INNOVATIVITY AND RESEARCH IN THE FUNCTION OF TECHNICAL AND TECHNOLOGICAL CHANGES IN TRANSPORT, ECOLOGY AND LOGISTICS

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Abstract: *Traffic is an activity related to everyday life and production, whose task is to transport people and goods from one place to another. Due to crowds in traffic, in more developed parts of the world, drivers and passengers in cars spend billions of hours and spend tens of billions of dollars a year. For traffic congestion, solutions are mainly found through projects based on the use of computer systems and simulations of different traffic situations, that is, in combining IT and traffic infrastructure. Using modern information technologies, it is encouraging the establishment of a new infrastructure consisting of networks of roads, railways, airports, stations and ports connected to systems based on the Internet. Future solutions will be based on the use of smarter and environmentally sound vehicles and their connection with infrastructure facilities, such as gas stations, parking lots, garages, etc. The wider application of advanced information technologies, besides communication with vehicles with infrastructure, will also enable communication of vehicles. At the beginning of the 21st century, traffic experts agree that successful solving of the growing problems of traffic and transport is no longer possible without the application of the complete concept and technologies of ITS (Intelligent Transport Systems).*

Key words: *Transport, ITS - systems, innovations, European Union, smart cities, logistics.*

Introduction

The first question that appears regarding new technologies is tricky and simple: Is today really that different? Is there something in today's new technologies - that is qualitatively different from those that marked other periods of technological change?

Each generation tends to exaggerate the degree of change it has gone through, in part because of the immediacy of the stress to which it is exposed, and also because it is easy to underestimate how difficult and unpredictable life has been in the past because it seems to us that life was going on logically and necessarily.

Indeed, fears of the world's downfall were common when many major technological systems first appeared, even though subsequent generations saw them as banal and boring.

In the first days of the railroad, there was a widespread belief that travel at then unimaginable speed could kill passengers, because such technology was clearly contrary to God's will.

Today's new technologies are different, not only in degree but also in type, from those from the past, primarily due to the range, scale and speed of technological change. While previous waves of technological change related to several key technologies, such as railways or electrification, today's technological developments take place along the entire technological composition. Partly thanks to such technologies that are present within a population of seven billion people, we today live on a planet, the first we know of, shaped by one kind. Therefore, the argument that new technologies threaten man argues that new technologies threaten new technologies.

Technological evolution is accelerating, which has significant consequences. The earlier speed of technological change was slow enough to allow for psychological, social, and institutional adjustment, but today technology is changing so fast that technological systems are rapidly disintegrating with management mechanisms. All these factors working together increase the effect, speed and depth of change. Any technology that is powerful enough to be interesting will inevitably destabilize existing institutions, power relations, social structures, governing economic and technological systems, and cultural assumptions.

Previous waves of technological change - from steam and coal to electricity, railways and the automotive industry - have destabilized and restructured human and natural systems on all scales, unpredictably interacting with modern natural, human and built systems. The railways, for example, opened up the interior of the continents by creating transport infrastructure as a necessary support for industrialized agriculture, which, coupled with advances in fertilizer production and the development of agricultural machinery, created the potential for dramatic population growth.

Following this, areas and ecology have changed dramatically: the American Midwest has become a granary since the prairie, as the railroad connected that agricultural area to the needs of the East Coast and, by steamer, to Europe. The Earth's atmosphere has been partially restructured thanks to the development of internal combustion engines in conjunction with a psychologically powerful automotive technology, which in turn rests on a massive fossil fuel infrastructure. Proposals to address climate change using the so-called "Geoengineering technologies," from inventions that would repel incident light to the application of carbon capture devices in the atmosphere, are explicitly focused on the engineering of major natural systems and cycles. In short, major new technologies are not just new devices; they rather represent unpredictable, sometimes obviously discontinuous shifts in the structure of integrated Earth systems.

So, in an economy where the only certainty is uncertainty, knowledge becomes only sure source of long period competitive advantage. Knowledge becomes the basic capital and lever of development.

PART I - INNOVATIONS

1. Importance of the innovations

In conditions of changing markets, rapid development and expansion of technologies, multiplication of competitors and products overnight, successful companies become those that constantly create new knowledge, share it throughout the organization and quickly integrate it into new technologies and products. These activities define the company as an organization that creates knowledge, whose only and basic job is constant innovation. These are organizations that have realized that learning and new knowledge are becoming the key to success, and education is crucial for future wealth.

The role of knowledge is increasing today, especially when it comes to achieving a competitive advantage in an increasingly challenging and dynamic market. The innovations are created through knowledge and creativity and innovation processes are implemented, which presents the basis for achieving competitive advantage.

One of the most significant carriers of productivity growth and increasing the competitiveness of companies but also the economy as a whole is human capital and its knowledge. Information, learning and working on the latest technologies greatly contribute to the development of a country's economy.

Investing in knowledge results in the creation of innovative products and processes, so investing in knowledge is profitable in the long term period because the returns are much higher than the initial costs. By creating an environment in which human capital comes first, many investments are attracted and the possibility of sustainable increase opens up in the number of investments leading to long-term economic growth and increased competitiveness. This creates a circle where knowledge is transferred from one industry to another, leading to multiple uses of knowledge and expertise with lower costs.

The level of innovation and competitiveness of countries around the world are two related terms and as such, it is important to study them. The development of the country provides better conditions and a better basis for innovation, retention of young and educated workforce, and such variables affect faster development, design of new trends and innovative products, business models or services and ultimately greatly affect the development of competitiveness of companies and the economy.

2. Conceptual definition of innovation

Innovation is the most important driver of national economic well-being. Due to the marked increase in global competitiveness, shortening of the product life cycle, increasing technological capability and the ever-present variability of customer requirements, innovation is crucial in creating competitive organizations and entire economies. That is why a large number of nations are engaged in achieving a global innovation advantage.

Continuous innovation is the key to the country’s sustainable progress. Before going into the topic of the importance of innovation in more detail, it is necessary to define what innovation really is. There is a large number of definitions that describe innovation. The difference between them is reflected in their scope and the types of innovations they define. One of the universal definitions, especially in the business environment, speaks of innovations as activities that are new or different from existing ones.

Very often, we talk about innovations in the context of new technology or results obtained from research and development activities that take place in universities and laboratories of large corporations. When it comes to technology, we can say that it is the knowledge of how to do something. More broadly, technology is considered to encompass the totality of knowledge, methods, techniques and means that serve the process of work, management and for mutual communications.

Although it is not enough to connect innovations with technology or talk about them in the context of new technologies, innovations represent much more than that.

All innovations must contain a novelty, whether it is something new for the company, the market or the whole world. Innovation cannot be anything new, but must create a sustainable business concept.

Interesting definition offers General Electric[1], and the definition is: " To innovate means to challenge and change the status quo in order to improve the consumer experience and provide them with new forms of value."

Nevertheless, those innovations are often understood in the context of technological innovations, which is not entirely true. Namely, it is a partial understanding of this term, which in essence represents much more. The most common consequence of this thinking is the identification of inventions and innovations. It is important to point out that these two concepts are actually very different. In doing so, inventions involve the creation of new ideas or knowledge, which are aimed at solving a technical problems and don't necessarily have to be related with commercialization. More specifically, they generally do not have to become innovations.

3. Why do we need innovation?

We only need innovation in order to be competitive in the world market with our products. Innovation is the foundation of competitiveness, because it gives the product "something" that has no competition. Competitiveness is one of the most important elements of a company and a product. Competitiveness is achieved and assessed only in the market through competition with other competitors. A competitive product on the market is the foundation of a company's success. The competitiveness of a company is the foundation for the competitiveness of a nation.

According to the OECD definition, competitiveness is the country's ability to produce goods and services that pass the test of the international market in free and equal market conditions, while retaining and increasing the real income of the population in the long time period.

So we can say that the competitiveness of the company is a measure of the company's ability to produce goods and services that pass the test of the international market in free and equal market conditions, while maintaining and long-term increase of successful business and company value. The foundation of a company's competitiveness is a competitive product. In order for a product to be successful in the market, in order to be able to be sold, exported and generate income, the company and the company must be competitive. That means it has to be better than any other product on the market.

What is competitive advantage? This is the reason why the customer chooses you, not your competition. That's what sets you apart from others, that's why you're still in business, that's what saves your customers money. Competitiveness is a set of parameters that are evaluated through competition to determine who is better according to selected criteria. And yes, the better one gets the job.

Competitiveness of products is achieved by:

- quality and reliability of the product, - delivery time, - technical and innovation level of the product, - reputation, market appearance and customer satisfaction, - price. All these components are closely related and strongly influence the efficiency and success of the business and the success of the market itself. Product innovation level is the level of a product or process measured by the degree of novelty (and originality) in relation to similar products or processes, where the innovation level is expected to bring a competitive advantage in the market.

Technical and innovation level is achieved by:

- creative process of development, new innovative product, - innovation and improvement of existing products.

Through innovation, we become better than the competition, because it does not have it. This is a great advantage of innovation. Innovation can be found in the market in

[1] General Electric or GE (Official title - The General Electric Company) is an American multinational company established in New York with head office in Boston, Massachusetts.

different situations. There, it can be a product that is not on the market, but there are similar products that are already in demand, so innovation with its novelty and originality will attract customers.

Research that was once conducted in our companies showed that the greatest innovative activity is present in those companies that show stable and good results over a long period of time. This means that only an orderly, organized and stimulating production organization is the basis for intensifying creativity. In a disorganized, unstimulated and staff-poor environment, there are no conditions for any, least of all for mass creativity, so no slogans and campaigns can do anything about it.

4. A fight with robots for a job is waiting for us

The fact is that some occupations are already dying out, but in the future that number will be even higher, because in the next 15 to 20 years, work automation is expected to affect many jobs and professions.

Workers will experience certain transformations in the future, and in the next 15 to 20 years, due to automation, a quarter of existing jobs will be abolished, while another 27 percent will be transformed, so additional training will be needed to perform them.

This is an assessment of the Organization for Economic Co-operation and Development (OECD), which has conducted a comprehensive study on future changes in the labor market in all 36 OECD member states. It is predicted, in that club of developed countries in the world, that their orders for industrial robots will quadruple by 2020 compared to ten years ago, which, like increasing investment in artificial intelligence, will lead to a reduction in the number of available jobs that will be occupied by automatic machines, especially when it comes to less complicated work operations.

This announcement does not surprise us much given the fact how much the labor market has changed in the past few years. There is constant talk and writing about how the IT sector is the most promising, and employs the most people, and which lacks the most workers. Therefore, everyone who has any ear for technology is redirected and learning these new skills, and if we go back only five years, such a thing was not even known to us. We already know that due to technology and modern machines, the way of working has changed in large companies, and the work that people used to do, is now very skillfully, even better, done by machines. So there is no longer so much need for people. So we have to worry that one day robots will do everything and that the need for humans will be minimal. However, one IT expert assures us that this will not happen. He says that it is a fact that in certain occupations there will be no more need for people as now, but at the same time new occupations are being born which, however, can't be done without people.

In several IT companies, it can be seen that an increasing number of workers are younger, which shows that this is also a young profession and that the older generations could not be educated for the profession, but it is not that there are none. Namely, there is an increasing number of people who retrain, who change professions.

So there are no rules. We can all already and must prepare for what the future brings us, and that is the modernization of all work processes. As it is happening now with some occupations, in the next 10-15 years it may not be, so it is necessary to learn new things in time, enter new jobs and fight for our place in this even more modern world, because no one said that there will not be a robots at all. It is up to us to show that they are not smarter than us.

Due to automation, in the next 15-20 years, 14 percent of jobs could be eliminated, while 32 percent could undergo a profound transformation, so employees will need lifelong training and new knowledge.

II – TRAFFIC – ISSUES AND CHALLENGES

1. Transport policy in the European Union

In the last 60 years, the development of transport in the EU has advanced significantly, so that transport is still of great importance for well-being and employment in Europe. The transport industry now employs 11.5 million people, accounting for 5.2% of the total number of employees in the EU. Traffic contributes to the economy with 7.0% of the total gross value added in the EU-28 group (548 billion euros). Good transport links are very important for the EU economy in terms of exports, in which transport accounts for 90% of the EU's foreign trade. Many European companies are world leaders in the field of infrastructure, logistics and production of transport equipment. EU households currently spend 13.5% of their income on transport-related products and services, making transport the second largest item in household budgets after household expenditure. Free movement would not be possible without good traffic connections and traffic networks.

That is why the EU's transport policy is always aimed at overcoming obstacles between member states and at creating a single European transport area in which there are conditions for fair market competition within, and between, different types of transport: road, rail, air and water.

In recent decades, changes in European transport policy have contributed to the expansion of the EU's internal market by opening up national markets that were previously dominated by public monopolies, as was the case in air and rail transport. Expansion, modernization and harmonization of infrastructure across the EU are fundamental to creating barrier-free cross-border networks for different types of travel. That is why the policy of trans-European networks were incorporated into the 1992 Maastricht Treaty. As part of the project to complete the European internal market, the interconnection of roads across all 28 member states that make up the European Union is of fundamental importance. This includes building missing links and removing many technical and administrative barriers that impede unhindered traffic and trade flows and create unnecessary bottlenecks in Europe's transport system. The ultimate goal is to create a single European transport area that will help Europe remain competitive by increasing the efficiency of the entire transport sector for the common good. In addition, the Treaty includes environmental protection requirements in transport policy to help complete the internal market.

2. Future challenges and goals of EU transport policy

Over the last 20 years, EU policy has made significant progress in the transport sector:

- Safer air, sea and road transport, - Decent working hours for people employed in the transport industry, - More types of transport for passengers and companies, - Reduction of traffic pollution.

The development of the infrastructure needed to meet the projected growth in traffic demand in Europe is expected to cost € 1.5 trillion by 2030.

Transport financing under the Connecting Europe Facility for the period 2014-2020. It will be directed to the central transport network. The EU supports research and innovation, and the efficient application of new environmentally friendly transport technologies.

The EU plans to establish a central network within TEN by 2030 to fill in the missing cross-border connections and make the network smarter, and deadlines will ensure that the implementation of all projects contributing to the construction of the central network takes precedence.

The goal is to gradually ensure that by 2050, the majority of citizens and businesses in Europe are no more than 30 minutes away from that extensive network. In addition to easier and faster travel, this network will ensure safer travel with less traffic jams.

The central network will be supported by a comprehensive road network that will contribute to its construction, at regional and national level. Standards have been set to ensure that trains, ships, planes, trucks and cars can use the infrastructure in a safe manner and without technical problems.

In addition to these advances, the EU has other strategic goals and challenges in the field of transport that it must respond to in the future. Demand for traffic will increase, freight road traffic only is expected to grow to 80% by 2050, and the urbanization trend will continue.

Today, traffic policy is at a crossroads. Oil will experience a major shortage in the next decade. There is a need to drastically reduce greenhouse gas emissions. Also, dealing with congestion by expanding road infrastructure is often not a good option.

The new strategies take on the challenge of addressing oil independence and creating modern infrastructure and multimodal mobility with the help of smart governance and information systems. A transport system can be considered smart if it is able to deal with new situations - such as those related to safety, traffic congestion, barriers or modal integration - by connecting all data sources to produce valuable information for transporting users and operators.

The potential of Intelligent Transport Systems (ITS) to help better understand the objectives of transport policy lies in the wide variety of applications in different modes of transport, both for passengers and freight. This is not only the case in road transport, where its applications include, for example: electronic tolls, dynamic traffic management (including variable speed limits, car parking and reservations, and real-time navigation), real-time information and other driver assistance systems such as electronic stability controls and departure warning systems.

One of the worst traffic problems is congestion, especially on roads and in air traffic. Congestion costs Europe about 1% of its GDP annually and produces large amounts of carbon and other non-ferrous emissions. It is the problem that needs to be solved.

It is necessary to increase traffic efficiency, which includes improving logistics and developing smarter "travel behavior" with optimal use of modern ICT systems and satellite technology. Europe needs to better coordinate all available modes of transport and networks instead of using just one mode of transport, allowing for optimal use of capacity.

By focusing on research and innovation, it should preserve the competitiveness of the European transport sector in the global market and maintain technological progress in the field of infrastructure, complete the trans-European transport network, better integrate road, rail, air and water transport (sea and inland waterways) into an unbroken logistics chain, remove major bottlenecks and build missing links, especially cross-border ones.

Under the new rules, EU members are required to promote clean technologies (electric or water-powered cars, trucks and gas-powered boats) by building a minimum number of power stations and petrol stations.

Since ¼ EU emissions from transport come from urban areas, cities have a key role to play in mitigating the effects of climate change. Many are struggling with congestion and improving poor air quality.

The number of deaths on European roads halved between 2017 and 2018 (from 70,000 to 30,000). Between 2016 and 2018, that number decreased by another 17%. This means that the EU is well on track to achieve its strategic goal of further reducing road deaths by 50%. by 2020, i.e. by 2050 there will be 0 or 0% of deaths.

3. Modern traffic issues

Adverse effects related to the conduct of transport activities depend on the time, place and type of traffic and are increasingly present and more pronounced in highly developed and densely populated areas. Peripheral regions and larger parts of some countries are still relatively immune to traffic congestion.

With regard to traffic congestion, three areas are particularly vulnerable: urban traffic, major roads, motorways and access roads. Regarding traffic in cities, in addition to a number of positive effects of traffic for the development and sizing of the city, traffic has recently turned into traffic congestion, low

speeds, increased costs, environmental pollution and other adverse effects. The safety of traffic participants and even the free movement of passengers are increasingly questionable.

Although city roads are not constantly congested, but only at peak loads when demand exceeds existing capacity, congestion is a factor that affects all forms of transportation. Everything affects the quality of daily transport and the mobility of passengers in urban areas, which is significantly endangered. Traffic congestion is not the only unfavorable factor for human health. There are other problems such as lack of safety, traffic noise, limited accessibility and mobility, impact on the natural environment, air pollution, which all affect these social values.

The development of transport infrastructure must be in the function of sustainable and balanced development of the country. The planning and construction of transport systems must be carried out carefully with respect for the environment and the modest use of natural resources. With the growth of traffic, gas emissions should be reduced, especially harmful CO2 emissions, which are socially dependent on fuel consumption, so, although there is a noticeable decrease in average fuel consumption in road traffic, due to the absolute increase in traffic, the total amount of CO2 emitted in road traffic is expected. Among the harmful substances that are released into the atmosphere during the combustion of fossil fuels are the chemical compounds carbon dioxide (CO2), carbon monoxide (CO), hydrocarbons (CH), nitrogen oxides (Nox), sulfur dioxide (SO2), solid particles , soot and heavy minerals. Currently, greenhouse gas emissions from road transport in the world and the European Union are growing too fast because the representation of rail and inland waterway transport is not adequate. It is necessary to redirect traffic from road to more energy efficient and environmentally friendly forms of transport. Increased pollution in road and air transport contributes to increased pollution in underdeveloped and transition countries. The spread of the harmful effects of transport and traffic on the environment imposes a new paradigm: reducing the conflict of economic, transport, traffic, environmental and socio-cultural conceptions of sustainable development.

With the growth of economic activities, the problems will become even more pronounced. Therefore, global traffic impact problems can be influenced by certain measures such as education, development of intelligent transport systems, development of modern transport technologies, technological progress of vehicles and scientific research, appropriate price systems with respect to external traffic costs, liberalization and harmonization of traffic and environmental emphasis in transport policy.

Experts of the European Conference of Ministers of Transport unequivocally recommend: by increasing fuel charges to cover external costs, to harmonize the annual load on vehicles with emissions of noise pollutants, to introduce congestion charges, especially when there is already a toll, the introduction of prices in large urban areas. At the basic national level, purposeful financing of roads and harmonization of the fee system with obvious needs and world tendencies and introduction of the "polluter pays" principle, reduction of negative effects on the environment. First of all, a larger amount of funds would be provided for the maintenance and construction of roads.

Frequent short trips with a cold engine greatly increase fuel consumption, and emissions are three to four times higher when the speed is three or four times lower.

Urban transport is therefore to blame for 40% of CO2 emissions that are responsible for climate change as well as other pollutants that have a worrying impact on the health of the urban population.

Due to the growing congestion in cities and metropolises, it is necessary to use public transport and the existing infrastructure as much as possible.

4. Urban traffic issues

Today, cities concentrate large masses of the world's population, the majority of world industry and other activities of a non-primary nature. In terms of traffic, urban settlements stand out primarily for the pronounced concentration of traffic. In urban settlements, unlike rural settlements, the traffic is up to several tens of times denser per unit area. In some larger cities, however, it is so concentrated that it has necessarily embarked on a vertical conquest of space. In modern conditions, city traffic is getting more and more complex transport requirements, and the conditions of its normal development are becoming very significantly complicated.

The accelerated pace of urban development and the complexity of that development leads to numerous conflict situations in city life. For the more normal functioning of the city organism, there are increasing demands right in front of traffic. In many examples of the world, and even our cities, the sudden development of urban traffic often leads to a worsening of the situation in the city. The cities themselves are much older than the city traffic.

Especially their cores were built for completely different traffic needs than today. The life of the city is most often concentrated in these cores - the main economic and social institutions, which attract a large number of inhabitants of the city and its surroundings. That is why the most significant problems of modern world city traffic occur in the city center. World cities solve these problems in very different ways.

Basically, everyone is trying to relieve the central zones of the city from motor, primarily individual traffic. The strictest shopping malls, neighborhoods or streets have recently been turned into pedestrian zones. Passing intercity traffic is guided by bypass expressways outside the city. In the city itself, the streets are being widened to increase their traffic. To transfer larger masses of passengers, specific forms of fast city traffic are being introduced, the most successful of which so far is the underground and high-speed overhead railways. Individual car traffic tends to be kept on the outskirts of the city, and advantages are given to city public transport. Most of the world's cities are trying to improve the traffic situation in the city as a whole by introducing more and more modern signaling devices that can be regulated at any time, according to the need for traffic.

Traffic is monitored on a daily basis and via television cameras. The most comprehensive changes in cities in order to improve traffic flows contain radical complex changes in the overall structure of the city. The effort is primarily to avoid the classic scheme of the city organism type center (city) - periphery.

Cities are planned to be built in all components. All parts of the city are equally burdened with functions, in terms of causing equal traffic needs. The best successes have been achieved in the world with the organization of metropolitan areas, where the classic city practically disappears and a more homogeneous symbiosis of settlements and surroundings is created, which above all has a more favorable traffic structure. In these areas, high-speed urban transport with mass transport possibilities, such as high-speed railways, is playing an increasing role. Finally, since recent times, for the most part still in projects, a number of new transport systems and means of transport have been proposed to solve the traffic situation in cities, which mainly go for greater or more complete automation of transport.

The constant expansion of the city, lifestyle changes and the flexibility of the private car combined with not always adequate public transport have caused huge traffic jams in cities over the last 40 years. Increased traffic and congestion in the city go hand in hand with increasing air pollution, noise and traffic accidents.

A significant reason for congestion in city traffic is the search for a free parking space (up to 30 percent of vehicles are circulating because they are looking for a free parking space). If these vehicles could be directed in time towards free parking lots, which are still available in certain city zones and garages, the congestion in city traffic could be significantly reduced. Of course, the best solutions require synergy of all types of traffic with as much use of public transport as possible.

The new transport branch - intelligent transport systems (ITS - intelligent transport systems), ie the development of "smart transport systems" can significantly help.

ITS is developing "smart" vehicles, "smart" roads, wireless "smart" toll cards, dynamic navigation systems, adaptive traffic light intersection systems, more efficient public transport, fast and Internet-supported shipment distribution, automatic reporting and positioning accident vehicles, biometric passenger protection systems.

Considering the problems of pollution, an action for clean public transport was promoted in the cities and an action for obtaining the title of green cities in Europe was initiated. To earn the title of green city, cities must constantly set high environmental standards and be persistent in gaining a sustainable vision or be a role model to others.

The concept of smart cities is becoming increasingly popular around the world. Of course, the key element of any smart city is transport, and this is where initiatives and solutions for intelligent transport systems come into play. Europe is making more and more progress in this segment as the authorities want to reduce traffic congestion, improve safety and reduce pollution.

The successful implementation of smart city projects depends heavily on the technologies - data transmission, cloud, mobility and sensors - that together make up the IoT ecosystem.

These technologies are the basis for smart city projects. Rapid development in these areas in recent years has enabled better connectivity of facilities, resulting in the comprehensive development of smarter ecosystems, ”the report said.

5. Road traffic safety in BiH

In 2018, 277 people lost their lives on the roads in Bosnia and Herzegovina, while 10,403 were seriously or lightly injured. Last year, the death rate in Bosnia and Herzegovina was 72 people per million inhabitants, which is far from the European Union average, where 49 out of a million people die. The largest number of traffic accidents was recorded on the streets in the settlement (37.44 percent), and then on highways roads (29.9 percent), followed by local (18.35 percent), then regional roads (9.88 percent). More than 100 accidents happen every day.

Improper speed and speed not adapted to the conditions on the roads are one of the most common traffic accidents. Traffic accidents caused by alcohol and other intoxicants follow. Among the mistakes of drivers in urban traffic conditions, driving at an insufficient distance between vehicles should be singled out.

It is believed that the very poor infrastructure was mostly affected by a large number of accidents. The data show that eight percent of the 100 thousand inhabitants participated in some traffic accident. It's like one city. The causes are always the same. In the first place is the speed, which is not adequate to the conditions on the road. The second is improper overtaking, and in third place is the inability to drive. There is also the deprivation of the championship of passage.

In order to reduce such black statistics, it is considered necessary to urgently ban drivers who avoid paying fines. In addition, it is necessary to build highways, expressways, but for this it is necessary to mark all dangerous places, and before the construction of city bypasses outside large populated areas.

III PART – INTELLIGENT TRAFFIC MANAGEMENT

1. Intelligent transport systems

Today, traffic policy is at a crossroad. There is a need to drastically reduce greenhouse gas emissions, address congestion, security, and problems related to the functioning of the city.

The new strategies aim to solve all existing transport problems with the help of smart management and information systems. A transport system can be considered smart if it is able to deal with new situations - such as those related to safety, traffic congestion, barriers or modal integration - by connecting

all data sources to produce valuable information for transporting users and operators.

The potential of Intelligent Transport Systems (ITS) to help achieve transport policy goals lies in the wide variety of applications in different modes of transport, both for passengers and freight. This is not only the case in road transport, where its applications include, for example: electronic tolls, dynamic traffic management (including variable speed limits, car parking and reservations, and real-time navigation), real-time information and other driver assistance systems such as electronic stability controls and departure warning systems.

ITS can connect different modes of transport much more easily, for example using integrated multimodal travel planners and tracking services for co-modal freight traffic. Such smart transport solutions are already being implemented across the EU. Although ITS is industrially very innovative and competitive, the benefits of scarce public and private resources remain inefficient. At European level, cooperation is increasing with the aim of achieving a common framework for the coordinated use of ITS that provides continuous customer service across the EU.

The reasons for using ITS stem from devastating data on safety and external traffic costs. According to the World Health Organization (WHO), over 1.2 million people die each year in traffic and 50 million are injured. The total direct and external costs of traffic accidents amount to 3 to 4% of the GDP of individual countries. In the area of passenger information services, static and dynamic information on the traffic network, pre-road and road information services, and support to services that collect, store and manage information for planning transport activities are included.

The benefits and effects of the introduction of ITS solutions, (ITS) is to improve the economy, efficiency and safety of the transport system. The effective implementation of ITS technologies depends in part on the knowledge of which technologies will most effectively address congestion and security issues.

Therefore, it is very important to understand the benefits of both existing and new technologies. Based on the justified introduction of ITS, ITS implementation brings the following benefits:

- Management systems can potentially reduce delays between 5% and 40%. - Control system and dissemination of passenger information. - Highway management systems can reduce collisions by up to 40%, increase capacity and reduce overall travel time by up to 60%. - Cargo management systems reduce costs for motor carriers by 35% in the implementation of business information systems and vehicle networks. - Transit management systems can reduce travel time by up to 50% and increase reliability by 35% with automatic vehicle set-up and transit priority signal implementation. - The incident management system can potentially reduce incident duration by 40% and offer a number of other benefits, such as increased public support for DOT activities and goodwill. - There is a wide range of benefits that can be obtained from ITS implementation. - For example, fuel consumption, travel time and delays can be significantly reduced. - ITS implementation can result in higher travel speeds, improved traffic flow, and more satisfied passengers in all ways.

2. Development and tasks

Traffic flow management and its integrated management in the environment of intelligent transport systems differ in approach, content and level of integration. Traffic management determines the level of service by which the offered traffic capacity can be provided on a particular road.

Important operational tasks of traffic management in ITS are control of network access, mitigation of congestion on roads and their teaching according to other modes,

solving bottlenecks due to incident events, achieving a satisfactory level of traffic safety, traffic logistics of special sports, political, religious, entertainment events, control of adverse effects on the flow of traffic such as weather conditions, aggressive driving, etc., redistribution of modes according to the use of more efficient modes of public transport. The course of development of an intelligent traffic and transport management system begins with the needs and requirements of users. After identifying these needs, the architecture of the MT composition is created, a detailed composition design is developed, prototypes are tested and implemented.

A special functional area of traffic management is defined in the European and American ITS architecture. According to European architecture, the functional area is divided into five functions. Those are:

- traffic flow management, - incident management, - demand management, - provision of meteorological information, - road maintenance. Each driving function also has its components, so the first function has the components of city traffic management, intercity traffic management and traffic management on bridges and tunnels.

Congestion on roads occurs when the amount of vehicles is significantly greater than the capacity of the road, ie when the ratio of traffic volume and operating capacity is such that there is a significant reduction in speed, and sometimes a complete standstill.

In traffic analyzes, two basic types of congestion are distinguished, repetitive and non-repetitive, i.e. predictable and unpredictable. Predictable congestion occurs in the morning or afternoon peak hours, or at predictable intervals and weekends.

The key management action is then to inform and advise passengers and drivers just before peak loads occur. Unpredictable congestion occurs due to unforeseen incidental events such as traffic accidents, vehicle breakdowns and special unannounced or insufficiently prepared events.

The occurrence and spread of congestion and the elimination of incident situations and the normalization of the situation are elaborated in detail within the ITS solution for incident management. Unfavorable consequences of congestion are prolonged travel time, increased risk of accidents, increased fuel consumption and environmental pollution, passenger stress and driver aggression, delayed emergency services, increased traffic on side roads, longer time and higher travel costs.

These continuous changes do not have to cause major traffic disruptions. However, if we keep in mind the real traffic flow, first of all the real characteristics of the "driver" system, then it is logical that in reality the change of the basic parameters of the traffic flow always means certain disturbances in the conditions of traffic.

Along the road in the traffic flow, jump changes in the basic parameters of the traffic flow can also occur. Such changes always cause unfavorable traffic disruptions along the roadway. Similar disturbances in fluid flow cause turbulent movements.

One of the very current solutions for automatic driving of road vehicles is the joint driving of a series of trucks according to the concept of "trains of truck". They are used for longer journeys where groups of vehicles have the same destination or their itineraries coincide in certain parts. But such a principle of mutual tracking travel without the use of automated aids requires that highways have a special backup route.

The effects of the automatic group truck control system can be monitored through several indicators: improved throughput expressed in number of vehicles or percentage, reduction of fuel consumption and pollution for the same transport performance, saving active driver time, increasing safety by reducing the risk of automatic driving.

3. Intelligent crossroads

Traffic lights, electric traffic lights, were introduced at intersections in the 1920s. Their purpose is to organize traffic at

intersections, that is, to reduce traffic accidents and reduce time losses, waiting. Classic systems do not have the ability to dynamically adjust the duration of the cycle, time plans, according to changes in traffic flow and special requirements for the omission of certain priority vehicles. Therefore, automatic traffic management is introduced. "Intelligent intersections" are advanced solutions for adaptive traffic light control at intersections by applying sophisticated detectors and control algorithms with significantly greater efficiency and flexibility.

Of particular importance is the safety effect on the leakage of emergency vehicles and at intersections where vehicle speeds are higher. Detectors at intersections identify the oncoming vehicle, assess its importance, and the control system adjusts the change of lights, ie the passing of emergency vehicles.

These technologies only improve the ability of drivers to make good and safe decisions. Intelligent intersections are part of the traffic management system and are connected to other subsystems of intelligent transport systems.

The intelligent intersection in the physical work of the system consists of the control part, ie the controller, with the properties of adaptability and signaling equipment. Detectors collect and send data on the passage of vehicles and the speed of vehicles approaching intersections. All data goes to city traffic management centers. Priority is given to public transport.

4. The role and importance of intelligent transport systems - ITS in the development of traffic and transport

The term 'Intelligent Transport Systems' and the acronym ITS were introduced after the First World Congress of ITS, held in 1994 in Paris. Prior to that, the term "traffic control" was used in a similar term, i.e. the terms "road transport" were used. telematics "and" intelligent road systems ".

At the beginning of the 21st century, traffic experts agree that successfully solving the growing problems of traffic and transport is no longer possible without the application of the complete concept and technologies of ITS (Intelligent Transport Systems).

ITS is a management and information-communication upgrade of the classic traffic and transport system, so that significantly higher throughput is achieved. This allows for greater throughput, security, protection and environmental friendliness compared to solutions without ITS applications.

The attribute "intelligent" generally means the ability to act adaptively in changing conditions and situations, where it is necessary to collect enough data and process them in real time. Existing ITS functional areas and services The International Organization for Standardization (ISO) has defined 11 domains of ITS:

1. passenger information, 2. traffic and operations management, 3. vehicles, 4. freight transport, 5. public transport, 6. emergency services, 7. electronic payments related to transport 8. personal safety in traffic transport, 9. weather surveillance conditions and environments, 10. major disaster response management, 11. national security. In the area of passenger information services, static and dynamic information on the traffic network, pre-road and road information services, and support to services that collect, store and manage information for planning transport activities are included.

The pre-trip information service enables users to get useful information about available modes, weather or travel prices from home, ie from their workplace or other public location. On-trip information includes real-time travel information, estimated travel time depending on existing conditions, availability of parking spaces, traffic accidents, etc.

Information is provided through terminals at bus and train stations, squares, transit points, vehicle screens or portable personal terminals. Route guide and navigation services may relate to road and road information on the optimal route or route to a designated destination. The choice of the best route is based on information about the

transport network and public transport and includes multimodal options with solutions such as park and drive (Park & Ride).

Examples of these services are:

- dynamic travel guide in the vehicle, - integrated multimodal travel guide, - pedestrian or bicycle travel guide. There are several services in the ITS domain called traffic management and operations:

- traffic management, - traffic incident management, - demand management, - management and maintenance of transport infrastructure, - identification of violators.

The traffic flow management service refers to the management of traffic flows, both in the network of city roads and outside cities (on highways, etc.). Examples of these services are:

- adaptive control of traffic lights, - ie traffic lights, variable traffic messages, - access control on the highway, - speed control, - parking management, etc.

Surveillance and elimination of incidents on roads include detection, response and clearing of incidents on roads or in their immediate vicinity. Only a smaller number of the total number of incidents relate to traffic accidents involving vehicles and there are injured or fatalities. In addition to a posteriori action, detection and clearing, accident prediction and prevention is performed. Prevention of secondary accidents is especially important. The focus is on traffic accidents and accidents and if the system includes a response to other causes of small incidents (tire puncture, vehicle disappearance, etc.) and major accidents and catastrophes (earthquakes, landslides, large fires, etc.). Demand management services include: - management of public transport tariffs, - control of access to certain city zones, - parking prices, - collection of congestion contributions, - introduction of special lanes for multi-passenger personal vehicles, etc.

Transport infrastructure maintenance management is a group of services based on the application of ITS technologies in the management of road maintenance, ie the associated communication and information infrastructure. The integration of different payment systems and institutions included in the system includes technical-technological and inter-organizational solutions. In the area called personal safety in road transport, several services are defined: - supervision and protection in public transport vehicles, stations and the like, - pedestrian monitoring system, - warning system on road works, etc. In the area called monitoring of weather conditions and environment there are services:

- road weather monitoring, - pollution monitoring, - water or ice level monitoring, etc. The area called major disaster response management connects services and agencies related to natural disasters, terrorism, etc. Examples of services are:

- management of data on major accidents, - coordination of emergency services, etc.

5. Goals of ITS

Comprehensive goal of ITS implementation in Europe is to reduce traffic congestion, which often occurs on motorways and which is a problem for workers traveling to work. ITS can play a significant role in this. In Europe, and at the level of countries, the main problem is traffic on highways. There are many developments and topics to consider in the field of ITS. The goal is to increase the quality of life of workers by reducing traffic and improving its flow.

A serious problem with traffic jams in all city centers during the biggest crowds in the morning and afternoon. More and more people live outside the city centers and have to drive to and from them every morning. Also, if you get off the highway and enter the city centers, you change from five lanes to one or two, and that causes congestion.

What people want to do with ITS is to have a very clear road sign system so you can steer cars and keep drivers informed of where

traffic jams have already occurred. A good example of this is in Brussels, where, if you enter the city, they give you very clear information about how long it will take you to get to a certain area.

Also, in certain German cities on the highway you have information about the situation with parking lots in the city. This will help drivers decide in a timely manner which roads are best to enter and exit the city.

One of the goals of ITS is to reduce the number of incidents and accidents, as well as deaths. The European Commission takes the number of road deaths very seriously and we are trying to bring it closer to zero, adding that a dynamic change in speed limits is one way to increase road safety. The Netherlands is a good example of this. If you drive on Dutch highways, you will have signboards that will give you information about top speed.

The normal speed limit is 130 kilometers per hour, but after entering certain risk zones you will see a reduction in speed to 90 or even 50 kilometers per hour.

6. Development of intelligent vehicles and automated roads

The ITS functionality of the intelligent vehicle is realized through telematics equipment that is upgraded to the basic equipment and devices of motor vehicles and trailers. At the same time, it is necessary to ensure compliance with regulations and ordinances on technical conditions of vehicles in traffic on roads or other roads. ITS includes: - vehicle control devices, - vehicle stop devices, - road lighting devices, - light signaling devices, - normal visibility devices, - reversing devices, - exhaust control and exhaust devices , - devices for coupling towing and trailer vehicles, - other devices and equipment of vehicles.

Road lighting devices and ITS solutions to improve visibility can significantly increase traffic safety while reducing the number and severity of the consequences of traffic accidents.

More than 95 percent of all decisions a driver makes while driving are related to a sense of visibility. ITS solutions enable: - improved perception of objects, - adaptation to light and darkness when exiting the tunnel and entering the tunnel, - better perception of traffic signs and messages, etc.

Active safety systems are becoming an important part of the vehicle and an important factor in improving traffic safety. Initial estimates that in 10 years ITS will halve the number of fatalities and injuries, have been largely realized. Automated, ie intelligent roads are realized by information and communication upgrade of the classic road, which includes a system of telecontrol, telemetry, telecommand and mobile communication. The initial solutions are:

- telecontrol of vehicle dimensions (using lasers and optical gratings), - video surveillance and flow control, - charging with smart wireless cards, - telemetry of meteorological conditions, - automatic systems for preventing road icing, - control of variable traffic signals, etc.

7. Smart roads

Smart Roads will send information that will be used by vehicles and traffic infrastructure. The roads of the future will be a digital communication channel that will not only share information about traffic, but also information about temperature, precipitation, road conditions and warnings of potentially dangerous situations such as fog, and similar situations in real time.

Also, information about some objects or people on the road will also be immediately available, as well as a report of damage to the roads. Keywords are "real time" and only if the information is collected, processed and transmitted without time interval, it is possible to get a digital image of traffic in real time.

In cities where network coverage is much better a large amount of data can cause a system crash. One solution could be to introduce a 5G standard that far exceeds all previous standards in terms of communication speed. The capacity of the 5G network, which should be introduced by

2020, exceeds the capabilities of the existing 4G LTE standard by 1000 times.

In China: “There are planned and built completely new big cities with traffic solutions according to the requirements of mobility. China is focused on the development of public transport and seeks to reduce the use of cars in cities. In Europe, the room for maneuver is much smaller because most of the infrastructure already exists and cannot be changed but only adapted. ”

Due to environmental problems, ie chronically high levels of air pollution in urban areas, China insists on finding innovative solutions that would change that. It is therefore not surprising that the Bavarian company SOLMOVE is not building its first solar road in Germany but not far from Beijing.

When solar roads that transmit energy to the vehicles that drive on them are mentioned, it can sound like a perpetuum mobile, and the question is how much their performance would cost. “The cost of maintaining standard asphalt roads is one euro per square meter per year,” explains Müller-Judex. "After deducting the investment costs, solar roads can earn eight euros per square meter per year. “There are also ideas about using solar roads as a heat source. Thus, during hot days, the road surface is heated to more than 60 degrees, and that heat could be used to heat buildings near roads and the like.

According to Müller-Judex, asphalt will continue to be the main construction material for road construction. “If they use materials that will be used for energy production or data transmission, it is only a thin layer on the surface, while asphalt will be used for years to build the base layer. ”Electricity production with the help of solar cells in the road is just one way because the installation of piezo-electronic elements is also planned.

Unlike solar cells, which produce electricity by the action of the sun, in this case, small amounts of electricity are generated by deformations caused by the passage of vehicles. Although these are small quantities, they would be sufficient to power the sensors, especially in areas where there is no electrical infrastructure. In addition, the roads will be able to purify the air in the future. The idea is to install stones coated with titanium oxide, which is a photocatalyst, in the slabs and fences along the road.

Therefore, although we will not have flying cars in the near future, all ideas, no matter how unusual, were welcome. "It is important that car manufacturers, designers, architects, urban planners and sociologists work together to find solutions for the mobility of the future." While some of the ideas sound too utopian, in 30 years they could very well be realistic and gradually become a part of our lives.

8. Smart traffic

Saobraćaj je aktivnost vezana za Traffic is an activity related to everyday life and production, whose task is to transport people and goods from one place to another. Due to traffic jams, in more developed parts of the world, drivers and passengers in vehicles spend several billion hours and spend tens of billions of dollars a year. Solutions for traffic jams are mainly found through projects based on the use of computer systems and simulations of different traffic cases, ie in the unification of information and traffic infrastructures. The application of modern information technologies encourages the establishment of new infrastructure consisting of networks of roads, railways, airports, stations and ports connected by Internet-based systems. Efficiency and quality are significantly influenced by intelligent systems that improve the mobility and safety of road users, because they provide proactive maintenance and faster and better diagnostics.

All advanced solutions, significantly, increase the productivity of the company's business. By applying the IoT solution, traffic regulation reduces costs and increases passenger satisfaction, which indirectly reduces the number of traffic accidents.

Future solutions will be based on the application of smarter and more environmentally friendly vehicles and their connection with infrastructure facilities, such as gas stations, parking lots, garages, etc.

Wider application of advanced information technologies, in addition to vehicle communication with infrastructure, will enable vehicle communication.

Examples of the implementation of intelligent transport systems are the integration of traffic control systems (traffic flow management, traffic light management, variable traffic messages, highway access control, speed control, parking management, etc.), public transport management (traffic routing, incident management, violator identification, maintenance transport infrastructure) and information for passengers (delivery of information).

Information delivered by telematics systems (vehicle tracking, navigation, e-toll collection, etc.) is most often transmitted over a 3G or 4G mobile network.

One of the ITS services is real-time traffic monitoring; it is most often realized as a part of the vehicle location and navigation system. In the automotive industry, in addition to the system for monitoring and reporting on the operation of individual parts of the vehicle, we work on providing information on distance from other road users, road conditions, information on the current condition of vehicles, etc. 9. Paying tickets with a smile

In China, there is a pilot project to pay for subway tickets using face recognition technology - just stand in front of the screen and the ticket will be paid. In order to be able to use face recognition technology and this way of buying tickets, it is necessary to register at the face recognition service and enter or connect a bank account from which money will be withdrawn. The face recognition technology used on the Futian site was developed by Shenzhen Metro and Huawei, and is based on the 5G network, which Shenzhen Metro says is more efficient and better for use in the subway, at lower cost.

10. I transport se robotizuje

Self-driving vehicles are already being tested and in ten years there will probably come a time when drivers will no longer be needed. Employers cannot expect the education system to produce ideal staff because production processes change too quickly in the direction of digitization and robotization. Transport is also being robotized, self-driving vehicles are already being tested and it is estimated that in ten years the time will come when drivers will no longer be needed on the labor market. Driver information systems

The ITS On-Trip Driver Information (ODI) service is implemented as a relatively stand-alone system or integrated with other information services. Its purpose is to provide quality information to the driver about traffic conditions before and after moving on the road. Using this information, the driver or passenger in the vehicle can make better decisions about the route or change the mode by leaving their own car in the parking lot and continuing by public transport.

Part of the services may relate to hazards and emergency service notifications which are then forwarded to all drivers free of charge, or may be at the request of the user which is charged according to certain tariffs. The information refers to road conditions, emergencies and accidents, various changes related to information, available parking spaces, alternative routes, attractive and tourist entertainment events. They are realized with devices installed in the vehicle, messages, control of access to the highway, speed control, parking management, etc.), public transport management (traffic direction, incident management, violation identification, transport infrastructure maintenance) and passenger information (information delivery).

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IV – SUSTAINABLE DEVELOPMENT

1. The concept of sustainable development

One of the basic concepts of natural resource and environmental economics is the concept of sustainability or sustainable development. Despite the different interpretations that can be found in the literature, this concept today has a central place in looking at the long-term perspective of the survival and progress of mankind. Sustainable development appears as a basic precondition, but also the ultimate goal of efficient organization of numerous human activities on Earth. The most common definition of sustainable development is given in the report of the Brundtland Commission. Sustainable development is defined as development that meets the needs of the current generation, and does not jeopardize meeting the needs of future generations.

In other words, today's generations need to start behaving responsibly towards the environment and natural resources because they may soon be gone. The state of the environment and natural resources must be maintained so that they maintain their productivity in the future. Here we come to the paradox that makes up the exploitation of resources and the destruction of the environment that inevitably accompanies economic growth on the one hand and the need for that same economic growth to meet the needs and eliminate poverty and hunger on the other. Sustainable development in general is viewed through three main aspects: environmental, economic and social. The environmental aspect refers to the management of natural resources and environmental protection, the economic aspect refers to development, growth and success, while the social aspect refers to the reduction of poverty and the achievement of equality among people.

Economic goals (productivity, competitiveness, economic growth) are optimized taking into account environmental goals (ecosystem integrity, global issues, biodiversity) and social requirements (humanization of work, motivation, joint management, cultural identity, social mobility, social care, etc.) which are in constant mutual (intertwined) interaction. Based on this division, we can talk about the need to manage three types of capital: natural, economic and social capital, which are not interchangeable and whose consumption does not have to be reversible. Natural capital may not necessarily be able to be replaced by economic while for some natural resources we can find a natural replacement.

But due to all efforts for some of the "services" of our ecosystem we cannot find a replacement. We cannot restore the protective function of the ozone layer or the climate stabilizing role of the Amazon rainforest. Yet, with all the care for the environment, the fact is that economic capital is the most interesting because profit still rules the world.

The concept of sustainability confronts the economy through the social and environmental consequences of economic activity. The shift towards sustainable development thus represents a social challenge that includes state and interstate law, urban planning, transport, local and individual lifestyle changes and ethical consumption. All of them have in common increased concern for the environment

through the reduction of negative human impact on the environment and a more rational use of natural resources. If we treat the environment as an external factor, we can make short-term profits, but at the expense of sustainability.

A sustainable approach to production integrates environmental care with social and economic aspects. This way of doing business can be an opportunity for the progress of local companies that adopt the principles of sustainable development. For example, industrial waste can be considered an economic resource in this context. By reducing the amount of waste in production, savings can be made on waste collection, environmental waste disposal fees, and material that is used more efficiently due to savings. All this can contribute to the reputation of companies that will ensure greater market importance with their environmentally friendly procedures. More efficient use of energy will also reduce costs, but also consume less solid fuels that we draw from the environment. The idea of sustainable development as a business opportunity has led to the formation of organizations at the global level such as the Sustainable Business Institute and the World Council for Sustainable Development.

The expansion of business based on the principle of sustainability can lead to a significant drop in unemployment (the social aspect of sustainable development), a problem that the world is having a hard time dealing with today. Given that the state of our environment in relation to some Western countries and members of the European Union is still relatively intact, the idea of seeking the competitiveness of Bosnia and Herzegovina production in this area. Sustainable development indicators are classified into four categories: social, economic, environmental and institutional.

2. Traffic and sustainable development

Sustainable development means at the same time enabling economic growth, social well-being and environmental protection. Sustainability therefore has an economic, social and environmental component. In the last few years. The European Union has integrated the goal of sustainable development (SD) into a wide range of policies. In relation to transport, the policy of sustainable development of transport and traffic should be directed towards achieving an efficient balance between different types of transport and traffic, establishing proper relations in their comparative and competitive advantages, increasing energy efficiency of transport and traffic system, reducing emissions, renewing traffic. systems based on railway transport and traffic, development of intelligent transport and traffic systems, solving the problem of distance between the center and periphery, improving the environment and location attractiveness, development of new transport and distribution systems that will meet the needs of users at minimal cost and contribute to increasing economic activity.

Transport and traffic are also one of the basic factors of putting uncultivated agricultural areas into function, more efficient protection of forestry and other protected areas, deurbanization, etc., which further increases the quality of human life.

That is why the EU launched the first EU sustainable development strategy in 2010, and was revised in 2017, in order to eliminate shortcomings and take into account new challenges. Closely related to climate change and energy policy, the revised plan emphasizes the importance of education, research and public funding to achieve sustainable production patterns. Since then, significant efforts have been made in policies, with an emphasis on putting policies into practice.

The established EU Commission for Sustainable Development has proposed a package of measures to encourage environmentally friendly products, including greater use of energy efficiency labels.

Open borders and affordable transport have given Europeans an unprecedented level of personal mobility. Goods are delivered quickly and efficiently from the factory to the consumer, often in different countries. The European Union has contributed to competitiveness by opening up national markets and free movement by removing

physical and technical barriers. But today's traffic patterns and growth rates are not sustainable. The ability for people and goods to move quickly, efficiently and cheaply is a central principle of the Union's goal of a dynamic economic and cohesion society. Removing barriers to cross-border trade and travel has increased the volume of long-distance transport of goods and people. This phenomenon has been fueled by enlargement in 2017, with significant increases, especially in road freight between the new Member States and the rest of the Union. The constant growth of mobility is a dangerous burden on transport systems. Congestion on roads and airports increases pollution and is estimated to increase EU fuel consumption by 6%.

Roads now carry 44% of the total goods transported in the Union, compared to 39% for short sea routes, 10% for railways and 34% for inland waterways. The imbalance is even more significant in passenger transport, where 81% go on roads (mainly car travel) compared to 6% by rail and 8% for air transport. The diversion of goods and passengers from roads to less polluted modes of transport will be a key factor in any sustainable transport policy. Another factor will be the ability to integrate different modes of transport by combining the elements of road, sea-rail or rail-air.

Stopping charges are also being introduced, which relate to paying users for the scarce infrastructure they occupy on roads, at airports or otherwise. One example of this is the system set up in London in 2003, which charges motorcyclists for driving in the central part of the city. Pilot programs for similar systems have been set up in several other major cities. So in cities:

- San Sebastian uses bicycles for transport and postal services, a biodiesel bus, - Rotterdam uses green corridors (underpass through the plain), etc. Paying for infrastructure also supports the idea of paying for simultaneous pollution. The transport sector, mainly road vehicles, is responsible for about 28% of total emissions of CO2, the main greenhouse gas, in the European Union. Better fuel efficiency, the use of alternative fuels and the setting of limits for carbon dioxide emissions from cars are some of the measures being introduced.

3. Modern technologies in the function of smart cities

Thanks to increased globalization, ie cultural, economic and political connections on a global level, today as many as 54 percent of the world's population lives in urban areas.

In the next few decades, this trend will accelerate further and it is expected that by 2050, two and a half billion more people will live in urban areas, the percentage will increase to 66%. The number of cities with more than 10 million inhabitants is projected to grow from 26 to 38 by 2030, most of them in Asia and Africa.

Smart cities "Without smart people, there are no smart cities." Smart cities are cities that strive for the development of holistic and sustainable cities, in which the quality of human life, but also the relationship to the natural environment will be at a much higher level. Cities are made potentially smart by modern digital technologies that enable better services to citizens, greater utilization of resources and less impact on the environment. They are mainly based on the use of smart grids, introduction of information and communication technologies, internet connection of all facilities, reduction of environmental pollution through introduction of intelligent transport systems, but also increase of energy efficiency through application of smart metering and introduction of innovative solutions in construction.

Smart transport is a key element of any smart city initiative is smart transport. It helps address common and frustrating transportation problems that residents face every day, including traffic congestion, difficulties in finding parking spaces, and a lack of information about train and bus arrivals.

Intelligent Transport Systems (ITS), which use IT technologies to improve traffic management, make roads and streets safer and easier to use, can help solve this problem.

It is estimated that by 2050, 64 percent of the world's population will live in cities. Therefore, "urban metabolism" must be improved by infrastructure that must be "smarter". When it comes to urban services, one of the most important is transportation. Enabling smarter transport networks, within which different management and transport systems are connected and combined, is key to achieving the goals that lead to the development of smart cities.

Cities with smart transport networks can boost tourism and employment, while at the same time becoming cleaner and more energy efficient due to lower gas emissions and energy consumption. Also, the growth of the ITS sector should not be ignored. According to a report by Research and Markets, the ITS market is estimated to have a combined annual growth rate of 7.9 percent by 2022.

The total demand for intelligent transport systems is growing, which is largely due to factors such as the growing demand for vehicles and increasing urbanization, which leads to a lack of space in cities. This has resulted in the need for more sophisticated infrastructure and more advanced traffic management systems and to address space shortages, the report said.

Smart cities in the world or in Europe have been supported by as many as 3,000 business partners, which opens a large market in the field of modern technologies for smart cities. It is predicted that in 2020, the market of smart cities will be worth 1.3 trillion euros, so it is not surprising that in 2016, as many as 337 cities in Europe decided to invest in some of the projects, in order to sew the name "smart". At the level of the countries, Spain and Italy lead the list with the amount of projects in which investments are made, so out of 800 projects at the level of Europe, as many as 157 and 131, respectively.

The smartest city in Europe is Amsterdam, which started with the Amsterdam Smart City initiative in 2009, with 79 projects jointly developed by the local population, government and businesses. Projects are based on connectivity via wireless devices, so that the ability to make real-time decisions can be increased. The main reasons for this initiative are to reduce traffic, save energy and increase the safety of residents. The traffic is monitored in real time and the traffic lights are changed according to the current situation on the road, in order to avoid traffic jams. To reduce traffic congestion and the search for a parking space, residents have developed the Mobypark app, which allows parking space owners to rent them out to people for a fee. Light pollution, as well as the reduction of energy consumption is regulated by smart lights, which turn on only when a person comes close, ie when the sensor registers the movement. Residents are also allowed to control street lighting by increasing or decreasing light intensity depending on visibility and time of day, but also to control light emission at some landmarks.

Public safety is achieved through video surveillance 24 hours a week, and the police go out on the field as soon as the need for it is noticed and they are at the scene very quickly, so that they provide their residents with all-day security. As another example of modern technologies, also in the Netherlands, in Krommenie it is worth mentioning the project of a bicycle path covered with solar panels. Bicycles are placed at locations near the trail, and their availability can be informed via a mobile app, and even payment, as well as identification of the person who rented the bike is done using it. Part of that 70-meter bike path generates enough solar energy for one household throughout the year. If such trails were to spread throughout the city, it would have a significant impact on the preservation of the environment, and the use of bicycles alone is smart because it does not pollute the environment like motor vehicles.

The smart nation, whose title today can be boasted only by the city-state of Singapore, has become, despite its size and lack of resources, the most advanced and most favorable country for life in the last 50 years. Their goal is to establish a 3D database of the entire city, each building and each part of which it consists, and start autonomous

processes for the maintenance of the city using this database. Singapore is in a way an experiment, because they use the most modern technologies and are ready to take revolutionary steps to make their lives as comfortable and high-quality as possible, and yet in harmony with nature.

4. The contribution of electric vehicles to sustainable development

Electric vehicles enjoyed popularity between the late 1800s and early 1900s. This period for electric vehicles was golden because electric vehicles provided more comfort and ease of use than fossil fuel-powered vehicles. The development of technology is greatly encouraged by the possibility of its practical application in everyday life. One example is the electric car that appeared shortly after the construction of the first electric motor. Nowadays, electric vehicles are ideal for city needs such as city driving and the like, in terms of radius of movement and price per km. Today, almost all car manufacturers are working on the development of electric vehicles.

In the early 1990s, after awareness, the US, Europe and other countries around the world were looking for environmentally friendly cars, with the goal of reducing exhaust emissions and increased and aided production of ZEV cars (Zero Emission Vehicle). Thus, all major countries in the world aim to achieve a number of cars (0% of exhaust emissions) of 10% of the total number of cars. Car manufacturers have responded by developing and placing electric cars on the market. In 1996, General Motors launched the EV1 electric sports car with an autonomy of 120 km, which reached speeds of up to 130 km / h. Certain environmental laws have been a major torment to the automotive industry, which they complain about. Thus, world administrations have passed new environmental laws in favor of ethanol and biodiesel. Later in the 2000s, new changes in legislation were made and aimed at developing energy efficiency. Throughout the 20th century, electric cars were completely overshadowed by vehicles with internal combustion engines, but since the early 2000s, great interest in the energy efficiency of electric vehicles has grown again and great strides have been made in the field of battery technology. , electronics and other important factors.

Electric vehicles run very quietly and have no direct emissions at the site. Increasing emphasis is placed on environmental awareness, but also due to the awareness that oil reserves are limited according to current knowledge, electric cars are again in the focus of possible technical solutions in traffic, so after concept cars appear the first models in series production (sports model Tesla Roadster of the American company Tesla and Motors) have been produced since 2008.

V PART – EDUCATION OF STAFF IN TRAFFIC

1. Education as the greatest capital

Education is the biggest capital we have for new management concepts based on digital transformations, and monitoring changes and the latest trends in management, but also getting to know, exchanging experiences and knowledge of successful managers and experts.

The importance of education in modern conditions is becoming one of the most important forms of management and development of human resources, and the science of ICT is especially applied. Modern companies are devoting more and more of their resources (money, time, information, energy, etc.) to education and continuous training of employees.

Management is increasingly realizing that continuous education and training of employees is one of the most effective ways to achieve competitive advantage, the basic premise of entering market competition and competing with the competition for the favor and trust of consumers. This knowledge is the result of large and rapid changes in the external and internal environment of modern companies that put knowledge, constant innovation and learning new things in the foreground of economic development. This is true for organizations as well as for society as a whole.

The most important thing that companies, organizations and certainly local governments can and should regulate is work on educating people, regardless of whether they are consumers or users of services. We need to be aware of how fast and temperamental change is, and the education and further development of individuals is the most significant capital we have.

Investments in education are becoming a key indicator of understanding what is happening in modern (global) business and competition. This expresses that in the new economic order, the countries that invest the most in education will be the most competent.

Insufficient investment in the education and development of employees is cited as one of the key reasons for the loss of market share and the lag of American companies behind foreign competition, especially Japanese companies. It is stated that American companies spend only 2,600 dollars per worker per year on education, unlike Japanese companies that spend 6,500 dollars. It is probable that investments in recent times have increased, as well as the intensification of educational activities in companies, the result of this knowledge and the desire to raise competitiveness in global competition. The growth of knowledge is that if people are not given an education, they steal from the future.

2. The impact of technology on the education of staff in traffic

Advances in artificial intelligence in previous decades have made significant contributions to the improvement of the education system, especially in the area of online courses. Regardless of the fact that the main actor in education will always be a man, one of the great challenges will be how to best integrate advanced AI (Artificial Intelligence) technologies with the traditional way of learning in the classroom. Greater application of Al technologies, intelligent tutors (ITS) and online learning systems is expected in the curricula of the faculty in the future. The growing use of robots as an educational tool in the education system is also expected.

This is especially true of traffic education. The future development of traffic, and thus the education of personnel in traffic will be significantly influenced by, among others, the following technologies: information technology; production, service and logistics systems with computer support; environmental technologies; new energy technologies; new materials, etc.

All these new technologies will enable the development of new transport technologies, loading and unloading and storage technologies, production of new means of transport and equipment. However, the greatest contribution to the development of traffic in the future will be given by the application of information technologies. Information technologies have caused a revolution in practically all economic areas, especially in traffic. In large traffic systems, thanks to information technologies, a much smaller number of hierarchical (management) levels is needed than traditional organizations. The current trend of introducing increasing levels of management will replace the trend with a drastic reduction in the number of levels of management of the application of information technology in the restructuring of transport systems. It is certain that one of the most significant contributions of information technologies is the development of Intelligent Transport Systems (ITS). It is considered that the use of telematics - electronics, communication, computerization in the field of transport is one of the biggest innovations in this field since the introduction of cars a century ago or highways more than 60 years ago. In traffic today, new modern technologies in the narrower sense mean Intelligent Transport Systems (ITS).

ITS is a term that describes a wide range of applications of new technologies that, through their application, facilitate the management and control of traffic systems. Intelligent transport systems are applied in all types of traffic.

In road transport Intelligent transport systems enable:

- Efficient traffic management, - Increasing safety in public transport, - Driving vehicles on the network, - More efficient use of traffic resources, - Increasing the capacity and capacity of the road through traffic management and regulation, - More productive use of roads, - Improving navigation performance, - Control and reduction of congestion, congestion and losses due to congestion, - Reduction of travel time and transport costs, - Reduction of fuel consumption, environmental pollution and damage due to traffic accidents, - Notification of passengers, etc.

3. New concept of education in traffic

Considering that the strategic development of traffic implies modern education of traffic staff, who will creatively apply modern knowledge in practice, encourage the development and efficient use of new technologies in traffic, develop entrepreneurship and competitiveness with the application of modern organization and management. In addition to the efficient use of transport infrastructure, means of transport and equipment in which huge financial resources and knowledge will be invested, personnel with appropriate knowledge, skills and abilities are needed efficiently and effectively.

According to the assessment of the experts of the European Union, the critical link in the implementation of the Strategy for the Development of the Transport System of Europe (2011-2030-2050) is the missing staff, especially in some countries of Southeast Europe. Therefore, there are staff in the jobs of graduate traffic engineers who do not have the appropriate knowledge, abilities and competencies to perform jobs in those jobs.

As a result, due to the great importance of personnel and education of personnel in transport, new concepts of education of personnel in transport, quality of higher education, especially in transport, permanent (lifelong) education, dual education, practical classes (education) and research education are necessary. to the necessity of changes in the education system from secondary to higher education. This is a great challenge for higher education institutions in the field of transport.

The choice of the optimal model of education is a very complex problem and can be reached through detailed research, both in secondary and higher education, and in transport organizations. In addition to the fact that it is known that changes and thorough innovations of educational programs are necessary, the following must be taken into account when choosing the model of education:

- Graduated traffic engineers, considering the requirements that are set before them, are expected to have a comprehensive education. Namely, they should have the appropriate knowledge and experience to perform tasks: researchers, planners, designers and especially transport infrastructure, experts and managers at all levels in transport institutions and transport organizations, transporters in the logistics chain, traffic experts in cities, etc. is a significant role of graduate traffic engineers in planning and designing traffic infrastructure where mistakes made cannot be corrected. Therefore, graduate traffic engineers in addition to traffic engineering and transport technology should have appropriate knowledge of engineering economics, marketing, information and communication technologies, business law (European legislation), foreign languages, management, etc. - Since traffic is the area where they apply state-of-the-art technologies, and bearing in mind that according to some estimates, the amount of human knowledge doubles every 7 years, the question arises how to establish a relationship between the study of fundamental sciences and applied sciences at faculties in the field of transport. On the other hand, the acquired knowledge is becoming increasingly obsolete, which is why constant innovation of knowledge is needed, which should enable acquaintance with the latest achievements and traffic technologies. - All transport organizations are mostly associated in the relevant international organizations and in

international traffic are obliged to apply international standards, directives, resolutions, etc. This primarily refers to the European Union Directives for certain modes of transport, resolutions of world organizations such as the United Nations Resolution on traffic safety, documents of international organizations in the field of traffic, state laws, etc. It should be emphasized that traffic organizations perform activities of public interest (public function) and have social responsibility. Therefore, it can be stated that there is no single model that would meet all the needs for modern education in traffic, and basically we can say a combined model of education, which would be composed of elements set out in the New education concepts.

VI PART – LOGISTICS

1. Logistics and logistics system

Logistics is the flow of goods between a point of mass production and a point of consumption in order to meet the needs of customers or corporations. Sources in logistics can include real products such as food, materials, animals, equipment, and liquids, as well as unreal products such as information, particles, and energy.

The logistics of actual products typically include the integration of information flow, material handling, manufacturing, packaging, inventory, transportation, warehousing, and often security. One of the main characteristics for business logistics is to have a good product in good quantity in the right place, for a good price in good conditions, for the right customer. Business logistics includes all sectors in the industry.

The market uses modern logistics teams that rely on information and communication technology, and are one of the conditions for meeting European standards. Logistics is an activity that deals with mastering space and time at the lowest cost. In modern conditions, it is most often used to denote a business function or scientific discipline that deals with the coordination of all movements of materials, products and goods in physical, IT and organizational terms. The circular process from procurement through production and sales to consumers.

It is part of the management system and must ensure production flexibility, required supply deadlines and supply readiness for the sales market. It is also responsible for tying capital into stock to remove bottlenecks.

The central role of logistics stems from its multidisciplinarity, implying respect for the technical, technological, organizational, economic, environmental and legal aspects. An entrepreneur of logistics activities and a manager in a logistics organization must be equally important in managing transport, storage and transport resources and their variables on which the traffic depends, whose role is to sell the service in the most favorable way, establish a place in the market and maintain competitive conditions.

The purpose of logistics is to continuously improve the flow of goods and information through the company, and its goal is to reduce inventory, shorten the flow of products and shorten the reaction time. Logistics is an integral part of our daily lives. It has a greater role and influence today than most other human activities. Logistics includes what we know today as supply chain management. It also includes service activities, not just physical production.

2. Logistics costs

The profitability of a company depends on the logistics costs that make up a significant part of the total operating costs. This share of costs varies between manufacturing and retail firms. Some research shows that the structure of total logistics costs consists of: transport 45%, warehousing 25%, inventory 20% and administrative costs 10%. Costs for logistics functions are more significant in retail than in manufacturing. Due to high costs, retail chains began to look for savings in the development of a personal logistics system.

Only the largest retailers in the market manage to reduce costs and compete with low prices. Due to the small quantities and the large number of delivery points, it is concluded that it is cheaper and easier to find a reliable logistics partner who will provide quality and complete logistics service.

Logistics services mainly include the cost of fuel, tolls and the driver's net salary. The most important items are all forms of fuel maintenance, warehouse rental costs and infrastructure depreciation. In addition, the depreciation of technology investments should be included in the logistics costs.

One of the most significant costs is staff costs while most costs are fixed. In order to perform the delivery service accurately and with quality, it is necessary to have a sufficient number of vehicles. However, due to the large number of places in Bosnia and Herzegovina, companies have a large number of vehicles and low utilization.

The costs and conditions of their occurrence affect the final result as well as revenues. Any rational management of costs leads to a reduction in costs, which is reflected in profits. The costs included in the consideration of logistics total costs consist of costs in functional logistics subsystems (execution of orders, stocks, warehousing, transport and packaging).

Logistic thinking is not just thinking about costs, but also thinking about effects (where it is necessary to decide whether it is more favorable for business success to reduce logistics costs or increase logistics effects). If the optimal batch size is determined, we get the optimal ratio between the cost of production preparation and the cost of inventory. Proper planning of material needs is the main purpose of production planning that affects the exact needs for semi-finished products, raw materials, packaging and quantities in warehouses and production halls, which saves on inventory and raises the level of efficiency.

If you know how to plan and terminate capacity well, waiting time will be reduced and savings in production costs will be created, it will become more efficient, more efficient and productive, and bottlenecks will be detected, while eliminating the dangers they present.

3. Application of information technology in logistics processes

Modern business imposes the application of a process approach with extensive use of information technology. This primarily refers to the development of a customer-centric business process model. This business process model is a method of doing business for profit. For this reason, the focus should be on processes because they are an integral part of every business.

Logistics processes are a set of processes, sub-processes and activities. Their goal is to meet the requirements of customers to dispose of certain products or services at a certain time and place, at minimal cost.

A set of interconnected logistics processes make up a logistics chain that involves information flows in both directions. It usually consists of a stock management process, a procurement process, a warehousing process, a transportation process, and a return process.

According to the picture, a logistics chain consisting of the following elements can be observed:

- flow of materials and information, - flow of information, - a - flow of information and return of information, - b - initial supplier (raw materials), - c - supplier, - d - producer, - e - consumer or end customer.

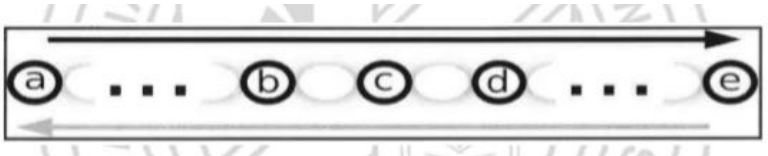

Figure 1. Logistics chain

The picture presents a more complex view of the logistics chain composed of a series of processes, sub processes and activities that are interconnected. The areas of technology, informatics, organization and economy, through mutual interaction, enable

coordinated and synchronized action of all factors of the logistics chain in order to achieve the main goal, ie greater efficiency at minimal cost.

Information technology is a basic component in modern logistics systems. The IT composition of the company consists of a business part that includes transaction processing and management of operational functions of the company and a management part that includes a decision support team and expert staff.

4. Information technology and transport process

The transport process refers to the physical movement of materials or products between individual points within the logistics chain along the transport network. Despite the technological advantages and cooperation among business partners, only a small part of the company is able to reduce transportation costs.

In order to achieve significant financial savings, it is necessary to plan the delivery route, monitor the operation of vehicles and drivers, and monitor vehicle maintenance. High demand and large investments lead to the integration of transport process management solutions. This achieves a significant synergistic effect. Transportation is a key component in the design and management of logistics systems. With the development of information technology, additional preconditions have been provided for the improvement and optimization of the transport chain and the reduction of transport costs. However, the carriers of changes in the application of information technology are mostly large companies, of which there are not many in our market.

Telematics as a term includes telecommunications, automation and informatics. Communication is in charge of data transfer, automation records data, and informatics presents them in a form that is convenient for users.

By using telematics, companies increase the efficiency of their vehicles and employees. They also reduce various transportation costs. Such a system allows the exchange of information between all vehicles and the central system. To facilitate the exchange of information, each vehicle is equipped with one or more devices that record and collect information from the vehicle. One of the devices is used for communication between the driver and the center. In this way, the driver can display data to the center without stopping. Using telematics technology, the location of each vehicle can be determined.

Telematics also provides a high degree of security in the case of transporting very expensive cargo. It also offers the possibility of cooperation. Depending on the needs of the center, it distributes the collected data on vehicles and their movements to interested companies. This way, customers can know the time of arrival of goods, and suppliers can have constant control over their cargo. This work has increased transparency in the supply chain. The use of telematics enables fuel savings, reduces the number of thefts and vehicle maintenance costs, speeds up delivery times, reduces the number of traffic accidents, enables better driver safety, reduces administration, and most of all increases the satisfaction of drivers and customers.

5. Information technology and storage process

A set of processes and activities related to the physical management of inventories make up the storage process. We distinguish the warehouse for finished products, semi-finished products and raw materials. The use of warehouses in the logistics chain implies the creation of stocks and thus increases the overall logistics costs. With the help of information technology, we try to reduce it to the lowest possible level.

It strives to improve the handling of goods from the moment of entry to the moment of exit from the warehouse. A company's information system refers to everything related to the collection, storage and distribution of data and information. The organization of warehousing operations is conditioned by the type of economic activity,

and is different in manufacturing companies, trade, distribution and transport.

Improper storage process leads to insufficient use of storage space, it is possible to replace items for each other, there is an inability to find a particular item in the warehouse, there is also a slow flow of goods, lack of information on quantities and time of goods in the warehouse, but there is also inefficient use of labor.

In order to maintain the existing costs for a larger quantity of goods, it is necessary to increase the efficiency of the company and thus ensure a competitive advantage in the market. To avoid all these problems, a WMS (Warehause Management System) system is introduced into the storage process.

Such a warehouse management system is a solution for monitoring and supervising all storage processes. As it is a key part of the supply chain, its goal is to take care of the movement of goods in the warehouse, which refers to loading, receipt, placement and selection, while enabling control of all logistics processes without a paper trace.

In the WMS system, the position of stocks is determined by WMS algorithms, the output of goods is ensured, better control, higher speed of turnover and better efficiency. We are continuously working on innovations in the warehouse monitoring system. We are also working on improving the warehouse, which would use voice recognition technology. Any control and data entry in the system would be done by voice.

For such quality work, the entire storage area must be covered by a quality radio signal. Each worker would be equipped with a voice terminal and headphones with a microphone.

All logistics solutions are developed according to the needs of the users themselves. In order to subordinate warehouse management to the WMS system, an expensive investment is required. Using such a system improves business and warehousing. It also increases customer satisfaction, reduces energy consumption, time, storage capacity, as well as workforce.

6. Application of information technology in the integration of logistics processes in BH companies

The application of information technology in logistics and the integration of logistics processes enable the progress of the entire logistics.

Degrees of application of information and communication technology in logistics are:

- Transportation planning is not based on paper, fax or telephone - each business unit has unique processes that are not repeated. - Functions such as carrier selection, type of transport and offers are automated. - There is a better use of means of transport, shorter routes, better planning of the logistics network and the use of a centralized ordering system. - The systems for conducting transactions have been improved, which gives them the possibility of overall planning and event management. - Real-time monitoring - this includes business and data exchange, balanced target methods and continuous system improvement.

The picture represents the development of logistics. At the very beginning, the activities were distributed throughout the company. But as firms recognized the impact of logistics, logistics activities were reorganized into raw materials management and physical distribution. This has led to the development of integrated logistics in order for companies to control the flow of goods and services to the end user. Based on the above, it can be concluded that BH companies are in the 2nd phase of application of information technology in logistics. Significant fragmentation of logistics processes is still present among BH companies and significant financial and organizational efforts are needed to move closer to a fully integrated logistics chain.

BiH's accession to the European Union is expected to accelerate computerization and integration of logistics processes based on significant application of EDI - a set of applications and solutions to improve efficiency and reduce trading costs, ie paperless paperwork, GPS - Global Positioning System (acronym GPS) is

satellite radio navigation system for determining the position on the Earth or in its vicinity and RFID - Radio Frequency Identification, ie radio frequency identification, technology.

CONCLUSION

When it comes to intelligent transport systems, Europe has made a big step forward by using IoT and data collected using networked devices to solve some of the problems that residents face. Transport is a key factor in the economic growth of the European Union, and solutions for safer highways and roads reduce transport costs to a minimum and maximize safety.

In addition, ITS can bring certain benefits to supply chains and other market sectors, such as tourism, agricultural production and product exports. ITS technologies also enable better route planning and route shortening and optimal use of vehicles by cooperating on driving planning and providing traffic information.

The overarching goal of ITS implementation in Europe is to reduce traffic congestion, which often occurs on motorways and which is a problem for workers traveling to work. ITS can play a significant role in this. The goal is to increase the quality of life of workers by reducing traffic and improving its flow.

There is a serious problem with traffic jams in all city centers during the busiest mornings and afternoons. More and more people live outside the city centers and have to drive to and from them every morning. Also, if you get off the highway and enter the city centers, you change from five lanes to one or two, and that causes congestion.

What people want to do with ITS is to have a very clear road sign system so you can steer cars and keep drivers informed of where traffic jams have already occurred. A good example of this is in Brussels, where, if you enter the city, they give you very clear information about how long it will take you to get to a certain area.

Also, in certain German cities on the highway you have information about the situation with parking lots in the city. This will help drivers decide in a timely manner which roads are best to enter and exit the city.

One of the goals of ITS is to reduce the number of incidents and accidents, as well as deaths. The European Commission takes the number of road deaths very seriously and we are trying to bring it closer to zero, adding that a dynamic change in speed limits is one way to increase road safety. The Netherlands is a good example of this. If you drive on Dutch highways, you will have signboards that will give you information about top speed. The normal speed limit is 130 kilometers per hour, but after entering certain risk zones you will see a reduction in speed to 90 or even 50 kilometers per hour.

ITS technology supports the improvement of individual transport, as well as public transport, freight transport and other modes of transport, and is directly related to energy, fuel and money savings. Conditionally, the goal of intelligent transport systems (ITS) is primarily to improve the efficiency and safety of the transport system, but also to achieve economic and environmental efficiency.

The justification for investing in the development of intelligent transport systems is unquestionable and represents a great opportunity for the economy of each country, and especially for those economies that are in the process of transition.

In addition to these benefits from the application of intelligent transport systems arising from the feasibility study of the introduction of ITS, in Europe there are a number of advantages that have come from the introduction of ITS, the most important of which are:

1. Increasing the capacity of the street network by 20 - 25%,

2. Improving road safety (reducing the number of accidents by 40 - 80%),

3. Improving the quality of the natural environment (reducing emissions of pollutants and harmful gases by 30 - 50%),

4. Improving road comfort and traffic conditions for drivers, users of collective transport and pedestrians,

5. Reduction of total travel time up to 60%, and reduction of delays between 5 and 40%,

6. Reduction of fleet management costs, reduction of road repair and maintenance costs and increase of economic benefits in the region and reduction of costs for motor carriers by 35%,

7. Increase of throughput on city roads and highways from 20 to 30%,

8. Energy consumption savings (by 40 to 70%),

9. Better passenger information and better integration.

All this would lead to an increase in traffic reliability, to 35% compared to the current situation. In addition to these advantages, one of the important opportunities for the development and introduction of ITS is the encouragement of the appropriate industrial sector (road telematics system, software industry, electronics, etc.). As one of the basic goals of the European Union in the field of ITS, on the basis of which it is possible to create new businesses with high added value.

Since ITS is a key determinant of sustainable development, transport, transport and logistics in the first half of the 21st century, the involvement of a significant part of the information community in these projects should be expected.

It is hoped that ITS will play a significant role in ensuring the future of sustainable mobility against the many economic, environmental and social pressures. New generations of intelligent transport traffic management systems will ensure dynamic, efficiently adaptable traffic flow management.

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