to 2.27 million passengers a year. Such results show the growing interest of passengers and shipping companies for the port of Civitavecchia, which alone recorded more than 2 million passengers in Barcelona in 2017. This is due to its good geographical location, close proximity to many cultural sites,

satisfactory infrastructure and excellent connectivity to the rest of Europe and the world. 2015 saw the highest passenger traffic of 2.53 million passengers, which is also the highest number of passengers in the history of the port of Civitavecchia.

Civitavecchia records the highest number of berths and according to these figures, it is the leading port in the Mediterranean. Barcelona and Piraeus follow.

The following is a quantification of the Civitavecchia variable: $868\ 143: 2\ 271\ 652 = 38$ on an index scale of zero to 100.

2.3. Balearic Islands

From the Ports de Balears (2017), the Balearic Islands (Balearic Islands) is the third busiest cruise port destination in the Mediterranean. What attracts travelers and cruisers to the Balear Islands is the specificity of the island's lifestyles, delicious food, shopping, culture, historic sites and beaches. The Balearic Islands have five ports managed by the Port Authority of Baleari. All five ports are equipped and equipped to accommodate the world's largest cruisers. These are: Palma, Alcudia, Mahon, Ibiza and La Savina.

Table 3: Total number of passenger movements and movements in the ports of the Balear Islands in the period 2012-2017

Year	Number of passengers (boarded / unloaded)	Number of passengers in transit	Total number of passengers (Boarding / unloading + transit)	Of call
2012	571 209	975 530	1 546 739	723
2013	587 048	1 021 656	1 608 704	613
2014	466 385	875 125	1 341 510	632

2015	490 631	1 050 745	1 541 376	699
2016	606 549	980 515	1 587 064	678
2017	553 928	1 442 605	1 996 533	788

Source:

[http://www.portsdebalears.com/\(12.11.2017.\)](http://www.portsdebalears.com/(12.11.2017.))

The change in passenger numbers between 2012 and 2017 is 29%, which makes the Balears increasingly attractive as a cruise destination year after year. The lowest total number of passengers was recorded in 2014. The number of passengers in transit is more significant than the number of passengers disembarked / disembarked. Also, the year 2014 recorded a smaller number of berths, which is probably the reason for the smaller number of cruise passengers. Although a smaller number of berths was seen in 2014 (632 ships), however, the smallest number of touches was recorded in 2013 (613 ships). A much smaller number of ships than in the previous and next year does not register and a smaller number of passengers, moreover, the number of passengers increased. This may be due to larger ships than a year earlier / later or ships of the same capacity, but with maximum passenger capacity.

Likewise, the difference in passenger numbers is evident between 2016 and 2017. In 2017, the number of passengers increased by 26% and the number of ticks by 16% (Table 3). From the above, the quantification of the Balearic Islands (Balearic Islands) variable follows: $553\ 928: 1\ 996\ 533 = 28$ on an index scale of zero to 100.

2.4. Venice

According to <https://en.wikipedia.org/wiki/Venice>

(10/11/2017) the port of Venice, as well as the city itself, is located on a group of 118 islands, in a vast swamp lagoon in the northern part of the Adriatic Sea. The Venice Travel Terminal was built in 1997. Kesic and Jugovic (2006) argue that Venice is today the most important port of call in the Mediterranean, which is also indicated by the fact that more than 1.4 million passengers are used by the Port of Venice each year for embarkation / disembarkation. MedCruise (2016) says that Base Port Status can be appreciated by its geographical location. It is located at the intersection of major road, rail and air links and is close to the city center and therefore tourist attractions. The city of Venice is an important tourist destination and after Rome the most important tourist destination of Italy. At <http://www.vtp.it/en/company/> (10.11.2017.) It is evident that the passenger port of Venice has 9 terminals and has a car park for 60 buses and 850 cars. Each terminal is equipped with the state-of-the-art technology needed to accommodate cruisers.

Table 4: Total number of passenger movements and departures at the Port of Venice in the period 2012-2017.

Year	Number of passengers (boarded / unloaded)	Number of passengers in transit	Total number of passengers (Boarding / unloading + transit)	Of call
2012	1 312 895	304 116	1 617 011	629
2013	1 448 622	337 794	1 786 416	654
2014	1 444 100	331 844	1 775 944	661
2015	1 512 596	303 227	1 815 823	548
2016	1 509 097	224 742	1 733 839	488
2017	1 364 044	218 437	1 582 481	521

Source: <http://www.vtp.it/en/company/> (10.11.2017.)

The total number of passengers, relative to passengers in transit, is dominated by passengers for boarding / disembarking purposes (Table 4). In the period from 2012 to 2016, the port of Venice recorded a steady increase in the total number of passengers, while in 2017 it decreased by 8.73% compared to 2016. Also, in 2017, the total number of passengers is 2.14% lower than in 2012. The reason for this is a smaller number of passengers in transit, while the number of boarding / disembarking passengers is higher by 4% compared to 2012. The number of berths in the port of Venice in 2017 is lower than in the first three years (Table 4). Specifically, in 2017 the port of Venice recorded 17% fewer touches than in 2012. The highest number of ship docks was recorded in 2014 and 2015 as well as the number of passengers in transit. From the following, the quantification of the variable Venice: $1\ 364\ 044 : 1\ 582\ 481 = 86$ on an index scale of zero to 100.

2.5. Marseille

At <http://www.enciklopedija.hr/natuknica.aspx?id=39102> (11/18/2017), Marseille is the second largest city in France and the largest French port. It is geographically located in the south of France, on the Gulf of Lyon. The website <http://www.enciklopedija.hr/natuknica.aspx?id=39102> (2017) claims that it is one of the busiest freight and passenger ports in Europe. Strazinic (1996) says that the present port extends over 50 km.

At <https://en.wikipedia.org/wiki/Marseille> (11/18/2017), the port of Marseille is well connected to the hinterland, rail, road and pipeline. Marseille has a total of 22 museums and cultural heritage centers, with festivals frequently held nationally and internationally in the city. More recently,

the Marseille Provence Cruise Center has been built, a cruise ship terminal. In 2017, Marseille as a base port recorded more than 0.5 million passengers, placing it at the seventh position of the most important cruise base ports in the Mediterranean.

MedCruise, (2016) says that over a period of five years, the port of Marseille has seen a continuous increase in the total number of passengers (Table 5). It also records the most dynamic increase in passenger numbers and destinations from all ports in the Mediterranean. The number of passengers in 2017 is 107% higher than in 2012. The only decrease in the number of passengers in transit was recorded in 2016, but the total number of passengers is on the rise due to the greater number of boarded / disembarked passengers. Although Marseille is one of the 10 most important base ports in the Mediterranean, it is still used more by transit passengers than for embarkation / disembarkation purposes. In terms of the number of berths in 2014, 20.1% fewer ships landed at the port of Marseille than in 2013. Also, there was a decrease of 11% in 2017 compared to 2016. Marseille is ranked 5th in the Mediterranean by total number of passengers. The new investment in infrastructure seeks to keep up the trend of increasing the number of passengers and landing ships.

Table 5: Total number of passenger movements and movements at the port of Marseille in the period 2012-2017.

Year	Number of passengers (boarded / unloaded)	Number of passengers in transit	Total number of passengers (Boarding / unloading + transit)	Of call
2012	268 451	431 649	700 100	335

2013	264 703	545 787	810 490	420
2014	313 322	576 698	890 020	354
2015	381 318	806 713	1 188 031	447
2016	506 412	804 872	1 311 284	497
2017	503 325	947 734	1 451 059	442

Source: http://issuu.com/medcruise.association/docs/medcruise_yearbook_16-17/53?e=15848004/39229756 (18.11.2017.)

From the above, the quantification of the Marseille variable follows: 503 325: 1 451 059 = 35 on an index scale of zero to 100.

3. CONCLUSION

The scientific paper analyzes the data for the five most visited cruise ports in the Mediterranean from 2012 to 2017: Barcelona, Civitavecchia, Balearic Islands, Venice and Marseille. All of these ports were used for the purpose of base ports and also ports of call. Total traffic in the major Mediterranean base ports in 2017 is 6.4% lower than in 2016. Comparing 2012 and 2017, there is a growing trend of base ports in the Mediterranean. Over the five-year period, there was a 7.4% increase in base port traffic. Due to spatial imbalance, passenger traffic and ticking are concentrated in only a few countries. According to 2015 data, six countries, of which Croatia is ranked fifth, each with more than one million passengers, or almost 9/10 of total passenger traffic (88.07%), and five countries with more than one thousand ticks have more than 3/4 (75.85%) ticks. A third of countries have a symbolic representation (less than 1%). Barcelona is the most prominent and favorite destination of all cruise ships. There are also over 2.4 million cruise passengers annually. The other ports in the Mediterranean are exemplary because of

the port facilities and infrastructure, as well as the connection of the port to other modes of transport. In 2015, Venice was the most important base port in the Mediterranean, which is also indicated by the fact that more than 1.4 million passengers are used by the Port of Venice each year for embarkation / disembarkation. This element was the basis of this scientific work for the quantification of variables. Based on the mentally verbal knowledge about the aforementioned, quantification of selected model variables on the index scale from zero to 100, the information model of Mediterranean cruising for 2017, was made for the first time. By quantified values, the variables of the information model are: Venice (86), Barcelona (53), Civitavecchia (38), Marseille (35) and the Balearic Islands (28). By continuing the research in a subsequent scientific paper, it is possible to determine the direct rates of an information model of Mediterranean cruising for a certain period of time, eg from 2017 to 2021.

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SERVICES FOCUSED ON KNOWLEDGE AS THE MOST IMPORTANT FORCE TO ACHIEVE COMPETITIVENESS

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Summary: The service sector is an important factor in the development of the modern economy. It manifests itself through the ease of overcoming the recession and by stimulating economic growth and employment. In this context, learning and knowledge play a key role in enhancing innovative processes, that is, achieving enviable competitiveness. Key issues that contemporary business activity should address are the challenges of managing knowledge, technology and innovation. The most important change that is taking place in the global economy is the change in the basis of acquiring, maintaining, developing and improving the competitive advantages of organizations and management functions in the process. Organizations have a successful competitive profile if they offer new, better, more reliable, functional, and cheaper products and services that the market and consumers are looking for, and that competitors cannot offer in competitive form. Today, many recognize the need for learning and knowledge capabilities throughout the organization, something that traditional authoritarian hierarchical organizations rarely possessed.

Keywords: innovation, competitive profile, absorption capacity, organizational learning.

Introduction

One of the few characteristics of the developed and competitive countries of the world today is that they have a "knowledge-based economy". As technologies become more complex, the participation of knowledge-based activities, through the successful application of innovations, significantly raises the competitiveness of businesses, the economy and countries as a whole. The OECD defines a knowledge-based economy as an economy that is directly based on the production, distribution and use of knowledge and

information⁵. Competitiveness is the foundation that measures the success of every organization. It determines the orderliness of activities that contribute to its performance, such as innovation, cohesion culture or good implementation⁶. Such settings show that the creation, application and commercialization of new innovative technologies and knowledge enables the development of highly sophisticated knowledge-based products and services, which are an important source of increasing productivity and productive and export competitiveness.

⁵ OECD (1996), *The Knowledge-Based Economy*, STI Outlook, Paris.

⁶ M. E. Porter, *Competitive Advantage, Achieving and Maintaining Top Business*, Masmedia, Zagreb 2008, 14.

1. Services as the most important means of achieving competitiveness

In the European economy, services have become the most important force for competitiveness. In 2016, two-thirds of jobs in EU countries were in the services sector, with no percentage in less than 50% in any country. More than three quarters of employees in the services sector had Luxembourg, 81 percent, France, 79 percent, Great Britain, 76.5 percent, Sweden, 75.8 percent and Germany 73 percent. On the other hand, there were 27.5 percent of EU employees in the industry, with the Czech Republic leading the largest share of employees in the industry, with 39.5 percent. This is followed by Slovakia with 38.8 percent and Slovenia with 37.1 percent.⁷

Service activities are an economic good, where, unlike goods, the material production or the tangible value of the end product is not in the forefront, but priority is given to the service of a natural or legal person who offers it for a fixed period or period of time to cover demand.

There are several definitions of services in the literature, the most famous of which are the following:

- *"A service is an activity or series of activities, to a greater or less intangible nature, which usually but not necessarily takes place in the interaction of the user with the person providing the service and / or with the physical resources or systems of the service provider,*

which is provided as a solution to a user's problem."⁸

- *"A service is any act or act that one party can offer to another, it is mostly intangible and does not result in owning something. Its production may or may not be related to a physical product.*"⁹

C. Gronroos brings together a number of definitions of other authors and says: *"A service is an activity or a series of activities, to a greater or less intangible nature, which usually but not necessarily occurs in the interaction of the user with the person providing the service and / or with the physical resources or systems of the service provider, which is provided as a solution to the user's problems.*"¹⁰

All of the above definitions are broad and many organizations have not clearly defined their services, that is, there are no precise descriptions of what the service entails. Many organizations face the problem that their structures and processes are inadequate to develop effective innovative services that would allow them to better market themselves. In this respect, it is necessary to distinguish precisely what are the basic elements of the service and what are the characteristics of each.

Bullinger, Fähnrich and Meiren distinguish three basic dimensions of service:

- Structure dimension - structure determines the ability and willingness to provide the service;
- Process dimension - service is provided with external factors integrated into the processes,
- Outcome dimension - The outcome

⁷ http://ec.europa.eu/eurostat/statistics-explained/index.php/Employment_statistics/hr (20. januara 2018. godine)

⁸ C. Gronroos, *Service Management and Marketing - Managing the Moments of Truth in Service Competition*, Maxwell Macmillan International Editions, Lexington, Mass, 1990., p. 27

⁹ P. Kotler, *Marketing Management*. Mate, d.o.o. Zagreb 2001, 467.

¹⁰ C. Grönroos, *Service Management and Marketing – A Customer Relationship Management Approach*, Wiley, Chichester 2000, 143.

of a service has some tangible or intangible impact on external factors.¹¹

Goffin and Mitchell, add resource model, process model and product model as three essential categories in sizing services.

Figure 1 illustrates a model of service components according to Goffin and Mitchell.

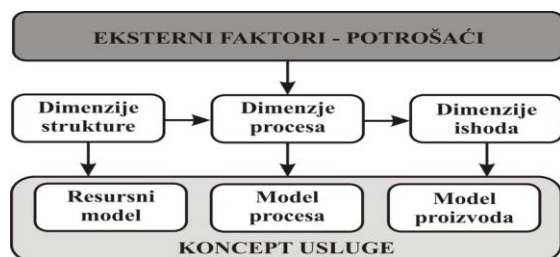


Figure 1. Model of service components¹²

In terms of the provision of intellectual and material resources, as well as appropriate information and communication technology, the most appropriate resource model is. The process model involves the preparation of adequate documentation. The product model implies the precise definition of procedures in the results of services in terms of appropriate quality and performance of services.

The service delivery chain is a logical continuation of the activity. In this regard, Hargadon and Sutton articulate the following operations:

- Reference to a service where the consumer must be attracted to a specific service;
- Scheduling of the service where the

service would be defined in time in order to adequately realize the service to the consumer;

- Diagnosing and selecting for a service application which involves troubleshooting and finding the right solution for customer satisfaction;
- Service application, which implies that the selected application must change;
- Paying for a service is an operation where the service consumer must pay a certain fee depending on the service provider's business policy.¹³

2. Innovation and innovating

Innovation and innovating are a fundamental process within every organization. It is a process that seeks to improve existing and create new products and services. From this point of view, innovation is a generic process associated with survival and growth.

The generic process, or its stages, are shown in Table 1 and are valid for all organizations.

Stages of innovation	Activities
Search	Searching the indoor and outdoor environment for signals to help come up with an idea for innovation, but also to identify

¹¹ H.J. Bullinger & T. Meiren, *Service Engineering* u M. Bruhn & H. Meffert (eds) *Handbuch Dienstleistungsmanagement, Von der strategischen Konzeption zur praktischen Umsetzung*, Gabler, Wiesbaden 2001, 149-175.

¹² K. Goffin & R. Mitchell, *Innovation Management: Strategy and Implementation Using*

Pentathlon Framework, Palgrave, Macmillian, New York 2002, 159.

¹³ A. Hargadon & R. Sutton, *Building an Innovative Factory*, Harvard Business Review, Vol. 80, No. 8, 2002, 263.

	threats from the environment;
Selection	Selecting those signals, at the strategic level, that are thought to have the greatest impact;
Implementation	Translating potential triggers into something new and launching it internally or externally;
Collecting resources in the form of knowledge	Especially gathering resources in the form of knowledge to enable innovation. This primarily refers to the knowledge of R&D, market research, the acquisition of knowledge through technology transfers, strategic alliances, the purchase of small businesses with a new product, etc.
Project execution and project management	Making a lot of quick decisions because of new uncertainty generation problems;
Supporting the project in the long term	Revising the original idea and modifying the

	idea, ie reinvention;
Learning	Organizations must seize the opportunity to learn by finding all stages as they progress in the innovation cycle to build a knowledge base and to improve the process of managing such innovation projects.

Table 1. Innovation phases as a generic process¹⁴

The technology and experience itself has shown that organizations that have tried to copy service development through product development have not achieved the expected results. Namely, services are based on interaction with consumers and require a sophisticated development methodology, and this depends largely on the type of service.

3. Innovation and learning

The effects of service innovation on the competitive position of an organization are directly dependent on the organizational learning process, which refers to knowledge of the components and key concepts underlying them. The lack of these components leads to poor performance of organizations. Failure to continue learning and not to support dynamic knowledge absorption leads to a loss of competitive advantage.

¹⁴ J. Prester, *Innovation Management*, Synergy, Zagreb 2010, 31.

3.1. Absorption capacity

As it becomes increasingly difficult for organizations to keep up with changes in technology and environment, those organizations that have a stronger absorption capacity, which is defined as the ability to acquire new knowledge, that is, the organization's ability to acquire information and communicate ideas, will be better able to create competitive advantage through innovation.

The absorption capacity of an organization is divided into:

organizational learning,
potential absorption capacity (acquisition of new knowledge and abilities) i
realized absorption capacity (includes transformation and application of acquired knowledge).

Forés and Camisión state that innovation is measured not only by investing a certain percentage in R&D but through its absorption capacity. For this activity, they offered an instrument to evaluate the absorption value of the organization. Ratings can be given from 1 (poor, poor ability) to 5 (excellent ability), with the ability for organizations that are in the more advanced innovation phase and up to the upper limit of 7 (for greater accuracy).

ORGANIZATIONAL LEARNING	
Internal learning ability	
Knowledge and acceptance of goals	All employees have a general knowledge of the goals the organization wants to achieve
Strategic orientation	The extent to which employee knowledge is consistent with the strategic goals of the organization

Teamwork	The level to which employees work in groups
Familiarity with contributing to an organization's goal	All parts of the organization (departments, sectors, teams and individuals) need to know how they contribute to the overall goal
Coordination in the organization	The level to which everyone in the organization is coordinated
Management commitment	
Talent for dialogue and collaboration managers	A managerial spirit that fosters dialogue and diverse opinions as well as reaping the benefits of collaboration
The ability to encourage	Managerial ability to support other employees' initiatives and suggestions, as well as experimenting with new ideas to improve a product or process
Motivating employees	Managers often inform employees about important decisions
Employee education	Employee learning is seen as an investment, not an expense
Managerial propensity for change	Managers take a positive view of implementing changes in any segment to be ahead of the competition
Compensation system for innovation	In this organization, innovation is rewarded
ABSORPTION CAPACITY	
Ability to accept	

Openness to the environment	Is management open to opportunities and threats from the environment or waiting, and then makes decisions subsequently
Cooperation in research and development	Frequency and importance of cooperation with colleges and institutes
Competition knowledge	The capacity to gather competition knowledge
Internal development of technological competencies	Effectiveness in developing initiatives that will enhance technology competencies in R&D, customers and suppliers
Ability to apply knowledge	
Knowledge management	Ability to develop knowledge management systems that enable employees to understand and analyze such accepted knowledge from other organizations
Assimilation of technology	The capacity to embrace new technology and innovations that have proven successful
Human resources	Ability for existing employees to use their knowledge to gather and apply the knowledge they have acquired
Industrial benchmarking	Organizations profit from the use of proven practices of similar businesses
Involvement in knowledge diffusion	The degree to which employees of organizations present papers at conferences, be guest lecturers, or outsourced researchers to the organization

Attendance at trainings and special events	Attendance at seminars, professional promotions and meetings
Transformational capacity	
Transfer of IT knowledge	The organization's capacity to deploy IT to accelerate knowledge sharing, including virtual meetings
The ability to adapt	The ability to adapt to own technology needs developed by other manufacturers
Exchange of scientific and technological knowledge	The degree to which organizations generally permit the exchange of scientific and technological knowledge with other organizations
The ability to rejuvenate	Ability to quickly dismiss outdated knowledge and look for new alternatives
I & R integration	Coordinating I&R with engineering, marketing and sales
Applying knowledge	
Application of experience	The degree of application of the know-how gained in technology and business in line with the business strategy, with a view to achieving a competitive advantage
Exploitation of new knowledge	The ability of an organization to apply acquired knowledge in specific workplaces to meet environmental requirements
Technological proactivity	The extent to which new products and

	services are being innovated and offered with regard to self-response to market demands
Development of patents	Ability to patent knowledge
INNOVATION CAPACITY	
Product and service innovation	
Number of different products and services	Ability to produce different products and services
Specialized products and services	Ability to offer special products and services
Diversification of products and services	Ability to develop a portfolio of different products and services
The first on the market	Ability to develop and adapt products and services to be first on the market
Quality of products and services	Ability to produce high quality products and services
Product and service behavior	Ability to produce high-tech products
Ease of use	Ability to make products that are easy to handle
Technological differentiation of products	The ability to differentiate a product technologically
Process innovation	
Flexibility in process planning	Ability to develop the planning process so that the production schedule can be changed quickly and frequently according to customer needs
Production organization	The capacity to develop a creative, effective and efficient production system or

	operating procedures for rapid production
Production planning and control	Ability to create and apply adequate control mechanisms in production
Delivery speed	Ability to deliver quickly either to your own or someone else's fleet
Organizational Performance Indicators	
Average margin	
Average Return on Assets (ROA)	
Average Return on Investment (ROI)	
Average sales return (net profit / sales)	

Table 2. Model for evaluating the innovation potential of an organization

Forés and Camisión calibrated this measurement instrument and, using structural mathematical expressions, defined strengths, the focus of which was the methodology of the effect of organizational learning and absorption capacity on the end result of the organization. All sets of questions from the Innovation Potential Evaluation Model are sublimated into the structural model shown in Figure 2.

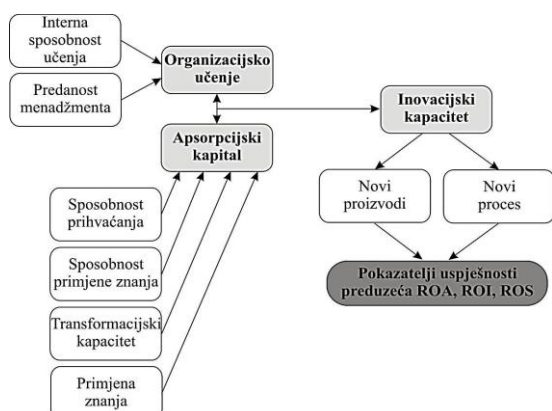


Figure 2. Structural model of organizational innovation potential¹⁵

Certainly, innovations provide an opportunity to identify the elements that have led to business success. These are valuable assumptions that help in the next innovation venture.

The facts that support successful innovation highlight McDonough, Zack, Lin and Berdrow in particular:

- successful innovations are of strategic importance,
- successful innovations depend on internal and external links,
- successful innovations require an innovation climate in the organization to bring about innovation at all,
- successful innovations require mechanisms that drive and enable change.¹⁶

Of course, it is easy to check all the above elements by appropriate questionnaires, but assuming that all the elements that exist in the organization require knowledge. This refers to the knowledge that is needed to

guide the innovation process itself, from service or product innovation to market launch.

Although the environment is turbulent, technology is advancing, the innovation process itself needs to be dynamic, and Prestner adds dynamic innovation capabilities to it, which is essentially an organization's strong absorption capacity and knowledge to drive innovation¹⁷. Lack of knowledge leads to a decline in the economic power of the organizations themselves. For these reasons, organizations need to find opportunities to learn from their innovation projects in order to enhance their competitive position¹⁸. To this setting, Govindarajan and Trimble add that learning is an absolute necessity.¹⁹

3.2. Knowledge

The explanation of the concept of knowledge can be approached from different points of view. The following division is in management:

- Uncodified (implicit) knowledge is one that is difficult to express clearly in a way that is only fully understood and complete. One knows more than he can express in words or otherwise points to an implicit dimension of knowledge.
- Codified (explicit) knowledge is one that can be grouped and encrypted, that is, expressed in the form of numbers, formulas, charts, diagrams, or in computer code, which enables easier

¹⁵ B. Forés i C. Camisión, *The complementary effect of internal learning capacity and absorptive capacity on performance: the mediating role of innovation capacity*. International Journal of Technology Management, X (Y), u J. Prester, *Menadžment inovacija*, Sinergija, Zagreb 2010, 134-137.

¹⁶ E.F. McDonough, M. Zack, H. Lin & I. Berdrow, 2008. *Integrating Innovation Style and Knowledge Into Strategy*. Sloan Management Review, Ref.No. SMR₂₉₄, p. 1-8.

¹⁷ J. Prester, *Innovation Management, Synergy*, Zagreb 2010, 202.

¹⁸ S.L.Beckman & M. Barry, 2007. *Innovation as a Learning Process: Embedding Design Thinking*. California Management Review (HBR Ref. No. CMR₃₇₇), p 1-33.

¹⁹ V. Govindarajan & C. Trimble, 2004. *Strategic Innovation and the Science of Learning*. Sloan Management Review (HBR Ref. No. SMR₁₂₈), p. 1-12.

communication.

This division suggests that the higher the level of codification of knowledge, the more cost-effective the transfer and does not require direct, direct contact for the source of knowledge.

Uncodified or implicit knowledge is difficult to transmit, and only the costs of transfer are higher. Deficiencies can be remedied by direct communication at the source of knowledge.

The division into "visible" and "invisible knowledge" is a framework of technologies that are publicly available and easily visible once purchased and the process itself, which is invisible from the outside, or sent within the product itself, is more difficult to access for negative engineering, imitation and copying.

'Positive knowledge', that is, discoveries, can direct research into areas that are highly anticipated, thus avoiding difficult or even challenging innovative, technological, financial and market situations.

It is often forgotten that knowledge about failures - the "negative knowledge" that can be expressed *as this approach does not work* - is also extremely valuable in directing resource allocation to the more promising champions and enabling a series of failed attempts to find an appropriate solution to a problem. Organizations often hide their failures as their own secrets of success, that is, they turn their actual failure into a successful strategy for avoiding similar mistakes.

The division into "autonomous" and "systemic knowledge" is within the framework of value delivery without major modifications to the system in which it can be incorporated. System innovation

requires modification of other subsystems involved in its technological and economic application.²⁰

Conclusion

The high quality of services in the age of globalization is the safest competitive strategy that leads to an increase in the value of the service and customer satisfaction, and thus a long-term competitive advantage in the market. Changing the structure of world trade by increasing the share of services turnover at the expense of reducing the turnover of goods is becoming more pronounced. The scientific and technological revolution strengthens the international division of labor and the increasing interdependence of individual countries, which eventually causes the world trade as well as the international movement of capital, labor, or service sector to become increasingly important factors of economic development.

In the chaotic world of global competition, organizations must continually innovate their services if they are to compete successfully with other organizations. Innovation is a key feature of modern organizations. Innovation is a process of change, experimentation, transformation and revolution, which means that the key aspect is activity. The process of "creative destruction" that characterizes innovation leads to technological change and employment growth.

The impact of service innovation on the competitive advantage of an organization interacts with organizational learning. Failure to conduct continuous learning and not to support dynamic knowledge absorption leads to a loss of competitive advantage.

²⁰S. Kotlica and S. Rankov, *The Impact of Innovation and Technology on the Competitiveness*

of Modern Business, Megatrend University, Belgrade 2014, 122-124.

Only by changing our way of thinking can we move deeply embedded policies and practices toward shared values and understandings of learning and knowledge as the most important force for competitiveness. In today's world economy, it is not only sufficient to learn, but also to learn faster than competing organizations.

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TRAFFIC INFRASTRUCTURE IN THE FUNCTION OF PROTECTION OF SOFT METS

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Summary: In recent years, terrorists have repeatedly used vehicles to attack large gatherings, resulting in a significant number of human casualties. Unlike explosives or weapons, vehicles are easily accessible to terrorists, requiring minimal training, skills and minimal preparation time to manage them. The purpose of this paper is to analyze the role of transport infrastructure in the function of protecting soft targets from terrorist attacks, based on an analysis of terrorist attacks by vehicles so far. A degree of protection can be achieved by interventions on existing roads by various physical barriers that force the driver to slow down the movement of the vehicle or prevent him from entering the gathering area for more people. On the other hand, controlling vehicles using digital technology can prevent or hinder terrorist attacks by vehicles. The aim of this paper is to propose effective systems for the protection of soft targets against terrorist attacks by vehicles, which it is advisable to install in transport infrastructure.

Keywords: transport infrastructure, terrorism, protection of soft targets, terrorist attacks by vehicles

1. INTRODUCTION

In recent years, the threat posed by terrorism has increased rapidly. Terrorists use readily available means to carry out an attack. A new approach to the fight against terrorism is needed. Public spaces that gather large numbers of people, such as streets with shops, city squares, transportation systems, sports and concert events, either indoors or outdoors, are particularly at risk. Building an environment that is more resilient to terrorist attacks through the architecture and infrastructure of urban systems, in an acceptable and effective way, improves citizens' security.

The question of how to increase cities' resilience to terrorist attacks through physical interventions and traffic management measures is a challenge for urban planners, builders, transport and security professionals - how to plan cities' resilience to terrorist attacks?

Since the start of 2016, vehicles have been used to carry out more than a dozen terrorist attacks worldwide. Tunisian Mohamed Lahouaiej-Bouhlel hit a massive truck on July 14, 2016 in a mass of people celebrating Bastille Day on the Promenade des Anglais promenade in Nice, killing 86 people and injuring more than 430 people. Two days later, ISIL claimed responsibility for the attack. The Nice terrorist attack, though not the first of its kind, was the most modern modern terrorist attack on a vehicle in Europe that triggered a wave of terrorist attacks on vehicles around the world.

Following the Nice attack, major incidents involving vehicles in Vienna, the USA (Ohio State University), Berlin, London, Antwerp, Stockholm, Paris, Barcelona, Edmonton and New York occurred.

In September 2016, an attacker ran into a car in Vienna Favoriten with a vehicle shouting "Allahu Akbar", fortunately without injuries. In November 2016, Somali Abdul Razak Ali Artan carried out

a car and knife attack at Ohio State University, injuring 11 people. In December 2016, Tunisian Anis Amri crashed into a stolen truck at a Christmas fair in Berlin, killing 12 and injuring 56 in an attack under the responsibility of ISIL.

Attacks on the vehicle continued in 2017, with at least 32 dead and more than 240 injured. On January 8, 2017, a truck driver rammed into a group of Israeli soldiers at a popular tourist destination in Jerusalem, killing four people. On March 22, 2017, terrorist Khalid Masood killed five people and injured more than 50 during a vehicle and knife attack in London. A similar attack was prevented the next day in Antwerp, Belgium. On April 7, 2017, another attacker carried out a terrorist attack in Sweden, hijacking a truck and crashing into pedestrians on a shopping street in downtown Stockholm, killing four and injuring more than 15 people.

On the evening of June 3, 2017, three assailants, with a rented van at full speed, crashed into a crowd of people on the London Bridge, exited the vehicle and attacked a pedestrian with a pedestrian in nearby Borough Market. The attack, which has been claimed by ISIL, has resulted in at least seven killed and 48 injured. The attack followed ISIL's call on May 17, 2017 to carry out terrorist attacks in the United States, United Kingdom and the European Union using knives and trucks. The attacker crashed into a crowd of believers near a mosque in north London on June 19, 2017, injuring at least eight people. Later that day, an armed gunman rammed a Renault Megan into a police car at the Champs-Élysées in Paris, severely wounding himself, with no other casualties. The car contained explosives and weapons.

On 17 August 2017, the attacker intentionally rammed into a crowd of tourists on the Las Ramblas promenade in central Barcelona on August 17, 2017. The attack killed 16 people and wounded 120 people. On September 30, 2017, the second attacker carried out two terrorist attacks on

vehicles in Edmonton, Canada, injuring five people in total. In the first attack, the perpetrator used a car to stab a police officer before exiting the vehicle and stabbing him with a knife. The attacker later used the truck and rammed into the pedestrians, injuring four people.

Vehicle attacks turn ordinary everyday objects into killing machines, creating an element of surprise as well as a constant threat. Due to the readily available means of attack, ease of execution, and inability to detect it early, ISIL and similar terrorist groups will most likely continue to use this tactic in their future attacks.

2. VEHICLES THAT terrorists use in their attacks

Getting a vehicle to carry out a terrorist attack is easy. The vehicle can be bought, rented, stolen or hijacked on the way to the destination. However, the type of vehicle and its structural and technical characteristics are extremely important factors that affect the success of an attack. Analyzing the previous attacks on vehicles, we can conclude that the attack with smaller vehicles and even smaller vans and ATVs does not result in a large number of casualties. Smaller vehicles do not have the required weight and a large enough wheel range to extinguish a large number of victims. The vehicle most suited to such a terrorist operation is a large cargo truck because of the ease with which it can pass protective obstacles and the great damage it can do to people and infrastructure. Trucks and buses on the roads are busy and do not cause any doubt about the access they usually have to certain areas.

Terrorists are the ideal vehicle (Vehicular Terrorism: The Threat Behind the Wheel, 2017) a heavy duty truck that can be controlled, relatively fast or as fast as possible, heavy, allowing it to destroy anything it hits, with twin wheels, so victims have less chance of escaping than the wheels of a vehicle, have a slightly

elevated suspension and bumper, which allow the truck to climb onto the pavement and pass all obstacles if necessary. Heavy duty vans, some special vehicles such as towing vehicles, etc. and buses are also considered.

Vehicles that terrorists usually avoid are (Vehicular Terrorism: The Threat Behind the Wheel, 2017):

- "Small cars, including larger SUVs,
- Slower vehicles not exceeding 90 km / h,
- Cargo vehicles with trailers that are not part of the cab and can lead to loss of control and jams, especially when cornering,
- Freight vehicles with extended trailers which may cause the driver problems when maneuvering the vehicle. "

Driving characteristics and vehicle dynamics vary with the type and weight of the vehicle. The center of balance is linked to the loading capacity of each vehicle and determines the speed and maneuverability of the vehicle. These are some of the weaknesses that can be exploited in preventing an active vehicle attack. Trucks and buses have a greater turning radius than passenger and utility vehicles. Vehicles with a larger turning radius circle around corners and obstacles. In order to be able to swerve and not lose control of the vehicle and topple over, they must reduce their speed.

3. PROTECTION OF CITIZENS FROM TERRORIST ATTACKS TO VEHICLES

What can we do to protect citizens from terrorist attacks by vehicles? This question is harder to answer when it comes to the overall protection of big cities. When securing a specific event, security officers can take measures to block vehicle access

to crowded areas. One possible solution is to set up barriers that temporarily or permanently prevent vehicles from accessing a specific area or prevent vehicles from either achieving high speeds or driving over longer distances. Protective barriers can be extremely visible, such as, for example, metal-coated concrete blocks in front of the Houses of Parliament in London - or concealed, such as heavy concrete flower and sculpture containers located on city streets.

Likewise, streets and access roads can be redone to prevent vehicles from reaching the target of the attack or to prevent the vehicle from accelerating during the attack. Only specific locations can be protected in this way, and multiple, sharp turns and narrow streets can prevent large vehicles from reaching high speeds before reaching an obstacle.

4. CONSTRUCTION MATERIALS AND TYPES OF PROTECTIVE BARRIERS

Common barrier materials are:

- Metal: cast iron; carbonitriated iron; stainless steel; aluminum, bronze or other alloys.
- Reinforced concrete: either cast in place or precast into a mold with embedded steel bars or steel mesh.
- Other materials: large natural stone, wood or trees, dense industrial plastics.

The advantages of metal barriers are great strength; light weight and relatively narrow shape and easy handling. Some of the disadvantages of metals are the complexity of maintenance, the need for routine anti-corrosion paint / coating and less architectural compatibility with the surrounding building materials (color, shape, texture). Compared to metal barrier protections, concrete elements are made of barrier material that has greater

compatibility of appearance (color, shape, texture) with the urban environment, high corrosion resistance, greater durability, less maintenance and usually lower costs. Other protective barrier materials include natural stone, wood or trees and industrial plastics. Stone and plastic materials usually do not have the high strength that metal or concrete has and therefore have to be of large overall dimensions or specific structural combinations to effectively stop vehicles in a collision. Protective barriers can also be made from a combination of materials for a better appearance or complementary properties, or to have the advantage of architecturally enhancing or complementing the environment in urban areas. There are two basic categories of vehicle anti-vehicle barrier (AVB) systems: stationary and operable (Vehicular Terrorism: The Treath Behind the Wheel, 2017).

- Stationary barriers are equivalent to, but not exactly equivalent to, the "fixed barriers" defined in FEMA 430 (2007), fixed to the ground or the base diaphragms and used to block the entry of vehicles into a specific area.
- Operable barriers are not attached and can be moved as needed to allow access to authorized vehicles. Operable barriers are ramps or wedges. Usually, hydraulic or electrical power is required to set them up. Their overall fabrication and design is more complicated than stationary barriers.

4.1. STATIONARY PROTECTION BARRIERS

Common stationary barriers are:

- Columns or columns - common barriers to vehicles, and their advantage is that they take up little space and are easy to install,
- Sculptures and other heavy objects,
- Metal fences,

- Concrete or stone protective barriers (fixed or anchored concrete barriers, road barriers called Jersey barriers, protective concrete walls, concrete flower containers).

In recent years, barriers or short guard posts have increasingly been used as barriers. Metal poles that prevent a vehicle from being parked cannot be considered a safeguard against terrorist attacks by vehicles, as they cannot successfully stop even a personal vehicle, let alone a truck. In addition, the piers must be deeply anchored to the ground, which means that they would probably not be erected on the bridges, given that two recent attacks in London have taken place on bridges.

Thick metal short poles are typically intended to stop vehicles weighing up to 7 tons at speeds up to 70 km / h (Krishna-Prasad, 2006; Kinney et al., 2014). Such technical characteristics of these columns would not be sufficient to stop a truck weighing 20 tons. The disadvantage of such poles is that in places where a lot of people move, they can injure pedestrians when pedestrians fall on a pole.

A large heavy cannon is placed in front of Emirates Stadium in London, which is the Arsenal club's logo, but also serves as a barrier.

Jersey concrete barriers are common and widespread vehicle barriers designed to permanently or temporarily maintain safety and direct traffic. They were created by the New Jersey State Highway Bureau to separate lanes on the freeway. The Jersey concrete barrier is 80 to 100 cm high and was originally designed to minimize damage and the likelihood of a vehicle collision in highway lanes. There are variations of the original shape such as tapered concrete barriers, F-shaped barriers and California K-rail barriers.

The simple construction, mobility and efficiency of the Jersey obstacles make them applicable to prevent vehicle attacks. The advantages of Jersey obstacles are their ability to quickly stop a vehicle using a large mass of concrete, eliminate collision with a vehicle at an angle, dissipate kinetic energy by lifting the front of the vehicle and planting it on obstacles. They are easily stacked in continuous arrays or combined with other types of obstacles such as steel railings. They are easily placed in various flexible specimens for temporary or permanent protection.

The disadvantages of Jersey obstacles are mainly related to the purpose for which they were initially made, which is to remove the vehicle and not to completely damage or stop the vehicle in motion. They minimize damage to the vehicle in the event of minor contact and prevent the vehicle from crossing and frontal collision and are designed to divert, slow or prevent severe vehicle collisions. In defense against terrorist attacks, Jersey obstacles cannot usually be fully effective if attacked by lorries due to insufficient height of the obstacle, relatively weak anchorage on the ground, and sloping front of the obstacle causing the truck to be lifted.

Newer versions of barriers are made of polyethylene. They are lightweight for transport and suitable for short-term use. These plastic barriers are usually filled with water after installation, and may be filled with earth, sand or concrete.

Multiple Jersey obstacles can be positioned in such a way that the vehicle passing the path between the obstacles must wind, which automatically slows it down.

The drawback of Jersey obstacles located near city facilities is their appearance, especially in areas with high pedestrian traffic where visual attractiveness of the space is expected.

Short concrete firewalls as well as high freestanding walls are made of cast concrete elements, road barriers or other road barrier materials and are usually reinforced with iron. The walls can be perforated or non-continuous to give a better appearance or to allow pedestrian passageways while meeting safety requirements. Firewalls must be either installed in the ground or anchored to the base in order to withstand the impact of the vehicle.

Short firewalls are usually well reinforced and at least 90 cm high. Reinforced reinforcement of short concrete walls provides resistance to high impact force and maintains stability due to the mass of passive soil pressure. High firewalls are designed to block heavy vehicles (eg trucks) and vehicles that achieve high speeds on impact. Higher-height walls have a larger contact area with the front of the truck and can cause the vehicle to overturn. Higher firewalls also need a wider foundation. To reduce the cost and time of construction, prefabricated concrete wall panels are typically used to be installed on site, and precast units are easily integrated into other perimeter protection systems.

The advantages of using concrete walls as a barrier are the high stopping power of the vehicle from all angles, high walls can destroy the vehicle and block most of the catapulted objects, and high walls serve as a vehicle crash protection and explosion protection.

The major drawbacks of concrete walls are the imposing large overall dimensions for walls with adequate anti-collision effect, higher costs and longer construction time required for large walls in relation to smaller obstacles, unattractive appearance and difficulty of erection in urban areas.

Another, more aesthetically pleasing option is the strategic placement of heavy flower

pots, metal lighting poles and sculptures around the area to be protected. Although it is possible to protect certain places, it is unlikely that just about any area in the city can be protected.

Fixed or anchored flower containers are either poured on site or pre-cast into the mold and delivered to the site. They can also be constructed of concrete blocks. Previously molded flower pots usually serve as urban architectural elements or so-called molds. street furniture. Filled with soil and plants, they are good absorbers of vehicle impact energy. In order to completely prevent the vehicle from entering a specific area at full speed, flower containers must be anchored to the ground.

Concrete flower containers, either ground-mounted or ground-anchored, can stop a 6.8 ton truck at speeds greater than 50 km / h, even when the tanks are individually mounted. Concrete flower containers are usually taller and wider than one meter.

The advantages of these popular barriers are that they effectively stop the vehicle at high speed, destroying the vehicle and prevent any potential further movement, dissipate kinetic energy with a combined mass of concrete and soil, enhance the urban environment and complement the appearance of the environment.

Some of the drawbacks of fixed flower containers are intrusive and large dimensions for the purpose of stopping vehicles, higher costs and longer construction time than road obstacles (Jersey obstacles) and difficulty setting up in urban areas with limited space.

4.2. OPERATIONAL SAFETY OBSTACLES

Operable barriers require significant construction time, are expensive and require special maintenance. It is because

of these characteristics that operable barriers are not suitable for protection during occasional events or for placing on parades. Nevertheless, they can be used integrated with moving and stationary obstacles, as well as for blocking vehicles.

The two most effective operable barriers for vehicles are wedges and guard posts. There may be different sizes, lengths and combinations of specimens for optimal protection of a particular area. They are best suited for traffic control, defense of facilities and fixed areas of permanent pedestrian zones and gathering places for large numbers of people, such as stadiums, parks and city squares commonly used for large public events.

Due to the increasing need to prevent terrorist attacks by vehicles, scientists and innovators are working to find new and innovative solutions. Last year, three new, easy-to-handle barriers were introduced, no special training is required to install them, they are portable and can be easily transported in standard vehicles (New Measures to Counter Vehicle-Ramming Attacks Exposed, 2017). They are made of solid but resilient materials that absorb the energy of the vehicle's impact, allowing the transfer from kinetic to potential energy, shifting the momentum of the vehicle to the ground to stop the vehicle. Portable barriers do not require infrastructure preparation, are quick to set up and easily adapt to the area to be protected.

FBM Flat Crossing Barrier is a multi-purpose, portable, fast, effective vehicle barrier. The modular system can stop vehicles weighing up to 2.5 tons, including cars, trucks, tractors, motorcycles and quad vehicles. The barrier is ideal for use in urban areas. Individual units can be arranged to suit different vehicles and road widths (New Measures to Counter Vehicle-Ramming Attacks Exposed, 2017).

The pyramidal folding barrier for heavy vehicles is a unique, two-way barrier that simultaneously blocks the entry and exit of vehicles. The modular barrier system for vehicles completely stops vehicles weighing up to 7 tons. It does not need concrete foundations, can be hydraulically or manually activated, can serve as a temporary or permanent obstacle even during low probability of attack, can be used to slow down traffic (New Measures to Counter Vehicle-Ramming Attacks Exposed, 2017).

The RMB barrier stops heavy trucks and semi-trailers weighing up to 40 tons. The obstacle causes the vehicle to lift up during the stopping process, thus reducing the damage caused by the impact (New Measures to Counter Vehicle-Ramming Attacks Exposed, 2017).

Shvetsov has designed and patented an ARPD barrier that blocks attack by passenger, off-road and commercial vehicles by means of a pull-out pole, and is positioned at points of possible vehicle entry into pedestrian zones (Shvetsov, A. V., Sharov, V. A., Shvetsova, S. V., 2017). When designing a vehicle anti-assault device, the author took into account the specific characteristics of pedestrian zones.

5. THE ROLE OF TECHNOLOGY IN PREVENTING THE USE OF VEHICLES TO PERFORM TERRORIST ATTACKS

Many companies are exploring ways to improve the Advanced Emergency Braking Systems (AEB), which activate vehicle brakes when on-board sensors detect a possible collision. In accordance with EU Regulation 347/2012, such technology has been mandatory in new transport vehicles since 2014, and upgrading the technology to stop the vehicle instantly and extending

its use to all vehicles would certainly prevent numerous vehicle attacks. The initial objective of this Regulation was to avoid vehicle collisions in front of motorways, and the Regulation applies to vehicles over 3.5 tonnes. For the AEB system to detect people and brake, more sophisticated cameras need to be installed on vehicles. Passing rules on AEB systems to passenger cars would also help reduce the number of road fatalities and attacks by smaller vehicles.

Delivery vehicles are increasingly equipped with sensor technology and one option could be an extinguisher switch that would shut off the vehicle and report the location to it immediately after the vehicle is reported missing. One has to be careful about this, as this is a cyber security issue and can cause a bigger security problem to shut down a large and heavy vehicle at high speed. Technical solutions such as remote locks, vehicle activation and other safety mechanisms could help prevent theft of vehicles. Truck manufacturers, however, fear that adding biometric systems such as fingerprint scanners to truck cab doors could endanger drivers. The hijackers could target drivers to gain access to vehicles. Geo-fencing systems are also being developed that could use software to limit speeds or enter specific areas based on GPS location, slow down unauthorized vehicles, and eventually stop them. On the other hand, it should be noted that modern cars with electronic controls are connected to the Internet, can be hacked and used for terrorist attacks, and a resourceful terrorist can use an older vehicle or find a way to disable AEB and other systems.

6. GUIDELINES FOR SELECTION OF SAFEGUARDS

Barriers to vehicles in an urban environment need to meet the unique requirements of functionality and acceptable visual aesthetics. In addition to

a solid defense against vehicle crashes, urban barriers should serve as both an architectural element and functional "street furniture".

The following steps should be followed in selecting the appropriate barriers (Caspé, M., Ji, J., Shen, L., Wang, Q., P. E., and Zhai, Y., 2010):

1. Step: Assessing the risk of a possible attack includes:
 - a) Field exploration of the site to identify weak points,
 - b) Conducting traffic analysis to identify possible attack scenarios and access by authorized vehicles,
 - c) Determination of minimum clearance in the event of an explosion,
 - d) Determining the level of protection.
2. Step: Selecting and setting the most appropriate obstacles for vehicles includes:
 - a) Determining the location of obstacles to ensure a minimum safe distance,
 - b) Exploring location conditions to determine possible foundations,
 - c) Choosing the right criteria based on your desired level of protection,
 - d) Choosing an aesthetically appropriate protective barrier that fits into the urban environment.

Critical selection factors are: counter-terrorism functionality; decorative / aesthetic flexibility in urban areas; environmental impact; set up and cost.

7. CONCLUSION

Terrorist organizations advocate the conduct of terrorist attacks by modified or standard vehicles on a crowd of people, buildings and other vehicles. The targets of such attacks may be the locations of various public gatherings, parades and other

celebrations, sports and concert events, fairs or shopping areas.

Vehicle attacks are considered unsophisticated attacks because the perpetrator can carry out such an attack with minimal planning and training. Such attacks are difficult to detect in advance, and their successful implementation can result in numerous human casualties. Events that attract large groups of people and are therefore attractive targets for attackers by vehicles, usually announced in advance, which greatly facilitates the planning, preparation and training of an attack. These attacks clearly demonstrate how difficult it can be to stop such an attack once it is launched.

In response to the increasing number of vehicle attacks, the development of protective barriers to vehicles that can withstand a direct vehicle crash has also been successful. Made as lightweight and compact, many vehicle barriers come in modular parts so they can be easily transported, installed and removed. The barriers in place should allow pedestrians, cyclists and authorized emergency vehicles to pass through.

Choosing ready-made protective products as a universal solution is not recommended for all specific sites that want to protect themselves. Before making a final decision on the selection of safeguards, comprehensive analysis, comparisons and evaluations of the various barriers available on the market should be made.

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VALORIZATION OF TRAFFIC RIGHTS AND ATTRACTION OF GOODS FLOW

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Summary: Focusing on conditioned efficiency and effectiveness of goods flows, the purpose of this paper is to point out the importance and place of systematic study of goods flows through the process of valorisation of traffic routes. This paper seeks to investigate the impact of appropriate commodity flow processes as well as the formation, allocation and attraction of commodity flow systems on the more efficient implementation of the process of adapting, linking and integrating total traffic to international commodity exchange in the global market. The results of a holistic approach to goods flows with a special focus on the valorisation of traffic routes and the attraction of goods flows indicate the interoperability of all branches of transport on a particular corridor, assuming the mobility and rapid movement of the vehicle and cargo from one transport module to another. An important focus is on developing a methodology and concept for selecting adequate commodity flows that largely meet all set decision-making criteria in the planning process and thus directly influence the increase of goods exchange, transport safety, reduction of negative environmental impacts and increase of economic efficiency.

Keywords: transport, international exchange, commodity flows, global market

1. INTRODUCTION

Recent trends have led to an increase in the complexity of legal and economic relations between participants in macroeconomic systems and their subsystems, ranging from primary to quintile industries. goods flows, as a consequence of the exchange of goods in the world through transport and trade, represent a significant indicator of the intensity and volume, structure and dynamics of world traffic, ie goods transport. Within the framework of international trade and trade in goods, it is indispensable to look at the category of goods flows, especially international goods flows.

At this level of significance, a comprehensive view of the process of valorisation of the traffic route and the formation and distribution of goods flows are imposed. Focusing on conditioned efficiency and effectiveness of goods flows, it is necessary to point out the importance and place of systematic study of goods flows through the process of valorisation of the traffic route and in the function of exchange of goods in international trade. It is necessary to determine the extent to which the proper processes of goods flows, as well as the formation, allocation and attraction of the system of goods flows, influence the more efficient implementation of the process of adapting, linking and integrating the total turnover in

the international exchange of goods in the global market. It also requires a holistic approach to goods flows, and a focus on valorizing traffic routes and attracting goods flows.

2. A HOLISTIC APPROACH TO CONSIDERING GOODS FLOWS

The fact that the design of goods flows is largely conditioned by a number of factors. It is for this reason that goods flows are not a static phenomenon in space and time, but a dynamic phenomenon whose formation, arrangement, structure and intensity are influenced by many factors. Given the significant changes in the movement, dynamics, direction of goods flows, these factors cause the inability to make accurate and lasting predictions regarding future goods flows.

The ideal transport mode should be instantaneous, free, unlimited capacity and always available. This would mean that space is rudimentary. This is clearly not the case. Space is a limitation in the construction of transport networks. Transport occurs as an economic activity different from the rest. Thus space is replaced with time, and therefore with money (Merlin, 1992). The overriding goal of transportation is to conquer space, which is bounded by various human and physical constraints such as distance, time, administrative divisions and topography. All these restrictions together produce resistance to movement, a commonly known term called *distance friction*. However, these restrictions and the friction they produce can only be partially limited. The extent to which this has been done has a cost that varies according to greater

alignment of factors such as the distance involved and the nature of what was transported. There should be no transportation without geography or geography without transportation. The goal of transport is therefore to transform the geographical attributes of cargo, passengers or information, from origin to destination, imparting added value to the process. The convenience on which this can be done - transportability²¹ - varies considerably. Transport is of particular interest to geographers for two main reasons: (1) transport infrastructure, terminals, equipment and network occupy a significant place in space and constitute the basis of a complex spatial system; and (2) as geographers seek to explain spatial correlations, transport networks are of particular interest because they are the main support for these interactions. *Transport geography* (Rodrigue, Comtois & Slack, 2009) is a subdiscipline of geography that deals with freight, passenger and information movements. It requires the connection of special constraints and attributes with the origin, destination, extent, nature and purpose of the movement.

Goods flows are flows of certain types of goods (cargo) that circulate in certain traffic routes, that is, traffic routes or corridors. goods flows, as a consequence of the exchange of goods (worldwide) carried out by means of transport and trade, represent a significant indicator of the intensity (volume), structure and dynamics of (world) traffic, ie goods transport. **The components of goods flows** are: (a) demand (passengers, freight and information); (b) hubs (points of origin, intermediate points and destinations); and transport networks (traffic connections). The basic characteristics of goods flows in

²¹*Transportability* refers to the easy movement of passengers, cargo or information. Refers to transport costs just like the attributes of the transport item

(breakage, perishability, price). Political factors that can also affect transportability are law, regulation, borders and customs. When transportability is high, activities are less constrained by distance.

geo-traffic sense are: direction, intensity and type of goods flow. The direction of the goods flow is determined by the origin (source) and destination, the intensity of the goods flow is determined and can be quantified by the amount of goods transported in a given time unit (eg, one year). The notion of **traffic flow** is determined by the continuous renewal of a series of traffic services that originate at the source (origin), with a focus on the destination (destination). As the intensity of traffic flow is measured in real units such as persons, tons, vehicles, traffic flows in certain situations for the object of transport are carried by persons and in certain situations by cargo or goods. According to the definition of transport (in the narrow sense) as an activity that has the function of transporting people, goods and communication between people in space (Malić, A. & Rendulić, I, 1995), traffic flows include freight (goods), people (passengers) and information in the space, using appropriate transport infrastructure and superstructure. Within traffic flows, freight flows (goods flows), passengers (passenger flows) and information (information flows) are distinguished. By analogy, the traffic goods flow is the parent term of the term goods flow, ie **goods flow** is a type of traffic flow that as a transport object has only goods (cargo), unlike passenger flows (whose transport object is passengers within passenger traffic) and information flows (whose traffic object is information and news). Goods flows are flows of certain types of goods (cargo) that circulate in certain traffic routes, that is, traffic routes or corridors. goods flows, as a consequence of the exchange of goods (worldwide) carried out by means of transport and trade, represent a significant indicator of the intensity (volume), structure and dynamics of (world) traffic, ie goods transport (Malić, A. & Rendulić, I, 1995 , p. 55.). In geo-traffic terms, **goods flows** are marked by direction (determined by origin and destination), intensity

(determined and quantitatively expressed by the amount of goods transported in a given time unit), and type of goods flow (different according to different criteria, of which are the most significant: the territorial scope of the goods flow, the mode of transport and the type of goods in transport). In the analysis of goods flows, an important characteristic is also the dynamics of the goods flows, which implies certain movements in the intensity of the goods flows over a period of time (period). Based on the analysis of the **dynamics** of a particular type of **goods flows**, it is possible to draw significant conclusions about the tendency of movement of a particular goods flows over a period of time. A detailed analysis of the spatial distribution of goods flows in the world is dealt with by commercial geography. As a separate branch of commercial geography, transport geography deals with the analysis of flows of food, raw materials and industrial products. It should be emphasized that the basic area and subject of research in transport geography is related to the basic elements, such as: traffic demand, traffic junctions and transport networks. The above elements condition, enable and determine the existence and unfolding of goods flows, including at the same time commodity exchange (trade) as the basic element of goods flows initiation. In contrast, there are a number of scientific areas and areas related to transport geography, given the conditionality of transport geography, that is, goods flows as a phenomenon it studies. In other words, for example, economic sciences, natural sciences, social sciences, historical sciences, etc.

Geo-traffic factors

All phenomena, processes and characteristics in space and factors affecting traffic are classified under the heading of geo-traffic factors. Geo-traffic factors, as conditions of traffic

development, always act simultaneously on traffic as a group of different factors. They are characterized by variability in space and time. The influence of geo-traffic factors on the development and daily flow of traffic is of great importance, and the following is a common division of geo-traffic factors (Bilen, 2001): (1) general geo-traffic factors, and (2) natural predispositions.

Each of these groups of factors plays an extremely important role in the development and development of traffic, and by its influence it promotes the development and increase of trade in goods. General geo-traffic factors, given their distinct geographical character, form the basis of understanding traffic in space and can further be divided into:

- *geo-traffic position* - the advantage of the location arises from the proper placement of the subject space in relation to the various large geographical units. In particular, it depends on the position between the various production and consumer areas, on the development of trade, the transport system of services, and the locations of intellectual centers of world power.
- The attractiveness of some traffic space is an essential feature of geo-traffic position. Affordability is best expressed through a pronounced centrality that is best reflected through the concentration of traffic flows towards a particular space.
- In this case, these are significant traffic intersections, that is, the points of intersection of various naturally favorable roads, waterways, land and air.
- *size, shape and boundaries of space* - the size of space plays an important role in the development of volumes, routes and forms of traffic. Traffic for successful development requires large, open spaces because small and closed

spaces provide little opportunity for traffic development. In addition to size, an important segment is the shape of space, which influences the formation of the transport network by analogy to the shape, shape and appearance of the country.

- State borders are often drawn in accordance with the natural characteristics of the area and thus represent a significant obstacle to the free flow of traffic. Natural and artificial constraints are a barrier to traffic flow, with slower traffic. For this reason, the integration processes of world life are very important, and the best example is the European Union.
- *time zones* - are the result of different positions of individual parts of the earth's surface according to the sun, depending on the rotation of the Earth. The advent of global world life also leads to the emergence of time zones, whose knowledge is very important in the course of modern world traffic. Good knowledge of time zones when traveling over long distances is essential. Accordingly, time zones have a special role to play in air, telecommunications and maritime transport.

Natural predispositions encompass numerous characteristics, states, phenomena and processes in space, and arise as a result of the action of the natural laws of Earth's development. Natural characteristics are objective factors "independent" of man, although man has the ability to understand, accept and exploit them. Natural factors give a certain predisposition, that is, they represent a possible natural basis for the development of transport and are variable under the influence of the development of human society. Natural predispositions play a significant role in the development and

development of transport, with stressed natural elements and characteristics of water, natural sea straits, reliefs, composition and structure of the Earth, climate and weather, soil and vegetation and mineral resources. Through work, knowledge and available technological solutions, man and human society can transform the natural environment, that is, to intervene in order, for example, to make a certain natural "unpredictability" a "predisposition". Consequently, traffic and the flow of commodity flows are becoming less dependent and conditioned by natural conditions, and it is justified to give relevant geo-traffic factors (specifically natural predispositions) relevant importance in the formation of commodity flows, ie. consider them a relative component, relative to some other factors that have an absolute impact on the formation and arrangement of commodity flows.

Economic factors

Depending on the human and material conditions of production and the social relations that are created in the production process, economic development of a region or country occurs. When evaluating the natural and social factors of development, it is not good to overestimate one and neglect the other preconditions, but rather to determine their interdependence. Natural factors are very important factors of production and exchange, especially in countries with lower levels of socio-economic development. In contrast, in countries with higher levels of socio-economic and technological development, natural factors do not have such a large impact, but they largely participate in determining the basic orientation and conception of the development and production of material goods, locating traffic and other economic and social activities. Natural conditions are an important precondition for economic

development, but today, social conditions, that is, the population and the community, are playing an increasing role. Accordingly, the distribution of the population on Earth and the socio-economic development are of utmost importance, which directly affects the routes of goods traffic throughout the world. Social factors emerge as the primary transport operator and directly influence the occurrence and development of traffic. There are numerous social factors that influence the development of transport, and the most important are the population, its structure and location and the economic development of a particular area.

Looking at the overall, social factors can be divided into the following:

- *population structure and movement* - the impact of the population in the transport industry is expressed through the total number and spatial distribution of the population and through migration with daily movements and seasonal tourist movements. The larger the population, the more the population becomes the object of transport activity, that is, the more significant consumer area for certain types of goods, which is reflected in the existence of a certain correlation between the number of inhabitants and the volume of traffic.
- *economic development* - the link between economy and transport stems from the fact that the more developed the economy, the more developed the traffic will be. Developing countries, compared to the industrialized countries of the West, have a much less developed economy and therefore less developed transport. Increasing industrial production leads to increased traffic needs and demands for the shipment of finished products to different places of consumption, ie markets.
- *socio-political factors* - the greatest

influence is exercised by the state, which organizes the construction of roads and which regulates the development of traffic by certain legal norms. Closeness or openness of national borders and economic and transport development significantly affect the volume and orientation of goods flows in the world. Large economic groups, which encourage international exchanges between member countries of the same grouping, also have a great influence on the formation of commodity flows.

- *technique, technology and science* - all having a significant impact on the development of transport, the size and directions of world goods flows. Production development has a major impact on the development of traffic. Mass production requires increasing storage, processing and transportation capacity. The widespread application of technical advances is mandatory in the exploitation of oil and ores, as well as in their transportation to the processing site.
- *impact of settlements* - the size, appearance and function of settlements affect the volume and development of traffic. Larger urban settlements are characterized by more developed and complex traffic. Today, the formation of conurbations is a growing influence on traffic - the concentration of a number of interconnected urban settlements in the suburbs and metropolitan areas with a number of smaller towns.

3. CONNECTION OF TRAFFIC VALORIZATION AND GOODS FLOW

The valuation of each traffic route is conditioned by the market conditions of

supply, demand and environment. The supply elements refer to the transport capacities and services of all those entities involved in the production of transport services, the elements of demand to the size and value of the area where the need for transport services arises, and the scope and structure of those needs, and the elements of the environment to the presence of competition and other constellation in the transport market. In relation to various economic, political and other factors that are difficult to predict, current commodity flows are the most reliable starting point for analyzing and forecasting freight demand on the transport route. In this way, the directions and dynamics of goods flows are also a basic indicator of the position and competitiveness of the traffic route in the market of transport services. (Poletan Jugović, 2008) Since goods flows are by definition movement of goods in the world through transport and trade, and maritime goods flows dominate the total world traffic, analysis of world foreign trade by regions and countries is a valid indicator of intensity and major directions in the formation of maritime goods flows.

The transport valorisation of a country in transition is determined by the historical overview of transport policy, transport potentials (transport-geographical location and transport infrastructure), the degree of convergence of national transport to Euro-integration, transport and economic development of the transition country, and the structure and dynamics of transport in it. In particular, the quantity of goods flows on a certain traffic route is a relevant indicator of the competitiveness of the traffic route in the market of transport services, ie it is an indicator of its traffic valorization. Many authors have addressed the problem of the competitiveness of the traffic route and the factors that determine it, as well as the methods for determining the optimal traffic route. Therefore, it is of particular importance to analyze the

existing methods, criteria and other determinants of choosing the optimal traffic route, including the analysis of the preference structure of the criteria defined by the service users. a path for valorizing the traffic route and attracting goods flows. Considering the national economy, European goods flows and transport routes are of particular importance as they are increasing, dynamic and therefore attractive, especially given the relatively high degree of technological convergence of the countries in transition.

The excellent structural development of the transport network is a significant reason why transition countries (SEE-South East Europe) should be connected to the Trans European Transport Network TEN-T, which consists of 89 511 km of road network; 93 741 km of railway network; 330 airports; 270 seaports; and 210 river ports. One of the more significant routes of possible connection are: (a) SSS - Short Sea Shipping; and (b) MoS - Motorways of the Sea. Furthermore, Corridor V consists of five branches, namely: (1) Main Branch: Venice - Trieste - Koper - Ljubljana - Maribor - Budapest - Uzhgorod - Lvov - Kiev; (2) Branch A: Bratislava - Zilina - Kosice - Uzhhorod; (3) Branch B: Rijeka - Zagreb - Croatian-Hungarian border - Budapest; (4) Branch C: Slabs - Sarajevo - Osijek - Budapest; and (5) PETrC V extends over about 1,600 km of roads and railways. Theoretical estimates of goods flows between Italy and countries linking the pan-European corridors Czech Republic, Slovakia, Croatia, Bosnia and Herzegovina, Hungary, Serbia, Montenegro, Romania, Bulgaria, Russia, Ukraine, Belarus, Moldova indicate annual turnover that could be directed to Copper - Chioggia and Ploče - Pescara has between 300,000 and 400,000 trucks a year. The expectations for the direction of Ploče - Pescara are realistic: (A) until the completion of Vc, a minimum of 20 trucks per day, or a maximum of 40 trucks per day;

(B) upon completion of Vc, a minimum of 100 trucks per day, or a maximum of 200 trucks per day.

3.1. Existing methods and criteria for choosing the optimal traffic route

Traffic routes or corridors imply certain directions for the movement of people and goods by roads, railways, waterways, (...), which bring multiple benefits to the spaces they cross. The framework of action and influence of a particular direction on the flow of international traffic is determined by the increasing international competition. In other words, there are competitive and less competitive routes in the transport services market. Since the competitiveness of the traffic route is a fundamental factor in its valorisation in the market for transport services, the question arises which determines the stated competitiveness and conditionality. Based on the basic market determinations of competitiveness, it can be concluded that the competitiveness of the traffic route is determined by its supply and demand. Accordingly, it is possible to talk about supply and demand in relation to the conditions and the specifics of the road traffic route, railway traffic route, maritime transport route, inland waterway, (...). It is also possible to talk about the conditions and the specifics of the supply and demand of integrated transport service, which at the same time may include different transport branches (traffic routes), transport hubs, port terminals, land terminals and other elements and participants (international freight forwarders, agents, logistics operators, warehousemen, etc.) in the production of transport services on the traffic route. The supply and demand of a traffic route is determined by the characteristics of all the above elements and entities in technical, technological, organizational, economic, legal, political, environmental and other circumstances. The demand for a traffic route service can be analyzed, evaluated and expressed: the

quantity and dynamics of movement of goods on the traffic route, the orientation and amount of foreign trade, etc. A significant indicator of demand, and thus the competitiveness of the traffic route, is the so-called the area of gravity, that is, the area that gravitates to the use of a particular traffic route in competition with alternative traffic routes. The boundaries of the hinterland, ie the gravitational area of the traffic route, are formed according to the offer and various other circumstances, and narrowed or widened depending on the interests of the users of transport services. The notion of geographical hinterland has lost its meaning in the area where the port or traffic route closest to it has absolute dominance. Specifically, geographical distance may not be the deciding factor in directing goods flows to specific traffic routes. In today's transport market, geographical position as one of the factors relevant to the operation and development of the port loses importance, while numerous logistical factors such as: technical equipment, development of land roads, the facade of the port, economic strength of the hinterland, tariffs and tariff policy, etc. ., they become much more important. They increasingly act to make physically different distances equal or even show the advantage of a longer path.

As the general definition of the notion of competitiveness of the traffic route and methods for determining the competitiveness of the traffic has not been observed in general, the concept of port's gravitational area is further defined, as well as factors, methods and other theoretical assumptions in determining the size of the port's gravitational area as a basic indicator of port competitiveness. In accordance with the importance of the port as a reference point of each transit traffic route, the theoretical port-related theoretical assumptions can be applied analogously to the traffic route, taking into account not only the ports but also all other elements

affecting its valorisation. In defining the concept of the gravitational region of the port, it should be noted that the authors define the term in different ways, although the vast majority of authors nevertheless agree. Thus, according to some authors (Tomasić, 1975), to determine and define the gravitational area of a port means to determine the size and boundary of an area in the hinterland of a port (Kesić, 1992) for the production of goods intended for overseas export or for goods imported by sea for consumption in that area, a specific port represents the most favorable point between land and sea transport. (Prikril, 1968) According to other authors, the gravitational zone of a port is defined as an economically organized and developed land area in the hinterland of a port, which is connected to the port by roads, and which exports and imports goods through that port. (Strazicic, 1984) Although, in practice and in theory, the distinction between the notions of the port hinterland and the gravitational zone and the notion of the gravitational port zone is not usually distinguished, the terminology related to the gravitational area of the port should distinguish the following:

- *gravity port area* - represents a subset of the port's gravity area, meaning that the gravity area is made up of a number of gravity port areas, which can be segmented in many ways and according to different criteria;
- *port gravity area* - represents the summarized areas of actual demand for port services (a set of port gravity zones) and is also a subset of the port hinterland;
- *port hinterland (port area of interest)* - is a term superior to the notion of gravity and represents a real potential source of traffic for a port; the difference in the spatial coverage of the gravitational area and the hinterland is, in theory, a space for the development of

competition between ports.

The terrestrial hinterland that gravitates to a particular port, that is, which prefers a given traffic route over a port, can be divided into three zones (Kesić, 1992, p. 35): immediate hinterland, national hinterland and transit hinterland. Some authors point out as factors influencing the gravity port zones: the nature of the goods (mass, general cargo), the mechanism of maritime transport (number of lines, mechanization) and the influence of political relations. However, other authors disagree, stating that citing only these factors underestimates the importance of other vital factors, such as the development of inland transport, agriculture, industry and cities inland or overseas. There are a number of other opinions on factors that are crucial for determining the gravitational area of a port, and therefore the traffic route as a whole, and it can be concluded that the competitiveness of the port and the traffic route can be determined by (simultaneous) consideration of many factors. In connection with this, various methods of determining the size of the gravitational area of a port are highlighted, such as (Kesić, 2003): geographical-geometric method, land-tariff method, the method of real cost of land transportation, the method based on the total cost of transport and the methods of estimating logistic elements. The following disadvantages are objectively stated for the above methods:

- the advantages of a shorter geographical distance can be nullified by other logistical elements;
- taking into account solely the land transport tariff does not take into account the importance of maritime freight, port costs and other logistical factors;
- the cost of the cost of land transportation (especially in transit) does not have its source in real costs but reflects the policy of each country, market or rail;

- taking into account the total cost of transport, the influence of the qualitative elements of the transport service on the choice of route, the impact of intervention and dumping tariffs are ignored.

The only method that does not highlight the disadvantages is the method of evaluating logistics elements, which includes a number of logistics elements in the analysis. This further confirms the fact that determining the area that gravitates to the use of a particular port or traffic route is a complex size that is conditioned by the simultaneous influence of many factors. At a time when service prices are becoming more uniform or uniform, the quality of customer service is crucial in ensuring that a job in the transport market is secured, so many authors are adopting the idea that the competitiveness of the traffic route is determined primarily by price and qualitative elements. transport services (*Quality-Price Ratio*). That the price and quality of service are one of the most important factors in the valorisation of the traffic route in the market of transport services and in the choice of the optimal transport route, transport technology and means of transport, (...) is the view shared by many experts. Their divergence of opinion is mainly about defining the criteria themselves and their meaning. Differences and the inability to define qualitative criteria uniformly in the valorisation of traffic are justified for several reasons. Some of the reasons that can be most easily justified are, for example:

- different types of freight prefer different modes of transport;
- characteristics of transport infrastructure, supra-structures, organization of transport, its planning possibilities, transport effects (...), are specific depending on the transport branch;
- each mode of transport has its specific advantages and disadvantages;

- Each traffic service user may have different priorities and requirements, (...).

On this basis, it is difficult to determine what are the aspects from which it is optimal to analyze the weight of individual competitiveness criteria and the quality of transport services, and it is often a dilemma whether the competitiveness criteria determine:

- market requirements or customer service requirements,
- cargo or transport substrate requirements,
- the presence of competition, etc.

As the traffic route is built primarily to serve its inland hinterland, and the economic strength of the hinterland is a basic precondition for the development of a modern transport route, it can be stated that competitiveness and development of the traffic route are directly conditioned and reflect its hinterland limited by the so-called hinterland. gravity zones.

4. CONCLUSION

The linkage with appropriate goods flows is very important and is the basis for a better economy, cultural and scientific integration and for the overall development of the area. This is especially important because of the need for a systematic approach to considering all influential factors, detecting regional specificities, ie levels of traffic development from an infrastructural, technical, technological, institutional, administrative and economic point of view, but also due to taking into account specific requirements in the integrated transport network planning system. emphasizing the inclusive adequacy of commodity flows. A detailed analysis of the spatial distribution of commodity flows in the world deals with commercial geography, within which, as a separate branch of commercial geography, transport geography deals with the analysis of the main characteristics of food flows, raw materials and industrial products - the

three basic groups of commodity flows. The basic area and subject of research is traffic geography related to the basic elements, such as: traffic demand, traffic junctions and transport networks. These elements condition, enable and determine the existence and unfolding of commodity flows, including at the same time commodity exchange as a basic element of commodity flow initiation. The flow and flow of commodity flows is less and less dependent on natural conditions, and it is justified to give particular geo-traffic factors relevant importance in the formation of commodity flows, ie to consider them as a relative component, compared to some other factors that have an absolute impact on the formation and arrangement of commodity flows. . The valuation of each traffic route is conditioned by the market conditions of supply, demand and environment. The supply elements refer to the transport capacities and services of all those entities involved in the production of transport services, the elements of demand to the size and value of the area where the need for transport services arises, and the scope and structure of those needs, and the elements of the environment to the presence of competition and other constellation in the transport market. New world tendencies require interoperability of all branches of transport on a particular corridor, assuming mobility and rapid movement of the vehicle and cargo from one transport module to another to avoid traffic congestion and adverse environmental impact. In doing so, it is important to focus on developing a methodology and concept for the selection of adequate commodity flows that largely meet all set decision-making criteria in the planning process, thereby directly affecting the increase of goods exchange, transport safety, reduction of negative environmental impacts and increase of economic efficiency.

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ENVIRONMENTAL ASPECTS IN THE SUSTAINABLE DEVELOPMENT FUNCTION

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Summary: Sustainable development as a modern concept implies economic development aligned with the social, economic and environmental component. This paper will analyze precisely its environmental aspects. The aim is to show to what extent environmental awareness is present in favor of achieving economic growth, and whether or not they are positively correlated. A dynamic economy, coupled with social equity and sustainable use of resources, form the basis of sustainable development. The concept of sustainable development has emerged as a result of the belief that environmental management and the rational use of natural resources are a necessary precondition for achieving economic growth without ecological degradation. economic development. The authors analyzed the correlation between economic growth and environmental protection, and the existence of a strong link between them, which is confirmed by the fact that economic development offers new opportunities for environmental protection, by creating conditions for the implementation of advanced ecological technology and management systems, but also by stimulating ecological similar consumption patterns. On the other hand, economic growth can contribute to sustainable development, but can also cause enormous damage to the environment in the absence of adequate measures.

Keywords: sustainable development, environment, ecological aspect, ecological technologies, economic growth

1. Introduction

Sustainable development is an economic, environmental and social, as well as a moral and general development concept, which seeks to ensure that the needs of present and future generations are balanced, given that it is considered the key to the reproduction and life of the human species. The whole philosophy of sustainability is set to ensure the continuity of positive civilizational trends.

The term "sustainable development" itself was first used in the 1987 UN World Commission on Environment and Development.

The Commission then offered and defined a concept as a possible solution to the global problems of ecological degradation, the depletion of natural resources, poverty and the destruction of planet Earth by the people who actually belong to it and must live on it. The need for economic growth to achieve faster progress in developing countries is acknowledged, but it is underlined that overall development must be sustainable. It was further defined by the Commission as "developing towards meeting the needs of present generations, which does not jeopardize the ability of future generations to meet their needs".

The report points to the danger of pursuing then-economic development policies if the Earth's ability to renew resources is not taken into account. This meant shifting the focus from economic growth to an approach that, in addition to economic encompasses, environmental and social development goals. Other issues were then considered: the role of the international economy in future development and its environmental implications; the challenges facing the world regarding the planet's population; ensuring the safety and sufficiency of food; ecosystem protection and conservation; use of energy resources; the implications of further industrial growth and changes in growth quality; integrating environmental and economic development goals in decision making. Sustainable development, as the Brundtland Commission report suggests, integrates two key concepts:²²

1. the concept of needs, above all the basic needs of the poor, who should be given the highest priority,
2. the idea of constraints, the imposed state of technology, and social organization, which diminishes the ability of the environment to meet present and future needs.

The concept of sustainable development provides a framework for integrating environmental policy and development strategy, thus breaking the belief that environmental protection can only be achieved at the expense of economic development. Since the report was made public, many countries and international

organizations have agreed that there is an urgent need to pursue policies that will contribute to achieving more sustainable forms of development.

When it came to the conclusion that sterile sectoral debates about the state of water, forests, arable land, air and biodiversity, beyond the relevant concept of social and economic development - the concept of sustainable development emerged, first shyly in economic theory and later as a development concept in other sciences.

It is the idea that people have the right to live better, produce more, enjoy the benefits of higher employment and higher income, but without depriving future generations of the same right, so this principle is usually defined as “intergenerational justice”.

2. The concept of sustainable development

Sustainable development is first defined as a development that gives the present generations a chance to live better without denying the same right to future generations. Or, more precisely, sustainable development is a development that implies economic progress and income growth, but in such a way that it provides approximately the same opportunity for future generations. It involves the exploitation of nature and its use for the economic progress and well-being of humans, but in such a way as to preserve the necessary natural balances and assumptions of development that will not be questioned by the way humans treat nature today.²³

²² Jovanović Gavrilović, B., (2007)“Serbia Facing the Challenge of Sustainable“, u G. Rikalović – S. Devetaković, (eds.): Contemporary Challenges of Theory and Practice in Economics - Economic Policy and the Development of Serbia, Faculty of Economics of the University of Belgrade – Publishing Centre, Belgrade, p. 87-98

²³ Đukic, P., (2011), Sustainable Development - Utopia or Chance for Serbia, Faculty of Technology and Metallurgy, University of Belgrade, Belgrade, p.12

The idea of sustainability came from the need to protect a largely threatened environment, but the idea of the natural environment, resources and environment could not remain purely without economic concretization. People's lives are based on their economic activities, and the way in which these activities are carried out, through technology and engineering, largely determines that long-term negative consequences spill over to the environment, resources and nature in general.

In any case, economics is responsible for concretizing the notion of sustainability, so the concept immediately received specific economic interpretations as well as interpretations from a socio-philosophical standpoint. Sustainability was transferred to the sphere of economics, law, politics, sociology, so that three basic dimensions or three pillars of sustainability (economic, social and environmental) were started to be discussed. In this context, a fourth institutional dimension can be added, since the concept always implies certain institutional arrangements arising from strategies, conventions, laws and other normative frameworks, as well as systems organized by people at national, regional and international levels implementing development concepts and strategies.

Sustainable development itself has become an integral concept of something that does not question any dimension of social development, that is, it harmonizes economic, technological, environmental, social, political, cultural and moral goals so that society manages to develop without endangering any of these aspects.

3. Contemporary perception of sustainable development

Sustainable development is a modern

development concept that simultaneously respects and embraces three key dimensions - economic, social and environmental. This concept has been widely used over the last few decades both in the strategic documents of the business world and in macroeconomic policy at the level of state institutions.

Sustainable development provides guidance for future development, while striking a balance between social, economic and environmental components.

The EU Sustainable Development Strategy was presented at the Gothenburg Summit in June 2001. The main threats to sustainable development, which pose a challenge for the further development of the EU, are: climate change, global warming, loss of biodiversity, increasing traffic. This Strategy represented the preparation for the forthcoming Johannesburg World Summit in 2002.

Significant topics discussed at this Conference were the role of companies in solving the global environmental problems and implementing the concept of sustainable development. It was pointed out that companies should take a more significant role in solving environmental problems. However, it was emphasized at the Conference that this goal can only be achieved in partnership with different companies, governmental and non-governmental organizations and local communities.²⁴

There is no generally accepted definition of sustainable development concept in the literature. In this sense, we can define sustainable development as a development path that ensures that the per capita well-being does not decline over a long period of time. The concept of sustainable development should be accepted as a

²⁴ Serbia Approaching the Summit on Sustainable Development – Johannesburg 2002, Preliminary

Seminar, Ministry for the Protection of Natural Resources and the Environment, Belgrade

process in which there are ongoing changes in the relations between social, economic, and natural systems and processes. This process is long-term and requires a carefully guided and gradual development policy, as the challenges at the global level that humanity faces are very complex. Some of the challenges on the path to achieving sustainable development are: the formation of new environmental awareness, increasing responsibility, greater involvement of science in solving current environmental problems.²⁵

The essence of the concept of sustainable development is the ethical principle, that is, care for the heritage. This means that the quality of future generations must not be worse than the quality of life of today's generation.

There are several characteristics of the concept of sustainable development that result from this definition. The most important are:²⁶

- Equality, because the definition of sustainable development clearly highlights the issue of equality. The concern for future generations and the demand for at least equal quality of life for today and future generations explicitly emphasize this dimension of sustainability.
- Ethnicity. Namely, the needs of the present generation must not be met at the expense of the needs, ie well-being of future generations. This characteristic of sustainable development is known as intergenerational equity.
- Efficiency. Economic efficiency is one of the key conditions for optimal use of natural resources.

The definition of the concept of sustainable development itself has been considered by a number of relevant institutions and relevant international actors. One interesting definition of sustainable development, which the authors found interesting, is the following.

The definition of sustainable development by one influential organization, such as the London Sustainable Development Commission, reads: “sustainable development is a dynamic process that enables all people to realize their potential and improve the quality of life in a way that protects and promotes Earth's life support systems.”²⁷

The concept of sustainable development implies a modern approach that incorporates all relevant factors as limiting factors that are viewed in a holistic way, all with the aim of improving the living environment and making it a more comfortable place for all people on the planet to live.

4. Environmental component of sustainable development

Ecology is an important component of international activities with a significant impact on product quality conception, pricing policy, promotion and traffic channels in international flows. Respect for economic postulates can today be considered as an integral part of the untouchable value package that enables certain firms to achieve competitive advantages, which is very important from the point of view of building the overall competitive advantage of the firm.

²⁵ Jovanovic, S., Radukić, S., Petrovic-Randelovic, M., (2011), Theoretical and institutional framework for sustainable development, Niš, p. 53

²⁶ Hussen, A., Principles of Environmental Economics, Routledge, New York, 2004, p. 269.

²⁷ London Sustainable Development Commission, http://www.lsx.org.uk/whysus/page_2760.aspx [pristup 18.09.2017.]

Finkelstein²⁸ points out that neither the first nor the second industrial revolution had any sense of the environment, so that land was often mercilessly exploited and air and water represented free goods, according to classical economic theory. However, today most experts understand that the mechanism of a traditional cost-based economy too narrowly defines the real price that society pays for misusing the environment.

There is doubt that foreign direct investment (FDI) promotes economic growth but it should be noted that they can simultaneously have a negative impact on the natural environment.²⁹ Environmental regulations are a major means of internationalizing environmental costs through the economic activity of the firm. Therefore, in order to attract foreign investment, governments in developing countries tend to threaten the environment through a relaxed relationship with foreign investors or fail to enforce regulations. As a result, businesses shift their operations to those developing countries where they have a lower unit cost of production. It is believed that foreign companies make better use of management and advanced technologies that lead to a healthier environment in the host country. However, it has been shown in practice that environmental trends by foreign companies are unsustainable. Empirical evidence does just that, and especially in energy-intensive and technology-based sectors.

Economic growth through rapid industrialization is also driven by growing environmental consequences. The link between environmental quality and

economic development has sparked heated debate in the last decade. Empirical studies have also supported this relationship between environmental degradation and economic growth.³⁰ The assumption is made that environmental degradation initially increases, reaches a maximum and subsequently decreases, as does economic development. This systematic U-shaped inverse relation is denoted as the Kuznets curve (EKC).

Unprecedented economic growth has been accompanied by the problem of environmental pollution. For example, the average annual CO₂ emissions per capita increased from 3.38 tonnes in the period 1988-1990. at 3.82 metric tons in the period 2000 - 2005. The results show that the Kuznets curve is confirmed in selected countries, namely 110 observed countries, and that foreign direct investment contributes to the increase of environmental degradation. The literature also points out that the economic success of countries is also achieved at the expense of environmental degradation. Grossman, and Krueger³¹, have shown that economic growth leads to environmental degradation when GDP per capita is less than US \$ 8,000.

A dynamic economy, coupled with social equity and sustainable use of resources, form the basis of sustainable development. Considering that the concept of sustainable development was created as a result of the belief that ecological management and rational use of natural resources are a necessary precondition for achieving "development without ecological degradation", the question arises as to how

²⁸ Finkelstein, J.,(1991) Capitalism and Technology, The World &I (November)

²⁹ Xing, Y. And Kolstad, C. (2002) „Do lax environmental regulations attract foreign investment?“ Environmental and Resource Economics, p.21

³⁰ Rothman, D.S. (1998) „Environmental Kuznets curve – real progress or passing the buck?:A case for consumption-base approaches, Ecological Economics, 25 p.186

³¹ Grossman, G.M. and Krueger, A.B. (1995)., “Economic growth and the environment”, Quarterly Journal of Economics, 60 p. 233

it is possible to achieve a more harmonious relationship between environmental protection and the need for accelerated economic development.

5. Correlation between economic growth and environmental protection

The existence of a strong link between economic development and environmental protection is confirmed by the fact that economic development offers new opportunities for environmental protection, by creating the conditions for the implementation of advanced environmental technology and management systems, and by encouraging environmentally friendly consumption patterns. Economic growth can contribute to the achievement of sustainable development, but it can also cause enormous damage to the environment in the absence of adequate regulation and lack of market regulators and democratic decision-making.

Environmental policy aims to solve numerous and increasingly significant environmental problems while ensuring economic growth, that is, maintaining ecological balance while accelerating the dynamics of economic development.

The key principles of environmental policy are as follows:

- harmonization of economic development with the need to preserve ecological balance,
- acting to create new needs that are in line with the principles of environmental safety,
- the focus in the application and commercial valorisation of those

highways of modern scientific and technological progress that are maximally in the function of meeting increasingly stringent environmental standards,

- conducting an appropriate demographic policy. In the context of the ecological dimension, it is a policy that seeks to provide population growth that can seamlessly support existing economic growth and current science and technology development.³²

Over the last few decades, the role of multinational companies as direct representatives of foreign direct investment in sustainable development has been one of the most controversial debates among economists focusing on environmental issues and problems. Views on the role of foreign direct investment in sustainable development differ and range from:

- those who find them the main culprits for the growing ecological degradation and unsustainability of current development models,
- to those who see them as the main driving force behind development and a leading factor in removing barriers that divide countries and hamper international economic relations, as well as factors contributing to reducing developmental disparities and achieving a vision for global sustainable development in the context of global change.

Environmental economists are critical of foreign direct investment and their relationship to sustainable development and environmental protection, and they are pessimistic about their contribution to environmental protection and conservation

³²Cvetanović, S., Jovović, D., (2006) Economic policy of the European Union - a new European economy, Faculty of Economics, Niš, 2006, p. 192.

in developing countries. In their view, driven by profit motivation, multinational corporations, as carriers of foreign direct investment, will relocate environmentally risky products from one country to another until they find the right market for those products. Under pressure from burning development problems, less developed countries are forced to prescribe poor environmental standards to attract foreign investors. Due to the high costs of complying with more stringent environmental standards in the developed world, developing countries will, as a result, become ports for the environmentally damaging industries of multinational corporations in the developed world.

These findings have been confirmed by numerous studies that have supported the thesis on the reallocation of dirty industries to developing countries. For example, UNEP (1981) provided evidence of the reallocation of some at-risk industries from the United States to Mexico precisely due to environmental factors. For Korten, therefore, “economic globalization provides greater opportunities for the wealthy to pass on their environmental taxes to poorer exports of waste and environmentally damaging factories. Mani and Wheeler point to the migration of some of Japan's dirty sectors, as well as the US, to their trading partners.”³³

However, this trend is not typical of developments within European industry. The weakness of environmental regulations may be a stronger foreign direct investment side in these sectors compared to less polluting industries such as electrical and

non-electrical machinery, transport equipment and food production. Mabey and McNally point out that dirty industries, whether resource-intensive or pollution-intensive, in which environmental costs are higher, can run toward less robust regimes of environmental regulation. Similar evidence was provided by Rasiah³⁴, who, by analyzing the relationship between multinational corporations and the environment in Malaysia, found that multinational corporations were transferring environmentally inferior machinery to Malaysia due to lower environmental standards in Malaysia.

In contrast, neoliberal economists argue that multinational corporations are the most important drivers of sustainable development, as they emerge as creators and owners of modern and cleaner technology, and because they follow better management practices that can be directly transferred to their affiliates in developing countries. As a result, instead of pollution ports, foreign direct investment through multinational companies creates haloes of pollution in developing countries through the export of modern technology. “Available facts show that in some sectors, haloes of pollution do exist. This hypothesis has also been validated in the energy sector, where the use of newer and superior technology can bring significant environmental savings”³⁵

6. Conclusion

To ensure that foreign direct investment does not cause significant environmental damage, it is necessary to build the regulatory capacity of most countries so

³³ Mani, M., Wheeler, D., In Search of Pollution Havens? Dirty Industry in the World Economy 1960-1995, *Journal of Environment & Development*, No. 7:3, 1998, p. 215-247.

³⁴ Rasiah, R., *Transnational Corporations and the Environment: From Pollution Havens to*

Sustainable Development, WWF-UK Report, July 1998. p.41

³⁵ Arandelović, Z., Petrović-Randelović, M., Does Foreign Direct Investment Harm the Host Country's Environmental Performance? An Analytical Assessment, *Economic themes*, No.6/2006, Faculty of Economics, Niš, 2006, p. 4

that it is able to implement and be consistent with higher national and international environmental standards. Improving standards may simply include better implementation of existing EIA legislation or investor liability rules. Attention should be focused on the functioning of meso-level institutions (regional, municipal and local authorities), because at these levels planning, use of resources and private activities are directly controlled.

It is now generally accepted that multinational corporations apply standardized technology and environmental management systems when pursuing their cross-border investment activities, regardless of the degree of development of the host country and the level of application of environmental regulations.

Whether it follows green growth from an economic or environmental perspective, the recommendations are still somewhat known.

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INQUESTS OF TRAFFIC ACCIDENTS IN THE AREA OF THE CITY OF ZAGREB AND SAFETY OF ROAD TRAFFIC

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Summary: The investigation and investigation of traffic accidents, especially criminal ones, by police officers and other entities handling such events require both explicit and tacit knowledge. This is especially important if the accident was caused by an unknown driver, whether he or she was moving away from the scene with or without a vehicle. In cases where the driver escapes from the scene of the accident, in addition to the quality of the investigation, a quality criminal investigation is required by police officers and the competent State Attorney's Office. The primary objective is to determine all the circumstances of the event and the consequences at the scene as well as to identify the driver. In this paper, in addition to processing the statistics of traffic accidents with unknown drivers, the manner in which police officers acted during such an investigation is presented and the process of criminal investigation of a traffic accident caused by an unknown driver, who left the scene arbitrarily. On the basis of the collected data and the analyzes of traffic accidents, guidelines for action have been proposed for the purpose of better performing the inspection and improving the safety of road traffic.

Keywords: car accident, investigation, unknown driver, criminal investigation.

1. INTRODUCTION

Road safety has undoubtedly become part of the global policy of all countries. While highly developed countries have made major shifts, medium-developed and underdeveloped countries are lagging behind in such processes, regardless of the fact that they continuously implement measures to improve the current situation through various forms of action. In this direction, the Government of the Republic of Croatia in 2011 adopted the "National Road Safety Program for the Axis 2011-2020"³⁶ with the aim of reducing the number of traffic accidents and persons killed in these accidents by 50% by 2020, in which they are defined concrete measures. Every single occurrence that grows into a mass phenomenon is a security problem for all security services, and especially for police officers dealing with it. In terms of safety, the total number of traffic accidents is a major problem, especially if they have resulted in death, serious injury and major material damage, and the very process of conducting the investigation and criminal investigations in such cases is very demanding. In the last few years, the number of traffic accidents and the number of injured persons in these accidents have been increasing in the City of Zagreb and Zagreb County [1]. However, these figures are assumed to be higher due to the fact that road accident participants in certain situations can agree without police investigation and treatment. Also interesting is the data on the number of road accidents published in the Road Traffic Safety Bulletin [2], which indicates that in 2016, 24.4% of all road accidents in the Republic of Croatia occurred in the Zagreb County.

In 2017, in the territory of the Zagreb Police

Directorate (PUZ), there were 267 traffic accidents that were recorded as criminal offenses, of which seven were traffic accidents involving unknown drivers, ie drivers who fled the scene of a car accident. Such traffic accidents, in addition to being of great interest in policing, are also of great public opinion, which is why pressure is exerted on the police through the media and other channels of communication in order to identify the unknown driver as soon as possible. The goal of fleeing a driver from a car accident is to seek to keep their identity unknown or at least temporarily unknown. The reasons for escaping can be different: driving under the influence of alcohol or narcotic drugs, guilty of a car accident, concealing a previous crime, driving without a driver's license, avoiding unpleasant situations due to the person in the vehicle or the scene of the accident, and similar to [1].

When it comes to escaping or leaving the scene of an accident, two common forms can be distinguished: when the driver leaves the scene of a car accident and when the driver leaves the scene of an accident without a vehicle. From the standpoint of the strategy of conduct in criminal investigations of identifying an unknown driver in the first case, that is, after fleeing a driver with a vehicle, such investigation is more demanding and complicated because of the small amount of data available to the police. When a driver leaves the vehicle at the scene, police officers conducting the investigation and criminal investigation have certain information that can be used in the process of identifying an unknown driver, making it easier to identify.

³⁶ The National Road Traffic Safety Program of the Republic of Croatia from 2011 to 2020 was published in

Official Gazette 59/2011. from 30.05.2011. years.

2. ACCIDENT INDICATORS IN THE ZAGREB AREA

In order to provide a better overview of the state of road safety in the City of Zagreb and Zagreb County, statistical data on the total number of traffic accidents were obtained and analyzes of the most common causes and consequences were carried out. Also, statistics were obtained on the number of traffic accidents involving unknown drivers, whether they left the scene or are unknown on any other basis, Table 1.

Table 1. View of the number of traffic accidents in the area of Zagreb and Zagreb County [1]

Day of the week	Accidents			Died		Injured	
	2016	2017	+/- %	2016	2017	2016	2017
Monday	1.200	1.239	+3,3	8	9	472	486
Tuesday	1.168	1.206	+3,3	3	2	466	452
Wednesday	1.159	1.212	+4,6	5	4	411	439
Thursday	1.189	1.254	+5,5	13	5	452	474
Friday	1.306	1.471	+12,6	12	6	541	558
Saturday	1.133	1.149	+1,4	12	14	483	477
Sunday	808	851	+5,3	5	8	355	355
TOTAL	7.963	8.382	+5,3	58	48	3.180	3.241

Table 1 shows that the highest number of traffic accidents in the observed period in the week occur most on Fridays, as well as the number of injuries, while the number of deaths varies by year. It is also evident from Table 2 that the total number of traffic accidents in 2017 increased by 5.3% compared to 2016. Furthermore, the total number of deaths in 2017 is lower than in 2016, while the number of injured persons is increasing.

Table 2. Comparison of traffic accidents and causes of occurrence [1]

Year	Total traffic accidents	Speed inappropriate to conditions	Disrespecting the benefits of passing	Other driver errors
2016.	7.569	1.276	1.206	1.375
2017.	7.921	1.229	1.239	1.545

Table 2 shows statistically the data on traffic accidents that cause the driver's behavior, that is, his mistakes and actions. Consequently, in 2016, there were 7,559 such cases, while in 2017, 7,921 cases were recorded, an increase of 4.7%. Still, the main cause of traffic accidents is speed inappropriate for conditions as an individual factor and disregard for the benefits of passing.

The basic factors of road safety, man, vehicle and road, are not the only ones that affect the safe flow of traffic. Therefore, two more important factors are needed, road traffic and incident factor. With this approach, it can be concluded that the risk of road accidents becomes a function of the five factors that make up the road safety system, namely: man, vehicle, road, road traffic and incident factors [3]. If one of the main causes of traffic accidents is cited in all research so far, it is necessary that most activities aimed at preventing traffic accidents and reducing their consequences are done through the same, and this can primarily be achieved by improving the quality of education and training. Through any form of education, two forms can be distinguished: preventive and repressive. It is difficult to determine which form should be favored, but the opinion of different authors is that preventive education should be given priority because it is more acceptable and does not encourage the dissatisfaction of those to whom it is directed.

As the City of Zagreb and the County of Zagreb make up a large number by population, (City of Zagreb according to the 2011 census has 790 017 inhabitants

and Zagreb County has 317 642 inhabitants), because together they have over one million inhabitants, data on the number of drivers were obtained and registered vehicles for 2016 and 2017, Table 3.

Table 3. Display of the number of registered drivers and vehicles in the PUZ area [1]

Balance per day	DRIVER			VEHICLE		
	31.12.2017.	31.12.2016.	+/-	31.12.2017.	31.12.2016.	+/-
RH	2.337.087	2.325.157	11.930	2.094.529	2.032.743	61.786
PUZ	607.372	601.578	5.794	524.720	507.515	17.205
PUZ FRO MRH (%)	25,99	25,87	0,12	25,05		0,08
CITY OF ZAGREB	436.349	432.250	4.099	370.504	358.202	12.302

Table 3 shows that in 2017 the number of registered vehicles and drivers increased in the territory of the Republic of Croatia as well as in the City of Zagreb and Zagreb County. It is also evident that the total number of registered drivers in the City of Zagreb and Zagreb County is 26%, and the registered number of vehicles is 25% in relation to the entire territory of the Republic of Croatia. Table 4 shows data on road traffic offenses for 2017, by months, showing that there were 267 such events, of which 34 were the most recorded in November. Out of the total number of these events, seven crimes were committed by an unknown perpetrator, two of which remained unsolved.

Table 4. Summary of the total number of road traffic offenses in 2017 [1]

Crimes by months in 2017 road accidents												
Crimes / months	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
Total criminal offenses	15	12	20	19	23	24	26	20	28	24	37	19

Crimes by perpetrator	0	2	1	0	1	1	0	0	1	0	1	0
Subsequently discovered perpetrator of KD by NN	0	2	1	0	1	0	0	0	1	0	0	0
Unsolved criminal offenses under NN	0	0	0	0	0	1	0	0	0	0	1	0
KD "furious driving" Art. 226 of the CC	0	0	1	0	1	0	0	0	0	0	0	0
Total KD with fatalities	2	3	2	1	1	2	4	3	5	2	3	3
KD with fatalities per NN perpetrator	0	0	0	0	0	0	0	0	1	0	0	0
A KD perpetrator was subsequently discovered with NN fatalities	0	0	0	0	0	0	0	0	1	0	0	0
Unsolved KD with ND deaths	0	0	0	0	0	0	0	0	0	0	0	0

Table 5 shows that the number of traffic accidents involving recidivists is increasing, which requires that targeted measures and activities, both preventive and repressive, be implemented against such groups in the future. It is not uncommon for recidivists to participate in car accidents as drivers of a person leaving the scene because of additional sanctions. Also, actions against this category of driver would have an effect on preventive action

both in reducing the number of traffic accidents and the consequences.

Table 5. View of the number of traffic accidents with recidivists [4]

Traffic accidents of recidivists	2017.	2016.
With fatalities	0	1
With injured people	21	16
With material damage	40	37
Total	61	54

3. PROCEEDINGS OF POLICE OFFICERS IN ACCORDING TO A TRAFFIC ACCIDENT

In most cases, traffic accident reports are received from the participants themselves or from eyewitnesses, most often by telephone at 192 at the Police Operational Communication Center (OKC) or at 112 of the National Protection and Rescue Directorate (DSZS) whose staff they are trying to get as much information about the event as possible from the person reporting the events. The first important step in dealing with traffic accidents is to receive the traffic accident events by telephone or otherwise. This step is most important in the follow-up of police officers and other entities, primarily medical personnel, to provide emergency medical assistance.

Another important step in handling it properly is securing the scene. The main objective is the protection of clues and objects that may be related to the event, as well as the collection of first notifications of any witnesses, perpetrators and injured persons, as well as other measures and actions that may contribute to the quality of the overall treatment. More recently, the installation and refinement of technical and technological devices as part of securing the venue requires increased activities in

collecting data stored on such devices that are directly or indirectly related to the venue. Securing a venue means all activities from the moment of arrival to the scene, the process of gathering useful information until the end of police proceedings, or if the investigation is done until the end of the incident and, if necessary, further. Ultimately, such police activity is of great importance in further police action, especially when it comes to criminal offenses as a consequence of a car accident in the criminal investigation process, appreciating the attitude of "today is irrelevant information tomorrow crucial to solving the problem", which is why access to the scene must be undertaken in a responsible and professional manner. . Event venues are all venues associated with an incriminating event, a venue where something happened, as well as a venue for eventual planning and "post actions after the event," such as a venue for discarding event related items, changing the state of the means of execution (for a car repair experience), etc. Experience from previous practice shows that from the "retrospective" of analyzed events from earlier periods, police officers are wrong about such actions.

The third important step in the process is the quality marking, fixation and photographing of the traces found at the scene, Figure 1. Labeling means using numbers and assigning a unique mark to each material trace found.



Figure 1. Fixing general event locations [5]

Fixing means documenting the current

state, position, size and appearance of material traces, objects, objects, relationships and distances, as well as other important facts identified during the examination. All traces found must be photographed (fixed) at their location so that it can subsequently be determined where the trace was located and in what relation it was to other objects and traces at the scene. When photographing, starting from point 1, it should be photographed so that the height of that point in relation to the ground, as well as its distance from the sideline of the vehicle, viewed from the direction of the pedestrian, is visible.

For the purpose of this work, an image of the general appearance of the scene of a car accident was obtained, showing the way of fixing the scene in the general appearance as a static part of the investigation, while it is too demanding in one paper to describe all possible situations and ways of performing the examination in a static and dynamic procedure. Also illustrated is the method of marking measures and damage to a vehicle involved in a pedestrian crash, Figure 2. This example is shown because pedestrian vehicle crashes are frequent events in major cities, and inspection is required especially when the driver leaves the scene.

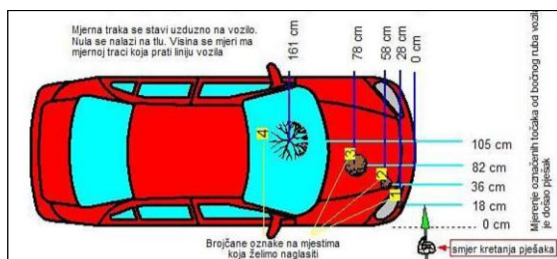


Figure 2. Marking and measuring vehicle damage during pedestrian collisions [5]

In view of previous experience, procedures for taking mandatory parameters, ie conducting all measurements of damage to the vehicle and the traffic surface, are presented in order to determine all the facts of the circumstances of the occurrence and

consequences of traffic accidents and the need for eventual reconstruction of the event.

As noted above, apart from the need for quality traffic accident reporting, one of the main problems encountered by police officers is road accidents where drivers have left the scene, requiring a criminal investigation to find an unknown driver. In such a paper, it is demanding to cover and describe all situations and procedures that must be carried out during criminal investigations encountered by police officers in practice. In this sense, based on the already acquired knowledge, experience and analysis of events from a specific issue, a scheme of the process of criminal investigation and criminal investigation in the cases of leaving the scene of unknown drivers was drawn up. Figure 3 shows a flow chart of the actions of police officers and other entities handling traffic accidents from the moment of the event notification to the submission of necessary reports to the competent authorities.

(by comparing parts of the vehicle exempted from the scene with undeniable damage to the vehicle). The material evidence collected in this way is not the only one that police officers collect during criminal investigations, but it is one of the most credible in evidence.

As already stated in this paper, additional knowledge is required from police officers and other entities acting in such situations to perform comprehensive and quality criminal investigations and investigations, especially when it is necessary to identify or identify the unknown driver and vehicle involved. in a car accident. One of the procedures, Figure 3, important for taking actions and actions to identify drivers and vehicles who have left the scene, demonstrates the complexity and comprehensiveness of the required eyewitness actions and activities in detecting an unknown driver.

4. CONCLUSION

Traffic accident reports and criminal investigations in the event of leaving the scene are the specific actions of all entities participating in such activities. Therefore, all those who are engaged in such jobs must, in addition to their previously acquired knowledge, improve themselves on a daily basis, appreciating the fact that such jobs cannot be treated as "template", but each is specific, which is why it is necessary to have a tacit knowledge besides possessing explicit knowledge. Knowledges.

Such work should be carried out by specialist staff who must support the requirements of the investigation and criminal investigation process. Certainly, in the future, the selection of police officers and other staff involved in eyewitness and criminal investigation processes with the necessary knowledge to support the requests should be made. Through training,

it is necessary to specialize in a certain number of police officers and other staff who, in addition to theoretical knowledge, will also show examples from practice as undeniable experiential facts.

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SAFETY OF CHILDREN- PEDESTRIAN IN TRAFFIC

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Abstract: This paper describes the safety of children in pedestrians as a special category of participants in traffic. We are witnessing the daily news of traffic accidents which often pass without victims and seriously injured persons. Frequent traffic collapse, daily crowds, drivers nervousness and inconclusive paths additionally endanger the safety of traffic, and therefore children of pedestrians as participants in traffic.

Keywords: children pedestrians, safety, traffic.

1. INTRODUCTION

The factors that lead to an accident are primarily the psychological behavior of individual drivers, which exceeds speed as the most important safety factor relative to the restriction several times, the influence of alcohol, poor age structure of vehicles on the roads and thus technical soundness, participation of young drivers with no experience of social reactions. the condition is reported by the rampage of the vehicle on the roads, lack of education and misconception of pedestrians on the street or on the way to school as a place of fun and play, instead of a place of constant danger. Children are among the most vulnerable categories of road users. Children are most commonly injured as pedestrians, bicycle riders, or passengers in a vehicle. By age, the most vulnerable categories of children are children aged 7 to 14 years. According to the research, pedestrian pedestrians account for about 63% of the total number of injured children, children passengers with about 29% and children drivers with about 8%. Analyzing the state of traffic safety in an area is a very important task in traffic safety.

By constantly analyzing, comparing and evaluating the state of traffic safety, measures and activities for improving traffic safety and reducing traffic distress are being further evaluated and developed.

2. CHILD SAFETY IN THE SCHOOL ZONE

The zone of a school is a part of a road or street in the immediate vicinity of the school, and as such, is marked by appropriate traffic signs. The speed of movement of vehicles in the school zone of the settlement is limited to 30 km / h and out of the village to 50 km / h, from 7am to 9pm, unless the traffic sign prohibits otherwise. In the school zone, the competent traffic authority will order the road manager to apply special technical means for the protection of the child's safety.

In cities, adequate child protection cannot be provided by setting up barriers that reduce the speed of movement of vehicles (police officers lying down), nor does the city have as many police officers as possible to recruit on duty at the elementary

school zone to provide for children. This concern must be taken over by the parents of the students in cooperation with and in cooperation with the school. Each parent should provide supervision and assistance to the child on the way from home to school by providing him / her with escort and protection along the route, especially when the child has to cross the street more than once on the road, where traffic is heavy and where the crossings are not provided by regulating traffic with the involvement of police officers or light signals.

Some schools do not have fenced yards, and if they are not maintained. In most schools there is no organized supply of children, so they take vacations between classes to buy food, run from the school yard to the shops, crossing the street. School traffic patrols are disorganized by older students or parents for the protection of children at the time of arrival at the school in the most vulnerable places in its area. Organized and synchronized care of parents, school and society is necessary for greater protection of children in traffic.

Motorists on the streets of the neighborhood are driving carelessly and at high speeds, and they also drive sidewalks, slamming into areas designed for children where they can endanger their safety. Such conduct and behavior must be punished more sharply and punished more rigorously.

In traffic, children are not only killed in the school zone. Their distress is much greater outside these areas and is exacerbated by the absence of intervention and preventive measures by others (parents, schools, drivers and pedestrians). Children are most likely to suffer in the game when their attention is focused on play and when they are allowed to play where they are not safe, on the street and in the parking lot.

3. Pedestrian children

We are all pedestrians. Walking is a basic and common mode of traffic in all societies around the world. Virtually every journey begins and ends with a walk. Due to the dramatic increase in the number of motor vehicles and the frequency of their use around the world - as well as the general neglect of pedestrian needs in the design and planning of use - of roadways, pedestrians are increasingly vulnerable to road traffic injuries, and children are particularly at risk. Pedestrian vulnerability is further enhanced in environments where traffic regulations are inadequately enforced.

As a general rule, pedestrians must only move and stand in areas designated for pedestrians. Pedestrians must navigate the sidewalks provided for them, which can be a sidewalk. If there are no sidewalks or sidewalks, pedestrians must walk on the left side of the road to see vehicles approaching them. If they are in a group, pedestrians must walk behind each other.

Children accompanied by their parents must always walk on the safe side of the road avoiding the edges of the road near road traffic. In places where traffic is regulated by traffic lights, pedestrians must comply with these rules.

Children are most often exposed to moving independently from home to school and vice versa. The first, second, third and fourth grades of the school are an unpleasant period for children in traffic. Children from urban areas were instructed in kindergartens and had contact with traffic safety, while children from rural areas who did not attend kindergarten were only taught by their parents.

Children in traffic can be observed through age, which depends on their independence and understanding of traffic safety, namely:

1. Children under 5 years

2. Children 6-9 years old
3. Children from 10-14 years.

More children walk to school on the long road, repeatedly crossing or moving along the roadway. In these places, there are often no police officers on duty and police on duty, in which case children, when traveling alone, should be assisted by all road users and drivers should pay special attention to them and allow them to move around safely.

Each child is the biggest role model for parents, it tends to emulate their parents in almost everything. He tends to follow the good but unfortunately bad habits of his parents. If parents are not persistent with the intention of their child adopting positive habits, he or she will take over those negative habits imposed by his or her environment. Kids learn the fastest and most thorough through play, in a relaxed atmosphere.

4. MEASURES TO INCREASE THE SAFETY OF PEDESTRIAN CHILDREN

One of the measures that need to be taken to increase the safety of pedestrian children is to increase the zones of calm traffic.

The calm traffic zone is an area in a settlement, marked by a prescribed traffic sign, in which vehicles must not move at a speed greater than the speed of pedestrian walking due to the permitted movement of pedestrians and children's play.

It is necessary to install horizontal and vertical signage, as well as regular maintenance of trees and greenery for better visibility. Also setting up pedestrian crossings combined with footpaths that will serve children to and from school via them.

The most important measures related to elementary schools, ie traffic education that elementary school students should master:

- basic traffic signs, their meaning and the traffic conditions in which they move,
- basic concepts and rules in traffic, and proper habits about them,
- avoidance of dangerous situations on the way from home to school and back by exposing them to practical situations,
- Independent use of authorized means of transport,
- basicS about the operation and use of traffic.

Major family-related measures:

- teach your child to go to school the same way,
- teach a child to go in a group with other children,
- teach your child to stop and watch traffic to the left and right before entering the roadway,
- teach your child to never run across the roadway,
- teach the child to observe the vehicle and make eye contact with the driver,
- teach your child not to run after a ball that jumps toward the roadway and
- teach your child to never cross the street when the red light is on at the traffic lights, as well as behind and in front of parked vehicles.

5. CONCLUSION

It is a fact that the education of children for safe participation in traffic starts in preschool institutions and continues in primary schools, nevertheless the role of parents is irreplaceable. Parents can do the most for their children's safety. That is why they need to know everything about children as independent traffic participants and how to prepare their child to participate

in traffic on their own. All the answers can be obtained in various educational literature, TV shows, the Internet and the like.

Children in traffic are making decisions too fast or slow. Which is why it is important that the traffic situations in which the child needs to make decisions are as simple as possible, rather than requiring the integration of more information. The child should be taught to choose the safest and easiest paths to the goal.

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LEGAL ASPECT OF ENVIRONMENTAL PROTECTION IN CONSTRUCTION OF THE HIGHWAY / CORRIDOR Vc THROUGH BOSNIA AND HERZEGOVINA

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Summary: One of the most important conditions for economic development and overall progress of the state of Bosnia and Herzegovina is the development of a modern transport network. If we consider motorways as an essential element of state development, the construction of Corridor Vc should be considered above all as a very important social and economic project that will bring new momentum to the economy and domestic production. Corridor Vc is included in the TEM network of South East Europe's transport infrastructure and runs from Budapest (Hungary), via Osijek (Croatia), Sarajevo (BiH), to the Ploce port (Croatia). Throughout BiH, the 330 km long Vc corridor route runs north-south, in the middle of the country, in the most favorable natural conditions, in the valleys of the Bosnia and Neretva Rivers. This paper presents the project's expected impacts on the environment and social issues, as well as the measures that must be taken to meet the legal and environmental requirements of the project as part of environmental and social policy.

Keywords: Bosnia and Herzegovina, Corridor Vc, environment and social issues

I INTRODUCTION

JP Motorways of the Federation of Bosnia and Herzegovina is a public company from the Federation of Bosnia and Herzegovina in charge of the construction, operation and maintenance of motorways in the Federation of Bosnia and Herzegovina. About 100 km of highway is already built and operational. The construction of this highway is expected to be a key driver of economic activity and to enable BiH to be included in major European traffic flows and the global European economic system. The construction of the highway will lead to rational integration of Bosnia and Herzegovina with neighboring countries and regions and to achieve stabilizing and developmental effects for the country.

Improving transport conditions will improve the quality of life, which will be manifested through:

- reducing the length of travel and journey times of goods and passengers;
- reducing the cost of transporting goods and passengers, increasing employment;
- valorization of geo-traffic position of BiH;
- increasing the competitiveness of the economy in the gravity area of the corridor;
- launching new projects and increasing private investment in the regional economy.

The passage of the future highway will lead to many changes in the observed area - it will affect the development of new activities (tourism, catering, new jobs, work areas in the immediate vicinity of the highway, highway maintenance facilities), but will also change the existing activities (agriculture, hunting, forestry). The population included in the sociological analysis did not express any specific attitude towards the potential impact of the

future highway, both in the most general sense and in the individual corridor variants. In other words, the local population, apart from occasionally expressing concern for the potential jeopardy of some activities by crossing the future highway or expressing dissatisfaction with some imagined technical solutions (crossing the highway across the Neretva River near Pocitelj due to endangering the landscape), did not show any specific reaction to the corridor. Considering the updated analyzes of the most recent and definitely adopted variants of the corridor, the sociological analysis concluded that the corridor does not significantly affect existing activities, that it does not significantly affect existing settlements, since the route was moved beyond the potential impact on existing settlements and activities, and that the corridor bypasses the most sensitive natural ones, cultural - historical and tourist areas of interest in the potential zone of influence (except in the case of the construction of a bridge near the settlement Počitelj where the road crosses to the west side of the Neretva River). In the latter case, as in the case of the construction of bridges over other, smaller rivers, sufficient care must be taken in the design of the said bridges and their positioning in such a way that they less encumber the existing valuable landscape.

1. Environmental and social policy

The quality and environmental policy of the JP Motorways of the Federation of Bosnia and Herzegovina is based on modern market-oriented principles, with the aim of meeting the expressed needs for transport of people and goods in a safe, fast and reliable manner. Construction, management and maintenance of modern road infrastructure while respecting the highest environmental requirements. Quality construction of highways and expressways, environmental protection, as well as maintenance and management of

the product are the need to respond properly and adequately to the set requirements.

Special attention is paid to the construction of the motorway:

- Preferring the selection of contractors (suppliers) of work that are environmentally aware while adhering to all environmental regulations and procedures;
- Control of products (services) which guarantees the fulfillment of contractual and legal obligations;
- Supervision key to the competencies of workers and management in quality and environmental management;
- Monitoring the work process and the integrated quality and environment management (IMS) system to ensure the highest possible efficiency and business improvement, as well as the conservation of natural resources and energy through their rational use.

2. Environmental protection and monitoring

The construction of every facility, including the motorway, has an environmental impact, but it is necessary at all stages from construction to the period of operation to take into account and take the necessary measures to minimize the negative impacts and to be below the prescribed limit values. During the construction works on a motorway as a complex structure or part of a motorway or on a section of a motorway that forms a separate construction unit, environmental studies will be performed as environmental protection measures and are subject to supervision and verification by authorized supervisory persons.³⁷ In the initial phase of

design documentation preparation of the EIA, the areas through which the motorway is planned to be constructed should be analyzed. In order to prevent and / or mitigate the direct and indirect negative impacts of the project on the environment, basic information is provided for:

- the corridor areas that the motorway route must avoid due to its exceptional value or sensitivity (protected natural and cultural values, valuable forest and agricultural land, water supply, etc.);
- the corridor areas through which the route may pass through the application of mitigation measures.³⁸

The answer that should also be given in the project documentation is to prescribe environmental measures that should be implemented through the construction period and subsequent exploitation. The process of monitoring the environmental impact should start from the very beginning of construction and implement the monitoring plan through three phases:

- zero monitoring status (before commencement of work);
- monitoring during the construction phase;
- monitoring during facility exploitation.

2.1. Design phase

A checklist at the design stage is necessary in order to properly consider and take into account all environmental aspects and problems, that is, to properly draft safety measures. The special protection zones established by the project must be respected and specific protective measures adopted in

³⁷Law on Highways on Corridor Vc, FBiH Official Gazette, no. 08/13, Article 20.

³⁸ Zaštita okoliša i monitoring, <http://www.jpautoceste.ba>, (20. april 2018.)

relation to them. This also applies to the construction phase and must be emphasized in the tender documentation.

2.2. Construction phase

In order to meet all the environmental requirements of the project, an environmental engineer (environmental expert) should be hired to oversee the way the works are carried out by conducting frequent inspections, thus protecting the interest of investors. Also, the contractor is obliged to have a person or persons responsible for monitoring the implementation of environmental requirements according to the tender documentation. This condition should be emphasized to the contractor when negotiating and before the contract is signed. The parameters monitored during the execution of the work cover the implementation of the adopted protection measures and all these parameters will be under frequent control of the environmental engineer and under the responsibility of the contractor.

2.3. Maintenance phase

The environmental engineer is tasked with providing a detailed procedure, technical manual / instructions for the regular maintenance of drainage systems, security and light signage, emergency repairs (spillage / spillage of hazardous materials) and maintenance of green spaces (these documents may also be included in tender documentation). While the first and second phases are carried out over a relatively short period of time, the third phase is carried out for a longer period, that is, during the entire exploitation period. After the completion of the construction of each section, carrying out the technical inspection, with the

issuance of the operating permit, the authorized institutions also prescribe the criteria that must be satisfied in a later period of exploitation. These criteria prescribe the permissible limit values for individual pollution and the frequency and types of testing and reporting required for the highway manager. During the period of exploitation, according to the regulations in force, it is the obligation of JP FBiH Motorway to carry out control measurements of the quality, ie pollution of water, air, soil and noise level.

Legal aspects and compliance with relevant environmental and social regulations

To achieve human and environmental protection, three operational objectives are envisaged to ensure strict implementation of adopted regulations and international commitments, align domestic environmental legislation with EU legislation, and integrate European sectoral environmental policies into FBiH³⁹ sectoral policies. The Environmental Impact Assessment was carried out in accordance with the Law on Environmental Protection (Official Gazette of the Federation of BiH, No.33 / 03) and the Rulebook on plants and plants for which an environmental impact assessment is required and the plants and plants that can be constructed and commissioned only if they have an environmental permit (Official Gazette of the Federation of BiH, No. 19/04). The Environmental Law is in line with the following European and international regulations:

- EIA Directive 85/337 / EEC as supplemented by Directive 97/11 / EC (Environmental Impact Assessment of Major Industrial and Infrastructure Projects);

³⁹ Strategija zaštite Federacije Bosne i Hercegovine, <http://www.fmoit.gov.ba>, (20. april 2018.)

- UNECE Convention on Environmental Impact Assessment across Borders (Espoo Convention adopted in Espoo, Finland on 25.02.1991);
- UNECE Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in the Environment (Aarhus, 1998 Denmark);
- IPPC Directive 96/61 / EC (IPPC - Integrated Pollution Prevention and Control);
- Union II - Directive (Prevention of major accidents).

During the environmental impact assessment process, the provisions of other environmental laws and regulations adopted pursuant to these laws were taken into account:

- Law on Nature Protection (Official Gazette of the Federation of BiH, No.33 / 03)
- Law on Water Protection (Official Gazette of the Federation of BiH, No.33 / 03)
- Law on Air Protection (“Official Gazette of the Federation of BiH”, No.33 / 03)
- Law on Waste Management (Official Gazette of the Federation of BiH, No.33 / 03)⁴⁰

All of these laws were enacted in 2003 as a set of environmental laws. The laws are drafted under the Phare program of the European Commission and are in line with European regulations. The laws are enforced by the Federal Ministry of the Environment and Tourism. TEM (Trans-European North-South Motorway Project) standards and guidelines issued by the United Nations Economic Commission for

Europe (UNECE, Third edition - February 2002), as well as international regulations, have been taken into account in the preparation of the environmental impact assessment documentation. financial institutions (WB, EBRD, EIB). In the further phase of preparation of the project documentation, as well as in the construction phase, the Guidelines for the Design, Construction, Maintenance and Supervision of Roads (Official Gazette of the Federation of BiH, No. 80/06) will be used. The guidelines have been drafted in accordance with EU standards and standards and are applicable from 01.01.2007. years. Numerous public-sector professional institutions dealing with environmental issues in both entities, either as part of the ministry or under the authority of the entity governments, participate in the creation and implementation of environmental policy. Within their responsibilities, they provide professional services (eg statistics offices, hydrometeorological, etc.), monitoring and control of activities that have an environmental impact (eg inspection), fundraising activities, encouraging and financing preparation, implementation and the development of programs, projects and similar activities in the field of conservation, sustainable use, protection and improvement of the environment and the use of renewable energy sources, and the planning and execution of activities aimed at protecting people, goods and the environment from natural disasters, emergencies and incidents.⁴¹

3. Measures to mitigate adverse environmental impacts

preparation as part of the design of the main highway project on the Vc corridor in Bosnia and Herzegovina, Parliament of Croatian Builders, Cavtat, p. 3

⁴⁰ Projekt autoceste na koridoru Vc procjena utjecaja na okoliš, <http://www.ekoakcija.org>, (20. april 2018.)

⁴¹ Zovko M., Brajković D., Kralj S., (2012), Experiences in environmental documentation

Mitigation / prevention measures will be implemented at all stages of the implementation of this project. Environmental impact studies include environmental action plans that recommend that mitigation measures be implemented in the following phases: design, construction, monitoring and maintenance. The motorway route is located in a space that avoids all the recorded cultural and historical monuments. Measures for the protection of cultural and historical heritage are contained through measures for the protection of air, water, soil, noise, etc.

3.1. Air quality

During the construction and execution of earthworks, air quality could be occasionally impaired by dust emissions as well as emissions from generators and vehicles. During the use of the highway, the exhaust emissions from traffic will adversely affect the air quality in the immediate vicinity of the highway. In order to reduce the degree of air pollution during the construction of the highway, it is necessary to consider the possibility of installing vertical ventilation pipes in tunnels, in order to reduce the increased concentration of pollutants in tunnel portals. Green barriers as well as sound barriers can also reduce the dispersion of pollutants in the air. In order to control and manage the air quality, the following measures are proposed:

It will be ensured that all engines on construction machinery and vehicles meet FBiH standards and are regularly maintained (this implies that machinery and vehicles to be used in construction works must have operating licenses and built-in emission reduction filters);

Roads will be sprayed regularly as well as soil material deposited;

Covering vehicles transporting soil and other bulk materials;

On dirt road construction sites, vehicle speeds will be limited to reduce dust emissions;

A thick vegetation with many leaves will be planted in the belt between the road and the settlement to filter it;

Equipment and machinery must be switched off when not in use.

3.2. Habitat fragmentation prevention

Today's approach to highway construction is far more contemporary and less damaging to nature. Extensive environmental impact studies are undertaken prior to each motorway construction, seeking to implement any research that exists on an area using an interdisciplinary approach. Modern highways have a number of measures to prevent habitat fragmentation. In fact, it would be more accurate and correct to write that this is a series of measures that reduce the consequences of habitat fragmentation. Some of these are: green bridges (often referred to as animal or animal bridges), viaducts, canals, tunnels and bridges. Each of these buildings has its good and bad sides. They have in common that there are too few of them and they do not have a large enough surface. There are many other problems such as noise caused by the movement of cars and lighting, which have a very adverse effect on the movement of animals and their orientation in space, etc. The most famous buildings are green bridges, although they are only between 100 and 200 m large. Their construction is extremely expensive, and there are too few of them because of this. Most often they are built in places where there are not enough natural crossings. By natural transitions we mean areas above tunnels and areas below viaducts and bridges. Green bridges are primarily intended for large animals that have a very wide range of motion and need different ecosystems to survive. These include wolf, bear and lynx. Bears and wolves often conflict with the population

living in their fringe area. The reason for this is that the habitat of large animals is usually not large enough to supply them with the necessary resources for life. The consequences are either killing animals by hunters or killing them on the roads, which, in addition to killing an animal, can lead to the loss of life.⁴²

3.3. Cultural and historical heritage

The impact of the construction of the road on the cultural and historical landscape is considered throughout the construction of the highway, based on the analysis on their vulnerability is determined and the following system of protection measures is applied: Relocation of the route (for all cases of physical destruction and endangering the basic values of the cultural property), Relocation of the cultural property (for all cases where the said action is possible without disturbing the fundamental values of the cultural property), Protection of the cultural property on the spot (for all cases where the cultural property and its basic values can be protected by special protection measures at the existing location), Research and documentation of the cultural assets (measures implemented for all endangered cultural property, including the conservation of movable archaeological finds from endangered sites and zones).⁴³

II CONCLUSION

The construction of new motorway sections will enhance regional traffic and reduce local traffic congestion. The proposed changes to the project will improve road safety. All relevant authorities should have adequate capacity and resources to manage environmental and occupational health and safety risks if they fully implement the

mitigation measures provided for in environmental impact studies. The aim of the drafting of environmental documents is to preserve, protect, restore and improve the quality and capacity of the environment, to protect natural resources and their rational use, to prevent pollution and pollution, to mitigate the direct and indirect negative impacts of projects on humans, flora and fauna, water, air, land , climate, landscapes, cultural heritage and material assets.

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⁴³ [Studija uticaja na okoliš autoputa na koridoru Vc, http://www.mkt.gov.ba](http://www.mkt.gov.ba), (20. april 2018.)



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