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## **ŠOLSKI CENTER CELJE**

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## **KOMUNIKACIJA V ORGANIZACIJI**

### **POVZETEK**

Komuniciranje je temeljno za planiranje, organiziranje, vodenje in kontroliranje logističnih procesov. Komunikacija omogoča usklajenost delovanja znotraj organizacije in njeno povezovanje navzven. Omogoča posredovanje, pridobivanje in izmenjavo informacij, kar je temelj sodobnega poslovanja v globalnem poslovnem svetu.

V prispevku navajam različne stopnje razvitosti organizacije v njenem razvojnem ciklusu od ustanovitve do njene ukinitve in ugotavljam vpliv stopnje v razvoju organizacije na obliko komunikacije v organizaciji, pa tudi vpliv načina komuniciranja na razvojno pot organizacije.

Ključne besede: komunikacija, organizacija, faze v razvoju organizacije

## 1. POMEN KOMUNIKACIJE

V logistiki komunikacijski proces pogosto enačimo s krvnim obtokom pri človeku.

Komuniciranje je temeljno za planiranje, organiziranje, vodenje in kontroliranje logističnih procesov v današnjem dinamičnem svetu, ki je v smislu informacij izjemno zasičen in usmerjen k maksimalnemu izkoriščanju časa, ko je časovno vse izredno natančno sprogramirano in ko se hitro prenašanje informacij, ki je značilno za današnjo dobo, seli tudi v odnose med ljudmi.

Poslovna komunikacija je pojem, s katerim se srečujemo v vsaki organizaciji, pri vsaki dejavnosti. Komuniciranje služi tako za usklajenost delovanja znotraj organizacije kot za predstavitev delovanja organizacije in njeno povezovanje navzven. Komuniciranje omogoča dajanje in pridobivanje informacij, medsebojno izmenjavo podatkov in mnenj ter je pogoj za vzdrževanje osebnih in poslovnih stikov, delovanje in prenos idej, zamisli in rešitev. Vsaka organizacija udejanja svoje cilje skozi svoje vrednote, vizijo in poslanstvo, zato je tudi način poslovnega komuniciranja v posamezni organizaciji vedno odraz organizacije same. Poslovna komunikacija je tista, ki omogoči, da pridejo jasneje do izraza cilji organizacije, strategije za doseganje skupnih ciljev in posledično večja učinkovitost.

V današnjem poslovnem svetu ni dober komunikator tisti, ki lepo govori, ampak tisti, ki uspe v kratkem času sogovorniku prenesti ravno pravšnjo količino informacij in to tako, da jih sogovornik lahko jasno razume.

## 2. VPLIV STOPNJE RAZVITOSTI ORGANIZACIJE NA KOMUNIKACIJO

Organizacija in njeno delovanje se v razvojnem ciklusu od ustanovitve do njene ukinitve zelo spreminja in s tem je močno povezan tudi način komuniciranja.

### 2.1.NAČRTOVANJE USTANOVITVE

Prva faza je faza načrtovanja ustanavljanja organizacije. To je obdobje, ko iščemo ideje, jih vrednotimo in skušamo umestiti v tržni prostor. Delovanje organizacije se šele vzpostavlja in pogosto spreminja in hitro prilagaja novo pridobljenim ugotovitvam in prvim odzivom trga. Ne le, da se šele formirajo cilji delovanja organizacije, prav tako se tudi sproti vzpostavlja oblika organiziranosti. Delovanje je pogosto stihijsko, sproti se prilagaja novim idejam in pogojem. Trenutnemu delovanju in organiziranosti se ne posveča veliko pozornosti, saj je vse usmerjeno v prihodnost, v možnosti in ambiciozne načrte, za katere ni nujno, da imajo realne osnove. V tem obdobju so dopuščene vse ideje, ki jih nato ovrednotijo in preverijo njihovo uresničljivost.

Vse to seveda vpliva tudi na oblike poslovnega komuniciranja, ki je v tej fazi običajno še zelo neformalno. Vzpostavitev delovanja organizacije pogosto temelji na prijateljskih vezeh in temu primerno je tudi komuniciranje pogosto bolj podobno zasebnemu pogovoru kot poslovnemu komuniciranju. V tej fazi je dopustno sprotno razmišljanje, popravljanje, dopolnjevanje. To je obdobje ambicioznih inovativnih načrtov, za katere je nujna tudi svoboda v komuniciranju, ki ne postavlja omejitev.

### 2.2.ZAČETEK DELOVANJA

Faza ustanovitve in začetnega delovanja organizacije je turbulentno obdobje, ko se začetna vzpostavitev delovanja in organiziranje dela hitro spreminjata in prilagajata trenutnim situacijam, ki se pogosto spreminjajo. V tem obdobju se osnovnim dejavnostim dodajajo še druge dopolnilne dejavnosti, prihaja do širitve ali do specializacije osnovne dejavnosti, preverja se učinkovitost izbranih dejavnosti, njihova pozicioniranost na trgu, išče se možnosti za vstop na nove trge, pogoste so tudi spremembe ali dopolnitve dejavnosti. To je čas sprotnih prilagajanj novim ugotovitvam. Vzpostavi se organiziranost podjetja, formira se delovni kolektiv. Ker večina podjetij začenja v majhnem obsegu, vodenje običajno ni povsem definirano in je največkrat v domeni ene osebe. Posamezne poslovne funkcije so le delno porazdeljene, pogosta je situacija, ko »vsi delajo vse«.

V takšnem okolju komuniciranje ni formalizirano, sproti se prilagaja potrebam in trenutnim odnosom. Ni predpisanih vzorcev komunikacije, malo je dokumentacije, ni še vzpostavljena funkcija nadzora in niso še izoblikovani in predpisani postopki delovanja. Pogosto je komunikacija na zasebni ravni in temelji bolj na poznanstvu ali na začetnem elanu kot pa na strokovnih utemeljitvah. Stili komuniciranja so različni in so odvisni bolj od predhodnih izkušenj posameznikov kot pa, da bi bili izoblikovani v novem kolektivu.

### 2.3.OBDOBJE HITRE RASTI

Obdobje hitre rasti organizacije je obdobje, ko ima organizacija že izoblikovano osnovno dejavnost in vzpostavljeno začetno organizacijsko strukturo. Njeno delovanje je sicer že formalizirano, zaradi hitre rasti pa se mora nenehno prilagajati tudi organiziranost. V tem obdobju organizacija svojo dejavnost širi na nova področja, na nove trge, dodaja sorodne dejavnosti, začenja vključevati tudi druge vzporedne dejavnosti ali pa se specializira. To je obdobje hitre rasti poslovanja, kar je običajno povečano tudi z rastjo organizacije, torej z večanjem števila zaposlenih, posledično pa z novo vzpostavitvijo sistema organiziranosti in vodenja. Zaradi večanja organizacije je potrebno odnose v organizaciji in navzven bolj formalizirati in podrobneje predpisati. V času hitre rasti pride do velikega povečanja zaposlenih, kar zahteva tudi delitev poslovnih funkcij, ki pa običajno ne sledi povsem hitrosti razvoja podjetja. Delitev poslovnih funkcij vodilni pogosto razumejo kot manjši nadzor nad celoto, zato delitev in predajanje funkcij odločanja pogosto zaostajata za siceršnjo vzpostavitvijo nove organiziranosti delovanja organizacije.

Večja formaliziranost v organizaciji vodi tudi v večjo formaliziranost v komuniciranju. Vloge in pristojnosti se jasneje opredeljujejo, zato so tudi nivoji in načini komuniciranja bolj opredeljeni. Še vedno pa je tudi možno sprotno prilagajanje in odzivanje na trenutne nove nastale situacije, saj gre za obdobje hitre rasti, torej hitrih sprememb, ki jim mora slediti tudi komunikacija. V organizaciji se začenjajo uporabljati vzorci, ki pa še niso nujno predpisani in poenoteni. Ko se pri delu pojavljajo specializirane funkcije, se to odraža tudi na načine komuniciranja. Oblikujejo se skupine, ki definirajo svoje oblike komuniciranja, so pa še vedno odprti za vse ostale. Organizacija je v obdobju zelo uspešnega poslovanja, komunikacija pa temu ne sledi povsem. Vzrokov za to je več. Neustrezna delitev poslovnih funkcij oziroma neprilagojenost poslovanja, ki ne sledi spremembam zaradi rasti organizacije, povzroča težave v komuniciranju. Hitra rast organizacije pomeni veliko povečanje števila udeleženi v poslovnih procesih, kar komuniciranje oteži. Zaradi rasti organizacije se ji dodajajo nove lokacije, novi obrati, začenja se poslovanje z novimi trgi, kar vse vpliva na večjo zapletenost pri komuniciranju. Pri hitri rasti prihaja do hitrih velikih nihanj, ki zahtevajo hitra odzivanja, na kar ustaljeni modeli komuniciranja niso pripravljeni.

### 2.4.VRHUNEC RASTI V RAZVOJU ORGANIZACIJE

Po obdobju hitre rasti, ko se preizkušajo različne dejavnosti, različne oblike delovanja in različni trgi se podjetje običajno ustali. To je obdobje, ko je organizacija »našla svoj prostor«, ko so ugotovili, katera dejavnost je najuspešnejša in to izoblikovali tako, da daje najboljše rezultate. Ker se dejavnost ustali, se sicer še vedno dogajajo sprotne prilagoditve, ki pa so manjše. Tudi organiziranost ostaja enaka, saj ne potrebuje nenehnih sprememb in prilagajanj, ker ni več tako burne rasti. To je obdobje največjega razcveta in tudi največjih uspehov organizacije. Organizacija doseže svoj vrhunec. Če želi organizacija ostati na tem nivoju, mora nenehno skrbeti za usklajenost med nadzorom in prilagajanjem, ostati mora inovativna in se prilagajati

potrebam trga. To obdobje pa je težko vzdrževati dlje časa, saj je treba kljub uspešnemu položaju, ki na prvi pogled ne potrebuje spreminjanja, nenehno prilagajati delovanje novim potrebam. V tem obdobju imamo visoko stopnjo formaliziranosti poslovanja, kar pomeni veliko učinkovitost, predstavlja pa nevarnost, da bo težje slediti nujnim spremembam, ki se pojavljajo kot posledica sprememb poslovnega okolja. Tudi komuniciranje je v tej fazi že lahko predpisano, ali pa je vsaj neformalno sprejet komunikacijski vzorec, ki ostaja enak dlje časa, saj se ni več potrebno nenehno prilagajati spremembam v poslovanju podjetja. Umirjenost rasti omogoča vzpostavitev stalnih komunikacijskih vzorcev. Ti vzorci postanejo privzeta oblika komuniciranja, kar pa lahko vodi v nevarnost, da ni več dovolj prilagajanja, ko je le to potrebno.

## 2.5.STABILNOST ORGANIZACIJE

Ko organizacija doseže svoj vrhunec, nekaj časa ostaja stabilna. V tem obdobju je organizacija močna, učinkovita in uspešna. Zato ni čutiti potrebe po inovativnosti in prilagajanju, saj so rezultati dobri. To pa vodi v stagniranje in nato v zmanjševanje uspešnosti. Pojavijo se novi, zagnani konkurenti, ki v fazi hitre rasti prehitijo delovanje organizacije. Direktno še ne predstavljajo grožnje, saj zaradi majhnosti še niso konkurenčni, postavljajo pa si temelje za hitro rast in doseganje vrhuncev, ki bodo hitro preseгли učinkovitost organizacije, ki je v fazi stabilnosti in je zaradi velikosti in formaliziranosti zato manj prilagodljiva.

V tej fazi je komuniciranje povsem formalizirano, se ne spreminja, ker za to ni potrebe, saj ni rasti ali drugih sprememb v poslovanju. S tem, ko se komunikaciji ni potrebno prilagajati in spreminjati, postaja vedno bolj formalizirana, z večjo formaliziranostjo se težje prilagaja in spreminja, to pa je tudi ena od ovir za spremembe v delovanju organizacije. Začne se torej »vražji krog«, ko nefleksibilnost delovanja organizacije povzroči formiranje ustaljenih nefleksibilnih vzorcev komuniciranja, le ti pa zavirajo razvoj delovanja in povzročajo še večjo nefleksibilnost organizacije. Nefleksibilno delovanje organizacije pa nujno vodi v njeno nazadovanje.

## 2.6.ZAČETEK TEŽAV

Organizacija pride v obdobje, ko je sicer še vedno poslovno uspešna, saj še ima prednost iz preteklosti, njeno delovanje pa je usmerjeno predvsem v to, da se poskuša predstavljati navzven še vedno enako uspešna. Organizacija skrbi predvsem za svoj ugled, ureja poslovne prostore, kaže svoje uspehe in rezultate, ki so bili doseženi v preteklosti, manjka pa ji elana, zagona, inovativnosti, pripadnosti... Ko se pokažejo prvi neuspehi ali težave, se začenja čas medsebojnega obtoževanja in iskanja krivcev, namesto da bi iskali rešitve in energijo usmerjali v vitalno inovativno delovanje organizacije.

Ker je to obdobje, ko se organizacija še ni pripravljena prilagajati in spreminjati, če se pokažejo prve težave, ki se niti še ne odražajo v poslovnem uspehu, ali pa v organizacijah teh kazalnikov še ne vidijo kot težave, ki bodo peljale k nazadovanju, je tudi komunikacija še vedno omejena



na ustaljene vzorce in izrazito formalizirana. Formaliziranost se še stopnjuje in počasi prerašča v birokracijo.

## 2.7.OBDOBJE ZATONA

Ko se v organizaciji začno kazati prve poslovne težave, bi morali na to odreagirati s hitrim prilagajanjem, odzivnostjo in zanosom, kot so ga imeli v času hitre rasti. Običajno pa namesto iskanja novih virov prihodkov izgublajo energijo z zmanjševanjem stroškov, namesto iskanja idej za izboljšave iščejo krivce za napake, namesto prilagajanja poslovnemu okolju in njegovim spremembam iščejo podporo v politiki in v zakonodaji. To pelje v vse večjo zbirokratiziranost, ukvarjajo se s sistemom svojega delovanja namesto s prilagajanjem in zadovoljevanjem trga.

To v organizaciji privede do povsem načrtovanega sistema komuniciranja, ki je zapleten, tog, neprilagodljiv in urejen s pravilniki in predpisi. Takšen sistem komuniciranja povsem onemogoča inovativnost in vpeljavo novih pristopov, ki pa bi bili nujni za spremembe v poslovanju, ki bi poslovanje ponovno oživile in s tem še dodatno otežuje vsako spremembo negativnega trenda poslovanja.

### 3. VPLIV NIVOJA RAZVITOSTI KOMUNIKACIJE NA LOGISTIKO

Ronald Ballou definira logistiko takole: pri logistiki gre za menedžment vseh aktivnosti v zvezi s premikanjem in skladiščenjem ter s tem povezanimi aktivnostmi, ki nastopajo med točkama dobave in porabe. Poslanstvo logistike je zagotoviti strankam storitev v skladu z njihovimi potrebami in zahtevami na najbolj učinkovit način. Osnovni cilj logistike je zagotoviti prave dobrine in storitve na pravem mestu ob pravem času, pri čemer je cena vsega tega najnižja.

Vidimo torej, da je po njegovi definiciji logistika ni le [proces](#) premikanja [stvari](#) od ene točke do druge in njihovo shranjevanje, kot pravijo zgodnejše definicije pojma logistika, ampak je bistveno menedžiranje aktivnosti in ne sam proces. Pri tem je pomembno, da imamo usklajene procese komuniciranja.

Ker pa se nivoji komuniciranja v različnih organizacijah bistveno ločujejo glede na stopnjo razvoja, v kateri se organizacije nahajajo, to predstavlja enega glavnih izzivov sodobne logistike.

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## **COMMUNICATION IN THE ORGANIZATION**

### **ABSTRACT**

Communication is the key aspect in planning, organizing, leading and controlling when dealing with logistic processes. Communication enables coordination within the organization and its unity on the outside. It enables passing on, gathering and exchanging information, which is the crucial element of modern business in the global business world.

In this article I state several stages of the development of the organization in its developmental cycle, from the establishment to the end, as well as discuss the influence of the developmental stage of the organization on the form of the communication within the organization, and also the influence of the manner of the communication on the development of the organization.

Key words: communication, organization, developmental phases of an organization

## 1. THE IMPORTANCE OF COMMUNICATION

In logistics communicational processes are usually illustrated with the human bloodstream. Communication is the key aspect in planning, organizing, leading and controlling of the logistic processes in today's dynamic world, which is extremely saturated with information and oriented towards the maximum time efficiency, when everything is carefully scheduled and when the quick flow of information, typical for this era, is beginning to reflect the relationship between people.

Business communication is the term which we encounter in every organization, with every activity. Communication is needed for the coordination of the work within the organization, likewise it is needed for the presentation of the work and its networking on the outside. Communication enables the giving and receiving of information, the exchange of data and opinions, and it is also the condition for the maintenance of personal and business connections, the production and exchange of ideas, concepts and solutions. Every organization fulfills its goals through its values, vision and mission, which is why also the manner of business communication of an individual organization is always also its reflection. Business communication is the one that allows clear goals of the organization and the strategies for their achievement to evolve, and consequently this leads to greater efficiency.

In today's business world a good communicator is not the one that speaks nicely, but the one who is able to transmit the exactly right amount of information in short period of time to the co-speaker in a manner that they understand it clearly.

## 2. THE INFLUENCE OF THE DEVELOPMENTAL STAGE OF THE ORGANIZATION ON COMMUNICATION

Organization and its activity change dramatically during the course of its establishment and all until it is put out of business and communication is strongly linked to that.

### 2.1.PLANNING THE ESTABLISHMENT

The first phase is the planning phase of the establishment of an organization. This is the period, in which we search for ideas, evaluate them and try to place them on the market. Activities of the organization are only beginning to be established and are often changed and quickly adjusted to the findings and first feedback of the market. Not only that the goals are being just formulated, also the form of organizing is being established simultaneously. Activities are often uncontrolled and adjusted in the process of gathering new ideas and conditions. There is not much emphasis put on the current activities and organization, as all focus is put on the future, possibilities and ambitious plans, which may not be realistic at all. In this period such ideas are allowed, as they are evaluated and tested later.

All that of course has also an influence on business communication, which is usually in this phase still relatively informal. The establishment of the organization is usually based on friendly terms and therefore also the communication reflects such relationships and resembles more to private conversations rather than being strictly business communication. This phase is also characterized by thinking, error-correction and addition as you go along. This is the time of ambitious innovative plans, for which freedom of communication without boundaries is absolutely necessary.

### 2.2.THE BEGINNING OF WORK

The phase of the establishment and initial activities of the organization are a turbulent era, when the work and its organization rapidly change and adjust to other situations, which also change quickly. At this time the basic activities are accompanied by additional supplementary activities, and the expansion or the specialization of the basic niche occur. Also the efficiency of the selected activities and their position on the market are evaluated and the possibilities for the entrance on the new markets are investigated. Equally frequent are also the changes and additions to the activities. This is the time of adjustments to new findings. The organization of the company and the formation of the team are established at this point. Because most of the companies are initially small, leadership is usually not defined and is mostly in the domain of one person. Specific management positions are only partially established, usually “everyone works on everything”.

In such environment communication is not formal and it is adjusted by the needs and current relationships. There are not prescribed communicational patterns, there is little paperwork, no control and the process of activities is also not defined yet at this stage. Communication is, thus,

more on a personal than professional level and based on acquaintances and on the initial enthusiasm and not so much on expert judgements. The communication styles are different and depend more on the previous experience of individuals, rather than on the knowledge of the newly established team.

### 2.3.THE PERIOD OF RAPID GROWTH

The period of rapid growth is the period in which the organization has already established its main activity and set initial organizing hierarchy. The formalities are already fixed, but due to the fast growth also the organizing structure of the company gets adjusted. At this time the organization quickly expands its activity to new fields, on new markets, adds similar activities, starts to incorporate also parallel activities or gets specialized. This period is also characterized by the quick growth of business, which is usually linked to the growth of the organization and leadership. Due to the expansion of the organization, also relationships within the organization need to be formalized and prescribed in greater detail. Fast development also means more employees, which requires also the division of managerial functions, which usually does not reflect exactly the growth of the company. The managers usually perceive the managerial functions as ways of controlling the entire company, which is why the distribution of the functions and decision-making is usually slower than the general establishment of the newly organized activities.

Greater formalization in the organization leads to the greater formalization of communication. Roles and responsibilities are clearly defined, which is why also the levels and ways of communication are prescribed better. However, some adjustments and reactions to the current new situations are still possible, as this is nevertheless a phase of rapid growth, namely quick changes, which also communication copies. The organization starts to use standard communicational patterns, which are not prescribed nor standardized. When it comes to specialized functions, also communication reflects this. Specific groups, which are formed, define their specific forms of communication, but are still open for others. The organization is in the period of making extremely successful business deals, however, communication does not follow that pattern. There are several reasons for this. Inappropriate division of managing functions or the maladjustment of management, which does not follow the changes due to the rapid growth of the organization, causes communication problems. Fast expansion of the organization means working on several locations, having new plants, entering new markets, which all contribute to the issues with communication. Fast growth brings about fast swings, which require quick reactions, and the established models of communication are not prepared for that.

## 2.4.THE PEAK OF THE DEVELOPMENT OF THE ORGANIZATION

After the period of rapid growth, in which several activities, various forms of activities and different markets are tested, the company usually gets stabilized. This is a period, in which the organization has found its “place” and discovered which activity is the most successful and how it should be carried out for maximum results. Even though the activity is not stable, some adjustments still occur from time to time, but are minor. Also the management remains the same, as there is no need for changes any longer, because there are less adjustments that need to take place. This is the time of the biggest successes of the organization. The organization reaches its peak. If it wants to stay on this level, it needs to constantly take care of the control and adjustments, remain innovative and adjust to the new needs on the market. However, this level is difficult to maintain for a longer period of time, as constant changes to new needs are necessary, despite the successful position of the organization. There is a high degree of formalization of business, which means high efficiency, but it also means it is more difficult to follow the necessary changes, which are consequences of a new business environment.

Similarly communication is at this stage already set or some communicational patterns are at least informally accepted and remain more or less the same, as there are no greater changes in the business. These patterns become adopted forms of communication, which can potentially lead to a danger in which there is no room for adjustments when that is necessary.

## 2.5.THE STABILITY OF THE ORGANIZATION

When at its peak, the organization remains stable for some time. In this period the organization is strong, efficient and successful. That is why there is no need for innovation and adjustment, because results are good. This leads to stagnation and later to less success. There are new, enthusiastic competitors, which in the phase of rapid growth overtake the organization. They do not pose a direct threat, because due to their small size they are not competitive, but they do have the basis for quick growth and reaching peaks, which will soon surpass the success of the organization which is in the phase of stability and is due to its size and formalization less adjustable.

At this stage communication is completely formalized, does not change, because there is no need for that, as there is no growth or other change in business. This leads to communication even more formalized and with that comes inability to adjust and change, which is also one of the obstacles for possible changes in the organization. This is a beginning of the vicious cycle, in which the inflexibility of the activity of the organization causes the formation of set, inflexible patterns of communication, which slow down the activities and cause even greater inflexibility of the organization. And this undoubtedly leads to regression.

## 2.6.THE BEGINNING OF PROBLEMS

The organization comes to an era in which it is still quite successful in business due to the advantage from the past, but its activity is oriented mostly towards trying to maintain the exact same successful image. The organization is concerned with its reputation, equipping offices, showing its success and past results, but lacks enthusiasm, initial élan, innovativeness, commitment... when the first problems of failure occur, this is reflected in mutual blame and finding the person responsible for it, instead of searching for solutions and focusing energy to innovative activity of the organization.

Because at this point the organization is not willing to adjust and change when the first problems appear, because these do not yet reflect on the business success or the organization does not perceive them as problems which will in the future lead to regression, also communication is still limited to the established patterns and is extremely formalized. The degree of formality is even heightened and is slowly turning into bureaucracy.

## 2.7.THE PERIOD OF DECLINE

When first business problems begin to emerge, the organization should react with rapid adjustments, responses, and enthusiasm which was once present in the time of rapid growth. However, usually instead of searching for new sources of incomes the organization wastes time with the cost reduction, instead finding new ideas for improvements they try to find the person responsible for the mistakes, and instead of adjusting to the new environment and its changes they look for support in politics and legislation. This leads to even greater bureaucracy and dealing with the system of their organization instead of dealing with the adjustments needed to satisfy the market.

This reflects also on the communication within the organization, which is completely systemized and thoroughly planned, very complicated, rigid, maladjusted and regulated with rules and prescriptions. This system of communication disables innovativeness and new approaches, which would be necessary for the changes in business which would revive it and this additionally worsens any negative business trend.



### 3. THE IMPACT OF THE DEVELOPMENTAL STAGE OF COMMUNICATION ON LOGISTICS

Ronald Ballou's view on logistics is: logistics is a management of all activities in relation to the transportation and storage and with it related activities which occur between the points of delivery and consumption. The mission of logistics is to ensure customers the service which is in accordance with their needs and requirements the most effectively as possible. The basic goal of logistics is to ensure that the right goods and services are in the right place at the right time and the cost of all that the lowest.

This definition specifies logistics not only as the process of transporting things from one point to another and storing them, as earlier definitions of logistics do, but states that the essence of it is in the managing of the activities and not the process itself. And that is why it is important to also have consistent processes of communication.

Because different stages of communication in different organizations are divided by the stage of the development of the organization this presents one of the greatest challenges in modern logistics.

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**Srednja poklicna in strokovna šola Bežigrad-Ljubljana**

## **Izobraževanje v logistiki**

**mag. Frančiška Al-Mansour**

Ljubljana, 2016

# Izobraževanje v logistiki v Sloveniji

## A/Osnovni pojmi

**Logistika**(iz Wikipedije, proste enciklopedije)je dejavnost, ki se ukvarja:

1. **z upravljanjem tokamaterialov** od virov do uporabnikov tako znotraj kot med podjetji. Logistika zajema fizični tok materiala in tok informacij od dobavitelja, preko proizvajalca in trgovca do končnega potrošnika in pomeni prostorske spremembe, poleg tega pa tudi skladiščenje (premagovanje časa). Cilj logistike je zagotoviti prave dobrine in storitve, na pravem mestu ob pravem času, količini in kakovosti, z najnižjimi stroški in vplivi na okolje, skladno s sklenjeno pogodbo.

Pri tem lahko logistika zajema vse procese v podjetju: napovedovanje, povpraševanja, nabavo, načrtovanje potreb, načrtovanje proizvodnje, materialno poslovanje, skladiščenje, manipuliranje z materiali, embalaranje, komisioniranje, zaloge končnih izdelkov, fizična distribucija, načrtovanje distribucije, naročila, transport, prodajne storitve, poprodaje storitve, ipd.

V modernem srednjem velikem podjetju zajema služba logistike npr.: planiranje potreb in nabavo materiala, planiranje proizvodnje in kapacitet, planiranje zalog, skladiščno poslovanje in odpremo materiala. V logistiki ločimo:

- glede na dejavnost: transportna, skladiščna, špedicijska, distribucijska, nabavna, ... logistika,
- glede na področje uporabe: industrijska, vojaška, gospodinjstva logistika,
- glede na področje opazovanja: mikro~, makro~, poslovna, mednarodna, ... logistika.

2. **z upravljanjem pretoka ljudi** (od ene do druge točke poti).

Različne vrste prometov zahtevajo tudi različne pristope in uporabe **logistike**. Razlikujemo med petimi bistveno različnimi vrstami logistik v prometu, kot so:

- logistika v morskem prometu,
- logistika v rečnem prometu,
- logistika v železniškem prometu,
- logistika v cestnem prometu,
- logistika v zračnem prometu.

Pri vseh različnih vrstah logistik je potrebno izdelovati študije in projekte, pri katerih nam pomaga računalnik in "virtualna logistika".

Za vsa dela in naloge v okviru logistike pa potrebujemo znanja in spretnosti, ki jih lahko pridobimo v okviru izobraževanj in usposabljanj na različnih nivojih.

## **B/ Izobraževalni programi za pridobitev stopnje izobrazbe v logistiki**

<b>Stopnja izobraževanja</b>	<b>Izobraževalni programi</b>	<b>Naziv pridobljene izobrazbe</b>
<b>Srednje poklicno izobraževanje – IV. St.</b>	Voznik*	Voznik/voznica
<b>Srednje strokovno izobraževanje – V.st.</b>	Logistični tehnik Plovbni tehnik Ladijski strojni tehnik	Logistični tehnik/logistična tehcnica Plovbni tehnik/ tehcnica Ladijski strojni tehnik/tehcnica
<b>Poklicno - tehniško izobraževanje – V.st.</b>	Logistični tehnik	Logistični tehnik/logistična tehcnica
<b>Višje strokovno izobraževanje – VI/1</b>	Logistično inženirstvo	Inženir/inženirka logistike
<b>Visoko strokovno izobraževanje – VII/1</b>	Prometna tehnologija in transportna logistika**	Dipl. inženir/inženirka logistike
<b>Univerzitetno izobraževanje – VII/2</b>	Tehnologija prometa	Univ. dipl. inž. prometa

\* samo za odrasle

\*\*smeri: Transportna logistika, Tehnologija pomorskega prometa, Tehnologija cestnega prometa, Tehnologija železniškega prometa, Tehnologija poštne prometa, Tehnologija zračnega prometa.

Za delo v logistiki se je mogoče v Sloveniji izobraževati že po končani OŠ v programu Logistični tehnik (v SSI - srednjem strokovnem izobraževanju) ali po končanem triletnem poklicnem izobraževanju katerekoli smeri (na t. i. PTI – poklicno tehničnem izobraževanju) po uspešno opravljenem zaključnem izpitu. Izobraževalni programi na tej ravni se izvajajo v:

- Ljubljani – SPSŠB Ljubljana
- Mariboru – Srednji prometni šoli Maribor
- Celju – ŠC Celje, Srednja šola za storitvene dejavnosti in logistiko
- Murski Soboti – Ekonomska šola Murska Sobota
- Novi Gorici – ŠC Nova Gorica, Srednja strojna, prometna in lesarske šola
- Portorožu – Pomorski in tehnični izobraževalni center Portorož (tudi programa Plovbni tehnik in Ladijski strojni tehnik)

Program, ki je namenjen le odraslim udeležencem, je program Voznik (SPI – srednje poklicno izobraževanje) in se izvaja v organizacijah izobraževanja odraslih (šole, druge institucije), če imajo varifikacijo za izvajanje programa.

Višje strokovno izobraževanje je namenjeno vsem, ki so uspešno končali SSI ali PTI ter opravili poklicno maturo. Program logistično inženirstvo traja dve leti in se konča z diplomsko nalogo. Pridobili boste stopnjo izobrazbe VI/1. V prvem letniku so splošni programi: komuniciranje, informatika, varnost v prometu in varstvo pri delu in podobno. V drugem letniku se študent odloči za modul: poslovna logistika, cestni, železniški promet, transportna ali vojaška logistika. Pridobljeni naziv je inženir logistike, iz priloge k diplomi pa je razvidno, na katerem področju je študent poglobljaj svoje znanje.

Izobraževanja v tej smeri se izvajajo na šolah, šolskih centrih in privatnih institucijah) v okviru programa Logistično inženirstvo na lokacijah:

- Ljubljani – SPSŠB Ljubljana
- Mariboru – Srednji prometni šoli Maribor
- Celju – ŠC Celje, Srednja šola za storitvene dejavnosti in logistiko
- Murski Soboti – Ekonomska šola Murska Sobota
- Novi Gorici – ŠC Nova Gorica, Srednja strojna, prometna in lesarske šola
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Logistiko je nadalje mogoče študirati tako na visokošolski kot univerzitetni (dodiplomski in podiplomski) ravni na:

- Univerzi v Mariboru, Fakulteti za logistiko, ki ima svoj sedež v Celju, dislocirana enota pa se nahaja še v Krškem(Logistika sistemov – UN, Gospodarska in tehniška logistika – VS),
- Univerzi na Primorskem, Koper, Fakulteti za pomorstvo in promet (Tehnologija prometa in logistike - UN, Ladijsko strojništvo – VS, Navtika – VS, Prometna tehnologija in transportna logistika – VS) in
- Univerzi v Ljubljani, Ekonomski fakulteti, Visoki poslovni šoli (Poslovna logistika – VS).

Znanja, ki jih pridobijo študentje logistike in ki jim v prihodnosti pomagajo pri lažjem zaposlovanju, so raznovrstna. Poleg strokovnih predmetov je izjemno velik poudarek tudi na učenju tujih jezikov, saj bodo imeli bodoči diplomanti pri svojem delu najverjetneje tudi veliko stikov s tujci.

## **C/ strokovna usposobljenost za opravljanje določenih del – Nacionalne poklicne kvalifikacije (NPK)**

Nacionalna poklicna kvalifikacija je delovna, poklicna oziroma strokovna usposobljenost, ki je potrebna za opravljanje poklica na določeni ravni zahtevnosti del in je pripravljena na podlagi nacionalnega poklicnega standarda. Nacionalna poklicna kvalifikacija omogoča pridobitev javno veljavne listine o poklicni usposobljenosti in se uvršča v nacionalno ogrodje kvalifikacij.

Center RS za poklicno izobraževanje je v sistemu nacionalnih poklicnih kvalifikacij osrednja institucija, zadolžena, da na nacionalni ravni in v sodelovanju s socialnimi partnerji pripravlja strokovne podlage in vodi ustrezne postopke pri pripravi katalogov standardov strokovnih znanj in spretnosti za nacionalne poklicne kvalifikacije, ki so podlaga za postopke preverjanja in potrjevanja neformalnega znanja, spretnosti in kompetenc.

Pogoje in postopke pridobivanja nacionalnih poklicnih kvalifikacij ureja [Zakon o nacionalnih poklicnih kvalifikacijah \(UI. št.1/2007\)](#), ki je v pristojnosti Ministrstva za delo, družino in socialne zadeve.

Več o prednostih nacionalnih poklicnih kvalifikacij za posameznika in podjetja si lahko ogledate na spletni strani za [nacionalne poklicne kvalifikacije](#), podrobnejše informacije o nacionalnih poklicnih kvalifikacijah in baze podatkov pa si lahko ogledate na spletni strani [Nacionalnega informacijskega središča](#).

Nacionalne poklicne kvalifikacije s področja logistike (ime in koda kataloga standardov strokovnih znanj in spretnosti, klasius ter leto objave):

<b>Ime in koda kataloga standardov strokovnih znanj in spretnosti</b>	<b>Klasius</b>	<b>Leto objave</b>
Odgovorna oseba v cestnem prometu 8400.003.6.1	Cestni promet (8401)	Ur.l.RS št. 67/11.07.2003
Operater / operaterka pri prevozu nevarnega blaga 1824385011	Cestni promet (8401)	Ur.l.RS št. /12.11.2013
Prometnik/prometnica v cestnem prometu 8400.017.5.1	Cestni promet (8401)	
Skladiščnik/skladiščnica v logistiki 8400.011.5.1	Skladiščenje (3413)	

Špediter/špediterka 8400.012.5.1	Transportne (prevozne) storitve (drugo) (8409)	
Varnostni svetovalec / varnostna svetovalka za prevoz nevarnega blaga 4148182011	Cestni promet (8401)	Ur.l. 604-8/2012/25 12.11.2013
Viličarist/viličaristka 8400.014.3.1	Upravljanje viličarjev, dvigal, žerjavov (8406)	
Temeljna kvalifikacija: Voznik/voznica v cestnem prometu 8400.002.4.1	Cestni promet (8401)	

Nacionalne poklicne kvalifikacije se lahko pridobijo:

- s preverjanjem in potrjevanjem spretnosti ter znanj, pridobljenih z neformalnim učenjem: med opravljanjem poklica, s prostovoljnim delom, prostočasnimi dejavnostmi, udeležbo na neformalnih programih izobraževanja, s samoučenjem ipd. Nacionalne poklicne kvalifikacije pridobljene po tej poti so namenjene predvsem odraslim z delovnimi izkušnjami ali izjemoma mlajšim, ki jim je potekel status vajenca ali dijaka in imajo ustrezne delovne izkušnje,
- ali pa z dokončanjem programa za pridobitev poklicne oziroma strokovne izobrazbe.

#### **D/ Usposabljanja za potrebe opravljanje dela v logistiki ali osebne potrebe**

V okviru dela avtošol se lahko izobražuje kandidate za voznike vseh kategorij, za katere je potrebno imeti vozniško dovoljenje za vožnjo motornih vozil ter pridobitev in podaljšanje TK. Kandidati opravijo tečaj cestnoprometnih predpisov (pri izpitu za traktor tudi varno delo s traktorjem ter vožnjo) za posamezno vrsto izpitne kategorije:

AM, skuter oziroma kolo z motorjem do 50 ccm,

A1, motorno kolo do 125 ccm,

A2, motorno kolo do 35 kW,

A, motorno kolo nad 35 kW,

B, osebno vozilo,

B+E, osebno vozilo s priklopnikom (prej EkB),

C, tovorno vozilo,

C+E, tovorno vozilo s priklopnikom (prej E),

D, avtobus ter

F, traktor.

### **Zakonsko predpisana starost za vožnjo motornih vozil posamezne kategorije je:**

- za vozila kategorije AM 15 let;
- za vozila kategorije A1 16 let;
- za vozila kategorije A2 18 let;
- za vozila kategorije A 20 let, če ima imetnik dve leti vozniško dovoljenje kategorije A2 oz. 24 let;
- za motorna trikolesa z močjo motorja, večjo od 15 kW 21 let;
- za vozila kategorije B1 16 let;
- za vozila kategorij B, BE 18 let;
- za vozila kategorij C1, C1E 18 let;
- za vozila kategorije C, CE 21 let;
- za vozila kategorij D1, D1E 21 let;
- za vozila kategorij D, DE 24 let;
- za vozila kategorije F, katerih konstrukcijsko določena hitrost ne presega 40 km/h 16 let;
- za vozila kategorije F, katerih konstrukcijsko določena hitrost presega 40 km/h 15 let;
- 15. za vozila kategorije G – motokultivatorji 15 let;
- 16. za vozila kategorije G – delovni stroji 18 let.

Načrtovanje in izvajanje nalog za preventivo in varnost v cestnem prometu, pravila in pogoji za udeležbo voznikov v cestnem prometu, pravila in pogoji za usposabljanje kandidatov za voznike motornih vozil, pogoji za delovanje šol vožnje, program voznškega izpita, vozniški izpiti in pogoji opravljanja zdravstvenih pregledov ter dodatnih usposabljanj voznikov se določajo z **Zakonom o voznikih** (ZVoz, Ur.l.RS št. 109/2010 z dne 30. 12. 2010). Minister za promet izda na podlagi 14. člena ZVoz **Pravilnik o usposabljanju kandidatov za voznike motornih vozil** (Ur.l.RS št. 48/2011 z dne 24. 6. 2011). Pravilnik opredeljuje cilje usposabljanja kandidatov za voznike, program usposabljanja (delitev in obseg programa), kriterije usposabljanja (kraj, priprava in trajanje ter izvedbo usposabljanja).

Usposabljanje kandidatov za voznike motornih vozil ali skupine vozil (v nadaljnjem besedilu: dejavnost usposabljanja kandidatov) opravljajo gospodarske družbe, javni in zasebni izobraževalni zavodi in druge pravne osebe zasebnega prava, samostojni podjetniki posamezniki, policija in vojska, ki izpolnjujejo pogoje, določene v Zakonu o voznikih in drugih predpisih (v nadaljnjem besedilu: **šola vožnje**).



Šola vožnje sme opravljati dejavnost usposabljanja kandidatov, ko izpolni pogoje, določene z ZVOZ ter drugimi predpisi in jo javna agencija vpiše v register šol vožnje.

Šola vožnje mora na predpisan način voditi register kandidatov ter evidenčni karton vožnje, dnevni razvid vožnje in dnevnik usposabljanja iz teorije.

A/Register kandidatov vsebuje:

- registrsko številko kandidata;
- datum vpisa;
- osebno ime kandidata;
- stalno oziroma začasno prebivališče;
- enotno matično številko občana (v nadaljnjem besedilu: EMŠO);
- številko evidenčnega kartona in datum njegove izdaje;
- podatke o usposabljanju;
- podatke o izpisu kandidata iz šole vožnje.

B/Evidenčni karton vožnje poleg podatkov iz registra z izjemo EMŠO vsebuje še osebno ime učitelja vožnje ter osebno ime, datum rojstva in stalno oziroma začasno prebivališče spremljevalca.

C/Dnevni razvid vožnje vsebuje podatke o šoli vožnje, ki ga je izdala, številki in datumu izdaje dnevnega razvida vožnje, osebnem imenu učitelja vožnje, registrski označbi vozila, podatke o številu prevoženih kilometrov, osebno ime kandidata, registrsko številko kandidata in podatke o usposabljanju kandidata.

D/Dnevnik usposabljanja iz teorije vsebuje zaporedno številko dnevnika, čas usposabljanja, osebno ime predavatelja, osebno ime ter datum rojstva kandidata, registrsko številko kandidata, naslov kandidata in podatke o poteku usposabljanja.

Nad delom šol vožnje (pooblašcanje organizacij za opravljanje nalog s področja voznikov in vozil) bdi **Javna agencija za varnost prometa**, ki izvaja tudi strokovni nadzor nad njihovim delom-

Javna agencija za varnost prometa poleg v ZVoz opredeljenih nalogah skrbi tudi za:

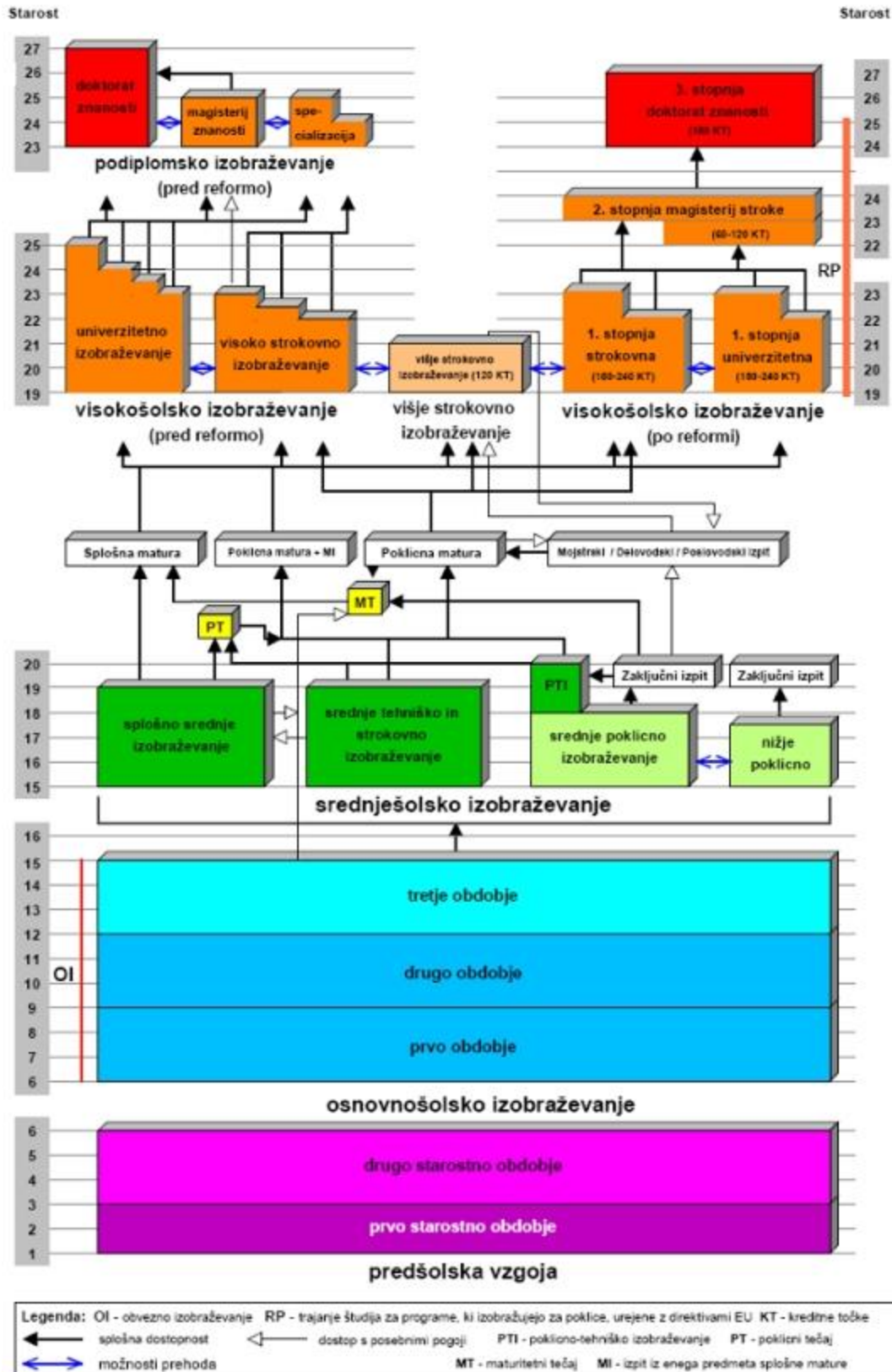
- a) pripravo izobraževalnih programov s področja voznikov in vozil,
- b) načrtovanje, vodenje in usklajevanje strokovnih nalog s področja varnosti cestnega prometa, potrebnih za izvajanje nacionalnega programa varnosti cestnega prometa, ter izvedbenih načrtov, ki zahtevajo sodelovanje državnih organov, lokalnih skupnosti, drugih organizacij, civilne družbe in strokovnjakov za varnost cestnega prometa (v nadaljnjem besedilu: strokovnjaki);

- c) razvijanje in pospeševanje prometne vzgoje, izdajanje in priprava prometno vzgojnih publikacij in drugega gradiva (letaki, plakati, brošure, filmi, spletno gradivo, ipd.), razvijanje in izvajanje preventivnih programov, kampanj in akcij za varnost cestnega prometa;
- d) preverjanje varnosti cestne infrastrukture v vseh fazah načrtovanja in obratovanja, ki temelji na presoji idejne zasnove in projektne dokumentacije ter pregledu obstoječe cestne infrastrukture;
- e) organiziranje usposabljanja izvajalcev programov usposabljanja, določenih s tem zakonom ter razvijanje in izvajanje različnih oblik dodatnega usposabljanja udeležencev v cestnem prometu;
- f) zagotavljanje opravljanja voznških izpitov;
- g) druge naloge na področju preventivnega, vzgojnega in raziskovalnega dela ter na drugih področjih, ki so pomembni za varnost cestnega prometa:
  - pripravlja **program usposabljanja in preizkus znanja izvajalcev usposabljanj voznikov začetnikov,**
  - **opredeljuje program dodatnega usposabljanja za varno vožnjo, edukacijske in psihosocialne delavnice,**
  - pripravlja program **dodatnega usposabljanja za varno vožnjo in rehabilitacijski program (le-tega se mora udeležiti oseba, ki ji je izrečeno prenehanje veljavnosti voznškega dovoljenja in so ji bile izrečene kazenske točke zaradi vožnje pod vplivom alkohola, prepovedanih drog, psihoaktivnih zdravil ali drugih psihoaktivnih snovi in jo v program napoti sodišče po opravljenem kontrolnem zdravstvenem pregledu v primeru odložitve izvrševanja prenehanja veljavnosti voznškega dovoljenja, skladno z zakonom, ki ureja prekrške),**
  - **organizira in izvaja izobraževanje in dodatno usposabljanje učiteljev vožnje, učiteljev predpisov in strokovnih vodij šol vožnje ter**
  - **usposabljanje spremljevalcev izrednih prevozov.**

Strokovni nadzor nad izvajanjem določb tega ZVoz in predpisov, izdanih na njegovi podlagi, ki se nanašajo na vozniška dovoljenja in vozniške izpite, opravlja **Ministrstvo za promet.**

Glede na široko področje, ki ga zajema logistika, je izobraževanje in usposabljanje oseb, ki delajo v okviru tega področja, izrednega pomena. Le strokovno in kvalitetno opravljanje del in nalog z zagotavljanjem varnosti ter upoštevanjem področnih predpisov omogoča kakovostne storitve na tem področju.

## Zgradba vzgoje in izobraževanja v Sloveniji 2007/08



Verzija: 12. 2. 2008

## VIRI, LITERATURA

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5. Zakon o voznikih (ZVoz), Uradni list RS, št. 109/2010 z dne 30. 12. 2010.

**Srednja poklicna in strokovna šola Bežigrad-Ljubljana**

## **EDUCATION IN LOGISTICS IN SLOVENIA**

**Frančiška Al-Mansour, MSc**

## Education in Logistics in Slovenia

### A / Basic terms

**Logistics** (Wikipedia) is an activity defining:

1. **the management of the flow of materials** from resources to consumers both within and between enterprises. Logistics covers physical flow of materials and information flow from the supplier via the manufacturer and dealer to the final consumer and means spatial changes as well as storage (bridging time). The objective of logistics is to ensure the right goods and services in the right place at the right time, quantity and quality, at the lowest cost and impact on environment, in accordance with the contract.

In doing so, logistics can cover all company processes: forecasting demand, procurement, planning needs, production planning, material management, storage and handling of materials, packaging, picking, inventories of finished products, physical distribution, programming distribution, procurement, transportation, sales services aftersales services, etc.

In a modern medium-sized company logistics covers: planning, enquiries, purchase, production and inventory planning, warehousing and shipping of materials.

Logistics fields:

- depending on the activity: transportation, warehousing, forwarding, distribution, purchasing, logistics ...,
- depending on the scope: industrial, military, domestic logistics,
- depending on the field of observation: micro/macro, business, international ... logistics.

2. **Management of the movement of people** (from one point to another).

Different modes require different approaches and use of **logistics**. A distinction is made between five different types of essential logistics in transport:

- maritime,
- river transport,
- rail,
- road and
- air transport logistics.

It is required to produce studies and projects with the help of a computer and "virtual logistics" with above mentioned different types of logistics.

Knowledge and skills, which can be acquired in the context of education and training at various levels, are needed for all tasks within the logistics.

## **B/ Educational programs in logistics**

<b>Level of education</b>	<b>Educational program</b>	<b>Education job title</b>
<b>Vocational Secondary education (VSE)</b>	Driver*	Driver
<b>Technical Secondary education (TSE)</b>	Logistics Technician Nautical Technician Marine Engineering Technician	Logistics Technician Nautical Technician Marine Engineering Technician
<b>Vocational-technical education (VTE)</b>	Logistics technician	Logistics technician
<b>Vocational College – VI/1</b>	Logistics Engineering	Logistics Engineer
<b>Professional College – VII/1</b>	Traffic Technology and transport logistics**	Logistics Engineer
<b>University – VII/2</b>	Traffic Technology	Logistics Engineer, BSc

\*Adult Education Program.

\*\*Programs: Transport Logistics, Maritime Technology, Road Transport Logistics, Rail Transport Technology, Technology of Postal Services, Air Transport Technology.

In order to work in logistics, one can do so by completing Logistics Technician Program (Technical Secondary Program after completing primary school) or three-year vocational education (Vocational-Technical Education) after successfully passing the final exam. Educational programs on this level are carried out in:

- Ljubljana, Secondary Vocational and Technical School,
- Maribor, Secondary school for traffic Maribor,
- Celje, School Center Celje, Secondary School of Services and logistics,
- Murska Sobota, Murska Sobota School of Economics

- Nova Gorica, Nova Gorica School Centre, School of Mechanical Engineering, Transport and Wood Processing,

- Portorož, Maritime and Technical Training Centre Portorož (Nautical Technician Marine Engineering Technician).

Educational program Driver (secondary vocational education), which is intended only for adult learners, is carried out in adult learning organizations (schools, other institutions) provided they are verified for the program implementation.

Higher vocational education is intended for those who have successfully completed TSE or VTE and passed The Vocational Matura. Logistics Engineering Program lasts two years and ends with a thesis. Education gained is VI/1. In the first year there are general subjects: Communication, IT, Traffic Safety, Work Safety and the like. In the second year, student decide on a module: Business Logistics, Road, Rail, Transport or Military Logistics. The obtained academic title is Logistics Engineer, the Diploma Supplement providing a standardised description of the nature, level, context, content and status of the studies completed by its holder.

Logistics Engineering is carried out in schools, educational centres and private institutions):

- Ljubljana, Secondary Vocational and Technical School,

- Maribor, Secondary school for traffic Maribor

- Celje, School Center Celje, Secondary School of Services and logistics

- Murska Sobota, Murska Sobota School of Economics

- Nova Gorica, Nova Gorica School Centre, School of Mechanical Engineering, Transport and Wood Processing,

- Portorož, Maritime and Technical Training Centre Portorož (Nautical Technician Marine Engineering Technician).

It is possible to study Logistics on higher education or university (undergraduate and postgraduate) level:

- University of Maribor, Faculty of Logistics, which has its headquarters in Celje, dislocated unit is still located in Krško (System Logistics - UN, Economic and Technical Logistics - HE)



- University of Primorska, Koper, Faculty of Maritime Studies and Transport (Traffic Technology and Logistics - the UN, Marine Engineering - HE, Nautical Studies - HE, Traffic Technology and Transport Logistics - HE) and

- University of Ljubljana, Faculty of Economics, Business Administration (Business Logistics - HE).

Knowledge acquired by students of logistics, facilitating their future employment, is diverse. In addition to technical subjects, there is great emphasis on learning foreign languages, as they will have a lot of contacts with foreigners in their future jobs.

### **C/ Professional competence to perform certain types of work - National Vocational Qualifications (NVQs)**

A national vocational qualification (NVQ) is a formally recognised work-related, competence-based qualification, which reflects the skills and knowledge needed to do a job effectively and shows that a candidate is competent in an area of work, or individual segments of work, within an area at a certain level of achievement, and as such, part of the national qualification framework. An NVQ is shown by a public document – a certificate whose form and content are defined by the Minister of Labour. The system of assessment and certification of NVQs in Slovenia is regulated by the National Professional Qualifications Act (Official Gazette of the Republic of Slovenia, Nos 81/2000, 55/2003, 118/2006, 1/2007) adopted by the Ministry of Labour, Family and Social Affairs. This Act regulates the procedure and the competent bodies, agencies and organisations for adopting catalogues of standards of professional knowledge and skills, and the conditions and procedures for obtaining NVQs.

More on National Vocational Qualifications: <http://www.npk.si/index.php?lang=en>

National vocational qualifications in the field of logistics (name and code of *catalogues of standards* of professional knowledge and skills, KLASIUS and year of publication):

<b>Name and code of catalogues of standards of professional knowledge and skills</b>	<b>Klasius</b>	<b>Year of publication</b>
Responsible person in road transport 8400.003.6.1	Road transport (8401)	Ur.l.RS št. 67/11.07.2003
Transport of dangerous goods operator of 1824385011	Road transport (8401)	Ur.l.RS št. /12.11.2013
Traffic technician in road transport 8400.017.5.1	Road transport (8401)	

Warehouse logistics 8400.011.5.1	Storage (3413)	
Forwarder 8400.012.5.1	Transport services (8409)	
Safety consultant for transport of dangerous goods 4148182011	Road transport (8401)	Ur.l. 604- 8/2012/25 12.11.2013
Forklift driver 8400.014.3.1	Forklift, elevator and crane management (8401)	
Basic qualification: Driver 8400.002.4.1	Road transport (8401)	

National Vocational Qualifications can be obtained by:

- the verification and validation of skills and knowledge acquired through non-formal learning during careers, volunteering, leisure activities, participation in informal education programs, with self-learning, etc. National vocational qualifications obtained in this way are primarily intended for adults with work experience or exceptionally younger people who have lost the apprentice/student status and have relevant work experience,
- completing a program of vocational or professional education.

#### **D/ Training to perform work in the field of logistics or for personal needs**

Driving schools can educate candidates for drivers of all categories, yet must have a license to drive motor vehicles and acquisition and renewal of BQ. Candidates undergo a course of road traffic regulations (candidates for tractor driver licence also do safety and practical driving) for each category:

- AM, scooter or moped up to 50 cc,
- A1 motorcycle up to 125 cc,
- A2 motorcycle up to 35 kW,
- A motorcycle above 35 kW,
- B, passenger car,

- B+E, a car with trailer (formerly EKB)
- C, truck,
- C+E, a truck with a trailer (formerly E)
- D, bus and
- F tractor.

**Statutory age for driving motor vehicles for each category is:**

- AM 15 years;
- A1 16 years;
- A2 18 years;
- A 20 years (provided the holder has had a driving license for category A2 for 2 years) or 24 years;
- Motor-powered tricycles with an engine power greater than 15 kW, 21 years;
- B1 16 years;
- B, BE 18 years;
- C1, C1E 18 years;
- C 21 years;
- D1, D1E 21 years;
- D, DE 24 years;
- F, speed not exceeding 40 km/h 16 years;
- G – multi cultivators 15 years;
- 16 for category G - working machines 18 years.

Planning and carrying out tasks of prevention and road safety, rules and conditions for the participation of drivers in road transport, rules and regulations for training candidates for drivers, conditions for driving schools, driving license program, driving licences and conditions to provide health checks and additional training for drivers are determined by the Drivers Act (ZVozUr.l.RS no. 109/2010, 30. 12. 2010). Minister of Infrastructure

issues (on the basis of Article 14 of ZVoz) Rules on driver education (Ur.I.RS št. 48/2011, 24. 6. 2011). Rules define the objectives of driver education, training program (division and scope), training criteria (location, preparation, duration and training implementation).

Training program for candidates to obtain a driving licence for motor vehicles or groups of vehicles (training activities for candidates) is performed by corporations, public and private educational institutions and other public legal entities, sole proprietors, the police and the army, which fulfil the conditions laid down in the Driver's Act and other regulations (driving school).

Driving School may train candidates when it meets the conditions laid down in the Drivers Act and other regulations and when the Public Agency enters it in the Driving Schools Register.

Driving school must keep a register of candidates and driving record card, daily register and evidence of passing training program.

A/ Register of candidates includes:

- candidate's registration number;
- date of registration;
- candidate's name;
- permanent or temporary residence;
- personal identification number (PIN);
- record card number and its date of issue;
- training information;
- candidate's drop out information.

B/ Record card, in addition to register data, with the exception of PIN, contains instructor's name, driver's companion date of birth and permanent or temporary residence.

C/ Daily register of practical driving contains information about driving school issuing it, number and date of issue, instructor's name, vehicle's register number, mileage, candidate's number and his/her training programme information.

D/ Diary of theory training program contains sequence number, time of training, lecturer's name, candidate's first name and date of birth, candidate's registration number, candidate's address and progress information.

**Slovenian Traffic Safety Agency** supervises driving schools. It is also responsible for:

- a) preparation of educational programs in the field of drivers and vehicles,
- b) planning, management and coordination of technical tasks in the field of road safety, necessary for the implementation of the national road safety program, and implementation plans, which require cooperation of state authorities, local communities and other organizations, civil society and experts on road safety (experts);
- c) development and promotion of traffic education, publishing and preparation of educational publications and other materials (leaflets, posters, brochures, films, web material, etc.), development and implementation of prevention programs and road safety campaigns;
- d) verification of road safety infrastructure on all stages of planning and operation, based on the assessment of conceptual design and project documentation and review of the existing road infrastructure;
- e) organization of training programme for training programme providers defined by this Act and development and implementation of various forms of additional training for road users;
- f) ensuring driving tests;
- g) other tasks in the field of preventive, educational and research work, and other areas important for road safety:
  - preparation of training program and examination for driving instructors,
  - additional training program for safe driving, educational and psychosocial workshops,
  - prepare a further training program for safe driving and rehabilitation program (must be attended by those with terminated licenses and penalty points for driving under the influence of alcohol, drugs or psychoactive substances referred by the Court after

completed medical examination in case of suspended licence termination, in accordance with the law governing misdemeanours)

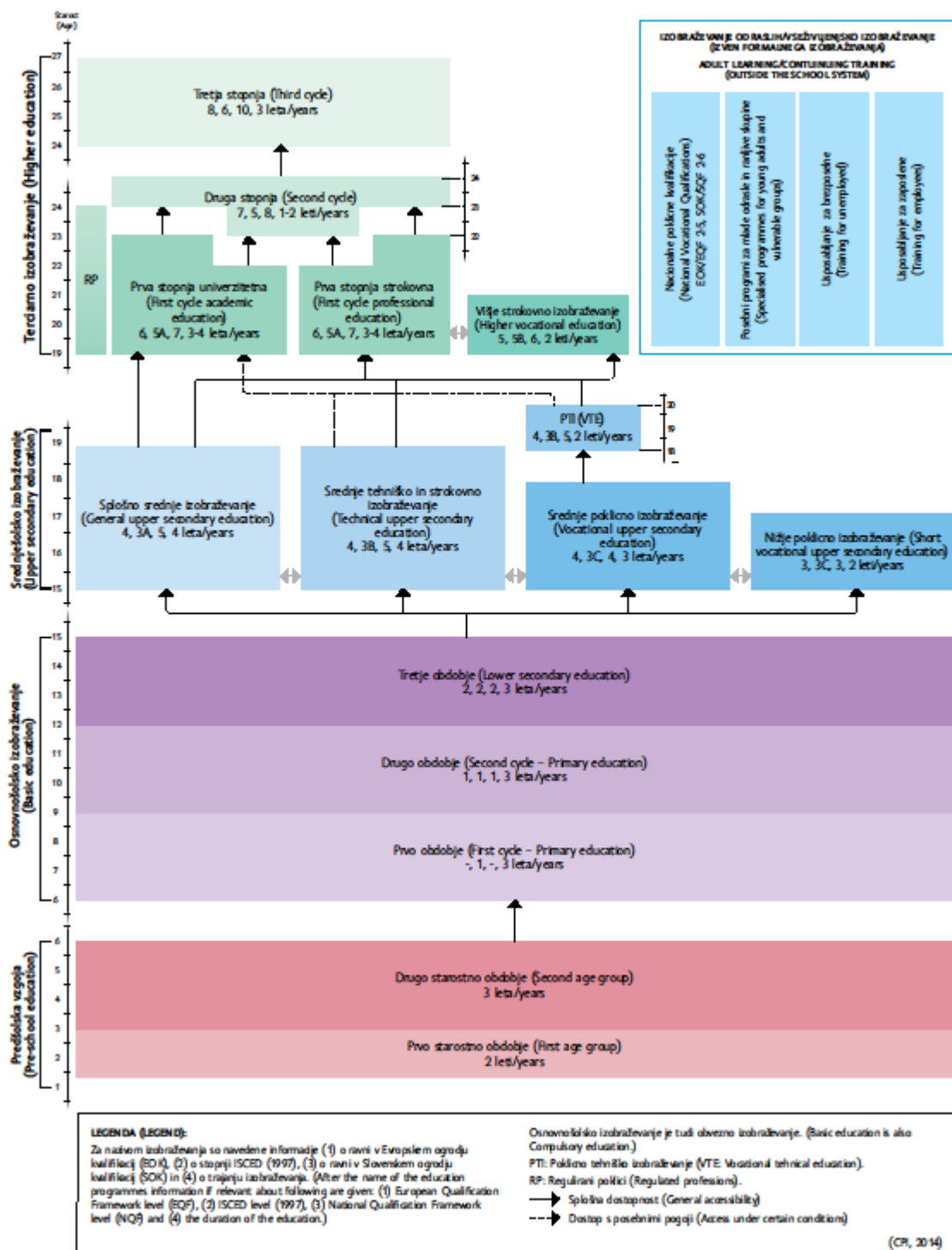
- organize and implement training and further training for driving instructors, theory teachers and driving school management and

- training of exceptional transport escorts.

Professional supervision of implementation of Drivers Act and its regulations, relating to driving licenses and driving tests, is carried out by the Ministry of Infrastructure.

Given the wide area covered by logistics, education and training of people working within this area is of paramount importance. Only professional and quality performance of tasks and duties, by providing security and respecting regulations, provides quality services in this area.

# ZGRADBA VZGOJE IN IZOBRAŽEVANJA V SLOVENIJI STRUCTURE OF THE EDUCATION SYSTEM IN SLOVENIA



## VIRI, LITERATURA

1. Izobraževalni programi. Dosegljivo naCPI, <http://www.cpi.si/logistika-in-promet/izobrazevalni-programi.aspx> (15. maj 2016).
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## **E-mobilnost u sustavu redovnog obrazovanja**

***Sažetak:***

Posljednjih nekoliko godina, uslijed sve češćih nestabilnosti na tržištu naftnih derivata i stalno rastućih cijena, jača svijest o nužnosti razvoja održive mobilnosti temeljene na obnovljivim izvorima energije te intenzivno promišlja o važnosti edukacije i osvješćivanju što većeg broja ljudi, a posebice mladih o potrebi razvoja i primjene održive mobilnosti u svakodnevnom životu. Električna vozila jedno su od tehnološki vrlo bitnih rješenja koja za cilj imaju smanjenje onečišćenja okoliša i poticanje korištenja obnovljivih izvora energije. Ukoliko objedinimo znanja o električnim vozilima i obnovljivim izvorima energije, možemo govoriti o održivoj mobilnosti, odnosno o e-mobilnosti.

Škola za cestovni promet iz Zagreba započela je usklađivanje s novim tehnologijama u prometu razvojem kompetencija učenika i nastavnika strukovnih škola kroz edukaciju i trening o e-mobilnosti u sklopu projekta Learning E-Mobility / LEMO. U ovom projektu poseban naglasak je stavljen na ekološki aspekt koncepta e-mobilnosti korištenjem električne energije dobivene iz obnovljivih izvora. Glavni ciljevi projekta su povećanje kvalitete učenja u strukovnom obrazovanju kroz razvoj novog inovativnog obrazovnog modula *Elektromobilnost* i pratećih alata za učenje i poučavanje (ICT, OER), prijenos i diseminacija dobre prakse među europskim strukovnim školama te jačanje povezanosti strukovnog obrazovanja i tržišta rada s naglaskom na područje e-mobilnosti. U radu će biti prikazana dostignuća Škole za cestovni promet iz Zagreba

u području e-mobilnosti, koja se odnose na električni automobil Škole, solarnu elektranu, stanicu za punjenje električnih automobila i kurikulum obrazovnog modula *Elektromobilnost* koji su zajednički kreirale strukovne škole iz Zagreba (Hrvatska), Celja (Slovenija) i Kouvole (Finska) u suradnji s poduzećima i drugim partnerskim ustanovama iz Hrvatske, Slovenije i Španjolske.

***Ključne riječi:***

- elektromobilnost,
- povezivanje obrazovanja s gospodarstvom i tržištem rada,
- projekti u okviru programa Erasmus+

## E-mobilnost u sustavu redovnog obrazovanja

Mobilnost je jedan od vrlo važnih čimbenika ljudskog života te predstavlja temelj osobnih sloboda i osnovu za uspostavljanje i razvoj međuljudskih odnosa, trgovine, gospodarstva. Gledano kroz povijest, mobilnost nikada nije bila razvijenija, brža i raznovrsnija nego danas, prvenstveno zahvaljujući jeftinom i široko dostupnom izvoru energije – nafti. Međutim, posljednjih nekoliko godina, uslijed sve većih nestabilnosti na tržištu naftnih derivata i stalno rastućih cijena kao i sve većeg zagađenja okoliša, dosad uobičajeni vidovi mobilnosti traže brzu promjenu dosadašnjeg načina života. Sve više jača svijest o nužnosti razvoja održive mobilnosti temeljene na obnovljivim izvorima energije te se intenzivno promišlja o važnosti edukacije i osvješćivanja što većeg broja ljudi, a posebice mladiho potrebi razvoja i primjene održive mobilnosti u svakodnevnom životu. Električna vozila jedno su od tehnološki vrlo bitnih rješenja koja za cilj imaju smanjenje onečišćenja okoliša i poticanje korištenja obnovljivih izvora energije. Ukoliko objedinimo znanja o električnim vozilima i o obnovljivim izvorima energije, možemo govoriti o održivoj mobilnosti, odnosno o e-mobilnosti (elektromobilnosti).

Cilj e-mobilnosti je pronaći održivu ravnotežu između ljudi, automobila i okoliša. E-mobilnost daje pozitivan učinak prema smanjenju emisija štetnih ispušnih plinova. Istraživanja pokazuju da je ukupni izračun emisija stakleničkih plinova za električne automobile puno niži od emisije konvencionalnih vozila. Smanjenje CO<sub>2</sub> iznosi od 11% do 100% što ovisi je li električna energija kojom punimo automobil proizvedena iz energenata koji negativno utječu na okoliš ili iz obnovljivih izvora energije. Upravo navedene činjenice traže od nas koji radimo na području prometa te nam je osnovarada organizacija i unaprjeđenje prometa kao i eksploatacija cestovnih vozila koja izravno i u velikom udjelu utječu na onečišćenje okoliša da uočimo potrebu za promjenom pristupu mobilnosti i da princip održive mobilnosti i nove tehnologije koje uz nju dolaze pokušamo primijeniti u suvremenom prometu. Osim novih tehnologija koje je nužno ugraditi u funkcioniranje suvremenog prometa, najvažniji zadatak nam je educirati i obrazovati nove generacije djelatnika u području prometa.

Potrebu za ovakvim pristupom obrazovanju uočila je i Škola za cestovni promet iz Zagreba, te se kroz europski projekt pod nazivom „LEMO - Learning E-Mobility“ uključila u stvaranje novih generacija učenika koji će moći na stručniji način popularizirati ideju e-mobilnosti. Projekt traje 3 godine, a njegova realizacija je podijeljena u 3 faze. U prvoj fazi (prvoj godini provedbe) nastavnici i sudionici iz partnerskih ustanova prolaze trening tijekom kojeg izučavaju sastavnice koncepta e-mobilnosti i primjenu koncepta u različitim europskim zemljama. U drugoj fazi (druvoj godini provedbe) nastavnici iz strukovnih škola u suradnji s gospodarstvenicima i stručnjacima u primjeni koncepta e-mobilnosti kreiraju novi obrazovni modul kao dopunu postojećim kurikulumima iz područja prometa i logistike, te inovativne alate za primjenu tog modula u obrazovanju (alate za učenje i poučavanje). U trećoj fazi (trećoj godini provedbe projekta) partnerske škole testiraju novokreirani modul i pripadajuće alate za učenje primjenom u svojim školama. Glavni ciljevi projekta su povećanje kvalitete učenja u strukovnom obrazovanju kroz razvoj novog inovativnog obrazovnog modula o elektromobilnosti i pratećih alata za učenje i

poučavanje, prijenos i diseminacija dobre prakse među europskim strukovnim školama te jačanje povezanosti strukovnog obrazovanja i tržišta rada s naglaskom na području e-mobilnosti. Kako bi zaokružila sve aspekte održive e-mobilnosti (električna vozila i obnovljive izvore energije), Škola za cestovni promet iz Zagreba je na prethodnom projektu (Europe Electric Car, 2012. - 2014.) preradila klasični automobil SMART fortwo sa dizelskim motorom u električno vozilo. Električni automobil SMART fortwo nastao je kao proizvod učenika i nastavnika Škole uz veliku pomoć hrvatskih proizvođača električnih automobila (NETeko, Rimac Automobili i Dok-Ing). Da bi automobil bio funkcionalan, ugrađene su mu sljedeće komponente: asinkroni motor 96V/11 kW, Zapi inverter 96V/450A s hladnjakom, Zapi pedala gasa, Albright sklopnik SW200/96V, baterije LiFePO4 100 Ah - 30 članaka, Net BMS jedinica za članak - 30 kom, punjač Atib 96V/25A, vakuumska pumpa, DC-DC pretvarač 72-144V/12/350, električni grijач putničkog prostora, glavna sklopka s držačem, glavni kabel 50 mm<sup>2</sup>, kabel za napajanje, konektori... Ovako preinačen automobil u svakodnevnoj upotrebi zadovoljava potrebe gradske i prigradske vožnje sa testiranim rezultatima:

Maksimalna brzina: 70km/h

Autonomija: 80km

Punjenje baterije: 4 sata

Cijena punjenja u nižoj tarifi: 4,5 kn

Cijena punjenja u višoj tarifi: 9,5 kn.

Osim dostatnih karakteristika za potrebe gradske i prigradske vožnje, električni automobil Škole vrijedno je nastavno pomagalo za izučavanje osnova e-mobilnosti u sklopu fakultativne nastave iz predmeta „Alternativni pogoni u cestovnom prometu“ koji izučavaju učenici četvrtih razreda u sklopu obrazovanja za zanimanje Tehničar cestovnog prometa.

Da bi e-mobilnost bila prihvaćena kao učinkovit i ekološki najprihvatljiviji oblik prometa, nužan preduvjet je da se električna vozila napajaju električnom energijom proizvedenom iz obnovljivih izvora energije (sunce, vjetar i sl.). Kako bi se zadovoljio i ovaj uvjet e-mobilnosti, Škola za cestovni promet iz Zagreba odlučila se na proizvodnju električne energije iz fotonaponskih ćelija. S obzirom na dostatan broj sunčanih dana tijekom godine i položaj zgrade Škole koji je pogodan za ugradnju fotonaponskih ćelija, sunčeva energija bilaje najprihvatljivije rješenje za proizvodnju električne energije iz obnovljivih izvora. Za potrebe proizvodnje električne energije odlučeno je da se solarna elektrana sastoji od:

- Fotonaponskih panela WINAICO WSP280M6
- Solarnog hibridnog pretvarača/punjača 3000W/48V
- Baterije DAB12-150FA 12V/150Ah
- Nosiva konstrukcija
- Elektromontažni set

Sustav solarne elektrane napravljen je u skladu s projektnom dokumentacijom, a uz osnovne komponente solarna elektrana je povezana sa informacijskim ustavom Škole na kojem je moguće pratiti izlazne rezultate (proizvodnja električne energije (godina/mjesec/dan), potrošnja i

raspodjela električne energije,...). Nakon ugradnje solarne elektrane uočeni su pozitivni rezultati u proizvodnji električne energije, kao i pozitivni učinci na smanjenje zagađenja okoliša. Solarna elektrana u vlasništvu Škole godišnje proizvede oko 461 kWh električne energije (cijena kWh je 0,95 kn + PDV), na punjenje električnog automobila Škole potroši se oko 1000 kWh proizvedene električne energije (izračun baziran na 2 punjenja tjedno potpuno prazne baterije električnog automobila), a ostatak od oko 3600 kWh proizvedene električne energije Škola može potrošiti na rad ostalih trošilau Školi ili na punjenje drugih električnih automobila. Osim osjetne uštede na troškovima koji se odnose na potrošnju električne energije, solarna elektrana Škole ostvari smanjenje emisije CO<sub>2</sub> za 1272kg godišnje u proizvedenoj električnoj energiji i oko 1000 kg godišnje emisije CO<sub>2</sub> zbog korištenja električnog automobila.

Da bi cjelokupan sustav solarne elektrane imao bolju učinkovitost te kako bi se mogao primjenjivati za javne potrebe, Škola je na svojem parkiralištu ugradila stanicu za punjenje električnih automobilatvrkeDucati komponenti iz Ludbrega. Stanica za punjenje električnih automobila opremljena je s dvije utičnice za dva priključka(*Schuko i Mennekes*), koje omogućavaju istovremenopunjenje dvaju električnih vozila. Komunikacija s vozilom je putem *PWM (Pulse Width Modulation)*. Svaka utičnica je opremljena odgovarajućim zaštitama. Utičnice su opremljene odgovarajućim *SweelingCover* vijkom koji sprječava umetanje utikača kod izostanka autorizacije korisnika. Ova karakteristika prilagođena je za „javno“ korištenje. Utičnice su opremljene sustavom za zaključavanje utičnice koji sprječava vađenje utikača u odsutnosti autorizacije korisnika dok nakon autoriziranog vađenja utikača automatski zaključava utičnicu. Fiskalni brojač *MID* broji isporučenu energiju u vozilo na svakom priključku, a elektronički modul s mikroprocesorom vodi funkcije i komunikaciju utičnice svozilom i korisničkim sučeljem. Ugrađen je specifični modul koji upravlja raspoloživim naponom putem *PWM derating* funkcije. Proizvod je napravljen u skladu sa zahtjevima u IEC 61851-1, IEC 61851-22, IEC 69-9. Stanica za punjenje opremljena je korisničkim sučeljem i vezom s kontrolnim centrom, a identifikacija korisnika obavlja se putem RFID kartica 14443-/ B. Stanica je opremljena LCD zaslonom 2x20 cm za prikazivanje informacija koje se odnose na: izbor utičnice, statuspunjenja (trenutna snaga, izlazna snaga, ...), anomalije,... Omogućena je komunikacija sa stanicom putem GPRS mreže / Lan i upravljačkim centromza potrebe prijenosa podataka o ciklusima punjenja, te je moguće upravljanje rezervacijom priključka, putem WEB/ SMS usluge. Elektronički modul s mikroprocesorom kontrolira gore navedene funkcije. Budući da je Škola za cestovni promet iz Zagreba zaokružila cjelokupan koncept e-mobilnosti (električni automobil, proizvodnja električne energije iz obnovljivih izvora, stanica za punjenje električnih automobila i educirani nastavnici), može se posvetiti glavnom cilju projekta koji se odnosi na povećanje kvalitete učenja u strukovnom obrazovanju kroz novi inovativni obrazovni modul pod nazivom „Elektromobilnost“. Obrazovni modul „Elektromobilnost“ namijenjen je prvenstveno učenicima iz obrazovnog programa Promet i logistika, mada je primjenjiv i na ostale strukovne obrazovne programe. Osnova ovog obrazovnog modula odnosi se na izučavanje e-mobilnosti kroz prijenos i diseminaciju dobre prakse između strukovnih škola uz primjenu pratećih alata za učenje i poučavanje, te jačanje povezanosti strukovnog obrazovanja i tržišta

rada. Za ostvarenje predviđenih ishoda učenja u obrazovnom modulu „Elektromobilnost“, Škola za cestovni promet iz Zagreba je, uz suradnju sa strukovnim školama KouvolaRegionVocationalCollege iz Finske i Šolskim centrom Celje iz Slovenije te sa partnerima na projektu -Energetski institut Hrvoje Požar iz Hrvatske, tvrtke AVANTCAR (Ljubljana, Slovenija), Ducati komponenti (Ludbreg, Hrvatska), NETeko (Zabok, Hrvatska), te ACASA (Barcelona, Španjolska)- razvila inovativan način učenja i poučavanja na daljinu javno dostupan putem mrežne stranice <http://www.lemo-project.eu>. Sustav učenja na daljinu u obrazovnom modulu „Elektromobilnost“ zamišljen je da se osnove e-mobilnosti izučavaju kroz tri koraka. U prvom koraku svaki korisnik treba proučiti poglavlje u kojem se obrađuju određeni nastavni sadržaji vezani za e-mobilnost. Drugi korak učenja i poučavanja predviđen je za inovativne i sadržajno povezane videosadržaje koji korisniku omogućuju da pročitane nastavne cjeline sagleda sa šireg gledišta na drugačiji način. Svaki videozapis pred kraj sadrži pitanja o kojima bi učenici sa svojim nastavnicima trebali razgovarati, a zaključke zajednički donositi za vrijeme nastavnog sata. U trećem koraku učenja obrazovnog modula „Elektromobilnost“ učenici trebaju točno odgovoriti na postavljena pitanja vezana za svaku ponuđenu nastavnu cjelinu. Ovakav oblik učenja i poučavanja u sustavu strukovnog srednjoškolskog obrazovanja korištenjem sustava učenja na daljinu omogućava lakše i brže postizanje ishoda učenja, a učenicima nudi vrijedne sadržaje koji će im omogućiti kvalitetniju nastavu. Potencijalni dugoročni učinci ovog projekta bit će vidljivi kroz bolje usklađivanje obrazovnog sustava i gospodarstva te popularizaciju ideje e-mobilnosti čime se podržavaju nastojanja da sve članice EU do 2020. osiguraju udio energije iz obnovljivih izvora u svim oblicima prijevoza u iznosu od najmanje 10% ukupne potrošnje.

## ROAD TRAFFIC SCHOOL, ZAGREB

### E – mobility in a system of regular education

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#### Summary:

Last few years, due to increasing instability in the market of petroleum products and constantly rising prices, is growing awareness of the necessity of developing sustainable mobility based on renewable energy sources and of the importance of education and awareness of many people, especially young people, about the need for the development and implementation of sustainable mobility in everyday life.

Electric vehicles are one of the very important technological solutions aimed at reducing environmental pollution and encourage the use of renewable energy sources. If we unify knowledge of electric vehicles and renewable energy sources, we can speak about sustainable mobility – e-mobility.

Road traffic school from Zagreb has started an alignment with the new technologies in transport by development of competences of students and teachers in vocational schools through the education and training about e-mobility within the project Learning E-Mobility / LEMO. In this project special accent was placed on the environmental aspect of the concept of e-mobility using electricity from renewable sources. The main project goals are increase of the quality of learning in vocational education through development of new innovative educational module Electromobility and following learning and teaching

tools (ICT, OER), transmission and dissemination of good practice between European vocational schools and strengthening of connection of vocational education and labor market with the accent in the field of e-mobility. In this work will be presented achievements in Road traffic school, Zagreb, in the area of e-mobility relating to the school's electric car, solar power plant, charging station for electric cars and curriculum of educational module Electromobility which is created together by vocational schools from Zagreb (Croatia), Celje (Slovenia) and Kouvola (Finland) in cooperation with companies and other partners' institutions from Croatia, Slovenia and Spain.

**Key words :**

- Electromobility
- Link connection the education with economy and the labor market ????
- Projects under the program Erasmus +



## **E-mobility in a system of regular education**

Mobility is one of very important factors of human life and represents the foundation of personal freedom and the basis for the establishment and development of interpersonal relations, trade, economy. Seen throughout history, mobility has never been so developed, faster and more versatile than today, primarily due to cheap and widely available energy source-oil. However, the last few years, due to the growing instability in the market of petroleum products and constantly rising prices and increasing pollution, traditional forms of mobility are looking for a quick change of current lifestyle. Awareness of the need for the development of sustainable mobility based on renewable energy sources is growing up and it is intensively thinking about the importance of education and awareness of greater number of people, especially young, about need for the development and implementation of sustainable mobility in everyday life. Electric vehicles are one of technologically very important solutions aimed to reduce pollution and encourage the use of renewable energy sources. If we unify knowledge of electric vehicles and renewable energy sources, we can talk about sustainable mobility – e-mobility (electromobility).

The goal of e-mobility is to find out sustainable balance between people, cars and environment. E-mobility gives positive effect to reducing of emissions of harmful exhaust gases. Researches show that the overall calculation of greenhouse gas emissions for electric cars is lower than the emission of conventional vehicles. Reduction of CO<sub>2</sub> is from 11% to 100% depending on whether the electricity that we fill a car is produced from energy sources that negatively affect on environment or from renewable energy sources. Just mentioned facts required of us, who work in the area of transport and whose basic of work is organization and improvement of the traffic and exploitation of road vehicles which directly and in a great part affects on environment, to notice a need to change to the access to mobility and that the princip of sustainable mobility and new technologies that come with it, we try to implement in modern transport. In addition to new technologies which are necessary build into the function of modern transport, our the most important task is to educate new generations of workers in the field of transport.

Road traffic school from Zagreb noted the need for this approach to education and through European project called „LEMO – Learning E-Mobility“ she involved in creation of new generations of students who will be able in more professional way to popularize the idea of e-mobility. The project lasts 3 years and its realization is divided into 3 phases. In the first phase (first year of implementation) teachers and participants from partners' institutions, pass the training during which study the components of the concept of e-mobility and an application of concept in various European countries. In the second phase (the second year of implementation) teachers from vocational schools in cooperation with businessmen and experts in implementation of e-mobility concept, create new educational module as supplement to current curricula in the field of transport and logistics and innovative tools for application of that module in education (learning and teaching tools). In the third phase ( in third year of implementation of the project) partner schools test newly created module and belonging tools for education by application in their schools.

The main goals of the project are increasing of quality of education in vocational education through development of new innovative educational module about electromobility and following learning and teaching tools, transmission and dissemination of good practice between European vocational schools and strengthening the links of vocational education and labor market with the accent in the field of e-mobility. To make a circle of all aspects of sustainable e-mobility (electric vehicles and renewable energy sources), Road traffic school, Zagreb in the previous project (Europe Electric Car, 2012. – 2014.) has converted classical car SMARTfortwo with Diesel engine, into electric vehicle. Electric car SMARTfortwo is created as product of students and teachers of the school, with great help of Croatian producers of electric cars (NETeko, Rimac Automobili and Dok-Ing). Car has to be functional so following components were built in it: asynchronous motor 96 V/11 Kw, Zapi inverter 96 V/450 A with cooler, Zapi accelerator pedal, Albright contactor SW200/96V, batteries LiFePO4 100 Ah – 30 cells, Net BMS unit for cell – 30 pcs, charger Atib 96 V/25 A, vacuum pump, DC-DC converter 72-144 V/12/350, electric heater for passenger compartment, main switch with holder, main cable 50 mm<sup>2</sup>, cable for charging, connectors,... In this way transformed car in daily use satisfies needs of urban and suburban driving test results:

Maximum speed: 70 km/h

Autonomy: 80 km

Battery charge: 4 hours

Price charging at a lower rate: 4,5 kn

Price charging at a higher rate: 9,5 kn

This electric car is worth teaching aid for studying the basis of e-mobility as a part of the optional classes in subject „Alternative propulsion in road traffic“ which is studied by fourth-grade students – technicians of road transport.

To recognize e-mobility as an efficient and environmentally the best form of transport, a necessary precondition is that electric vehicles are powered by electricity produced from renewable energy sources (sun, wind,...). To satisfy also this e-mobility condition, Road traffic school from Zagreb decided to produce electricity from photovoltaic cells. According a sufficient number of sunny days during the year and the position of the school's building that is suitable for the installation of photovoltaic cells, solar energy was the most appropriate solution for production electricity from renewable sources.

For the purpose of electricity production, it was decided that the solar power plant consists of:

- Photovoltaic panels WINAICO WSP280M6
- Solar hybrid converter/charger 3000 W/48 V
- Batteries DAB 12-150FA 12 V/150 Ah
- Supporting structure
- Electrical mounting kit

A solar energy system is designed in accordance with project documentation, and beside the basic components, a solar power plant is connected to the information system of the school at which is possible to follow outputs (production of electricity (year/month/day), consumption and distribution of electricity,...). After installation of solar power plants, we could observe positive results in the generation of electricity, as well as the positive effects on the reduction of environmental pollution. The solar power plant- school's property- annually produces cca 4611 kWh of electricity (the price for 1 kWh is 0,95 kn + VAT), for charging of electric car consumes about 1000 kWh of produced electricity (calculation is based on 2 charging/week of totally empty battery of electric car), and the rest of cca 3600 kWh produced electricity the school can spend for the operation of other loads in the school or for charging of other electric cars. In addition to the sensible cost savings related to the consumption of electricity, the solar power plant realizes the reduction of emission CO<sub>2</sub> for 1272 kg annually in produced electricity and cca 1000 kg/year of emission CO<sub>2</sub> because of using electric car.

Road traffic school is incorporated charging station for electric cars (product of Ducati komponenti from Ludbreg) that the whole system of solar power has better performance and can be used for public purposes. The charging station is equipped with two sockets for two connectors (Schuko and Mennekes), that allow simultaneous charging of two electric vehicles. The communication with the vehicle is by PWM (Pulse Width Modulation). Each socket is equipped with certain protections. The sockets are equipped with Sweeling Cover screw which prevents the insertion of the plug at the lack of user's authorization. This feature has been adapted for „public“ use. The sockets are equipped with the system for locking socket that protects removing the plug in absence of user's authorization. After authorized removing the plug, the socket is locked automaticaly.

Fiscal counter MID counts delivered energy into a vehicle on each connection and electronic module with a microprocessor leads the function and communication of socket with vehicle and user's interface. There is also incorporated a specific module that manages with the available voltage by PWM derating function. The product is made in accordance with the requirements in IEC 61851-1, IEC 61851-22, IEC 69-9. The charging station is equipped with user's interface and connection with control centre. The identification of user is done by RFID card 14443-/B. The station is equipped with LCD screen 2 x 20 cm for representation these information: choice of socket, charging status (current power, output power, ...) anomalies,... It is possible to have a communication with station by GPRS net/Lan and the control centre for the purposes of data transmission about charging cycles and it is possible to control with reservation of connection , by WEB/SMS service. Electronic module with microprocessor controls above mentioned functions.

Road traffic school from Zagreb circled the whole concept of e-mobility (electric car, production of electricity from renewable energy sources, charging station and educated teachers) so now we can commit to the main project goal that is related to increasing of quality of teaching and learning in vocational education through new innovative educational module called „Electromobility“. This module is primarily intended to students in sector Transport and Logistics (but it can be used in other vocational educational programs). The basic of this module is studying e-mobility through transmission and dissemination of good practice between vocational schools, using certain learning and teaching tools and the strengthen links between vocational education and labor market. To achieve the foreseen learning

outcomes in the educational module „Electromobility“, Road traffic school, Zagreb is in cooperation with vocational schools Kouvola Region Vocational College from Finland and Šolski centar Celje from Slovenia, and with the project partners – Energetski institut Hrvoje Požar from Croatia, company AVANTCAR (Ljubljana, Slovenia), Ducati komponenti (Ludbreg, Croatia), NETeko (Zabok, Croatia), ACASA (Barcelona, Spain), developed an innovative way of teaching and learning at distance, publicly available at the website <http://www.lemo-project.eu>.

The system of distance learning in the educational module „Electromobility“ is designed that the basics of e-mobility are studied in three steps. In the first step each user has to study the chapter in which is certain teaching content related to e-mobility. The second step of learning and teaching is scheduled for innovative and content-associated videocontents that allows to user that red contents looks from the wider point of view and in a different way. Each video, before the end, contains the issues about which students should discuss with their teachers. The conclusions will be brought during the lesson. In the third step of learning educational module „Electromobility“, the students must correctly answer the questions related to each choice teaching unit. This way of learning and teaching in the system of secondary vocational education, using system of learning at distance, makes it easier and faster to achieve the learning outcomes, and offers to the students valuable contents that will enable them better education.

Potential long-term effects on the project will be visible through better alignment of the education system and the economy as well as popularization of the idea of e-mobility thus supporting the efforts that all EU members by 2020. ensure the share of renewable energy in all forms of transport in the amount of at least 10% of total consumption.



**Vlasta Perotić, dipl.ing.**

**Škola za cestovni promet**

**10 000 ZAGREB**

**Trg J. F. Kennedyja 8**

## **„Mladi, doprinesimo sigurnosti u cestovnom prometu“**

### **Sažetak:**

Protiv stradavanja u cestovnom prometu cijeli je svijet podigao glas. Krenula je globalna akcija kojoj je cilj u sljedećih deset godina prepoloviti broj stradalih. Pred Hrvatskom su, također, mnoge akcije...

Cestovne nesreće najveći su ubojica mladih ljudi u dobi od 15 do 29 godina i deveti ubojica, gleda li se ukupna populacija. Nastavi li se sadašnja progresija promet će 2030. godine biti na 5. mjestu. Više će ljudi umirati na cesti nego od AIDS-a, raka želuca, raka pluća...

Gotovo polovica stradalih su biciklisti, motoristi i pješaci. Smrtnost u prometnim nesrećama, invalidnost i ozljeđivanje postali su i javnozdravstveni problem pa nije čudno da iza velikog globalnog projekta Desetljeće sigurnosti u cestovnom prometu 2011.-2020., koji je pokrenut stoji upravo Svjetska zdravstvena organizacija kao krovni nositelj aktivnosti.

Cilj "Desetljeća sigurnosti u cestovnom prometu" je jednostavan: prepoloviti broj smrtno stradalih i ozljeđenih u svijetu u sljedećih deset godina.

Primjer dobre prakse je realiziran i u našoj školi, kao i u još nekim školama koje osposobljavaju za prometna zanimanja.

U radu će biti naglašene glavne smjernice kako realizirati spomenutu aktivnost u našim školama i potaknuti mlade na veću brigu i pažnju pri sudjelovanju u prometu.

Dana 6.travnja 2016.g., po drugi puta je u Školi za cestovni promet Zagreb održana edukativno-preventivna akcija s ciljem sigurnosti i zaštite mladih u prometu. Škola je u suradnji sa HAK-om

i MUP-om organizirala edukativno-preventivnu akciju „Mladi, doprinesimo sigurnosti na cestama“. Akcija je namijenjena učenicima trećih i četvrtih završnih razreda naše škole i gostima srednjih škola iz grada Zagreba i iz cijele Hrvatske, kako bi osvijestili mlade u očuvanju ljudskih života.

Na nama je da poduzmemo sve što možemo i zajedno djelujemo na smanjivanje strašnih brojki i da što više proširimo mrežu uključenih na rješavanju ovog problema.


**Ključne riječi: mladi, sigurnost prometa, desetljeće sigurnosti, prometne nesreće, uređaji za nadzor nad odvijanjem prometa.**



**DESETLJEĆE SIGURNOSTI  
CESTOVNOG PROMETA 2011-2020**

Akcija se provodi u okviru UN-ovog *Desetljeća sigurnosti cestovnog prometa 2011.-2020.*, te *Nacionalnog programa sigurnosti cestovnog prometa Republike Hrvatske 2011.-2020. godine.* Suorganizatori akcije su PU zagrebačka i HAK Zagreb.

Uvjereni smo da ova akcija može doprinijeti smanjenju broja stradanja kako mladih tako i ostalih sudionika u prometu, te se tako nadamo popraviti sliku stradalih osoba u prometu na cestama Republike Hrvatske.

RANG SMRTNOSTI	DOMINANTNI UZROCI SMRTNOSTI U SVIJETU	FREKVENCIJA
1	Srčane bolesti	12.6
2	Moždani udari	9.7
3	Dišne infekcije	6.9
4	HIV/AIDS	4.8
5	 Kronične plućne bolesti	4.8
6	Perinatalni razlozi	4.3
7	Crijevne bolesti	3.3
8	Tuberkuloza	2.7
9	Dušnik, bronhi, rak pluća	2.2
10	Nesreće u cestovnom prometu	2.1
11	Šećerna bolest	1.7
12	Malaria	1.6

Izvor: WHO – Svjetska zdravstvena organizacija

Tablica 1. Dominantni uzroci smrtnosti u svijetu

U tablici 1. su vidljivi rezultati dominacije smrtnosti u svijetu, ali isti tako znamo ako ne prekinemo trend porasta prometnih nesreće da ćemo 2030. godine biti na 5. mjestu, što je poražavajući podatak.

Kako bismo potaknuli mlade našeg grada, županije a i ostatka Republike Hrvatske na ozbiljnost njihova ponašanja u prometu tijekom nastavka života, te kako bismo produbili njihova shvaćanja o sigurnosti upravljanja motornim vozilima, Edukacija obuhvaća predavanja i demonstracije rada simulatora vožnje motocikla i simulatora prevrtanja automobila.

Predavanjima i demonstracijama rada simulatora prisustvovali su i po dva maturanta i jedan nastavnik/stručni suradnik iz svake srednje škole s područja naše mjesne zajednice.

Također je pokrenuta inicijativa prema ostalim srednjim školama koje u Republici Hrvatskoj kako bi ova akcija postala tradicionalna i odvijala se svake godine tijekom travnja/svibnja tekuće godine.

Teme zastupljene u teorijskom dijelu su:

1. Maturanti, svojim ponašanjem u prometu doprinesite „Desetljeću sigurnosti“ – predavanje, mr. sc. Nenad Zuber, HAK Zagreb

Predavanje je koncipirano kroz utjecanje na promjenu stava koji dovodi do promjene ponašanja, Elementi kroz koje se želi utjecati na promjenu ponašanja su prebrza vožnje, utjecaj alkohola i vezanja sigurnosnog pojasa tijekom vožnje. Također se želi naglasiti želja za preuzimanjem upravljanja rizicima pri vožnji.

2. Stanje sigurnosti mladih vozača grada Zagreba s posebnim osvrtom na mopediste i motocikliste – predavanje MUP.

Predavač je prezentirao pokazatelje sigurnosti prometa u gradu i mjere koje poduzima policija za smanjenje broja prometnih nesreća.

Nakon teorijskog dijela koji ne bi smio biti duži od 45 minuta slijedio je demonstracijski dio edukacije.

Tu su učenici bili upoznati i sami su mogli isprobati i steći iskustva o djelovanju sigurnosnog pojasa u vozilu tijekom prevrtanja vozila kao i steći iskustvo djelovanja sigurnosnog pojasa pri relativno malim brzinama oko 35 km/h.



Slika 1. Teorijski dio akcije

Slika 2. Učenici na teorijskom dijelu predavanja



Slika 3. Simulator vožnje motociklom

Slika 4. Uređaj za mjerenje brzine kretanja vozila



Slika 5. Učenici razgledavaju uređaje

Slika 6. Alkotest je također izazvao interes učenika





*Slika 7. Simulator prevrtanja automobila – uloga sigurnosnih pojaseva*



*Slika 8. Simulator prevrtanja automobila u dvorištu škole*

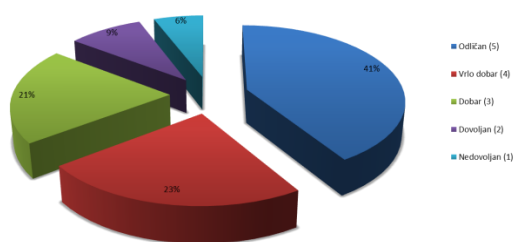


Slika 9. Rampa koja simulira udarac kod sudara pri brzinama oko 35 km/h.

Naravno, nakon obavljene akcije pitali smo naše učenike kako su zadovoljni s prezentiranim sadržajem.

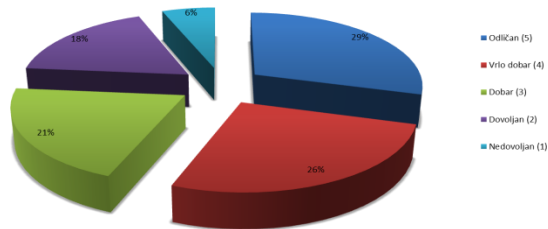
### Rezultati ankete:

1. Kojom ocjenom biste ocijenili povezanost teorijskog i praktičnog dijela predavanja.



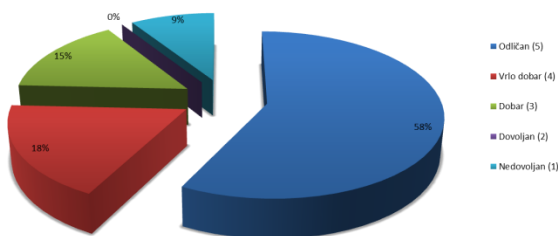
85 % učenika procjenjuje da je povezanost teorijskog i praktičnog dijela dobra.

**2. Kojom ocjenom biste ocijenili svoju motiviranost na teorijskom dijelu predavanja.**



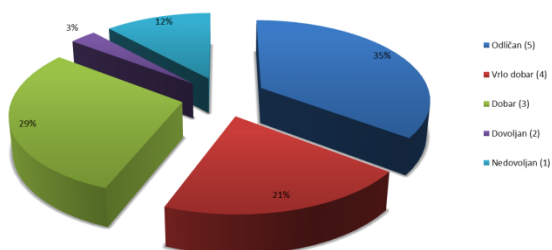
79% učenika smatra da su dobro motivirani i za teorijski dio prezentacije o sigurnosti prometa.

**3. Kojom ocjenom biste ocijenili svoju motiviranost na praktičnom (poligonskom) dijelu.**



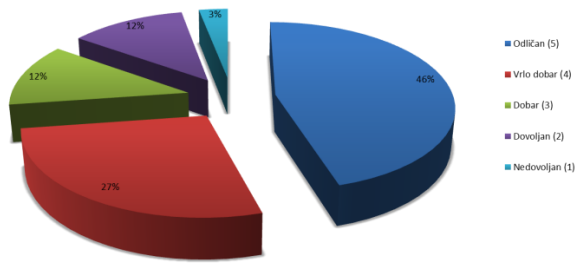
91% učenika procjenjuje da je poligonski dio dobra motivacija za uvjeriti se kako djeluje sigurnosni pojas pri nastupanju prevrtanja. Ovaj njihov odgovor ulijeva nadu da će se kod većine sudionika u vozilu javiti potreba za vezanjem sigurnosnim pojasom tijekom vožnje. Inače taj podatak u RH iznosi oko 80% na otvorenoj cesti i oko 60% u naselju.

**4. Kojom ocjenom biste ocijenili primjenjivost edukacije u teorijskom dijelu.**



85% učenika smatra da su podaci s teorijskog dijela primjenjivi u praksi.

**5. Kojom ocjenom biste ocijenili primjenjivost edukacije u praktičnom (poligonskom) dijelu.**



Također ih 85% smatra da su iskustva s praktičnog dijela primjenjiva u životu.

Zaključak koji se namače, a povezan je sa izjašnjavanjem učenika o prezentaciji upućuje nas na realizaciju teorijskog dijela sa konkretnim (životnim) primjerima i kraćim vremenom prezentacije.

Poligonski dio su učenici prihvatili i isprobali u velikom postotku, te se tako i očitovali u anketi.

**Od tri bitna čimbenika sigurnosti prometa (sudionici, vozila, ceste), prometna kultura svih sudionika u prometu - ponajviše vozači - najbrže može smanjiti tragične posljedice. Ona ne traži toliko financijskih sredstava, koliko svježije ideje te stalan i sustavan rad na njihovom promicanju.**

Upravo na tragu financija, kojih uvijek ima premalo, osmislili smo edukaciju za populaciju srednjoškolaca koja nije do autoškole obuhvaćena nikakvim edukacijama o ponašanju u prometu.

Nositelji akcija u Republici Hrvatskoj bi trebale biti srednje strukovne škole koje obrazuju kadar u cestovnom prometu u suradnji s lokalnim auto moto klubovima i policijskim uprava.



Vlasta Perotić, dipl. ing.

Škola za cestovni promet

10 000 ZAGREB

Trg J. F. Kennedyja 8

## **“Young, contribute to road safety”**

### **Summary:**

The whole world raised voice against casualties in road traffic. A global action has started, and the goal is in the next ten years to halve the number of casualties. Many actions involve Croatia...

Road accidents are the biggest killer of young people aged 15-29 years and the ninth in overall population. If this trend continues in 2030, it will be in 5th place. More people will die from the road accidents than AIDS, cancer, gastric cancer, lung diseases...

Almost half of the victims are cyclists, motorcyclists and pedestrians. The mortality rate in road accidents, disabilities and injuries become a public health problem and so it is not surprising that after the great global project Decade of road safety 2011.-2020., was launched by World Health Organization as a key holder of the activities.

The goal of "Decade of road safety" is simple: to halve the number of fatalities and injuries in the world in the next ten years.

Example of good practice is implemented in our school, as well as in some other schools that have traffic interest.

In this paper we will emphasize main directions how to implement mentioned activity in our schools and encourage young people on greater care and attention for participation in traffic.

On the 6th of April 2016, for the second time, at the Traffic school Zagreb an educational and preventive action was held with a goal to the safety and protection of young people in traffic. School in collaboration with HAK and the MUP organized an educational and preventive action "Young, contribute to road safety". This was meant for students of third and fourth final grades of our school and other high school guests from Zagreb and all of Croatia, in order to raise awareness in young people on preservation of human life.

It is on us to undertake everything we can do to act together on reducing terrible numbers, and to the expand the network of people involved on solving this problem.

**Keywords: young, traffic safety, Decade of road safety, traffic accidents, devices to control the flow of traffic.**



## **DECADE OF ACTION FOR ROAD SAFETY 2011-2020**

The programme is carried out within the framework of the UN *Decade of road safety 2011. - 2020.*, and the *National Programme for road safety of the Republic of Croatia 2011. - 2020.* Co-organizers of the programme are PU Zagreb and HAK Zagreb.

We are confident that this programme could contribute in reducing the number of accidents in young and other road participants. We hope to prevent numbers of people killed on roads in Croatia.

MORTALITY	THE DOMINANT CAUSES OF DEATH IN THE WORLD	FREQUENCY
1	heart disease	12,6
2	strokes	9,7
3	respiratory infection	6,9
4	hiv/aids	4,8
5	Chronic pulmonary disease	4,8
6	perinatal reasons	4,3
7	intestinal diseases	3,3
8	TB- tuberculosis	2,7
9	intestinal diseases lung cancer, bronchi, trachea	2,2
10	traffic accidents	2,1
11	diabetes	1,7
12	malaria	1,6

Source: WHO - World Health Organization

Table 1. The dominant causes of death in the world

Table 1 shows dominant death causes in the world, but we also know if don't stop this upward trend, in 2030., traffic accidents will be in 5th place.

To encourage young people of our city, county and the rest of the Croatia on seriousness of their behavior in traffic during the continuation of their lives, and to deepen their understanding about safety of motor vehicles, Education includes lectures and demonstration of the simulator ride, both motorcycle and car overturning.

Two high school seniors and one teacher/associate from each high school attended lectures and demonstrations of simulator.

An ongoing initiative has also started towards other secondary schools in the Republic of Croatia to make this program traditional and held every year during April / May.

### Topics represented in the theoretical part are:

1. First graduates should contribute with their behavior in traffic "Decade of security" - lecture, mr. sc. Nenad Zuber, HAK Zagreb

Influencing on the change of attitude that leads to behavioral changes. We want to influence on driving too fast, the impact of using alcohol and putting the seatbelt on while driving. We want to emphasize the desire to take over the management of risks when driving.

## 2.Safety of young drivers in Zagreb with special emphasis on the moped and motorcyclists - lecture MUP.

The lecturer presented the indicators of traffic safety in the city and the measures taken by the police to reduce the number of traffic accidents.

After the theoretical part (not longer than 45 minutes), demonstration part of education followed.

In that demonstration part students could try and gain experience of using of the seat belt in the vehicle during a rollover and in relatively low speeds around 35 km/h.



Figure 1.The theoretical part of the programme Figure 2. Students in the theoretical part of the lecture



Figure 3. Simulating a ride with a motorcycle Figure 4. The device for measuring the speed of vehicles



Figure 5.Students taking a tour around devices Figure 6. Breathalyzer also sparked the interest of students





Figure 7. Overturning simulator - the role of seat belts



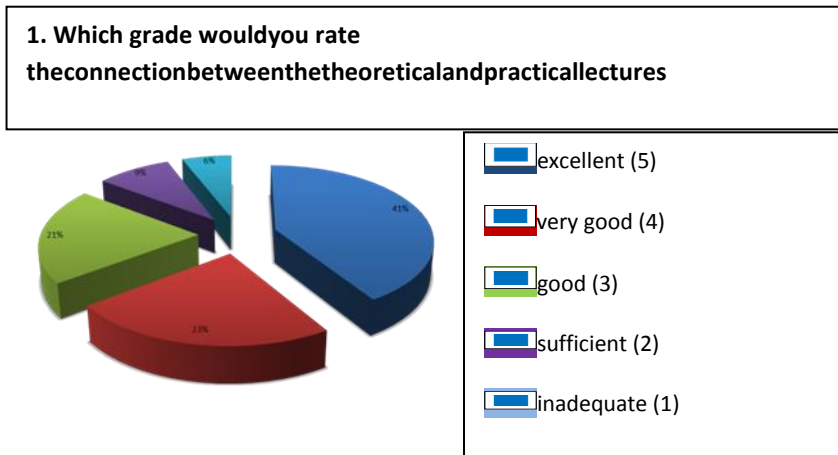
Figure 8. Overturning simulator - in the school yard



Figure 9. The ramp that simulates a collision at speeds of about 35 km/h.

After the completion of the programme, we asked our students how they are satisfied with the presented content.

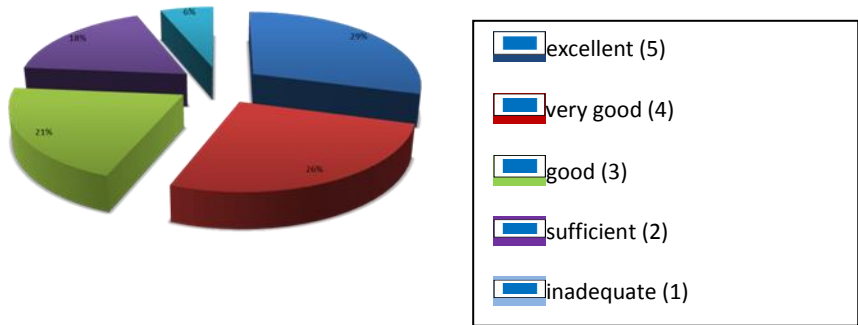
### Results of the pool:



85% of students think that the connection between the theoretical and practical part was good.

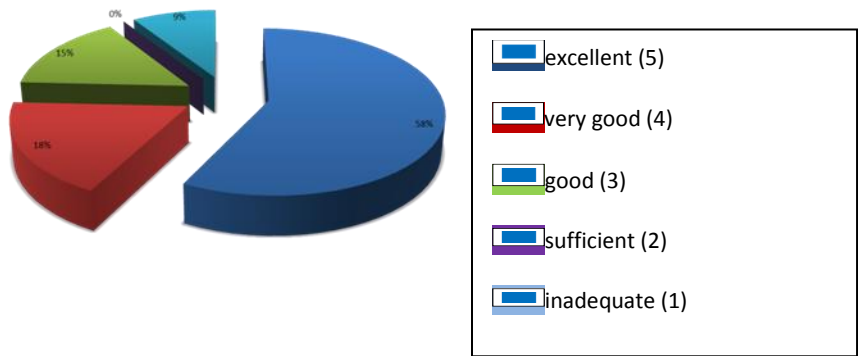


**2. Kojom ocjenom biste ocijenili svoju motiviranost na teorijskom dijelu predavanja.**



79% of students think that they are well motivated for the theoretical part of the presentation on traffic safety.

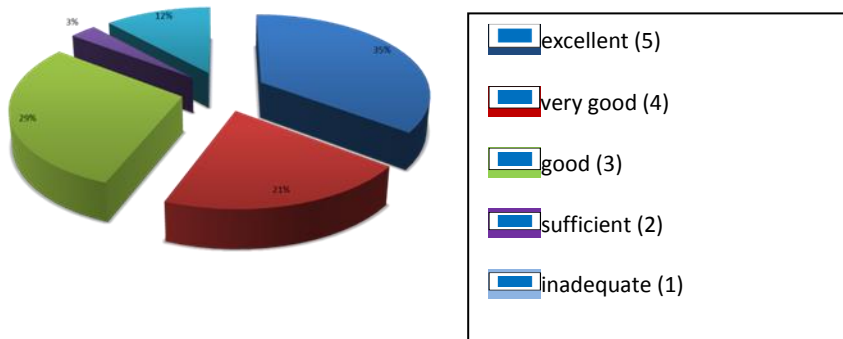
**Which grade would you rate your motivation to practical (polygon)**



91% of them think that the polygonal part was a good motivation to make sure how the seat belt works. In Croatia about 80% of the people are putting the seat belt on the open road, and about 60% of them in the populated areas.

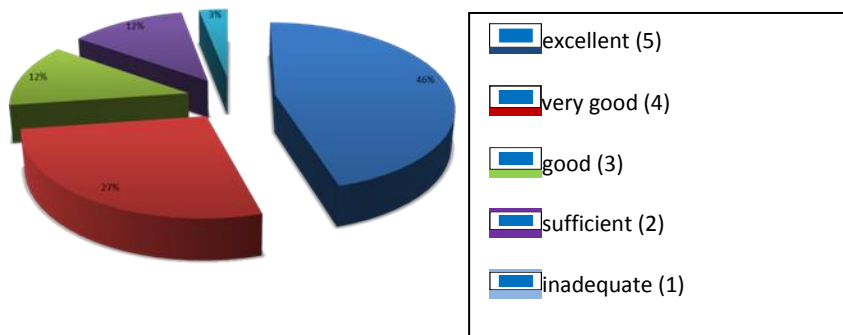
**4. Which grade would you rate the applicability of education in the theoretical part**

**4. Kojom ocjenom biste ocijenili primjenjivost edukacije u teorijskom dijelu.**



85% of the students believe that the data from the theoretical part are applicable in practice.

**5. Which grade would you rate the applicability of training in practical (polygon)**



Also 85% of them believe that the experiences from the practical part are applicable in life.

The Conclusion is, students like to learn from short theoretical parts and real life examples.

Polygonal part of the programme students accepted and tried in a high percentage.

**There are three main factors of traffic safety (participants, vehicles, roads), but mostly drivers are able to lower tragic consequences. It does not require much funding, but many fresh ideas and a steady and systematic work on its promotion.**

We have designed training for the population of high school students who do not receive any driving school training before going to driving school.

Holders of this kind of programmes in the Republic of Croatia should be vocational schools that educate students in road traffic together with local automobile and motorcycle clubs and police administration.



## Eksterna evaluacija saobraćajnih zanimanja u srednjim školama u Crnoj Gori

### **ABSTRAKT**

Metodologiju za obezbjeđivanje i unapređenje kvaliteta obrazovno vaspitnog rada u srednjim školama (samoevaluacija i evaluacija ) propisuje Ministarstvo prosvjete na predlog Zavoda za školstvo i Centra za stručno obrazovanje. Saobraćajnazanimanja u Crnoj Gori obrazuju osam srednjih stručnih škola. Eksterna evaluacija u ovim školama se obavlja jedanput u toku četiri godine. Za ovu potrebu Ministarstvo prosvjete je na osnovu javnog konkursa licenciralo više eksternih evaluatora . Vođe timova određenih za utvrđivanje eksterne evaluacije u jednoj školi angažuju evaluatore iz oblasti koje ta škola ima u područjima rada.

Angažovani evaluatori dobijaju termin obavljanja evaluacije , obavezu da po metodologiji evaluiraju obrzovni program u toj školi i na osnovu toga napišu izvještaj koji će biti javno prezentovan .

**Ključne riječi:** evaluacija ,saobraćaj i obrazovanje

## Uvod

Tehnološki razvoj i promjene na tržištu rada nameću potrebu za novim znanjima i vještinama. Odgovornost za ponudu programa obrazovanja u saobraćaju i oraganizaciju njihovog izvođenja je od ključnog značaja za opšti društveni i ekonomski razvoj. To podrazumijeva stalno unapređivanje sistema stručnog obrazovanja i obrazovanja odraslih, na istraživanjima, sagledavanjima i analizama. Sistem je potrebno sagledavati sa svim uticajima spolja i procesima iznutra i nakon toga plansko i postupno usklađivanje obrazovne politike.

Obezbjeđivanje i unapređivanje kvaliteta u stručnom obrazovanju je zakonska obaveza institucija i škola/ustanova, a ostvaruje se, između ostalog, kroz procese eksterne i interne evaluacije.

Praćenje i evaluacija ustanova koje implementiraju programe obrazovanja u saobraćaju zahtijeva normativno regulisanje, definisanje ciljeva i standarda obrazovanja i obuke, procedura, sagledavanje postojećeg stanja, uspostavljanje kriterijuma za procjenu, uvažavanje realnih ograničenja, procjenu i definisanje predloga mjera za unapređivanje. Osim toga, evaluacija svojom periodičnošću treba da utiče i na uspostavljanje održivog sistema održavanja i unapređivanja kvaliteta obrazovanja i obuke.

S obzirom da je reforma obrazovanja proces, to se i zakonska regulativa mijenjala ka osnaživanju procesa obezbjeđivanja i unapređivanja kvaliteta, prvenstveno kroz povećanje mandata institucija na centralnom nivou i ustanova koje implementiraju programe.

## **1. Prednazor**

U toku prednazora vođa tima treba da stekne uvid u postojeća dostignuća ustanove i koje su se promjene desile od prethodno izvršenog utvrđivanja kvaliteta. Na osnovu prednazora ustanove vođa tima priprema informaciju (sinopsis o prednazoru) za savjetnike evaluatore koji učestvuju u procesu utvrđivanja kvaliteta o: ustanovi; programima; resursima; terminima predviđenim za utvrđivanje kvaliteta; kratku analizu informacija koje su sakupljene tokom prednazora; ključne oblasti koje će se procjenjivati; pregled aktivnosti (strategiju i plan obilaska nastave); plan sastanaka sa osobljem i učenicima/polaznicima.

Tokom prednazora škola se ne kontaktira, već se informacije sakupljaju iz relevantnih baza podataka, sajtova, izvještaja i druge dostupne dokumentacije.

Vođa tima raspoređuje obaveze na članove tima.

Vođa tima upravlja vremenom na način da se aktivnosti predviđene planom utvrđivanja kvaliteta ustanove završe na vrijeme i po planu.

Ustanova se ne upoznaje sa planom obilaska nastave, osim sa opredijeljenom strategijom obilaska.

## **3. Proces utvrđivanja kvaliteta**

Eksterno utvrđivanje kvaliteta u ustanovama inicijalnog stručnog obrazovanja vrše Centar za stručno obrazovanje i Zavod za školstvo, na osnovu zakonskih nadležnosti.

Centar za stručno obrazovanje dostavlja Ministarstvu prosvjete plan obilaska ustanova inicijalnog stručnog obrazovanja i obrazovanja odraslih za kalendarsku godinu. Plan obuhvata ustanove i centre/organizatore koji realizuju programe stručnog obrazovanja.

Eksterno utvrđivanje kvaliteta ustanova inicijalnog stručnog obrazovanja, osim nastave opšteobrazovnih predmeta i organizatora obrazovanja odraslih vrši Centar za stručno obrazovanje na osnovu Metodologije.

Eksterno utvrđivanje kvaliteta vrši vođa tima sa eksternim evaluatorima. Tim za utvrđivanje kvaliteta sprovodi aktivnosti na osnovu zakona, Metodologije i deskriptora. Podaci se sakupljaju i obrađuju za ustanovu, program i razred. Ustanove se obavještavaju tri dana prije o početku procesa utvrđivanja kvaliteta. Ustanova može da traži odgađanje utvrđivanja kvaliteta u pisanoj

formi sa obrazloženjem, u roku 24 časa prije početka, a zahtjev se razmatra od strane Centra za stručno obrazovanje, a sa konačnom odlukom se upoznaje Ministarstvo prosvjete i ustanova.

Ustanove formalnog sistema obrazovanja, svake godine, u roku od 10 dana od početka školske godine, dostavljaju informaciju Centru za stručno obrazovanje o periodu od 200 dana tokom školske godine u kojima se, u skladu sa procesom, može na optimalan način realizovati proces eksternog utvrđivanja kvaliteta. U okviru dostavljenog perioda za eksterno utvrđivanje kvaliteta ustanova planira se utvrđivanje kvaliteta određene ustanove.

Licencirani organizatori obrazovanja odraslih 15 dana prije početka realizacije obuke obavještavaju Centar za stručno obrazovanje o programu i mjestu realizacije. U okviru dostavljenog perioda planira se eksterno utvrđivanje kvaliteta organizatora obrazovanja odraslih.

Vođa tima podnosi predlog direktoru Centra za stručno obrazovanje za sastav tima za eksterno utvrđivanje kvaliteta.

Tim čini do pet članova i određeni broj saradnika za nastavu, po procjeni, na osnovu programa koji se realizuju u ustanovi. Vođa tima planira rad savjetnika evaluatora na procesu eksterne evaluacije. Tim podnosi izvještaj. Savjetnici evaluatori uz rješenje dobijaju i bedž sa identifikacijom o evaluaciji ustanove.

Eksterno utvrđivanje kvaliteta traje, u zavisnosti od plana aktivnosti, od 1 do 5 dana.

Pri dolasku u ustanovu vođa tima direktoru i upravi predstavlja: tim savjetnika evaluatora, aktivnosti, oblasti utvrđivanja kvaliteta, pojedinačnu ulogu evaluatora i odgovornosti, planirane sastanke, strategiju obilaska nastave.

Vođa tima prije početka nadzora upoznaje tim sa strategijom opservacije časova u funkciji utvrđivanja kvaliteta nastave.

Obilazak nastave se ne najavljuje nastavniku časa/časova koji će biti predmet opservacije. Škola se ne obavještava o časovima koji će biti opservirani.

Evaluatori bi trebali da kombinuju različite strategije za utvrđivanje kvaliteta nastave/opservacije časova, pa mogu izabrati ili kombinovati: praćenje cijelog časa, posjete času/časovima, 2 časa po nastavniku; obilazak časa u trajanju ne kraćem od 15 min. uz komunikaciju sa učenicima, možda i kratak test.

Evaluacija kvaliteta nastave vrši se u cilju utvrđivanja kvaliteta izvođenja obrazovnog programa.

Izještavanje o kvalitetu nastave u inicijalnom stručnom obrazovanju vrši se po obrazovnom programu, a za obrazovanje odraslih po programu obrazovanja/ obuke.



Nije neophodno posjetiti sve nastavnike u cilju utvrđivanja kvaliteta nastave/ učenja. U toku procesa utvrđivanja kvaliteta realizacije obrazovnog programa obilazi se nastava najmanje 50% nastavnika koji realizuju nastavu stručno- teorijskih predmeta i praktične nastave.

U zavisnosti od izabrane vrste opservacije, treba dati procjenu kvaliteta obrazovnog programa (po mogućnosti i postignuća učenika u nastavi), i na osnovu prikupljenih podataka donijeti ukupnu ocjenu za nastavu.

Evaluatori trebaju doprošudujukvalitetnaosnovudobroisplaniranihi realizovanih časova, godišnjih i operativnih planova, upotrebu nastavnih sredstava, metoda i oblika rada i sl., a ne samo na osnovu formalnih zahtjeva (npr. pisane pripreme za čas i sl.).

Eksterni evaluatori mogu da vrše opservaciju samostalno ili da pozovu direktora, pomoćnika direktora, pedagoga, člana odbora za kvalitet, predsjednika aktiva ili više njih da sa njima prisustvuju opservaciji.

Ako je u opservaciji, osim evaluatora, učestvovao i direktor ili drugi članovi ustanove, posle opservacije trebaju da analiziraju kvalitet nastave i učenja koju su opservirali. Razlike u analizi časa i procjeni treba da se dodatno provjere.

Evaluatori za procjenu kvaliteta ustanove trebaju pratiti učenike/polaznike, njihovo ponašanje i bezbjednost i u drugim situacijama, osim na časovima, kao što su: početak i kraj školskog dana; odmora, pauze između časova; ispred škole itd.

Članovi tima za utvrđivanje kvaliteta trebaju da daju doprinos u procjenjivanju ključnih oblasti i zajednički dođu do stava o kvalitetu ustanove. Vođa tima na zajedničkom sastanku članova tima, na samom kraju nadzora, diskutuje procjenu kvaliteta i usaglašava predlog procjene.

Evaluatori su nezavisni u definisanju kvaliteta izvođenja obrazovnih programa za čiju su procjenu neposredno zaduženi, s tim što se mogu konsultovati u okviru tima.

Vođa tima nacrt izvještaja o kvalitetu dostavlja direktoru Centra za stručno obrazovanje na usvajanje.

Tim evaluatora za utvrđivanje kvaliteta ustanova inicijalnog stručnog obrazovanja treba da uzme u obzir stavove i mišljenja roditelja. Osnovne informacije se sakupljaju iz anketa roditelja, sagledavanja rada Savjeta roditelja, razgovora sa predsjednikom Savjeta roditelja, analize iz izvještaja koje je radila ustanova ili drugi partneri, a tiču se mišljenja roditelja o različitim aspektima rada.

Tokom procesa utvrđivanja kvaliteta savjetnici evaluatori: analiziraju evidencije, dokumentaciju, izvještaje o internoj evaluaciji, razvojne i druge planove, prethodne izvještaje o kvalitetu,

izvještaje drugih institucija i organa, ateste, licence, sertifikate; ljetopis, vebisajt; prate nastavu i druge oblike obrazovanja i obuke; anketiraju, razgovaraju pojedinačno sa učesnicima u organizaciji i realizaciji nastavnog procesa, roditeljima, učenicima, partnerima i sl.

#### **4. Izvještavanje**

Izvještaj po indikatorima sačinjavaju evaluatori prema zaduženjima. Izvještaj po indikatoru sadrži: procijenjeni nivo, obrazloženje i predlog mjera za unapređivanje. Evaluatori su obavezni da za navode, koje koriste u obrazloženju procjene indikatora, čuvaju dokaze u bilježnicama i dokumentima. Potrebno je da evaluatori imaju potvrdu informacije iz najmanje tri izvora. Parcijalni izvještaji se dostavljaju vođi tima. Vođa tima vrši objedinjavanje izvještaja. Nakon definisanja predloga izvještaja vođa tima je obavezan da sa direktorom ustanove, uz učešće direktora Centra za stručno obrazovanje, izvrši usaglašavanje, koje se odnosi na provjeru navoda i tvrdnji, koje su osnov za definisanje nivoa kvaliteta. Direktor Centra za stručno obrazovanje nakon usaglašavanja usvaja izvještaj.

Elektronska verzija izvještaja se dostavlja savjetnicima evaluatorima na dan dostavljanja izvještaja ustanovi, a na sajt Centra za stručno obrazovanje se postavlja 15 dana nakon dostavljanja ustanovi.

Djelovi izvještaja mogu biti potkrijepljeni fotografijama, a podaci fusnotama koje ukazuju na dokumenta ili podatke.

Direktor škole, nakon dobijanja izvještaja o kvalitetu, je u obavezi da ga dostavi na razmatranje stručnim organima škole.

#### **5. Procjenjivanje – skala procjene**

Ocjene indikatora ključnih oblasti kvaliteta i kvaliteta obrazovnih programa su:

- ✓ Izvrstan,
- ✓ Uspješan u ključnim segmentima,
- ✓ Zadovoljava,
- ✓ Potrebna podrška.

Za svaku ključnu oblast određuje se kvalitet na osnovu nivoa kvaliteta indikatora koji je definišu. Ustanove koje se procijene sa nivoom „potrebna podrška“ će biti praćene i kod njih će se ponovo utvrđivati kvalitet najkasnije za jednu godinu (za one oblasti koje su „loše ocijenjene“). Ako je ustanova procijenjena nivoom „Potrebna podrška“ u dva ciklusa eksternog utvrđivanja kvaliteta zaredom i još uvijek nije iskazala progres u trećem ciklusu ona se procjenjuje nivoom „nezadovoljavajuća uopšte“ i zahtijeva posebne mjere.

Kvalitet ustanove se definiše na nivou:

- ✓ Izvrsna – ako je ocjena 80% indikatora ocijenjeno kao izvrsno ili pokazuje progres;
- ✓ Uspješna u ključnim segmentima – ako je više od 80% indikatora uspješno ili izvrsno, ali je 80% ključnih indikatora uspješno ili izvrsno;
- ✓ Zadovoljava – ako je za manje od 20% indikatora potrebna podrška, ali je 100% ključnih indikatora na nivou zadovoljava i/ili više;
- ✓ Potrebna podrška – ako je za više od 20% indikatora potrebna podrška, bez obzira na stanje drugih ključnih indikatora, ustanovu je potrebno evaluirati u roku kraćem od dvije godine, iako stanje ne pokazuje progres, ustanovi se dodjeljuje ocjena „nezadovoljavajuća uopšte“.

## **6.Indikatori**

Eksterno utvrđivanje kvaliteta će se bazirati na kvantitativnim i kvalitativnim indikatorima kako bi se njihovom kombinacijom odredio napredak i procijenila ustanova.

Podaci za kvantitativne indikatore se uzimaju iz: zvanične školske dokumentacije, prijavaučenika/polaznika ili informacijadostavljenih ministarstvu/ministarstvima, Centru za stručno obrazovanje, Zavodu za školstvo ili drugim institucijama. Ostali pokazatelji kvaliteta se utvrđuju rezultatom anketa, na osnovu intervjua, izjava itd.

Kvalitativni indikatori su definisani tako da omoguće redovnu, sistematsku i objektivnu procjenu u pogledu promjene „vrijednosti“ ili statusa indikatora kako bi se olakšale procjene prethodnog i kasnijeg i onoga što se nalazi unutar ili izvan ustanove.

### **6.1. A.Upravljanje , rukovođenje i organizacija**

1. Aktivnosti uprave ustanove na kontinuiranom unapređenju kvaliteta obrazovanja, obuke i organizacije koji se mogu mjeriti i kvantifikovati.
2. Uprava ustanove promovira plansko unapređenje kvaliteta kroz proces interne evaluacije.
3. Uprava ustanove sprovodi aktivnosti na promovisanju i razvoju etosa.
4. Uprava ustanove obezbjeđuje da su svi nastavnici, treneri, zaposleni, i partneri na odgovarajući način uključeni u kontinuirano unapređivanje implementacije programa i različitih oblika podrške.
5. Rukovodstvo ustanove podstiče i koordinira aktivnosti upravnih i stručnih organa koji doprinose planiranju i realizaciji aktivnosti.

## **6.2 B. Nastava/učenje i obuka - izvođenje vetprograma**

1. Organizacija i realizacija programa stručnog obrazovanja.
2. Realizacija VET programa se odvija efektivno i efikasno (praksa i teorija).
3. Nastavna sredstva (materijali), oprema, udžbenici, elektronski materijali se koriste u nastavi i obuci u skladu sa zahtjevima programa.
4. Učenici/polaznici se usmjeravaju i dobijaju podršku koja je usklađena specifičnim potrebama pojedinca.
5. Učenici su zadovoljni sa realizacijom i podrškom koju dobijaju pri postizanju ishoda i ciljeva obrazovanja i obuke.
6. Nastavnici i treneri realizuju obrazovanje i obuku na način da učenici/ polaznici dostignu vještine predviđene programom.

## **6.3 C. Postignuća učenika/polaznika stručnog obrazovanja**

1. Postignuća učenika se kontinuirano prate.
2. Učenici/polaznici se podstiču i učestvuju u nadmetanjima.
3. Vanastavne aktivnosti se planiraju i organizuju, a učenici/polaznici su podsticani da u njima učestvuju.
4. Rezultati učenika na provjerama znanja.
5. Procenat učenika/polaznika koji napuste školu.
6. Procenat učenika/polaznika koji završavaju program u okviru redovnog trajanja.
7. Postignuća učenika/polaznika sa posebnim obrazovnim potrebama se kontinuirano prate i evidentiraju.
8. Vaspitna postignuća učenika.
9. Obrazovanje, obuka i postignuća vanrednih učenika se kontinuirano prate.
10. Učešće učenika u projektima.

## **6.4 D. Saradnja koja omogućava da se odgovori na potrebe partnera u stručnom obrazovanju**

1. Korisnici blagovremeno imaju pristup relevantnim informacijama.

- 2.Socijalni partneri i druge zainteresovane strane blagovremeno imaju pristup relevantnim informacijama.
- 3.Socijalni partneri se motivišu i učestvuju u planiranju, organizaciji i realizaciji obrazovanja i obuke.
- 4.Socijalni partneri su zadovoljni znanjem, vještinama i kompetencijama kojima su učenici ovladali u toku obrazovanja i obuke.
- 5.Ustanova sprovodi procedure i politike upisa i uzima strateške lokalne smjernice u obzir.
- 6.Diplomirani učenici/polaznici koji su dobili sertifikat/potvrdu se prate i bilježe se podaci o njima (destinacije učenika).

#### **6.5.E.Usklađenost rada sa zakonskim propisima**

- 1.Škola posjeduje dozvole, ateste i sertifikate za objekat, bezbjednost, sigurnost, sanitarne mjere zaštite itd.
- 2.Ustanova vodi pedagošku i drugu dokumentaciju u skladu sa propisima.
- 3.Ustanova posjeduje pravilnike, u skladu sa zakonom, i procedure koje su usklađene sa aktivnostima.
- 4.Škola je licencirana i akreditovana od strane autorizovanih organizacija (Loyd, HACCP i dr.).
- 5.Ugovori sa zaposlenima i partnerima su sklopljeni, odobreni i čuvaju se na propisan način.
- 6.Učenici/polaznici su bezbjedni u ustanovi, kod socijalnih partnera i u drugim prostorima u kojima uče.

#### **6.6.F.Kvalitet nastavnika, trenera i saradnika (drugog osoblja)**

- 1.Učenici su zadovoljni podrškom i povratnom informacijom od nastavnika/ trenera i uprave ustanove.
- 2.Nastavni materijal koji nastavnici i treneri pripremaju je usklađen sa ciljevima programa.
- 3.Kvalitet rada nastavnika/trenera i drugog osoblja se redovno prati i procjenjuje.
- 4.Nastavnici i treneri redovno pohađaju organizovane obuke.
- 5.Nastavnici, treneri i saradnici dodatno se usavršavaju na sopstvenu inicijativu.
- 6.Nastavnici, treneri i stručni saradnici posjeduju odgovarajuće kvalifikacije.

#### **6.7.G.Upravljanje kvalitetom**

- 1.Postoje procedure za sistematsko usklađivanje nastave i obuke sa ciljem kontinuiranog unapređivanja realizacije programa.

- 2.Kvalitet realizacije stručnog obrazovanja i obuke je u skladu sa programom (standardima).
- 3.Mjere unapređenja se kontinuirano i sistematski primjenjuju.
- 4.Aktivnosti odbora za kvalitet su u skladu sa strategijom kvaliteta ustanove.

#### **6.8.H.Materijalni resursi**

- 1.Prostorno-tehnički uslovi su u skladu sa zahtjevima programa.
- 2.Prostorno-tehnički uslovi omogućavaju učenicima da postignu postavljene ishode učenja na efektivan i efikasan način.
- 3.Prostor za obrazovanje i obuku je prilagođen učenicima/polaznicima sa posebnim obrazovnim potrebama.
- 4.U ustanovi se koristi odgovarajuća tehnologija kao podrška procesu učenja.
- 5.Optimizirana je upotreba opreme.

#### **6.9.I.Dokumentacija i procedure**

- 1.Koristi se odgovarajuća dokumentacija i ona je dostupna shodno odredbama zakona o informisanju.
- 2.Podaci koji se odnose na postignuća učenika se propisno evidentiraju.
- 3.Arhiva se propisno uređuje i čuva.
- 4.Mehanizmi za internu komunikaciju su odgovarajući i efikasni.
- 5.Poslovna komunikacija u ustanovi je u skladu sa etičkim kodeksom.
- 6.Razvijene su procedure za upravljanje određenim aktivnostima u školi.

#### **6.10.J.Provjera kompetencija**

- 1.Učenici na vrijeme dobijaju (blagovremeno) tačne informacije o ispitivanjima i rezultatima.
- 2.Provjera kompetencija se temelji na ishodima učenja programa.
- 3.Postoje procedure koje osiguravaju da se različite provjere sprovode na kvalitetan način.
- 4.Postoje procedure da se različite provjere vještina učenika vrše na različite načine.
- 5.Organizacija i realizacija provjera odgovara zahtjevima koji su propisani od strane nadležnih institucija.

### **7. Zaključak**

Ovim radom sam pokušao da obuhvatim problem edukacije i sistematskog pristupa u ovoj oblasti . Školovanje učenika za potrebe saobraćaja se vrši kao i u drugim oblastima . Nadzor nad

radom u ovoj oblasti daje nam predstavu do kog se nivoa došlo , šta je dobro i šta je lose u trenutnom načinu rada. Metodologijom je predviđen mehanizam za potvrdu da se nešto dobro radi ili da je potrebno sistemski intervenisati u cilju poboljšanja trenutnog stanja .

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## **External evaluation of the traffic professions in secondary schools in Montenegro**

### **Abstract**

Ministry of education on a proposal from the Department of Education and the Center for Vocational Education subscribed methodology for ensuring and improving the quality of educational work in secondary schools (self evaluation and evaluation)

Professions regarding traffic form eight vocational schools.

. External evaluation in these schools is carried out once in the course of four years. For this purpose the Ministry of Education on the basis of a public competition licensed several external evaluators. Team leaders that are specified for ascertaining external evaluation in one school engage evaluators from areas that this school has in its working areas.

Engaged evaluators receive the dates of the performance evaluation. They are required to evaluate the curriculum in that school according to the methodology and therefore they should write the report which will be publicly presented.

**Key words:** evaluation, traffic and education



## **1. Introduction**

Technological developments and changes in the labor market impose the need for new knowledge and skills. The responsibility for the offer of educational programs referring traffic but also organization of its performance is essential to the overall social and economic development. . This implies constant improvement of the system of vocational education and education for adults, regarding researches, insights and analysis. The system must be viewed with all outer influences and processes inside and after which there should be a planned and gradual harmonization of education policy.

Ensuring and improving the quality of vocational education is a legal obligation of institutions and schools / institutions, and achieved by, among other things, through the processes of external and internal evaluation.

Monitoring and evaluation of institutions that implement educational programs in traffic requires normative regulation, defining the objectives and standards of education and training, procedures, assessment of the current situation, establishment of the criteria for the evaluation, taking into account realistic constraints, evaluating and defining the proposal of measures for improvement. In addition, the evaluation of its periodicity should be affected by the establishment of a sustainable system of maintaining and improving the quality of education and training.

Since the educational reform is a process, therefore the legislation changed according to strengthening the process of providing and improving the quality, especially through increasing the mandate of central institutions and institutions that implement programs.

## **2. Pre-surveillance**

During the pre-surveillance the team leader should gain an insight into the existing institutions and achievements that have taken place since the previous determination of the quality.

Based on the institutional pre surveillance, the team leader prepares information ( synopsis about pre -surveillance) for advisors evaluators participating in the process of determining the quality of: the institution; programs; resources; the terms predicted for determination of the quality

a brief analysis of the information gathered during the pre-surveillance;

Key areas to be assessed; Review activities (strategy and tour plan of classes); Plan meetings with staff and students / learners.

During the pre-surveillance the school is not contacted, but the information is gathered from the relevant databases, websites, reports and other available documentation.

Team leader allocates responsibilities to the team members.

The team leader arranges time in a way that the activities calculated by the plan of establishing the quality of the institution should be completed on time and on schedule.

The institution itself is not acquainted with the plan of class surveillance but only with the chosen strategy.

### **3. The process of determining the quality**

Center for professional education with the Bureau for education perform the establishment of quality in institutions of initial vocational education, according to the legal jurisdiction.

Centre for Vocational Education delivers the plan of visitation to the Ministry of education for the institutions of initial vocational education and adult education for the calendar year. The Plan includes institutions and centers / organizers who implemented vocational education programs.

External quality assessment of institutions of initial professional education, except for teaching general education subjects and educators is conducted by the Vocational Education Centre on the basis of methodologies.

External quality assessment is carried by the team leader with external evaluators. The Team for determining the quality does the activities according to law, methodologies and descriptors. Data is collected and processed for the institution, program and the course. Institutions are notified three days before the beginning of the process of determining quality. Institution may request postponement of determination of quality by writing an explanation within 24 hours before the start, and the request is reviewed by the Center for Vocational education, with a final decision of the Ministry of education and institutions.

Each year, at the beginning of the school semester, Institutions of formal education system, within ten days, give the information to the Centre for Vocational Education about the period of 200 days. It's the time where you can, in accordance with the process, in an optimal way, realize the process of determining the external quality.

Within the period submitted for external quality assessment of institutions, the determination of quality is planned.

15 days before the implementation of training , licensed adult education organizers training inform the Centre for Vocational Education about the program and place of realization.

Within the period submitted for external quality assessment of institutions, the determination of quality of the organizers of the adults is planned.

Team Leader submitted a proposal to the Director of the Centre for Vocational Education regarding the composition of the team for determination of quality. The team consists of five members and a number of associates for teaching, which is estimated according to the basis of programs that are implemented in the institution. The team leader plans to work with the advisers evaluators on the process of external evaluation. The team comes up with a solution and receives a badge with identification about evaluation of the institution.

External quality assessment takes, depending on the action plan, from 1 to 5 days.

While arriving to the institution, the team leader represents : a team of advisors evaluators, activities, field verification of the quality, individual roles and responsibilities of the evaluator, the planned meetings, the strategy of hosting teaching .

Before the surveillance , the team leader introduces the team with the strategy of observation of classes , all in the function of determining the quality of teaching.

The class surveillance is not told in advance to the teacher who will be the subject of observation. The school is not notified about the classes that will be observed.

Evaluators should combine different strategies for determining the quality of teaching / observation hours, so they can choose or combine: observing the entire class, visiting demonstrational classes 2 hours per teacher; Class observing for a period of time not less than 15 min. to communication with students, perhaps a brief test.

Evaluation of the quality of teaching is carried out in order to determine the quality of performance of the educational program.

Reporting on the quality of teaching in initial vocational education is carried out by the educational program and adult education under the program of education / training.

It is not necessary to visit all the teachers in order to determine the quality of teaching / learning. During the realization process of determination of quality, they visit at least 50% of the teachers who implement the teaching of professional and theoretical courses and practical training.

Depending on the selected type of observation, there should be given an estimation of the quality of the educational program (if possible, student's achievement in the classroom), and based on the collected data an overall assessment for teaching should be given.

Evaluators need to judge the quality on the basis of well-planned and realized classes, annual and operational plans, the use of teaching materials, methods and forms of work, etc., Not only on the basis of formal requirements (eg. Written preparations for the class, etc.).

External evaluators can perform observation alone or to call the head master, assistant of the head master, pedagogue, member of Committee for Quality, President of assets or more of them to attend observation.

If the head master or the other members of the institution participated in the observation, in addition to evaluators, they should all analyze the quality of teaching and learning that is observed. Differences in the analysis and assessment of the classes should be additionally checked.

Evaluators for assessing the quality of the institution should monitor pupils / students, their behavior and safety and in othersituations, in addition to the classes, such as the start and end of the school day; holidays, breaks between classes; in front of the school, etc.

Team members for determining the quality should contribute to the assessment of key areas and come together to the attitude on the quality of the institution

At a joint meeting of the team members at the end of the surveillance, the team leader discusses about the estimation of the quality and harmonizes proposal of the evaluation.

Evaluators are independent in defining the quality of the educational programs for which assessment they were directly responsible, but it can also be consulted as part of the team.

The team Leader drafts report on the quality and delivers it to the Director of the Centre for Vocational Education for adoption.

The team evaluator for determining the quality of initial vocational education institutions should take into account the views and opinions of parents.

Basic information is gathered from surveys of parents, parents review the work of the Council, talks with the President of the Parents 'Council, an analysis of the report that was made by an institution or other partners, related to parents' opinions on various aspects of the work.

During the process of determining the quality of advisors evaluators: analyze records, documents, reports on internal evaluation, development and other plans, previous reports on the quality, reports of other institutions and bodies, approvals, licenses, certificates; Yearbook, website they are following the curriculum and other forms of education and training; they are interviewing talking individually with the participants in the organization and implementation of the teaching process, they talk with parents, students, partners, etc

#### **4. Reporting**

Report according to indicators consists of the evaluators assignments. . The report contains of: an estimated level, an explanation and proposal of measures for improvement. Evaluators are required to preserve evidence in notebooks and documents about the ways they use in the estimation of the indicators. It is necessary that evaluators receive the information from at least three sources. Partial reports are submitted to the team leader. The Team leader consolidates the reports. After the proposal of defining the report, the team leader with the head master and in accordance with the Centre for Vocational Education is obligated to reconcile, referring to verify allegations and claims that are the basis for defining quality levels. After the adjustment, the Director of the Centre for Vocational Education adopts the report.

The electronic version of the report is submitted to the evaluators advisers on the day of submitting the report for the organization. It can be seen on the site of the Center for Vocational Education where is set 15 days after the delivery of the institution.

Parts of the report can be supported by photographs, footnotes and data indicating the document or data.

The head master of the school, after receiving the report on quality, is obliged to deliver it to the consideration of the professional bodies of the school.

## **5. Estimation-assessment scale**

Indicators' ratings of the key areas regarding quality but also the quality of the curriculum are:

- ✓Terrific,
- ✓Successful in key segments,
- ✓Satisfying
- ✓The support is needed

For each key area the quality is set on the basis of the indicators' quality level that define it.

Institutions that are assessed with the level of "necessary support" will be followed and they will have to re-establish the quality of at least one year (for those areas that are "poorly rated").

If the institution is rated with the level "The support is needed" in two cycles of the external verification of the quality and also hasn't demonstrated the progress in the third cycle, it is estimated with the level of "satisfying" and requires special measures.

The quality of the institution is defined according to levels :

- ✓Terrific- if the evaluation of the 80% of indicators is rated as excellent or showing progress

✓Successful in key segments-- if more than 80% of the indicators are successful and great , or 80% of the key indicators are successful and excellent;

✓Satisfying - if less than 20% of the indicators are needed support, but 100% of key indicators are on the level of satisfying or more;

✓The support is needed

--if more than 20% of indicators need support, regardless of the status of other key indicators. The institution needs to be evaluated in a period shorter than two years. Even though the situation does not show progress, the institution is rated with "unsatisfactory at all."

## **6.Indicators**

External quality assessment will be based on quantitative and qualitative indicators in order to determine the combination of their progress and to assess the institution.

Data for the quantitative indicators should be taken from official school records, registration of students/ trainees or from the information delivered to the Ministry/ ministries, the Centre for Vocational Education, Department of Education and other institutions. Other indicators of the quality of the survey are done by the results and they are determined on the basis of interviews, statements, etc..

Qualitative indicators are defined to allow a regular, systematic and objective assessment regarding the change of "values" or status indicators to facilitate the assessment of previous and subsequent and to see what is inside or outside the institution.

### **6.1 A. Management, administration and organization**

1.Administration of the institution does the activities in order to gain continuous improvement of the quality of education, training and organization that can be measured and quantified.

2.Administration of the institution promotes quality improvement through the planning process of internal evaluation.

3. The Administration and institutions conduct activities on promotion and development ethos.

4.The administration of the institution ensures that all teachers, coaches, employees and partners are appropriately involved in a continuous improvement implementation of the program and the different forms of support.

The management of the institution encourages and coordinates the activities of administrative and professional bodies that contribute to the planning and implementation of activities.

## **6.2 B. Teaching / Learning and Training - performing vet program**

1. The Organization and implementation of programs of vocational education
2. Realization of the VET program is carried out effectively and efficiently (practice and theory).
3. Teaching resources (materials), equipment, textbooks and electronic materials are used in teaching and training in accordance with the requirements of the program.
4. Students / attendants are redirected and they receive support which is matched to the specific needs of the individual.
5. Students are satisfied with the implementation and support they receive in achieving outcomes and objectives of education and training.
6. Teachers and coaches realize the education and training so that students / trainees attain the skills that are foreseen in the program.

## **6.3 C. The achievements of pupils / students of vocational education**

1. The achievements of students are continuously monitored.
2. Students / participants are encouraged and they participate in competitions.
3. Extracurricular activities are planned and organized, and the students / trainees are encouraged to participate in them.
4. The students' results on the examinations.
5. The percentage of the pupils who leave school
6. 6. The percentage of the students / trainees who complete the program in the normal course of life.
7. The achievements of the pupils with special needs are continuously monitored.
8. The achievements of the pupils regarding education.
9. Education, training and achievements of students
10. Students' participation in projects.

#### **6.4 D. The cooperation which enables the answers to the needs of partners in the vocational education**

- 1.Users promptly have access to relevant information.
2. Social partners and other stakeholders promptly have access to relevant information.
- 3.Social partners are motivated and participate in the planning, organization and implementation of education and training.
4. Social partners are satisfied with the knowledge, skills and competences which students mastered in the course of education and training.
- . 5.The institution implements policies and procedures for enrollment and takes strategic local guidelines into account.

Graduated pupils / students who have obtained the certificate / receipt are being monitored and record data are written about them (destinations of the pupils).

#### **6.5 E. Coordination of the work with legal regulations**

- 1.School possesses permits, approvals and certificates for building, security, safety, sanitation, etc. protection.
- 2.The institution is keeping records about pedagogical and other documentation in accordance with regulations.
- 3.The institution has policies in accordance with the law, and procedures that are consistent with the activities.
4. The school is licensed and accredited by authorized organizations (Loyd, HACCP, etc.).
5. Contracts with employees and partners are concluded, approved and kept in a proper manner.
6. The students / participants are safe in the institution, with the social partners and in other areas in which they learn.

#### **6.6.F.The competence of the teachers, trainers and cooperators (other staff)**

- 1.The students are satisfied with the support and feedback from teachers / trainers and management of the institution
- 2.The teaching materials that teachers and trainers prepare are in conformity with the objectives of the program.



- 3.The competences of teachers / trainers and other staff are regularly monitored and evaluated.
- 4.Teachers and coaches regularly attend an organized training.
- 5.Teachers , coaches and colleagues further improve on its own initiative.
- 6.Teachers , coaches and experts have appropriate qualifications.

### **6.7 G. Management of the quality**

There are procedures for the systematic harmonization of teaching and training with the aim of continuing to improve implementation of the program.

2. Quality of implementation of vocational education and training is in line with the program (standards).
- 3.Improvement measures are continuously and systematically applied.
4. Activities of the board for quality are in accordance with a strategy of institutional quality.

### **6.8.H.Material resources**

- 1.Spatial and technical requirements are in accordance with the requirements of the program.
2. Spatial and technical conditions allow students to reach their learning outcomes in an effective and efficient manner.
- 3.The space for education and training is tailored to students / learners with special educational needs.
4. The institution uses appropriate technology to support the learning process.
5. The use of equipment is optimized .

### **6.9.I.Documentation and procedures**

1. The appropriate documentation is used and it is available in accordance with the provisions of the informational law .
2. The data relating to student achievement are properly recorded.
- 3.Archive is properly edited and saved.
4. Mechanizm for internal communications are appropriate and effective.
- 5.The business communications are set up in accordance with the code of ethics.

6. The procedures for the management of a certain activities at school are developed.

### **6.10.J.The competencies' check**

1.Students receive (on time) accurate information about the tests and results.

2. The Check of the competences is based on learning outcomes of the program.

3. There are procedures to ensure that the various checks are carried out in a quality manner.

4. There are procedures to test different skills of students and they are carried out in different ways.

5. Organization and realization of checks are equivalent to the requirements laid down by the relevant institutions.

## **7. Conclusion**

With this work I tried to grasp the problem of education and systematic approach in this area.

Training students for the purposes of transport is carried out as well as in other areas.

Supervision of the work in this area gives us the idea to which extent it raised, what is good and what is bad in the current mode. Methodology is designed to confirm that the mechanism sometimes works well, or that it takes the system to intervene in order to improve the current situation.

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JU SREDNJA ŠKOLA ZA SAOBRAĆAJ

I KOMUNIKACIJE SARAJEVO

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## PROJEKAT SIGURNIM KORACIMA PREKO ZEBRE PO LOD METODOLOGIJI

### Sažetak

Okruženje odgojno obrazovnih ustanova uslovalo je menadžment škole da izvore finansiranja trebaju potraživati kroz realizaciju različitih projekata. Putem projekata škola postaje propoznatljiva na lokalnom nivou i na taj način uključuje se u rad iste koja ujedno predstavlja i temelj odgojnog sistema. Realizirajući projekte lokalna zajednica u školama prepoznaje svog partnera i putem finansiranja nudi im podršku za realizaciju istih u cilju razvijanja vještina i kompetencija ne samo kod učenika nego i kod građana lokalne zajednice. Primjer saradnje lokalne zajednice i škole je projekat Sigurnim koracima preko zebre, koji se realizovao u našoj školi. Uslov apliciranja je bio da projekat bude napisan po LOD metodologiji. Projekat je imao za cilj podizanje svijesti građana o poštivanju saobraćajne signalizacije. Samo svjesno društvo ima mogućnost da napreduje i prilagodi se prilikama sa kojima se svakodnevno susreće. Svijest vozača nije dovoljno razvijena o značaju pješačkog prelaza, što je uzrok povrede pješaka koje nekada završavaju i smrtnim posljedicama.

Ključne riječi: **cprojekat, aktivnost, rezultati, pretpostavke i rizici, monitoring, izvještavanje, evaluacija, budžet.**

### 1. LOD Metodologija

**Projekat** (lat. Proiectum - bačen naprijed) je vremenski određena aktivnost koja ima za cilj da proizvede jedinstven proizvod, uslugu ili rezultat.

Prvi korak je taj da morate imati ideju koju želite implementirati kroz projektni prijedlog, a drugi korak je imati kvalitetan plan kako tu ideju implementirati. Taj plan je zapravo naš projektni prijedlog kojeg želimo kreirati.

Timski rad i liderstvo

“Brod ne ide naprijed ako svako vesla za sebe.”

Osobine tima su:

- članovi se međusobno poštuju
- moguće je jedinstveno mišljenje u pogledu glavnih ciljeva
- sukobi se javljaju samo kratko i rješavaju se konstruktivno - poželjni su
- osnovni ciljevi zastupaju se zajedničkom angažiranošću

“The greatest leader is not the one who does great things.

He is the one who gets people to do great things.”

(Ronald Reagan)

Postavite sebi pitanje da li je liderstvo osobina ili proces?

Liderstvo u pojedinim trenucima osobina, a u pojedinim proces. Osobe koje su “rođeni lideri” vrlo vjerovatno će biti dobri lideri, ali bitno je da kroz proces sazrijevanja dođu na nivo dobrog lidera. Iako su “rođeni lideri” ne znači da će biti i dobri lider.

Ključna pitanja na koja odgovara prijedlog projekta?

Ko je aplikant koji aplicira sa projektnim prijedlogom?

Zašto pomenuti aplikant traži potporu za njegov projektni prijedlog?

Šta aplikant želi da učini u sklopu projektnog prijedloga, tj. koji društveni problem će se pokušati riješiti projektnim prijedlogom?

Kako aplikant planira to učiniti?

Ko su ciljne skupine aplikanta?

Kada i gdje aplikant planira izvršiti aktivnosti pomenute u projektnom prijedlogu?

Koliko novca je potrebno za realizaciju projektnog prijedloga i koliko je projektni prijedlog isplativ i održiv.

Najčešći elementi prijedloga projekta:

- Administrativni podaci o nosiocu prijedloga
- Sažetak - pišemo ga na kraju
- Uvod - opis problema koji se pokušava riješiti projektnim prijedlogom
- Opis projekta - aktivnosti na rješavanju pomenutog problema
- Ciljna skupina - ne mogu biti **SVI**
- Sveukupni cilj projekta - uvijek je **JEDAN**
- Ciljevi projekta - kratkoročni i dugoročni
- Aktivnosti - detaljan plan aktivnosti i realizacije pojedinih faza projekta
- Očekivani rezultati - poklapaju se sa ciljevima
- Trajanje projekta
- Monitoring, izvještavanje i evaluacija
- Budžet - plan potrošnje sredstava, kreiranje okvirnog budžeta i kreiranje narativnog budžeta

## **Sažetak**

Sažetak sumira sve elemente projektnog prijedloga i to:

- potrebu/problem u lokalnoj zajednici
- razloge i značaj projekta za lokalnu zajednicu
- ciljeve projekta
- ciljnu grupu
- trajanje sprovedbe projekta i budžet projekta
- metode koje će se koristiti da se ostvare projektni ciljevi
- korisnost predloženih aktivnosti za lokalnu zajednicu

Zašto je zapravo potreban vaš projekat?

Koji to problem u lokalnoj zajednici će vaš projekat pokušati riješiti?

Koliko je bitno da se pristupi rješavanju tog problema kroz projektni pristup? Pokušati prikazati statističke pokazatelje. Problem koji pokušavate riješiti ili usluga koja se treba pružiti treba da se odnose na svrhu i ciljeve vaše organizacije. Na koji način se projektni prijedlog odnosi na jedan ili više prioriteta iz Javnog poziva?

Jedan od najvećih problema današnjice je kako motivisati omladinu i uticati na njihovu svijest, shodno da žive u informatičkom društvu. Sagledavajući navedene probleme, mi kao odgojno obrazovna ustanova koja ima zadaću da razvija vještine, kompetencije i znanja kod omladine, želimo sprovesti projekat „Sigurnim koracim preko zebre“. Želimo da kroz naš projekat, ukažemo na značaj zaustavljanja vozača na pješački prelaz. Želimo da ukažemo svim učesnicima u saobraćaju da je pješački prelaz mjesto gdje pješak nesmetano može preći cestu i da je prelazak 100% siguran. Razlog radionica je i sama činjenica da se pješački prelazi postavljaju u blizini osnovnih škola, gdje su učesnici direktno djeca od 6-15 godina. Ujedno cilj projekta je da kod učenika naše škole razvijemo svijest o moralnoj odgovornosti prema mlađim generacijama.

Kako bismo realizovali ovaj projekat i obezbjedili podizanje svijesti kroz podjelu propagandnog materijala potrebno nam je 4300, 00 KM. Škola je spremna da uzme aktivno učesće u sufinansiranju u iznosu od 1542,00 KM, kao i u materijalnim toškovima obezbjeđivanja prostora, troškovi grijanja, električne energije, telefona, evaluacije, vidljivosti projekta i sl. Shodno tome, neophodna nam je donacija od 2758,00 KM.

## **Opis projekta**

Kako namjeravate ostvariti vaše ciljeve? Inovativni pristupi u rješavanju problema! Zagovaranje modela politike ljudskih prava i utjecanje na ranjive grupe kroz projektni prijedlog! Uloga partnera na projektu i nivo njihove uključenosti u implementaciju projekta!

## **Ciljne skupine**

Koje su potrebe vaše ciljne skupine? Koja je to korist koju će imati ciljna skupina od vašeg

projekta? Detaljna analiza ciljne skupine prema: etničkoj strukturi, spolnoj strukturi, starosnim grupama i sl.

CILJNE SKUPINE *NE MOGU BITI SVISTANOVNICI* LOKALNE ZAJEDNICE, SVI UČENICI JEDNE ŠKOLE, SVI STANOVNICI JEDNOG GRADA, SVI ZAPOSLENICI JEDNE FIRME I SL.!

### ***Sveukupni cilj projekta***

Sveukupni cilj može biti samo jedan za svaki projekat. Sveukupni cilj treba biti povezan sa vizijom razvoja. Teško je ili gotovo nemoguće mjeriti uspjeh sveukupnog cilja pomoću mjerljivih indikatora, ali trebalo bi biti moguće dokazati njegovu vrijednost i doprinos ostvarenju vizije.

### ***Ciljevi projekta***

Cilj projekta - željeni ishod projekta!

Dugoročni i kratkoročni ciljevi!

Ciljevi moraju biti:

- specifični
- mjerljivi
- dostižni
- realni
- tačno vremenski određeni

### ***SMART metoda: Specific + Measurable + Achievable + Relevant + Timely***

Cilj našeg projekta je da, osim podizanja svijesti našim učenicima o moralnoj odgovornosti prema mlađim generacijama i značaju pješačkog prelaza, kao budućoj populaciji vozača, uključimo što veći broj učesnika u realizaciji projekta, policiju, medije, građane. Želimo da kroz naše radionice koje će obuhvatiti izlazak na mjestima gdje se nalaze pješački prelazi i podjelu reklamnog materijala (afiša), informišemo sve učesnike u saobraćaju o značaju i funkciji pješačkog prelaza.

### ***Aktivnosti***

Aktivnosti trebaju biti jasne i specifične. Definišite jasnu vezu aktivnosti sa ciljevima projekta i onda opišite zašto ste odabrali te konkretne aktivnosti. Predviđene aktivnosti trebaju biti grupirane i vezane za relevantne projektne rezultate. Projekat bismo realizovali u tri faze:

- Prva faza obuhvata izradu, osmišljavanje i štampanje propagandnog materijala- članovi projektnog tima će u učionicama osmisliti izgled propagadnog materijala;
- Druga faza je izrada i osmišljavanje pultova;
- Treća faza bi se odnosila na izlazak na teren – članovi projektnog tima, na mjestima gdje se nalaze pješački prelazi na području četiri gradske općine, bila bi istovremeno postavljena 4 pulta. Mjesec kada bismo realizovali ove radionice je april.

## **Očekivani rezultati**

Ovo je osnova na kojoj će se projekt ocjenjivati. Očekivani rezultati su detaljniji nego sveukupni cilj i pojedinačni ciljevi i trebaju biti potvrđeni putem objektivno indikatora Objektivni indikatori moraju biti:

- Specifični: jasno definirano šta gdje, kad, kako i za koga će se situacija promijenti; jasno definirati rodnu razvrstanost
- Mjerljivi: da je moguće kvantificirati ciljeve i korist; da je moguće analizirati korist za oba spola
- Ostvarivi: da je moguće ostvariti ciljeve (uzimajući u obzir resurse i kapacitete koji su na raspolaganju zajednici)
- Realistični: da je moguće ostvariti nivo promjene koja odslikava cilj
- Vremenski ograničeni: navesti vremenski period u kojem će svaki biti ostvaren.

Podjela 3500 promotivnog materijala u cilju podizanja svijesti vozača o važnosti pješačkog prelaza. Izgraditi saradnju sa Policijom u zajednici, privući medijsku pažnju kao i pažnju građana.

## **Pretpostavke i rizici**

Pod ovom sekcijom treba da identifikirate moguće pretpostavke i rizike koji mogu da ugroze implementaciju projekta i/ili uspjeh projekta. Posvetite posebnu pažnju na ovaj dio obzirom da je vrlo važno identifikovati buduće događaje i okolnosti kao moguće prijetnje uspješnoj implementaciji projekta. To će vam dati mogućnost da pripremite strategiju za izbjegavanje svakog potencijalnog rizika.

## **Swot analiza**

	Pozitivno	Negativno
Unutarnje	<b>Snage</b>	<b>Slabosti</b>
Vanjsko	<b>Prilike</b>	<b>Prijetnje</b>

**Snage** - (*Šta mi radimo dobro?*) — posmatramo sa aspekta našeg Udruženja, a ne okoline

**Slabosti** - (*Šta možemo poboljšati?*) - posmatramo sa aspekta našeg Udruženja, a ne okoline

**Prilike** — (*Kakve se promjene, koje nam mogu pomoći da bolje ostvarujemo svoju misiju, dešavaju u okruženju?*) - posmatramo sa aspekta okoline

**Prijetnje** — (*Od kojih se promjena iz okruženja moramo čuvati ili za njih pripremiti radi boljeg obavljanja našeg posla?*) — posmatramo sa aspekta okoline

## **Vidljivost projekta**

Da li će navedene aktivnosti doprinijeti promociji problema kojeg rješavamo ili ideje



koju želimo implementirati i njihovoj vrijednosti? Da li se osigurala medijska praćenost projekta? Hoće li građani biti uključeni u projekat i na koji način? Je li realan način na koji će se građani informirati i uključiti u provedbu projekta?

### ***Monitoring, izvještavanje i evaluacija***

Monitoring je:

- refleksija plana projekta,
- događa se u toku implementacije projekta,
- odvija se po unaprijed utvrđenom vremenskom roku, a radi se na bazi:

a) kvantitativnih podataka (indikatori),

b) kvalitativnih podataka.

Prva stvar koja nas zanima u procesu monitoringa je da li se krećemo prema planiranim ciljevima. Evaluacija je:

- refleksija na projekat,
- radi se poslije ili u toku implementacije samog projekta,
- odvija se u skladu sa unaprijed utvrđenim kriterijima,
- rezultira zaključcima i preporukama.

### ***Budžet — narativno i tabelarno pojašnjenje***

Prilikom pisanja budžeta bitno je da isti narativno pojasnimo ukoliko za to ima potrebe (a obično ima). Svaku stavku koju isplanirate u budžetu opišite sa nekoliko riječi. Pet kategorija koje obuhvata budžet su:

- ljudski resursi/osoblje
- putovanje/prevoz
- kancelarijski troškovi
- projektni troškovi
- vidljivost projekta

Ljudski resursi, putovanje, prevoz i kancelarijski troškovi su administrativni troškovi i ne smiju biti veći od 20% ukupnog budžeta.

Ljudski resursi su samo ono osoblje koje predstavlja naš projekat ispred naše Organizacije i kojeg ćemo platiti za to što radi u ime projekta. U ljudske resurse ne spadaju edukatori ili neki drugi ljudi koji su dio samog projekta.

Putovanje i prevoz se plaćaju samo ukoliko idemo na teritoriju druge Opštine. Uz to plaćamo i dnevnicu koja iznosi 25KM, a gorivo se obračunava po tarifi 0,25KM po prijeđenom kilometru. Bitno je da izdamo putni nalog za svako putovanje kojim pravdamo potrošeni novac.

Kancelarijski troškovi su oni troškovi koji podrazumjevaju neophodna sredstava kojima ćemo

realizovati naš projekat, a tiču se opremanja naše kancelarije ili potrošnog materijala koji je potreban za rad iste. U kancelarijske troškove ne spadaju oni proizvodi koje obezbjedimo našim projektom, a koji kasnije ne postanu naša svojina, već ih dadnemo učesnicima projekta na poklon.

Projektni troškovi su svi oni troškovi koji su vezani za samu realizaciju našeg projekta i njegovu implementaciju na terenu. Na projektne troškove možemo potrošiti 70-75% ukupne sume našeg budžeta.

Troškovi vidljivosti projekta su oni troškovi koji su vezani za prepoznavanje i promovisanje našeg projekta na lokalnom ili globalnom nivou. U troškove vidljivosti spada medijsko oglašavanje, kreiranje web stranice, štampanje i distribucija letaka, kreiranje banera i sl. Na ovu stavku ne smijete potrošiti više od 5-10% ukupnog budžeta projekta.

**Važna napomena:** U kancelarijske troškove nemojte zaboraviti uvrstiti troškove mobitela project managera koji su ograničeni na 20KM mjesečno i koji se pravdaju listingom. Također, vodite računa o tome kakve Ugovore potpisujete, jer ako u Ugovoru niste definisali da ćete nekome platiti bruto iznos, već neto iznos, onda morate formirati posebnu rubriku u kojoj ćete navesti troškove poreza.

U finansiranju projekta aktivno učešće će uzeti i Srednja škola za saobraćaj i komunikacije kroz sufinansiranje projekta, obezbjeđivanje prostorija, troškova grijanja, električne energije, telefona, evaluacije, vidljivosti projekta, administracije, itd. Kroz tabelarni prikaz biti će iskazani finansijski troškovi.

Aktivnosti koje nisu preporučene za apliciranje na projekte UNDP-a;

- Individualna sponzorstva za učestvovanje u radionicama, seminarima, konferencijama, kongresima;
  - Individualne stipendije za studije ili trening kurseve;
  - Povremene konferencije (osim ako su neophodne za uspješnu implementaciju projekta);
  - Kupovinu opreme (osim ako je neophodna za uspješnu implementaciju projekta);
  - Finansiranje projekata koji su već u toku ili su završeni;
  - Projekti za ekskluzivnu dobrobit pojedinaca;
  - Projekti koji podržavaju političke partije;
  - Primarno finansiranje aplikanta ili njihovih partnera;
  - Radovi rekonstrukcije ili rehabilitacije (osim ako su neophodni za uspješnu implementaciju projekta, ali ne veći od 20% vrijednosti predloženog budžeta);
- Dodjeljivanje grantova trećoj strani.

## 2. Zaključak

Kroz realizaciju ovog projekta uočili smo da učenici naše škole su razvili vještine, kompetencije i stekli znanje promovisanja usluge. Razvili su vještine komunikacije i prenošenja stečenog znanja. Unutar lokalne zajednice smo bili prepoznatljivi kao škola koja radi na podizanju svijesti građana. Ujedno menadžment je uočio prednosti promovisanja škole kroz projekte koji se realizuju unutar lokalne zajednice i nastavni kadar kontantno šalje

na stručno edukovanje u cilju realizacije što kvalitetnijih projekata.

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## **PROJECT SAFE STEPS OVER CROSSWALK LOD METHODOLOGY**

### **Abstract**

The environment educational institutions caused the school management to sources of funding should be claimed through projects. Through projects school becomes recognized at the local level and thus included in the work of the same, which also represents the foundation of the educational system. Within the project the local community in schools recognizes its partners and through financing offers they support for their implementation in order to develop skills and competencies not only for students but also for the citizens of the local joint. An example of such a project is a project firm steps over the zebra, which was implemented in our school. The condition of application was the project to be written by LOD methodology.

The project is aimed at raising public awareness of respect for traffic signals. Only conscious society has the opportunity to progress and adapt to the conditions with throughout their lives. Awareness of the driver is not developed enough about the importance of pedestrian crossing, which is the cause of injury to pedestrians who sometimes end and fatal consequences.

**Keywords: project, activity, results, assumptions and risks, monitoring, reporting, evaluation, budget.**

## 1. LOD Methodology

The project (lat. Proiectum - thrown forward) is timed activity that aims to produce a unique product, service or result.

The first step is that you must have an idea you want to implement the project proposal and the second step is to have a reasonable plan to implement this idea. This plan is in fact our project proposal which we would like to create.

Teamwork and leadership

"The boat does not go forward if each rowing for yourself."

Features team are:

- Members respect each other
- It is possible to single opinion regarding the main objectives
- Conflicts occur only briefly and resolve constructive - are desirable
- The main objectives represent the common cadre's involvement

“The greatest leader is not the one who does great things.  
He is the one who gets people to do great things.”  
(Ronald Reagan)

Ask yourself the question of whether the leadership qualities or process?

Leadership at times feature, and in particular the process. People who are "born leaders" very likely to be good leaders, but it is essential that the process of maturation they get to the level of a good leader. Although "born leaders" does not mean it will be a good leader. Key issues in the corresponding project proposal? When the applicant who applied with the application? Why mention the applicant seeks support for his project proposal?

What the applicant wants to do as part of the project proposal, ie. The social problem will try to solve the project proposal? How the applicant intends to do? Who are the target groups of the applicant?

When and where the applicant plans to carry out the activities mentioned in the project proposal? How much money is needed for the realization of the project proposal and how the project proposal is cost-effective and sustainable?

The most common elements of the project proposal

- Administrative data on the holder of the proposal
- Summary - make it to the end
- Introduction - Description of the problem that you are trying to solve the project proposal
- Description of the project - activities to solve the aforementioned problems
- Target group - cannot be ALL
- The overall objective of the project - is always ONE
- The objectives of the project - short and long term
- activities - detailed action plan and implementation of phases
- Expected results - coincide with the goals
- Duration
- Monitoring, reporting and evaluation
- Budget - plan on spending the funds, creating budget framework and creating a narrative budget

### ***Abstract***

Summary sums up all elements of the project proposal as follows:

- need / problem in the local community
- reasons and significance of the project for the local community
- project objectives
- target group
- duration of project implementation and project budget
- methods that will be used to achieve the project objectives
- usefulness of the proposed activities for the local community

What is actually required is your project? What is the problem in the local community will try to solve your project? How important is it to approach solving this problem through projects? Try to show statistical indicators. The problem you're trying to solve or the services to be provided should be related to the purpose and goals of your organization. How the project proposal is refers to one or more of the priorities of the Public Invitation?

One of the biggest problems of our time is how to motivate young people and influence their consciousness, according to live in an information society. Considering the above problems, we as

educational institutions that have the task to develop the skills, competencies and knowledge of youth, we want to implement the project "steady pace over the zebras". We want our project, show the importance of stopping drivers at pedestrian crossing. We wish to point out to all participants in traffic to the pedestrian crossing where the pedestrian can freely cross the street, and that the move 100% safe. The reason for the workshop and the fact that pedestrian crossings placed near the elementary school, where participants directly children of 6-15 years. At the same time the target of projects that students at our school develop an awareness of moral responsibility towards the younger generations.

In order to accomplish this project and have provided awareness through the distribution of promotional material we need is 4300, 00 KM. School is ready to take an active part in co-financing in the amount of 1542.00 KM, as well as material providing space heating costs, electric power, phone, evaluation, project visibility and the like. Consequently, we need a donation of 2758.00 KM.

### ***Description of the project***

How do you intend to achieve your goals? Innovative approaches to problem solving! Advocacy model human rights policy and influence vulnerable groups through project proposal! The role of the project partners and their level of involvement in the implementation of the project!

### ***Target groups***

What are the needs of your target group? What is the benefit that will be the target group of your project? Detailed analysis of the target groups: ethnic structure, gender, age groups and the like.

TARGET GROUPS CAN NOT BE ALL RESIDENTS OF LOCAL COMMUNITIES, all students of a school, all the inhabitants of a city, all employees of one company, ETC.!

### ***The overall objective of the project***

The overall objective can only be one for each project. The overall goal should be connected to development vision. It is difficult or almost impossible to measure the success of the overall aim using measurable indicators, but it should be possible to prove its value and contribution to the vision.

### *The objectives of the project*

The aim of the project - the desired outcome of the project! Long-term and short-term goals?

Objectives must be:

- specific
- measurable
- achievable
- real
- Precisely timed

### ***SMART method: Specific + Measurable + Achievable Relevant + Timely***

The aim of our project is that, in addition to raising awareness of our students about moral responsibility towards the younger generations and the importance of pedestrian crossing, as the future population of drivers, include as many participants in the project, the police, the media, citizens. We wish that through our workshops that will include going to places where there are pedestrian crossings and distribution of advertising material (AFIS), inform all road users of the importance and function of a pedestrian crossing.

### ***Activities***

Activities should be clear and specific. Define a clear link activities with the objectives of the project and then describe why you chose that particular activity. Planned activities should be grouped and linked to relevant project results.

The project would be realized in three phases:

- The first phase includes the development, design and printing materials: propaganda project team members will be in the classroom to design layout propaganda materials;
- The second phase is the creation and design desks;
- The third stage in relation to the on-ground - members of the project team, in places where there are pedestrian crossings in the area of four city municipalities, would be simultaneously placed 4 counters. Month when we realized this workshop is April.



### ***Expected results***

This is the basis on which the project will be evaluated. Expected results are more detailed than the overall goal and individual objectives and should be verifiable by objective indicators. Objective indicators must be:

- **Specific:** clearly defined what, where, when, how and for whom the situation; clearly define gender Segmentation
- **Measurable:** it is possible to quantify the targets and benefits; it is possible to analyze the benefits for both genders
- **Achievable:** that it is possible to achieve the goals (taking into account the resources and capacities at the disposal of the community)
- **Realistic:** it is possible to achieve the level of change that reflects the objective
- **Time-limited:** specify the time period in which each will be achieved.

Distribution of 3,500 promotional material to raise awareness of the importance of the driver of a pedestrian crossing. Build relationships with the police in the community, to attract media attention and the attention of citizens.

### ***Assumptions and risks***

Under this section should identify possible assumptions and risks that may jeopardize the implementation of the project and / or success of the project. Pay special attention to this part since it is very important to identify future events and circumstances as a possible threat to the successful implementation of the project. This will give you an opportunity to prepare a strategy for avoiding any potential risk - **SWOT analysis**.

Power - (What are we doing well?) - We look at in terms of our Association, not the environment  
Weaknesses - (What can we improve?) - We look at in terms of our Association, not the environment

Opportunities - (What the changes, which can help us to better achieve its mission, taking place in the environment?) - We look at in terms of environmental  
Threats - (of which the change in the environment we need to keep or to prepare them for better performance of our business?) - We look at in terms of environmental.

### ***Visibility project***

Will the above activities contribute to the promotion of the problem which is solved or ideas you want to implement and their values? Do ensure media coverage of the project? Will citizens be involved in the project and in what way?

Is it a realistic way in which citizens will be informed and involved in the implementation of the project? Monitoring, reporting and evaluation.

Monitoring is:

- Reflection of a project plan,
- Occurs in the course of project implementation,
- Takes place after a predetermined period of time, and it is based on:
  - a) quantitative data (indicators)
  - b) qualitative data.

The first thing that we are interested in monitoring is whether we are moving towards the planned objectives.

Evaluation is:

- Reflection on the project,
- It is after or during the implementation of the project,
- Takes place in accordance with predetermined criteria,
- Resulting conclusions and recommendations.

### ***Budget - narrative and tabular clarification***

When writing the budget, it is important that the same narrative clarify if need be (and usually has). Each item you plan to describe the budget with few words. Five categories covered by the budget are:

- Human resources / staff
- Travel / transport
- Office expenses
- Project Costs
- Visibility of the project

Human resources, travel, transportation and office costs are administrative costs and should not be greater than 20% of the total budget. Human resources are the only staff that represents our project in front of our Organization and who will pay for what he is doing in the name of the project. The human resources are not educators or other people who are part of the project. Travel and transportation are paid only if we go to the other municipality. In addition to pay and a daily allowance which amounts to 25 KM and the fuel is calculated at a rate 0,25KM per kilometer. It is important that we issue a travel order for each trip which justify the money spent. Office costs are those costs which imply the necessary means by which we will implement our project, concerning the furnishing of our offices or supplies is required to operate the same. The office costs do not include those products that provide our project and who later become our property, but they may give the project participants as a gift. Project costs are all those costs that are related to the realization of our project and its implementation on the ground. At the project costs can spend 70-75% of the total amount of our budget. The cost of the visibility of the project are those costs related to the recognition and promotion of our project on a local or global level. The cost visibility falls media advertising, creating a website, printing and distribution of leaflets, creating banners and similar. In this sentence, you can not spend more than 5-10% of the total project budget.

Important note: In office costs do not forget to include the cost of mobile phone project managers who are limited to 20 KM per month and which justify listing. Also, please note that any contracts are signed, because if you have not defined in the Treaty that someone will pay gross amount, but the net amount, then you need to form a special section in which you specify the cost of the tax.

The financing of the project will take part and the High School of Transport and Communications through co-financing the project, providing premises, the cost of heating, electricity, phone, evaluation, project visibility, administration, and so on. Through the tabulation will be reported financial costs.

Activities that are not recommended for application on UNDP projects

- Individual sponsorships for participation in workshops, seminars, conferences, congresses;
- Individual scholarships for studies or training courses;
- Temporary conferences (except if necessary for successful implementation of the project);
- The purchase of equipment (except if necessary for successful implementation of the project);
- Financing of projects already in progress or completed;
- Projects for exclusive benefit of individuals;
- Actions supporting political parties;
- Primary funding applicants and their partners;

- Works of reconstruction or rehabilitation (unless they are necessary for the successful implementation of the project, but not more than 20% of the proposed budget); Allocation of grants to third parties.

## 2. Conclusion

Through this project, we noticed that the students of our schools have developed skills, competence and knowledge gained promotion services. They developed skills of communication and transfer of knowledge. Within the local community have been recognized as a school that works to raise awareness of citizens. At the same time management has noticed the benefits of promoting school through the projects realized within the local community and the teaching staff is a constant sends the professional education of in order to realize high quality projects.

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**KULTURA V LOGISTIKI**

## **POVZETEK**

Logistika se je pojavila že v prazgodovini z razvojem človeštva. Prelomno leto za sistemsko teoretsko osnovo logistike je leto 1937, ko se pojavi na simpoziju filozofije ideja o teoretskem proučevanju logistike.

V Sloveniji je možno študirati logistiko od srednje šole naprej. S kurikularno prenovo se uvajajo v srednjem strokovnem izobraževanju v srednji šoli sodobne metode poučevanja, med katerimi je tudi medpredmetno povezovanje. Predstavljen je primer medpredmetnega povezovanja slovenščine, matematike in logistike.

**Ključne besede:** kultura, logistika, projektno delo, medpredmetne povezave

## 1 UVOD

Logistiko ne srečujemo samo v prometu, temveč na vseh področjih javnega življenja. Povezujemo jo s trenutki vsakdanjosti tako v realnem kot v abstraktnem svetu. Preprosto bi rekli organiziranost, organiziranost logističnih poti.

Ko sem razmišljala, kako združiti logistiko in kulturo, lahko rečem, da sta skrbno povezani. Vse se začne z načrtovanjem. Kadar imamo pred sabo projektno delo, moramo biti nujno organizirani. Praznovanje spominskega dneva Ta veseli dan kulture mi je bil povod, da sva se s kolegico odločili, da poveževa stroko, torej logistiko z matematiko in slovenščino, s poudarkom na natančnosti načrtovanja logistike. Z razvojem logistike so se pojavili posebni vplivi na ljudi. Načrtovanje je postajalo nujno in morda včasih naporno. To je proces, ki se ga moramo naučiti in osvojiti.

V svojem razmišljanju bom najprej predstavila v nekaj povedih zgodovino logističnih sistemov, potem bom na konkretnem primeru izpostavila, kako v praksi skušamo v šoli prikazati logistični sistem kot proces tudi na kulturnem področju. Kot jezikoslovka težko razpravljam o teoriji logističnih sistemov, je pa nujno laično poznavanje za poučevanje v logističnem programu. Za uporabo logistike v šolski praksi vezano na kulturo je potrebno širše matematično in jezikovno znanje ter bralna pismenost. Nujen je sodobnejši pristop k povezovanju različnih modelov v logistiki s ciljem, da se prihrani čas in razbremenjuje dodatno nepotrebno delo. S tem se poveča kvaliteta lastnega znanja in uspeha.

## 2 ZGODOVINA LOGISTIČNIH SISTEMOV

Razmišljam, da so zametki logistike že v prazgodovini, ko se je moral človek organizirati, da je preživel. Glavno vlogo so imele ženske, zato kot jezikoslovka razmišljam, da je logistika ženske spola. Kamorkoli po svetu gremo, srečamo človeka. Ko so se začeli ljudje preseljevati, so se morali organizirati. Odgovori na ta vprašanja so stoletja sloneli na razlagah filozofije in religije. Danes odgovore iščemo znotraj empiričnih ved. Z raziskovanjem naše preteklosti in odkrivanjem materialnih dokazov, lahko danes znanost odgovori na nekatera naša vprašanja. Z novimi metodami, z raziskovanji in z odkritji lahko povemo zelo kompleksno zgodbo, ki nam omogoča razumevanje naše preteklosti in sedanjosti v logistiki.

Na razvoj logističnih potreb so vplivale tudi klimatske razmere. To se danes odraža v logistiki (ladijski, železniški promet ...)

Prazgodovino sem omenila, ker pogosto pozabljamo, da se je logistično področje začelo razvijati z razvojem človeštva. Zanima me predvsem pristop k in razvoj logistike v različnih kulturah. Danes poznamo kulture, kjer je ženski prepovedano voziti avto.

To omenjam zato, ker radi pozabljamo, da so odkritja tudi na logističnem področju stara več tisoč let. Z večjimi potrebami ljudi, se je razvijala tudi logistika. Logistika in kultura sta povezani in imata močan vpliv na človeka tako v zasebnem kot poklicnem življenju. Za medpredmetno povezovanje pri pouku, mi je najbliže Požarjeva definicija logistike. Potreba po splošni teoriji logističnih sistemov je bila uradno izražena po prvi svetovni vojni in sicer v okviru filozofije.



*Leta 1937 je ameriški biolog madžarskega rodu Ludwig von Bertalanffy predaval na seminarju filozofije v Chicagu. Na tem predavanju je prvič v zgodovini izrazil potrebo po ustvarjanju neke splošne teorije, ki bi jo lahko uporabljali za vse zapletene pojave, imenovane »sistem«. Vendar ideja ni naletela na plodna tla. Po drugi svetovni vojni, ko je razvoj znanosti hitro napredoval, je von Bertalanffy ponovno predstavil idejo o splošni teoriji sistemov. Znanstveniki po vsem svetu so bili presenečeni nad ugotovitvami in idejami, tako da so 1954 leta ustanovili Društvo za splošno teorijo sistemov in kasneje Društvo za splošno raziskavo sistemov.*

Logistični sistemi [Elektronski vir] : gradivo za 1. letnik / Anton Pepevnik. - El. knjiga. - Ljubljana : Zavod IRC, 2008. - (Višješolski strokovni program Logistično inženirstvo / Zavod IRC)

## **KAJ JE LOGISTIKA?**

### **Predstavlja bom definicije uglednih strokovnjakov:**

***Požar** pravi, da je logistika vojaškega izvora in pomeni premagovanje prostora in časa.*

***Kirsch:** Logistika v sistemskem smislu zajema oblikovanje, krmiljenje, uravnavanje in izvedbo celotnega toka energije, informacij, oseb in posebnih snovi.*

***Jünemann:** opredeljuje logistiko kot znanstveno disciplino o planiranju, upravljanju in kontroli materialnega, osebnega, energijskega in informacijskega toka v sistemih.*

***Jakomin, Zelenika in Medeot** opredeljujejo logistiko kot skupek med seboj povezanih aktivnosti, ki služijo za premikanje surovin.*

<https://sl.wikipedia.org/wiki/Logistika>, 15. 6. 2016

Skozi zgodovino so se logistični sistemi spreminjali in dopolnjevali. Metode so se dopolnjevale in spreminjale. Nujni so bili novejši pristopi, ki jih različni avtorji utemeljujejo različno.

Zgodovina logistike je vezana na različna področja. Ko sem prebirala literaturo za ta projekt, sem ugotovila, da je v literaturi zastopana tudi vojaška logistika. Logistika je nujna na vsakem koraku. Z razvojem gospodarstva so se pristopi dopolnjevali in razvijali. V nadaljnjih desetletjih so se pojavila različna mnenja o reševanju posameznih problemov sistema.

Zagovarjam zgodovinsko dejstvo, da je potrebno načrtovati natančno in upoštevati različne teorije

V nadaljevanju predstavljam projekt **Kultura, medpredmetno povezovanje in projektni pouk v programu logistični tehnik.**

### **3 KULTURA, MEDPREDMETNO POVEZOVANJE IN PROJEKTNI POUK V PROGRAMU LOGISTIČNI TEHNIK**

Letnik: 2.

Izobraževalni program: Logistični tehnik

Medpredmetno povezovanje: logistika, slovenščina, matematika

ŠC Celje, Srednja šola za storitvene dejavnosti in logistiko

#### **Načrt dela:**

#### **Situacija/problem:**

Poiskati prireditve, ki si jih lahko ogledamo na spominski dan z naslovom Ta veseli dan kulture v Celju, Mariboru in Ljubljani. Izbrati ustrezno in dostopno prireditev in si jo ogledati.

#### **Ideja oz. osnutek projektnega dne:**

1. zbiranje podatkov iz različnih medijev o kulturnih dogodkih ta dan v CE, MB, LJ;
2. obdelava teh podatkov in prikazovanje podatkov;
3. izbor ustrezne prireditve;
4. ogled izbrane prireditve;
5. pisanje subjektivnega besedila o doživetju na kulturni prireditvi;
6. evalvacija projektnega dne.

#### **Ključne kompetence:**

**SLO** Razvijajo sporazumevalno možnost v slovenščini, razvijajo estetsko zmožnost, kulturno in medkulturno zmožnost poglobljajo prek umeščanja izbranih prireditev v kulturni kontekst.

**MAT** Zmožnost za uporabljanje tehnologije pri izvajanju matematičnih postopkov in reševanju matematičnih problemov.

Zmožnost za zbiranje, urejanje, prikazovanje in analiziranje podatkov (če je statistični znak opisni).

Zmožnost za sodelovanje in delo v timu.

Sprejemanje in doživljanje matematike kot kulturne vrednote.

**LOG:** Razvijajo zmožnost poznavanja logističnih tokov, logistika in dodana vrednost v teoriji, reševanje logističnih težav.

## Načrtovanje ciljev

Področje	Znanja (Kaj bodo dijaki znali, zmogli in obvladali?)
Zbiranje podatkov	Berejo, razčlenjujejo, primerjajo in presojujejo obveščevalna besedila. Ločijo med opisnimi in numeričnimi podatki. Znajo zbrati podatke neposredno z anketiranjem in posredno iz podatkovnih baz v spletu ter dnevnega časopisja. Kritično presojujejo o verodostojnosti in zanesljivosti podatkov ter o možnih vzrokih napak pri zbiranju podatkov.
Razumevanje besedila	Ob razčlembi in primerjanju danih besedil osvojijo značilnosti obveščevalnega besedila ter povzamejo lastnosti obveščevalnih besedil. Osvojijo načela uspešnega sprejemanja in ta nato upoštevajo pri svojem sporazumevanju.
Tvorjenje besedila, predstavitev besedila	Tvorijo pisno subjektivno predstavitev doživetega izbranega dogodka. Spoznajo učinkovit potek poslušanja enogovornih besedil
Urejanje podatkov	<i>Pripravijo in izvedejo</i> anketni vprašalnik ter uredijo in komentirajo rezultate. Podatke ustrezno in zanesljivo beležijo in jih uredijo v obliko frekvenčne tabele. Pri urejanju znajo za zapis tabele uporabiti Excel. Razumejo pomen relativne in absolutne frekvence, ju znajo določiti oz. izračunati.
Prikazovanje podatkov	Rezultate anketnega vprašalnika predstavijo grafično in jih ubesedijo. <b>Ugotovitve komentirajo. – morda pod analizo in interpretacijo podatkov.</b> Seznanijo se z vrstami diagramov, s pomočjo katerih lahko prikazujemo podatke, pri katerih je statistični znak opisni. Podatke (opisne z enim kriterijem) znajo prikazati s frekvenčnim krogom, paličnim in stolpčnim diagramom s pomočjo programa Excel.
Analiziranje in interpretiranje podatkov	Znajo iz diagramov razbrati značilnosti obravnavane spremenljivke. Znajo uporabiti podatke iz tabelarnih in diagramatskih prikazov tudi v kompleksnem in poklicnem kontekstu. Znajo analizirane podatke interpretirati. Iz izdelanih tabel, diagramov in povzetih podatkov znajo razbrati ponavljajoče vzorce, zakonitosti in pomembne značilnosti. Ugotovitve znajo formulirati v matematičnem jeziku in jih znajo kritično interpretirati v kontekstu izhodiščnega konteksta.
IKK	Informacijsko – komunikacijska pismenost: <ul style="list-style-type: none"> <li>- uporaba računalnika za pisanje besedila in urejanje gradiva;</li> <li>- uporaba računalnika za iskanje informacij in podatkov;</li> <li>- uporaba računalnika za prikazovanje podatkov.</li> </ul> Socialne spretnosti: <ul style="list-style-type: none"> <li>- učinkovito sporazumevanje s sošolci pri opravljanju konkretne naloge;</li> <li>- učinkovito sporazumevanje na javni prireditvi;</li> <li>- delo v timu;</li> <li>- odgovorno opravljanje naloge.</li> </ul> Učenje učenja: <ul style="list-style-type: none"> <li>- navajanje na informiranje o kulturnih prireditvah;</li> <li>- spodbujanje notranje motivacije za zanimanje za kulturne prireditve;</li> <li>- ozaveščanje pomena za obiskovanje kulturnih prireditev;</li> <li>- spoznavanje strategij dela v timu.</li> </ul>

## Faze dejavnosti

8.00 – 9.00 UVOD IN RAZDELITEV V DELOVNE SKUPINE (6)

Navodila za delo (poiščejo čim več različnih prireditev, izpišejo tip prireditve, kraj in za CELJE tudi čas prireditve in ceno vstopnice.

Iskanje informacij v medijih (internet, dnevni časopisi)(20min).

Zapis prireditev po krajih.

Usklajevanje zapisa med skupinami metoda vrtiljak: LJ, MB, CE- gledališke predstave, glasbene predstave in razstave) in predstavitev podatkov (plakat).

Izbor prireditve (CE).

9.00 - 10.00 DOGOVOR O RAZDELITVI NALOG SKUPINAM (3 PO KRAJU, 3 PO DEJAVNOSTI)

Akcijski načrt (za obisk prireditve)

Urejanje podatkov (excel)

Prikazovanje podatkov

Izvoz podatkov v Word

Predstavitev grafičnih prikazov oziroma poročanje

10.00 -10.30 ODMOR/MALICA

10.30 – 12.00 OGLED PRIREDITVE

12.00 – 12.30 NAVODILA ZA DELO

Pisanje subjektivnega besedila (samostojno delo).

12.30 – 13.30 IZPOLNJEVANJE EVALVACIJSKEGA VPRAŠALNIKA

Urejanje podatkov (6 skupin)

Prikazovanje podatkov in predstavitev podatkov v Wordov dokument

Priprava predstavitve

13.30 – 14.00 PREDSTAVITEV DELA IN REZULTATOV

## ZAKLJUČEK

**Medpredmetno povezovanje in uvajanje sodobnih didaktičnih metod in strategij dela postavlja učence v aktivnejšo vlogo.** V okviru projektne dni je idealno, da pouk poteka v sproščenem vzdušju in se učenci nevede naučijo veliko več, kot bi se s frontalnim podajanjem učne snovi. Po evalvaciji učenci niso imeli občutka, da je bil to pouk, temveč so dan doživeli kot nekaj prijetnega in sproščenega.

Ob ciljnem načrtovanju učitelji lažje prepoznajo možnost doprinosa vsebin iz predmeta, ki ga poučujejo za doseg izobraževalnega cilja. Učne vsebine se med predmeti prepletajo, učitelji skušamo učencem pomagati, da usvojena znanja povezujejo. V takšno načrtovanje je vloženo precej časa in energije, zato je tak pristop smiselno grditi postopoma in se osredotočiti na tiste učne cilje, ki so kompetenčnemu načinu dela najbližji.

Rezultat medpredmetnega povezovanja je e-knjiga z gradivom, ki so ga pripravili dijaki.

Projektne pouk je didaktična strategija, ki jo vsi dobro poznamo, verjetno tudi vsi učitelji redno izvajamo. Potrebno je poudariti, da je nujno, da se osredotočimo na načrtovanje, da ne pozabimo, da zajamemo vse korake projektne pouka. Koraki projektne pouka so: pobuda (namen in cilji), aktivnosti za uresničitev, izdelava osnutka, načrtovanje, izvedba, predstavitev dela.

Medpredmetno povezovanje in projektne pouk predstavljata prednost v uporabi raznih metod dela, aktivno vključevanje dijakov v načrtovanje dela in aktivno opravljanje zastavljenih delovnih nalog.

Vloga logistike je nujna, kajti odlična organiziranost pomeni prihranek časa in je pot do uspeha.

## 5. LITERATURA

Logistični sistemi [Elektronski vir] : gradivo za 1. letnik / Anton Pepevnik. - El. knjiga. - Ljubljana : Zavod IRC, 2008. - (Višješolski strokovni program Logistično inženirstvo / Zavod

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Srednje strokovno izobraževanje (SSI), Katalog znanja Slovenščina, 2010

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Srednje strokovno izobraževanje (SSI), Katalog znanja Logistika ..., 2010

<https://sl.wikipedia.org/wiki/Logistika>,15. 6. 2016

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Pot na Lavo 22, 3000 Celje, Slovenija**

**METKA HOJNIK VERDEV, prof.**

**CULTURE IN LOGISTICS**

## **ABSTRACT**

Logistics has been a part of human evolution since prehistoric times. The basic system of logistics was established in 1937, when an idea of theoretic logistics was proposed on a philosophical symposium.

In Slovenia it is possible to learn about logistics through high school onward. With the change of curricular in high school education we have implemented modern teaching methods, which include interdisciplinary collaboration. Below we present an example of Slovenian language, math and logistics working hand in hand.

**Key words:** culture, logistics, project work, Cross- Curricular integration



## 1 INTRODUCTION

Logistics is not only connected with traffic, but is a part of all areas of public life. Its is implemented in our everyday life, whether its real or abstract.

When I was thinking about how to combine the logistics and culture, I realized how intertwined they really are. Every plan begins with logistics. When we are facing a difficult project, it is imperative that we remain organised. Being a part of a celebration of memorial day *Ta veseli dan kulture* (*This happy day of culture*), convinced my colleague and I to connect logistics with mathematics and Slovenian language, with special focus on precision planning of logistics. Development of logistics has influenced people along the way. Planning has become an essential, sometimes very tiresome task. It is a process we must learn and conquer.

I will first present some history of different logistic systems. Afterward I will present our case study of how we try to portray logistics in school and other cultural fields. As a linguist it is difficult for me to discuss the theory behind logistic systems, but atleast basic knowledge is required for teaching. For using the logistics related to culture, we need to posses different mathematical and linguistic skill, as well as basic reading literacy. Modern approach is necessary for applying different models of logistics to our own goals, so we can save time and subtract redundant work. This increases the quality of our own knowledge and success.

## 2 HISTORY OF LOGISTICS SYSTEMS

First steps towards logistics were made in prehistory, when humans had to organise in order to survive. The main role was played by women, which makes me as a linguist think that logistics is female term. Everywhere in the world we go, we meet a different human beings. When people started to migrate, they had to organize. Answers to these questions were for centuries based on interpretations of philosophers and religion. Today we are looking for answers with the help of empirical sciences. By exploring our past and discovering certain material evidences, science can now answer to some of our questions. With new methods of research, and the findings from them, we can tell a complex story, which allow us to understand our past and present of logistics. The development of logistics needs are also influenced by climatic conditions. This is now reflected in logistics (shipping, rail transport ...).

I mentioned prehistory, because we often forget the logistics field began to develop along with the development of mankind. Personally I'm interested how different cultures approach logistics and how it developed in their context. Today, there are cultures where women are forbidden to drive a car. I mention this because we tend to forget that we have evidence of in the logistics field dating back several thousand years. With the increasing demands of the environment and people logistics exponentially developed. Logistics and culture are intertwined and have a strong effect on humans, both in the private and professional life. For explaining interdisciplinary cooperation in teaching logistics, I prefer Požar's definition of logistics. The demand for a

general theory on logistics systems has been formally expressed in the context of philosophy after the First World War.

*In 1937, the American Hungarian-born biologist Ludwig von Bertalanffy lectured on philosophy seminar in Chicago. In this lecture he expressed for the first time in history the need to create a general theory that could be used for all complex phenomena called "system". But the idea did not encounter fertile ground. After the Second World War, when the development of science progressed rapidly, von Bertalanffy re-introduced the idea of the general theory of systems. Scientists over the world were surprised by the findings and ideas, which is way they founded the Society for General Systems Theory in 1954 and later the Association for General Research Systems.*

Logistični sistemi [Elektronski vir] : gradivo za 1. letnik / Anton Pepevnik. - El. knjiga. – Ljubljana: Zavod IRC, 2008. - (Višješolski strokovni program Logistično inženirstvo / Zavod IRC)

## **WHAT IS LOGISTICS?**

**Below I will introduce the definition of some eminent experts:**

**Požar:** Logistics is of military origin and means overcoming space and time.

**Kirsch:** Logistics in terms of system include design, control, regulation and implementation of the overall flow of energy, information, people and special matter.

**Jünemann** defines logistics as a scientific discipline of planning, management and control of the material, personal, energy and information flow in the system.

*Jakomin, Zelenika in Medeot define logistics as a set of interrelated activities, which serve to move raw materials.*

*<https://sl.wikipedia.org/wiki/Logistika>, 15. 6. 2016*

Through history logistics systems have been changing and modifying. Methods have been supplemented and amended. Newer approaches were necessarily, which in the eyes of different scientists were justified differently.

History of logistics is linked to different areas. When I was reading the literature for his project, I found out, that military logistics are equally presented in the books. Logistics is imperative in every step of the way. With the development of our economy, the approaches evolved aswell. In subsequent decades different opinions were raised on resolving individual problems of the system. I advocate a historical fact that it is necessary to plan carefully and consider the various theories.

Below we present the project **Culture, interdisciplinary cooperation and project work in the program logistics technician.**

### **3 CULTURE, CROSS- CURRICULAR INTEGRATION AND PROJECT EDUCATION PROGRAMME LOGISTICS TECHNICIAN**

**Grade:** 2nd

**Educational program:** Logistics Techniques

**Cross-Curricular integration:** logistics, Slovenian, Mathematics

SC Celje, High school of the service industry and logistics

#### **The workplan:**

Situation / Problem:

Search the events we can view on Memorial Day, entitled *Ta veseli dan kulture (This happy day of culture)* in Celje, Maribor and Ljubljana. Choose the most appropriate and accessible event and view it.

#### **The idea or draft of our project:**

1. Collect data from various media on the cultural events on this day in CE, MB, LJ;
2. The processing of this data and displaying gathered information;
3. The selection of relevant events;
4. Seeing selected events;
5. Writing a report on subjective experience of the cultural event;
6. The evaluation of the project.

#### **Key competences:**

**SLOVENIAN:** To develop communicative competence in Slovenian, the ability to develop an aesthetic competence, cultural and intracultural competence deepened through the experience of selected events in the cultural context.

**MATHEMATICS:** Ability for using the technology in the implementation of mathematical processes and solving mathematical problems.

The ability to collect, edit, display, and analyze data (if it is a sign of statistics).

Ability to cooperate and work as a team.

Acceptance and perception of mathematics as a cultural value.

**LOGISTICS:** The ability to develop knowledge of logistics flows, logistics and its value added in theory, solving logistical problems.

**PLANNING GOALS**

Field	Knowledge (what will the students know how to handle and what not?)
Data collecting	<p>Read, parse, compare and evaluate the informative texts.</p> <p>Distinguish between descriptive and numeric data.</p> <p>Being able to collect data directly from the interviews and indirectly from databases on the Web and daily newspapers.</p> <p>Critically evaluate the credibility and reliability of the data and the possible causes of errors in data collection.</p>
Text Comprehension	<p>Upon breaking down and comparing the given texts, they master the features of the informative text and summarize the characteristics of these texts. They acquire principles of successful understanding and furthermore apply them in their communication.</p>
Generating a thesis and its presentation	<p>Generating a subjective presentation of their experience watching different events. Learning about effective listening course of monologue texts</p>
Data editing	<p>Preparing and implementing a questionnaire and editing as well as commenting on the results.</p> <p>Adequately and reliably recording and editing the information in the form of frequency tables. When editing, knowing how to use Excel format tables. Understanding the importance of relative and absolute frequencies, while also being able to determine or calculate them.</p>
Displaying data	<p>Presenting the results of the questionnaire graphically and in word form.</p> <p><b>Commenting their findings. - Perhaps the analysis and interpretation of data.</b></p> <p>Get acquainted with the types of diagrams, (those which statistic sign is description), which can help show acquired data.</p> <p>They are able to display the data using frequency circuit and the bar diagram using Excel.</p>

<p>Analyzing and interpreting the data</p>	<p>They can figure out the characteristic of the variables out of the diagrams. They can use the data in tabular and diagramatic results in a complex and professional context.</p> <p>They are able to interpret the data analyzed. From the manufactured tables, charts and summarized data they can read repetitive patterns, rules and important features. Being able to formulate findings in mathematical language, and they know how to critically interpret them in the starting context.</p>
<p>IKK</p>	<p><b>Information - communication literacy</b></p> <ul style="list-style-type: none"> <li>- The use of a computer for writing and editing text documents;</li> <li>- The use your computer to search for information and data;</li> <li>- The use of computers for displaying data.</li> </ul> <p><b>Social skills:</b></p> <ul style="list-style-type: none"> <li>- Effectively communicate with classmates while performing specific tasks;</li> <li>- Communicate effectively at a public event;</li> <li>- Work as a team;</li> <li>- Responsibly performing each task.</li> </ul> <p><b>Learning to learn:</b></p> <ul style="list-style-type: none"> <li>- Getting accustomed to information on cultural events;</li> <li>- Promoting intrinsic motivation for interest in the cultural events;</li> <li>- Promoting awareness of the importance of attending cultural events;</li> <li>- Learning strategies of working in a team.</li> </ul>

## **Schedule**

8:00 to 9:00 INTRODUCTION AND DISTRIBUTION IN WORKING GROUP (6)

Work instructions (find as many different events, displaying the type of event, its location and for CELJE the time of the event and the ticket prices.

Finding information in the media (internet, daily newspapers) (20min).

Catalogue the events regarding places.

Coordination between the groups catalogues with the Carousel method: LJ, MB, CE - theatrical performances, musical performances and exhibitions) and data presentation (poster).

Selection of the event (CE).

9:00 to 10:00 - task distribution of the group (3 by place, 3 by activity)

Plan of action (visiting the event)

Data editing (EXCEL)

Data presentation

Export data to WORD

PRESENTATION of made charts and reporting

10:00 to 10:30 BREAK

10:30 to 12:00 VIEWING THE EVENTS

12:00 to 12:30 INSTRUCTIONS FOR WORK

Writing a subjective text (individual work).

12:30 to 13:30 COMPLETING evaluation questionnaire

Data editing (6 groups)

Presentation of data and exporting said data in a word document

Getting ready for presentations

13:30 to 14:00 PRESENTATION OF WORKS AND RESULTS

## 4 CONCLUSION

Cross-Curricular integration and the introduction of modern teaching methods and strategies of work puts the students in a more active role. Within days of the project, it is ideal that the classes take on a relaxed atmosphere and the students unknowingly learn a lot more, then being fed with up front teaching materials. After the evaluation the students did not have the feeling that this was a class, but a pleasant and relaxed daily experience.

With the planning of goals, teachers help identify the opportunity the contribution of the subject content they teach for achieving educational objectives. These topics among subjects intertwine, while teachers try to help students to link the acquired knowledge with different fields. Such a design requires a lot of time and energy, that's way it makes sense to build this approach gradually and instead focus on those learning goals, which are closest to the competence way of work.

Results cross-curricular integration is an e-book with the material prepared by the students.

Project teaching is a didactic strategy, which we all know well and as teacher regularly practice it in class. It should be noted that it is necessary to focus on the planning, not to forget to include all steps of project teaching. Steps of project classes are: Initiative (purpose and objectives), activities needed for success, work planning, execution, presentation of the work.

Curricular integration and project work represent an advantage in the use of various methods of work, active involvement of students in planning work and active carrying out the set tasks.

The role of logistics is indispensable, because an excellent organization means saving time and it is the way to success.

## 5 LITERATURE

Logistični sistemi [Elektronski vir] : gradivo za 1. letnik / Anton Pepevnik. - El. knjiga. - Ljubljana : Zavod IRC, 2008. - (Višješolski strokovni program Logistično inženirstvo / Zavod IRC)

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## Škola za cestovni promet, Zagreb

### Primjena interaktivnog poučavanja u sustavu redovnog obrazovanja

Autor: Tomislav Ćurković, dipl. ing. – prof. mentor

Tomislav Kučina, dipl. ing. – prof. mentor

Današnje doba modernih tehnologija i globalizacije donosi brze promjene u svim aspektima ljudskog života. Svakim danom stvaraju se nove informacije, a opći razvoj tehnologije zahtijeva kontinuirano stjecanje novih znanja i vještina. Javlja se potreba za novim oblicima učenja i poučavanja, za modernom nastavom koja je otvorena, široko dostupna, te prilagođena novim generacijama učenika.

Potrebu za ovakvim pristupom obrazovanju uočila je i Škola za cestovni promet iz Zagreba, te se uključila u kreiranje nastave čiji bi sadržaji upotrebom suvremenih tehnologija bili dostupni učenicima i nastavnicima u svakom trenutku.

Ovaj rad daje prikaz i primjenu suvremene online aplikacije nazvane „eŠkola“ koja je u funkciji učenja, a namijenjena je učenicima u sustavu redovnog obrazovanja. Online aplikacija nastala je kao proizvod entuzijasta iz područja prometa i stručnjaka iz područja IT te kroz ogledne primjere obrađuje nastavne sadržaje iz predmeta „Propisi u cestovnom prometu“. U potpunosti je vlasništvo Škole za cestovni promet iz Zagreba.

Primjenom ovakvih suvremenih interaktivnih načina učenja nastoji se osuvremeniti nastavni proces, poboljšati kvaliteta obrazovanja i motivirati učenike na postizanje boljih obrazovnih rezultata.

Ključne riječi:

- učenje na daljinu
- propisi u cestovnom prometu
- osuvremenjivanje nastave

## Primjena interaktivnog poučavanja u sustavu redovnog obrazovanja

Današnje doba modernih tehnologija i globalizacije donosi brze promjene u svim aspektima ljudskog života. Svakim danom stvaraju se nove informacije, a opći razvoj tehnologije zahtijeva kontinuirano stjecanje novih znanja i vještina. Javlja se potreba za novim oblicima učenja i poučavanja, kao i za modernom nastavom koja je otvorena, širokodostupna, te prilagođena novim generacijama učenika.

Jedna od novijih metoda učenja i poučavanja je elektroničko učenje na daljinu, odnosno „e-učenje“. Elektroničko učenje ili e-učenje (engl. *Electronic learning* ili *E-learning*) je jedan od brojnih pojmova s prefiksom „e“ koji označava izvođenje određene djelatnosti uz pomoć informacijsko-komunikacijske tehnologije (ICT).

Elektroničko učenje na daljinu može se definirati kao izvođenje obrazovnog procesa uz pomoć informacijsko-komunikacijske tehnologije, odnosno učenje koje se odvija uz pomoć računala i interneta, a omogućava učenicima učenje s bilo kojeg mjesta i u bilo koje vrijeme. Ovakav oblik učenja omogućava učeniku da uz pomoć interneta, odnosno uz primjenu odgovarajuće aplikacije u svakom trenutku i s bilo kojeg mjesta pristupi pisanom materijalu, videozapisima, zvučnim zapisima, animacijama ili bilo kojem drugom nastavnim sadržaju bitnom za nastavni proces iz pojedinog nastavnog predmeta. Prednosti ovakvog oblika učenja za učenike u sustavu srednjoškolskog obrazovanja u Republici Hrvatskoj podrazumijevaju vremensku i prostornu fleksibilnost u organiziranju učenja (tijekom putovanja, u sredstvima javnog prijevoza, u prirodi, tijekom stanke, odnosno bilo gdje i bilo kad), izostanak tradicionalnih pisanih materijala i udžbenika zbog primjene pametnih telefona, tablet računala ili računala, manje troškove nabavke obvezne literature za pojedini nastavni predmet (udžbenici, radne bilježnice, ispitna pitanja,...), bolju interakciju između učenika i nastavnika koja nije ograničena samo na nastavni sat,...

Sustav učenja na daljinu pod nazivom „eŠkola“ nastao je zbog potrebe da se učenicima olakša učenje, a nastavnicima izvođenje nastave nastavnog predmeta „Propisi u cestovnom prometu“. Uvažavajući zahtjeve tržišta rada te potrebe novih generacija učenika, Škola za cestovni promet iz Zagreba prepoznala je mogućnosti i prednosti ovakvog poučavanja i vlastitim resursima stvorila novi inovativni sustav učenja na daljinu pod nazivom „eŠkola“ s ciljem unaprjeđenja i osuvremenjivanja nastavnog procesa, kao i zbog potrebe zadržavanja visokog standarda u obrazovanju učenika.

Nastavni predmet „Propisi u cestovnom prometu“ predviđen je za učenike koji se obrazuju u nastavnom programu „Promet i logistika“ tijekom drugog razreda obrazovanja za zanimanje Vozač motornog vozila, te tijekom trećeg razreda obrazovanja za zanimanje Tehničar cestovnog prometa. Učenje i poučavanje nastavnog predmeta „Propisi u cestovnom prometu“ je izrazito zahtjevno jer se temelji na opsežnoj zakonskoj regulativi koja je podložna čestim izmjenama, a stanje dodatno otežava i činjenica da učenici koji se obrazuju za zanimanje Vozač motornog vozila u drugom razredu obrazovanja ulaze u sustav osposobljavanja kandidata za vozače te po završetku nastavnog predmeta „Propisi u cestovnom prometu“ polažu zahtjevan ispit pred ispitnim povjerenstvom Hrvatskog autokluba. Hrvatski autoklub je u RH stručna organizacija koja je zadužena za organizaciju i provođenje vozačkih ispita i samim tim zadužena za vanjsko vrednovanje učenika koji se u sustavu redovnog obrazovanja obrazuju za zanimanje Vozač motornog vozila.

Sustav „eŠkola“ je prateći alat za učenje i poučavanje, a omogućava izvođenje suvremenije i jednostavnije nastave nastavnog predmeta „Propisi u cestovnom prometu“ te je njegovim korištenjem nastava tehnološki unaprijeđenija, usmjerenija na učenike, interaktivnija i zanimljivija današnjim generacijama učenika, ali i nastavnicima. Sustav „eŠkola“ ima responsive dizajn mrežne aplikacije u kojem je izgled prilagođen prikazu na pametnim telefonima, tablet računalima i računalima tako da susvi sadržaji predviđeni nastavnim planom i programom iz nastavnog predmeta dostupni učenicima putem računala, tablet računala ili pametnih telefona, a svoja znanja mogu nadograditi u svoje slobodno vrijeme iz vlastitog doma, na putu do kuće ili škole, odnosno uvijek kada to učenik poželi, što omogućava kvalitetnije usvajanje nastavnih sadržaja i u konačnici bolje rezultate na ispitima. Predmetnim nastavnicima ovakav oblik nastave omogućava lakši pristup nastavnim sadržajima koji su jednoobrazni i ažurirani u skladu s izmjenama važećih zakona ili podzakonskih akata.

Sustav učenja na daljinu „eŠkola“ sastoji se od nekoliko funkcionalnih dijelova koji predstavljaju sistemsku cjelinu.

### ***Administratorski dio***

Postoje dvije administratorske razine: „superadmin“ i „nastavnikadmin“. „Superadmin“ postavlja i uređuje nastavno gradivo po nastavnim sadržajima i registrira nastavnike. „Nastavnikadmin“ registrira učenike po razredima i dodjeljuje im ime i prezime, korisničko ime, lozinku, e-mail, razred,...

### ***Nastavni dio***

U nastavnom dijelu učenik mora pročitati po određenom redoslijedu sve nastavne jedinice iz jedne nastavne cjeline. Nakon što ih pročita, mora položiti mali ispit znanja iz tog područja i tek nakon toga može prijeći na sljedeću nastavnu cjelinu (samo one nastavne cjeline koje je „nastavnikadmin“ ili „superadmin“ napravio dostupnim). Kada učenik uspješno završi sve ponuđene nastavne cjeline, može pristupiti provjeri znanja na postojećim online ispitima iz nastavnog predmeta „Propisi u cestovnom prometu“ koji susastavni dio ovog sustava za učenje na daljinu.

Provjera znanja pomoću sustava online ispita svakom učeniku omogućava pristup ispitima znanja koji se automatski generiraju iz baze ispitnih pitanja. Svaki ispit kojem učenik pristupi sadrži 38 pitanja, a kako bi se spriječilo ponavljanje istih pitanja i učenje „napamet“ pitanja se mijenjajunasumičnim odabirom iz baze svaki puta kada učenik rješava novi ispit. Uvjet za uspješan prolazak na ispitima je 90 % točno riješenih pitanja i uz uvjet da su sva pitanja iz cjeline „Raskrižja“ u potpunosti točno riješena. Vrijeme predviđeno za rješavanje ispita je 45 minuta, a rješenja s točnim odgovorima svaki učenik može provjeriti klikom na „Provjeri odgovore“. Sustav online ispita za provjeru i ponavljanje gradiva iz predmeta „Propisi u cestovnom prometu“ trenutno posjeduje bazu sa 903 pitanja iz svih nastavnih cjelina koje su predviđene nastavnim planom i programom. Pitanja je kontinuirano nadopunjavaju novima i ažuriraju po potrebi.

### ***Komunikacijski dio***

Prilikom registracije učenika, upisuje se i e-mail adresa učenika kako bi komunikacija bila dvosmjerna. Predmetni nastavnik preko sustava „eŠkola“ može slati e-mail poruku učeniku ili cijelom razredu, kao što i učenik može komunicirati s predmetnim nastavnikom. „Superadmin“ također može komunicirati sa svim registriranim nastavnicima („nastavnikadmin“).

### ***Nadzor***

„Nastavnikadmin“ može pratiti napredak svojih učenika u učenju (kada se tko zadnji put *logira*ou aplikaciju, do koje nastavne cjeline je došao, što je sve pročitao i koji su mu rezultati na ispitu). „Superadmin“ može pregledati podatke svih učenika u sustavu učenja na daljinu „eŠkola“.

### ***Mogućnosti***

Osim primjene u nastavnom predmetu „Propisi u cestovnom prometu“ ovaj sustav u potpunosti je primjenjiv i na sve ostale nastavne predmete, te predstavlja zanimljiv i inovativan alat za učenje i poučavanje prilagođen zahtjevima i potrebama novih generacija učenika.

Ovakav oblik učenja i poučavanja u sustavu srednjoškolskog obrazovanja korištenjem multimedije omogućava lakše i brže postizanje ishoda učenja, a učenicim nuditi vrijedne sadržaje i velik broj interaktivnih rješenja koja im omogućavaju aktivnije sudjelovanje u nastavnom procesu kao i u samostalnom učenju.

# **ROAD TRAFFIC SCHOOL, ZAGREB**

## **E – mobility in a system of regular education**

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### **Summary:**

Last few years, due to increasing instability in the market of petroleum products and constantly rising prices, is growing awareness of the necessity of developing sustainable mobility based on renewable energy sources and of the importance of education and awareness of many people, especially young people, about the need for the development and implementation of sustainable mobility in everyday life.

Electric vehicles are one of the very important technological solutions aimed at reducing environmental pollution and encourage the use of renewable energy sources. If we unify knowledge of electric vehicles and renewable energy sources, we can speak about sustainable mobility – e-mobility.

Road traffic school from Zagreb has started an alignment with the new technologies in transport by development of competences of students and teachers in vocational schools through the education and training about e-mobility within the project Learning E-Mobility / LEMO. In this project special accent was placed on the environmental aspect of the concept of e-mobility using electricity from renewable sources. The main project goals are increase of the quality of learning in vocational education through development of new innovative educational module Electromobility and following learning and teaching tools (ICT, OER), transmission and dissemination of good practice between European vocational schools and strengthening of connection of vocational education and labor market with the accent in the field of

e-mobility. In this work will be presented achievements in Road traffic school, Zagreb, in the area of e-mobility relating to the school's electric car, solar power plant, charging station for electric cars and curriculum of educational module Electromobility which is created together by vocational schools from Zagreb (Croatia), Celje (Slovenia) and Kouvola (Finland) in cooperation with companies and other partners' institutions from Croatia, Slovenia and Spain.

**Key words :**

- Electromobility
- Link connection the education with economy and the labor market ????
- Projects under the program Erasmus +

## **E-mobility in a system of regular education**

Mobility is one of very important factors of human life and represents the foundation of personal freedom and the basis for the establishment and development of interpersonal relations, trade, economy. Seen throughout history, mobility has never been so developed, faster and more versatile than today, primarily due to cheap and widely available energy source-oil. However, the last few years, due to the growing instability in the market of petroleum products and constantly rising prices and increasing pollution, traditional forms of mobility are looking for a quick change of current lifestyle. Awareness of the need for the development of sustainable mobility based on renewable energy sources is growing up and it is intensively thinking about the importance of education and awareness of greater number of people, especially young, about need for the development and implementation of sustainable mobility in everyday life. Electric vehicles are one of technologically very important solutions aimed to reduce pollution and encourage the use of renewable energy sources. If we unify knowledge of electric vehicles and renewable energy sources, we can talk about sustainable mobility – e-mobility (electromobility).

The goal of e-mobility is to find out sustainable balance between people, cars and environment. E-mobility gives positive effect to reducing of emissions of harmful exhaust gases. Researches show that the overall calculation of greenhouse gas emissions for electric cars is lower than the emission of conventional vehicles. Reduction of CO<sub>2</sub> is from 11% to 100% depending on whether the electricity that we fill a car is produced from energy sources that negatively affect on environment or from renewable energy sources. Just mentioned facts required of us, who work in the area of transport and whose basic of work is organization and improvement of the traffic and exploitation of road vehicles which directly and in a great part affects on environment, to notice a need to change to the access to mobility and that the princip of sustainable mobility and new technologies that come with it, we try to implement in modern transport. In addition to new technologies which are necessary build into the function of modern transport, our the most important task is to educate new generations of workers in the field of transport.

Road traffic school from Zagreb noted the need for this approach to education and through European project called „LEMO – Learning E-Mobility“ she involved in creation of new generations of students who will be able in more professional way to popularize the idea of e-mobility. The project lasts 3 years and its realization is divided into 3 phases. In the first phase (first year of implementation) teachers and participants from partners' institutions, pass the training during which study the components of the concept of e-mobility and an application of concept in various European countries. In the second phase (the second year of implementation) teachers from vocational schools in cooperation with businessmen and experts in implementation of e-mobility concept, create new educational module as supplement to current curricula in the field of transport and logistics and innovative tools for application of that module in education (learning and teaching tools). In the third phase ( in third year of implementation of the project) partner schools test newly created module and belonging tools for education by application in their schools.



The main goals of the project are increasing of quality of education in vocational education through development of new innovative educational module about electromobility and following learning and teaching tools, transmission and dissemination of good practice between European vocational schools and strengthening the links of vocational education and labor market with the accent in the field of e-mobility. To make a circle of all aspects of sustainable e-mobility (electric vehicles and renewable energy sources), Road traffic school, Zagreb in the previous project (Europe Electric Car, 2012. – 2014.) has converted classical car SMARTfortwo with Diesel engine, into electric vehicle. Electric car SMARTfortwo is created as product of students and teachers of the school, with great help of Croatian producers of electric cars (NETeko, Rimac Automobili and Dok-Ing). Car has to be functional so following components were built in it: asynchronous motor 96 V/11 Kw, Zapi inverter 96 V/450 A with cooler, Zapi accelerator pedal, Albright contactor SW200/96V, batteries LiFePO4 100 Ah – 30 cells, Net BMS unit for cell – 30 pcs, charger Atib 96 V/25 A, vacuum pump, DC-DC converter 72-144 V/12/350, electric heater for passenger compartment, main switch with holder, main cable 50 mm<sup>2</sup>, cable for charging, connectors,... In this way transformed car in daily use satisfies needs of urban and suburban driving test results:

Maximum speed: 70 km/h

Autonomy: 80 km

Battery charge: 4 hours

Price charging at a lower rate: 4,5 kn

Price charging at a higher rate: 9,5 kn

This electric car is worth teaching aid for studying the basis of e-mobility as a part of the optional classes in subject „Alternative propulsion in road traffic“ which is studied by fourth-grade students – technicians of road transport.

To recognize e-mobility as an efficient and environmentally the best form of transport, a necessary precondition is that electric vehicles are powered by electricity produced from renewable energy sources (sun, wind,...). To satisfy also this e-mobility condition, Road traffic school from Zagreb decided to produce electricity from photovoltaic cells. According a sufficient number of sunny days during the year and the position of the school's building that is suitable for the installation of photovoltaic cells, solar energy was the most appropriate solution for production electricity from renewable sources.

For the purpose of electricity production, it was decided that the solar power plant consists of:

- Photovoltaic panels WINAICO WSP280M6
- Solar hybrid converter/charger 3000 W/48 V
- Batteries DAB 12-150FA 12 V/150 Ah
- Supporting structure
- Electrical mounting kit

A solar energy system is designed in accordance with project documentation, and beside the basic components, a solar power plant is connected to the information system of the school at which is possible to follow outputs (production of electricity (year/month/day), consumption and distribution of electricity,...). After installation of solar power plants, we could observe positive results in the generation of electricity, as well as the positive effects on the reduction of environmental pollution. The solar power plant- school's property- annually produces cca 4611 kWh of electricity (the price for 1 kWh is 0,95 kn + VAT), for charging of electric car consumes about 1000 kWh of produced electricity (calculation is based on 2 charging/week of totally empty battery of electric car), and the rest of cca 3600 kWh produced electricity the school can spend for the operation of other loads in the school or for charging of other electric cars. In addition to the sensible cost savings related to the consumption of electricity, the solar power plant realizes the reduction of emission CO<sub>2</sub> for 1272 kg annually in produced electricity and cca 1000 kg/year of emission CO<sub>2</sub> because of using electric car.

Road traffic school is incorporated charging station for electric cars (product of Ducati komponenti from Ludbreg) that the whole system of solar power has better performance and can be used for public purposes. The charging station is equipped with two sockets for two connectors (Schuko and Mennekes), that allow simultaneous charging of two electric vehicles. The communication with the vehicle is by PWM (Pulse Width Modulation). Each socket is equipped with certain protections. The sockets are equipped with Sweeling Cover screw which prevents the insertion of the plug at the lack of user's authorization. This feature has been adapted for „public“ use. The sockets are equipped with the system for locking socket that protects removing the plug in absence of user's authorization. After authorized removing the plug, the socket is locked automatically.

Fiscal counter MID counts delivered energy into a vehicle on each connection and electronic module with a microprocessor leads the function and communication of socket with vehicle and user's interface. There is also incorporated a specific module that manages with the available voltage by PWM derating function. The product is made in accordance with the requirements in IEC 61851-1, IEC 61851-22, IEC 69-9. The charging station is equipped with user's interface and connection with control centre. The identification of user is done by RFID card 14443-/B. The station is equipped with LCD screen 2 x 20 cm for representation these information: choice of socket, charging status (current power, output power, ...) anomalies,... It is possible to have a communication with station by GPRS net/Lan and the control centre for the purposes of data transmission about charging cycles and it is possible to control with reservation of connection , by WEB/SMS service. Electronic module with microprocessor controls above mentioned functions.

Road traffic school from Zagreb circled the whole concept of e-mobility (electric car, production of electricity from renewable energy sources, charging station and educated teachers) so now we can commit to the main project goal that is related to increasing of quality of teaching and learning in vocational education through new innovative educational module called „Electromobility“. This module is primarily intended to students in sector Transport and Logistics (but it can be used in other vocational educational programs). The basic of this module is studying e-mobility through transmission and dissemination of good practice between vocational schools, using certain learning and teaching tools and the strengthen links between vocational education and labor market. To achieve the foreseen learning

outcomes in the educational module „Electromobility“, Road traffic school, Zagreb is in cooperation with vocational schools Kouvola Region Vocational College from Finland and Šolski centar Celje from Slovenia, and with the project partners – Energetski institut Hrvoje Požar from Croatia, company AVANTCAR (Ljubljana, Slovenia), Ducati komponenti (Ludbreg, Croatia), NETeko (Zabok, Croatia), ACASA (Barcelona, Spain), developed an innovative way of teaching and learning at distance, publicly available at the website <http://www.lemo-project.eu>.

The system of distance learning in the educational module „Electromobility“ is designed that the basics of e-mobility are studied in three steps. In the first step each user has to study the chapter in which is certain teaching content related to e-mobility. The second step of learning and teaching is scheduled for innovative and content-associated videocontents that allows to user that red contents looks from the wider point of view and in a different way. Each video, before the end, contains the issues about which students should discuss with their teachers. The conclusions will be brought during the lesson. In the third step of learning educational module „Electromobility“, the students must correctly answer the questions related to each choice teaching unit. This way of learning and teaching in the system of secondary vocational education, using system of learning at distance, makes it easier and faster to achieve the learning outcomes, and offers to the students valuable contents that will enable them better education.

Potential long-term effects on the project will be visible through better alignment of the education system and the economy as well as popularization of the idea of e-mobility thus supporting the efforts that all EU members by 2020. ensure the share of renewable energy in all forms of transport in the amount of at least 10% of total consumption.



**JU SREDNJA ŠKOLA ZA SAOBRAĆAJ  
I KOMUNIKACIJE SARAJEVO**

**Kemal Jaganjac, MA, dipl.ing.saobr.**

**PRAKTIČNI EFEKTI UTICAJA JGPP-A NA OKOLINU**

**SAŽETAK:**

*U savremenim uslovima života, zagađenje okoliša u urbanim sredinama je neizbježno. Zagađenju zraka od ispušnih gasova motornih vozila, doprinosi i značajan broj vozila javnog gradskog transporta koji se svakodnevno kreću ulicama velikih gradova. Buka je, također, jedna od pojava koja, ako prelazi granice štetne po zdravlje za ljudski organizam, spada u elemente koji zagađuju okolinu. Znatan udio buke u ukupnom nivou u urbanim sredinama, nastaje od vozila javnog gradskog transporta,*

Ključne riječi: *Javni gradski prevoz, emisija, zagađenje, zrak, buka*

## 1. UVOD

**„Ponašajte se dobro prema Zemlji, ona vam nije data od vaših roditelja, nego je posuđena od vaše djece“**

**(stara indijanska poslovice)**

Javni gradski prevoz, kao djelatnost od posebnog društvenog interesa, predstavlja vrlo značajnu komponentu u obavljanju svakodnevnih gradskih funkcija i od izuzetne je važnosti za razvoj privrede i društva u cjelini. Današnji nivo razvoja saobraćaja dovodi do fizičkog zagušenja saobraćajnih površina, zagađenja životne sredine (emisije štetnih gasova i buke) i znatnog povećanja troškova (vremenski i energetske), zbog čega se nameće opravdano pitanje: „Kakav saobraćaj imamo u gradovima i kako na njega možemo uticati?“

Drumski saobraćaj jedan je od najvažnijih izvora zagađenja zraka. Oslobađanje ugljen dioksida(CO<sub>2</sub>), iz izduvnih gasovamotornih vozila, dovode do postepenog globalnog zagrijavanja (izazivanja tzv. efekta stakleničke bašte, nastajanje kiselih kiša, oštećenja gornjih slojeva atmosfere i drugih posljedica). Zahtjevi za poboljšanje kvaliteta životnog zdravlja se pooštreni, pa je u tom smislu i na nivou UN, dogovoren Protokol iz Kyota uz Okvirnu konvenciju UN o promjeni klime. Protokol je dodatak međunarodnom sporazumu o klimatskim promjenama i otvoren za potpisivanje 11.decembra 1997.godine, s ciljem smanjenja emisije ugljen dioksida i drugih stakleničkih gasova.

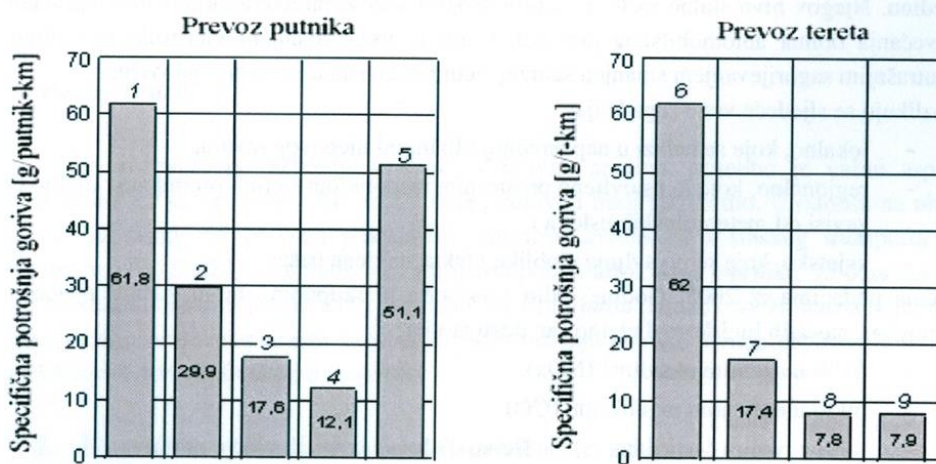
Procjene eksperata su da će do 2050.godine više od 6,2 milijarde ljudi živjeti u gradovima. (oko 2/3 svjetske populacije koja će tada iznositi oko 9 milijardi).Urbano stanovništvo povećava se za oko 50 miliona svake godine. Gradovi postaju sve veći pa se i zahtjevi za urbanim transportom, koji trebaju podržavati mobilnost ljudi i roba u gradovima, proporcijonalno povećavaju, a samim tim i zagađenje životne okoline od JGP

## 1. Zahtjevi prema raznim vidovima transporta

Transportna djelatnost, bez obzira dali se radi o putničkim automobilima, javnom transportu ili logističkom, zahtijeva odgovarajuće resurse, kao što su: zemljište, materijale i energije i pri tome proizvodi neželjene prapratne efekte: zagađenje atmosfere, buka i stradanja u saobraćajnim nezgodama.

### 1.1. Potrebe energije

Prema specifičnoj potrošnji energije, šinski transport za istu potrošnju energije kao druga prevozna sredstva može izvesti najveći obim prevoza.



**Slika 1. Specifična potrošnja energije različitim transportnim sredstvima: 1. Putnički automobil u gradu, 2. Putnički automobil na magistrali, 3. Obični međugradski voz, 4. Voz velike brzine – TGV, 5. Avion, 6. Obični teretni kamion, 7. Kamion velike nosivosti, 8. Maršutni voz, 9. Riječni teretni prevoz**

Sa slike 1. vidljivo je da je energetska efikasnost šinskog transporta 2 do 3 puta veća od automobilskog. Šinski transport predstavlja najbolju alternativu drugim vidovima transporta sa stanovišta zaštite životne okoline po potrošnji energije.

## 1.2. Zauzimanje površine zemljišta

U pogledu zauzimanja potrebne površine zemljišta za infrastrukturu šinskog transporta potrebno je značajno manje zemljišta nego za drumski transport. Manja širina zemljišne površine, koju zauzima šinski kolosjek, bitna je kod složene konfiguracije terena, a posebno je bitna u gradskim zonama. Širina 2-kolosječne pruge lakog šinskog sistema sa ivičnjakom je 7,15 (m), a ukupna širina zajedno sa sigurnosnim prostorom širine 2x0,7 (m), iznosi 7,75 (m). Potrebne saobraćajne površine, za isti obim prevoza, sa putničkim automobilima su 42 do 48 puta veće od šinskih sistema za masovni prevoz putnika, čime se ostvaruju uštede u potrošnji energije za 18 do 32 puta i postiže veća prevozna brzina 2,5 do 4 puta, naročito u užoj gradskoj zoni.

## 1.3. Zagađenje životne sredine

Zagađenje atmosfere je osnovni oblik negativnog uticaja transporta na životnu sredinu. Njegov nivo stalno je u porastu, usljed konstantnog povećanja automobilskog prevoza, iako je usvaršavanjem konstrukcije motora s unutrašnjim sagorijevanjem smanjen sadržaj štetnih materija u izduvnim gasovima.

Postoje sljedeće vrste zagađenja:

- **Lokoalno** – koje se nalazi u neposrednoj blizini od njegovog izvora;
- **Regionalno** – koje je uslovljeno prostornim rasporedom štetnih produkata i djelimično zavisi od meteoroloških uslova, i
- **Svjetsko** – koje se pojavljuje u obliku efekata stakleničke bašte.

Na osnovu podataka iz 2005. godine udio transporta u ukupnom obimu štetnih materija u atmosferi nastalih ljudskom djelatnošću, dostiga je:

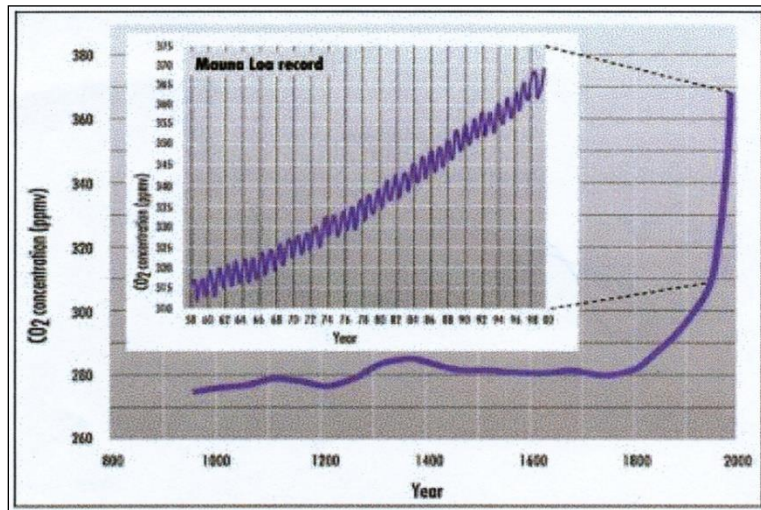
- 63 % u azotnim oksidima (NO<sub>x</sub>).
- 59 % u ugljen-monoksidu (CO),
- 45 % u tvrdim česticama, čije je štetno djelovanje na zdravlje dokazano,
- 42 % u lebdećim organskim nemetalnim jedinjenjima,
- 39 % u ugljed-dioksidu (CO<sub>2</sub>), koji je glavni uzrok efekta stakleničke bašte.

Unutar transportnog sektora, udio šinskog transporta u štetnim materijama iznosi 0,1 do 0,8 %, a automobilskog od 94 do 99 %. Odavde je jasna važnost korištenja raznih vidova transporta radi ekoloških faktora.

Ekološke prednosti šinskog transporta mogu se sagledati kroz:

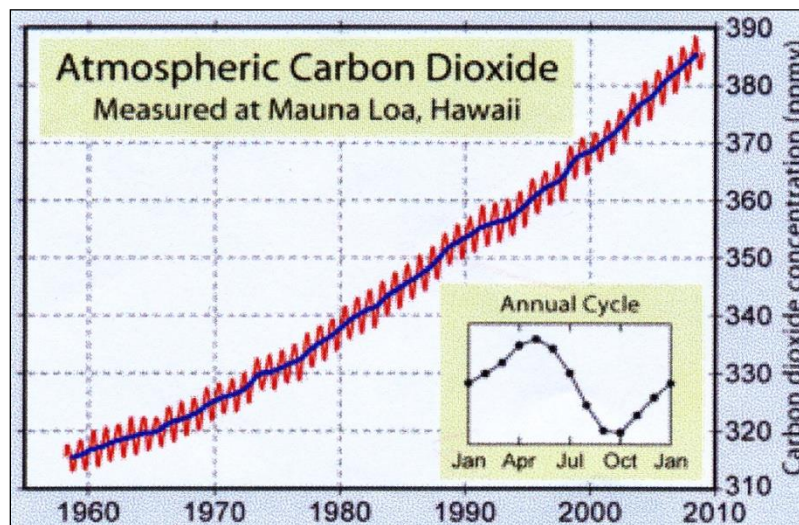
- široku primjenu električne vuče, koja ne stvara lokalno zagađenje atmosfere,

- 30 % elektroenergije, koja je potrebna za vuču, koristi se iz ekoloških čistih izvora: hidroelektrane i atomskih centrala.



Izvor: [www.bom.gov.au](http://www.bom.gov.au)

*Slika 2. Promjena koncentracije CO<sub>2</sub> u atmosferi u posljednjih hiljadu godina*



Izvor: [www.bom.gov.au](http://www.bom.gov.au)

*Slika 3. Izrazit porast koncentracije CO<sub>2</sub> vidljiv je u drugoj polovici dvadesetog stoljeća*



<b>Transportno sredstvo</b>	<b>Potrebe energije (MJ/pkm)</b>	<b>Specifična količina izbačenog CO<sub>2</sub> (g/pkm)</b>
Prigradski dizel-voz	0,78	59,6
Prigradski elekto-voz	0,85	47,7
Metropolitan	1,1	61,6
Laki šinski sistem	1,0	56,2
Zglobni autobus	1,17	89,4
Autobus velike zapremine	1,06	80,8
Gradski autobus	1,37	104,3
Međugradski autobus	0,96	74,5

*Tablica 1. Količine izbačenog ugljen-dioksida (CO<sub>2</sub>)*

Za putničke automobile u proračun se uzimaju vrijednosti CO<sub>2</sub> od 278 (g/pkm) u gradu i 210 (g/pkm) izvan grada. To znači, da se povećanje udjela šinskog transporta u javnom prevozu doprinosi rješenju energetske i ekološke probleme.

#### **1.4. Sigurnost**

Pri razmatranjima različitih uticaja na životnu sredinu posebno je važan aspekt sigurnosti jer je u prevozu očuvanje života i zdravlja ljudi jako bitno. U odnosu na obim prevoza za svaki vid prevoza pokazatelji smrtnosti avionskog i šinskog transporta su približno isti (0,25 i 0,18 poginulih na 1 milijardu putnik/km). To je oko 75 puta manje nego u automobilskom prevozu (15 poginulih na 1 milijardu putnik/km). Efikasna politika u oblasti sigurnosti razmatra se kao bitan faktor vođenja politike javnog prevoza, kojim se daje prednost razvoju šinskog transporta.

## **2. Uticaj vozila gradskog putničkog prevoza i putničkih automobila na životnu sredinu**

Glavni zagađivači zraka, emitovani od strane motornih vozila su ugljenmonoksid (CO), azotni oksid (NO<sub>x</sub>), razni nesagorjeli ugljenvodonici (C<sub>x</sub>H<sub>y</sub>), sumpordioksid (SO<sub>2</sub>) i čvrste čestice (čad). Pored ovih, motorna vozila emituju i niz vrlo otrovnih komponenti: benzol, formaldehid, polinuklearni aromatski ugljikohidrati, olovo čija je emisija povezana sa kvalitetom goriva i aditivima u gorivu. Nivo emisije osnovnih zagađivača dat je u narednoj tablici:

<b>VRSTA MOTORA</b>	<b>CO(g/kWh)</b>	<b>C<sub>x</sub>H<sub>y</sub> (g/kWh)</b>	<b>NO<sub>x</sub> (g/kWh)</b>
<b>Otto motor</b>	<b>35,0</b>	<b>3,0</b>	<b>27,0</b>
<b>Diesel motor</b>	<b>4,0</b>	<b>1,1</b>	<b>7,0</b>
<b>Savremeni diesel motor</b>	<b>2,1</b>	<b>0,66</b>	<b>5,0</b>
<b>Motor na zemni gas</b>	<b>1,0</b>	<b>0,15</b>	<b>2,15</b>

**Tabela 2. Nivo emisije zagađenja zraka od vozila sa motorima SUS**

Uz pretpostavku da autobus javnog gradskog saobraćaja ima prosječno 120 (kW) i prosječnu popunjenost 40 (%), a putnički automobil (sa OTTO motorom) ima prosječno 55 kW, sa prosječno 1,5 putnika, dobija se masa emitovanih štetnih materija prikazana u narednoj tabeli:

	<b>CO(g/kWh)</b>	<b>C<sub>x</sub>H<sub>y</sub> (g/kWh)</b>	<b>NO<sub>x</sub> (g/kWh)</b>
<b>Putnički automobil (Otto motor)</b>	<b>815</b>	<b>70</b>	<b>630</b>
<b>Autobus (Diesel motor)</b>	<b>12</b>	<b>3,3</b>	<b>21</b>
<b>Odnos: putnič.autom./autobus</b>	<b>68</b>	<b>21</b>	<b>30</b>

**Tabela 3. Uporedna vrijednosti odnosa emisije štetnih sastojaka sagorijevanja dva prijevozna sredstva sa različitim vrstama motora SUS i gorivima**

Iz tablice se može uočiti da je odnos štetnih sastojaka sagorijevanja kod automobila i autobusa, jako nepovoljan za vozila individualnog saobraćaja. Ovaj odnos bio bi još povoljniji u korist autobusa, koji bi koristili motore sa zemnim gasom. Kako u većini gradova, dio prevoznih potreba stanovnika obavljaju i električna vozila javnog saobraćaja, i kako će se u budućnosti njihova uloga povećavati, usmjeravanjem gradskog saobraćaja na sredstva javnog prevoza značajno će doprinijeti smanjenju zagađenja urbanih sredina.

Buka izazvana kretanjem vozila u gradu, također dovodi do psihičkih i fizioloških poremećaja stanovnika. Pojedine vrste vozila emituju sljedeću buku:

	<b>dB (A) Srednja vrijednost</b>	<b>dB (A) granica</b>
<b>Putničko vozilo (1100 ccm)</b>	<b>70</b>	<b>67-75</b>
<b>Putničko vozilo preko 1600 (ccm)</b>	<b>72</b>	<b>68-77</b>
<b>Dostavno vozilo</b>	<b>73</b>	<b>69-77</b>
<b>Teretno vozilo i autobus</b>	<b>81</b>	<b>76-86</b>
<b>Motocikl</b>	<b>77</b>	<b>72-86</b>
<b>Tramvaj-stara konstrukcija</b>	<b>81</b>	<b>76-86</b>
<b>Tramvaj-nova konstrukcija</b>	<b>75</b>	<b>73-77</b>
<b>Podzemna eljeznica</b>	<b>75</b>	<b>73-77</b>

**Tabela 4. Vrste vozila i emisija buke**

Gornja tablica pokazuje da teretno vozilo ili autobus razvija, pod određenim uslovima gradskog saobraćaja, isto toliko buke kao 10 putničkih automobila i da putnički automobil izaziva u pravilu 10 dB(A) manje buke nego jedno teretno vozilo ili autobus. Međutim, neophodno je praviti izvjesnu razliku između teretnih vozila i autobusa, jer su autobusi po pravilu tiši. U poređenju sa putničkim automobilom, treba imati u vidu da autobus po svom kapacitetu, odnosno broju putnika koje prevozi, zamjenjuje 30-40 putničkih automobila, što mu u općem saobraćaju daje relativnu prednost u odnosu na putničke automobile, ali što svakakao ne isključuje potrebu da se buka koju proizvodi autobus ne smanji na podnošljivu mjeru.

Poseban napredak ostavaren je u savremenoj konstrukciji tramvaja, kod kojih je pogodnim rješenjem glavnih izvora buke (reduktor, kompresor, vibracije obrtnih masa itd.) ona svedena na najmanju mjeru.

### **3. Potencijalne mjere za smanjenje negativnog uticaja javnog gradskog putničkog prevoza na okolinu**

Da bi se mogle definisati mjere koje će doprinijeti smanjenju emisije zagađivača od strane transportnog sektora, neophodno je uočiti parametre na koje je moguće djelovati. Pored mogućnosti upravljanja transportom, u smislu ograničavanja korištenja pojedinih kategorija motornih vozila u užim gradskim jezgrima i općenito boljim organizovanjem, postoje i tehničko-tehnološki potencijali čija bi primjena omogućila znatnu redukciju emisiju zagađivača.

Kao kontrolni parametri koji omogućavaju definisanja mjera za redukciju emisije zagađivača bitini su:

- Emisije u izduvnim gasovima;
- Sastav goriva;
- Emisija isparivanja;
- Poboljšanje efikasnosti korištenja goriva;
- Korištenje alternativnih goriva;
- Upravljanje transportom.

Ciljanim djelovanjem na pojedine kontrolne parametre, bilo uvođenjem strožijih zakonskih regulativa u pogledu emisije zagađivača, bilo stimulativnim ekonomskim mjerama, nastoji se umanjiti zagađenje čovjekove životne sredine.

U Bosni i Hercegovini kao prvi korak u sprečavanju zagađivanja životne sredine od strane motornih vozila trebao bi se ogledati u postepenom pooštrenju zakonskih regulativa.

Usljed velikog broja tehničkih i tehnoloških inovacija u području automobilske industrije posljednjih godina nameće se permanentna edukacija postojećeg i budućeg kadra u oblasti transporta, što će predstavljati osnovu za poboljšanje u pogledu rješavanja problema zaštite čovjekove sredine i transportnog sektora uopće.

U pogledu mjera zaštite, postoje tri načela koja se mogu primijeniti za smanjenje sadržaja zagađenog zraka i koja se mogu kombinovati na različite načine:

- Smanjenje sadraja zagađenja iz vozila putem:
  - Čistog ispuha (NO<sub>2</sub> i CO<sub>2</sub>)
  - Korištenjem „čistih“ vrsta vozila u osjetljivim područjima
- Smanjenje volumena saobraćaja putem boljeg predviđanja saobraćaja:
  - Općenito smanjenje saobraćaja
  - Ograničenja za teški saobraćaj (vozila na dizelski pogon)
- Regulisanje saobraćaja na osjetljivim mjestima putem:
  - Držanjem teškog saobraćaja izvan urbanih područja
  - Naziranja saobraćaja u urbanim područjima.

Pred motorna vozila, postavljaju se strogi zahtjevi u pogledu potrošnje goriva, emisije CO<sub>2</sub>, i emisije tzv. konvencionalnih zagađivača (CO, C<sub>x</sub>H<sub>y</sub>, NO<sub>x</sub> i čestica). Iako su granične vrijednosti konvencionalnih zagađivača za teretna vozila od početka njihovog uvođenja smanjene za pojedine komponente više od 90%, predviđeno je njihovo daljnje smanjenje od oko 50% u odnosu na sadašnje evropske granične vrijednosti (EURO III) do 2025.godine (EURO IV). Istovremeno u SAD/Kalifornija uvode se tzv. SULEV (Super Low Emission Vehicle) granične vrijednosti koje su opet manje od predviđenih vrijednosti EURO IV i preko 50%. Međutim, u budućnosti pravi izazov za konstruktore motornih vozila biti će redukcija CO<sub>2</sub>, pošto ova

emisija, pri primjeni goriva u svom jedinjenju sadrže ugljik, direktno zavisi od potrošnje goriva. Pored dobrovoljnog preuzimanja obaveze u pogledu nastojanja smanjenja emisije CO<sub>2</sub> od strane proizvođača i udruženja proizvođača motornih vozila, u okviru Evrope postavljeni su jasni ciljevi za granične vrijednosti CO<sub>2</sub>, u okviru Evrope postavljeni su jasni ciljevi za granične vrijednosti emisije CO<sub>2</sub>, od putničkih vozila i to 120 g/km za 2014. godinu.

Glavne skupine mjera za zaštitu okoline od djelovanja drumskog saobraćaja su sljedeće:

1. EKONOMSKE MJERE ZAŠTITE – kao što su porezi, nakanade za ceste, oporezivanjem privatnih vozila uvođenjem posebnih taksi na parkiranje, smanjenjem poreza za korištenje „čistih“ goriva itd.
2. MJERE ZAŠTITE KOJE UTIČU NA UČESTLAOST I NAČIN PREVOZA – kao što su ograničenje korištenja zemljišta, poboljšanje javnog prevoza, ograničenje površine za parkiranje, efikasno lokaliziranje mjesta stanovanja i radnih mjesta, pravilno lociranje trgovačkih centara itd.
3. MJERE KOJE PREUSMJERAVAJU DRUMSKI SAOBRAĆAJ – kao što su cestovne obilaznice, izgradnja tunela kao obilaznica, ograničenje teretnog saobraćaja u pojedinim zonama itd.
4. ZAŠTITNE MJERE ILI MJERE POBOLJŠANJA – kao što su sprečavanje buke ili pročišćavanje zraka u tunelu, zasađivanje drveća pored saobraćajnica itd.
5. MJERE KOJE SE ODNOSU NA VOZILO – kao što su zahtjevi za emisiju buke i gasova iz vozila.

Najveći izvor buke u komunalnoj sredini je saobraćaj, odnosno vozila sa motorom sa unutrašnjim sagorjevanjem. Na osnovu rezultata obavljenih mjerenja mogu se u cilju smanjenja nivoa buke sprovesti aktivnosti u sljedećim pravcima:

1. Dislokacija teškog i teretnog, pogotovu tranzitnog saobraćaja, na saobraćajnice van gusto naseljenog gradskog jezgra.
2. Isključiti bučna i dotrajala vozila uz nabavku i proizvodnju transportnih sredstava, koja emituju što je moguće nižu buku, sprovesti modernizaciju vuče tramvaja i elektrifikaciju javnog saobraćaja uopšte.
3. Primjena novih, modernih prevlaka na većim saobraćajnicama radi eliminacije udarnih rupa i amortizacije zvučnih talasa. Također treba predvidjeti prekid kontinuiteta tvrde podloge u cilju sprečavanja prenosa vibracija sa kolovoza na okolne zgrade, te maksimalno izdvajanje pješackog od drumskog saobraćaja.
4. Pri planiranju novih ulica obezbjediti dovoljnu širinu istih, kao i drveće sa širokim listovima u dva reda, da bi se razdvojile saobraćajnice od zgrada. Podizanju zona zelenila treba težiti u svim naseljima, a insistirati da se jako prometne i bučne ulice sa nagibom pretvore u jednosmjerne, i to tako da jednosmjerni pravac kretanja vozila bude odozgo prema dole.

Buka promjenjivog inteziteta koja se javlja na raskrsnicama, prilikom prolaska vozila ili njihovog zaustavljanja, nepovoljno djeluje na nervni sistem čovjeka i mora se otkloniti sinhronizacijom svjetlosnih signala na dužim putnim potezima. Ovo je posebno izraženo u vrijeme vršnih časova pa svi napori smanjenju zagušenja gradskog soobraćaja, potenciranjem upotrebe javnih prevoznih sredstava, povoljno utiču i na smanjenje buke, imajući u vidu broj putnika koji se preveze u jednom autobusu ili tramvaju.

Neophodno je periodično vršiti mjerenja emisije štetnih sastojaka sagorijevanja kao i nivoa buke, analizirati dobijene podatke, uporediti sa definisanim standardima i vrijednostima izmjerenim u prethodnom periodu i poduzeti odgovarajuće aktivnosti u cilju poboljšanja stanja.

## ZAKLJUČAK

Iskustva kompanija za javni gradski prevoz i lokalnih uprava gradova EU, vezanih za održiv razvoj predstavljaju putokaz ka iznalaženju rješenja koje će učiniti da sistem javnog transporta putnika u Sarajevu bude promoter održivog razvoja grada. Konačan cilj je da se Sarajevopriključi "zelenoj" mapi Evrope.

Trenutno stanje u kojem se nalazi ekonomija Evrope, naročito loše stanje u BiH, ne bi trebalo da stvara pesimizam u pogledu velikih finansijskih potreba ulaganja u sistem javnog gradskog transporta. Nabavka i uvođenje u eksploataciju autobusa sa ekološki "čistim" motorima SUS trebalo bi da bude postupno sa trendom ubrzanja dinamike nabavke novih autobusa koji bi zamijenili autobuse sa motorima na konvencionalna goriva. Razvoj svijesti o ekološki "čistom" javnom gradskom transportu, usklađivanje domaćih standarda i propisa sa EU, nabavka ekološki „čistih“ autobusa, sa ciljem smanjenja emisije štetnih sastojaka sagorijevanja, mora biti imperativ i sastavni dio svih strateških planova javnih autosobraćajnih preduzeća u Sarajevu, Ministarstva prometa i komunikacija kantona Sarajevu, kao i drugih organa lokalne uprave, odnosno općinskih i gradskih vlasti.

Kako se u urbanim gradu naseljima i gradovima dio prijevoznih potreba građana zadovoljava i tramvajima i trolejbusima, koji koriste električnu energiju za pogon, potrebno je obratiti pažnju da se njihov udio u ukupnom broju prijevoznih sredstava u budućnosti poveća.

Posebnu pažnju treba usmjeriti na podsticaj građana (brzinom prijevozne usluge, cijenom prijevoza itd.) da koriste sredstva prijevoza javnog gradskog transporta, umjesto svojih putničkih automobila, čime bi značajno doprinijeli smanjenju zagađenje zraka od emisije štetnih sastojaka sagorijevanja, smanjenju emisije buke i rasterećenju saobraćajnica odnosno smanjenu saobraćajnih gužvi.

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## **THE PRACTICAL EFFECTS OF THE PT IMPACT ON ENVIRONMENT**

### ***ABSTRACT:***

*Nowadays the environmental pollution in urban areas is unavoidable. The daily public transportation also takes a part in the motor vehicles' gaseous emissions which cause the air pollution. Also, if the transport noise exceeds the noise margin, being harmful for human beings as such, it becomes also a pollutant. In that sense, a noticeable share of total level of noise in urban areas belongs to public transportation.*

Key words: **Public transportation, emissions, pollution, air, noise**



## 1. INTRODUCTION

**"Treat the earth well: it was not given to you by your parents, it was loaned to you by your children"**

**(Ancient Indian proverb)**

Public transport, as an activity of public interest, represents a very important component in everyday urban functions and is of great importance for the development of economy and society as a whole. Today's level of development of traffic leads to physical congestion of traffic areas, environmental pollution (emissions and noise) and a significant increase in the cost (time and energy), which imposes a legitimate question: "What kind of traffic we have in cities and how it can be affected?"

Road traffic is one of the most important sources of air pollution. Liberation of carbon dioxide (CO<sub>2</sub>) from vehicle exhaust gases, leading to gradual global warming (causing so called greenhouse effect, formations of acid rain, damages to the upper layers of the atmosphere and other effects). Requirements to improve the quality of life health is tightened, so in that sense, and at the level of the UN, agreed the Kyoto Protocol to the UN Framework Convention on Climate Change. The Protocol is an international agreement on climate change and opened for signature on 11 December 1997, with the aim of reducing emissions of carbon dioxide and other greenhouse gases.

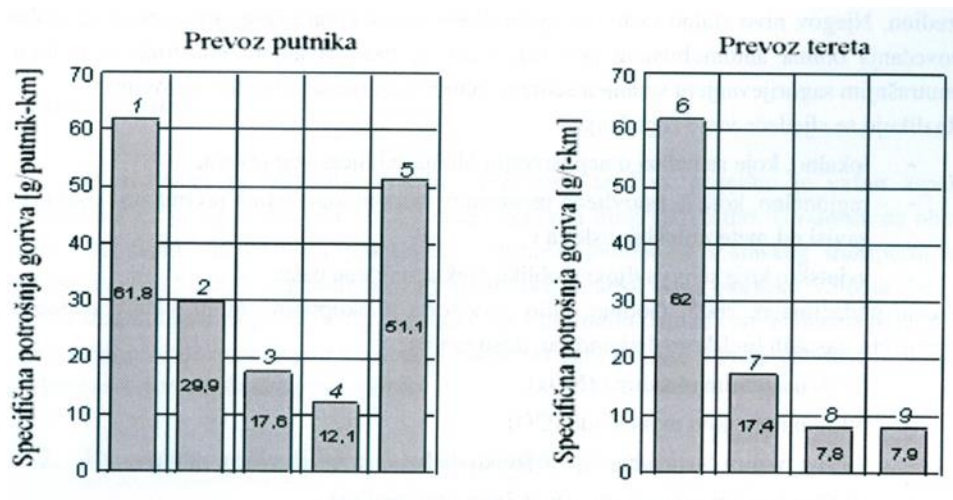
Expert estimations are that by 2050 more than 6.2 billion people will live in cities. (About 2/3 of the world population, which will then be around 9 billion). Urban population is increasing by about 50 million every year. Cities are getting bigger, the demands for urban transport, which should support the mobility of people and goods in cities, proportionally increase, and therefore the pollution of the environment by JGP.

## 1. Requests to various modes of transport

Transport activity, regardless of whether it is a passenger car, public transport or logistics, requires adequate resources, such as land, matter and energy, and thereby produces unwanted side effects: air pollution, noise and suffering in traffic accidents.

### 1.1. Energy needs

According to the specific energy consumption, rail transport for the same power consumption as well as other means of transport can carry out the largest volume transport.



*Figure 1. Specific energy consumption to different means of transport: 1. Passenger car in the city, 2. passenger car on Highway 3. Conventional intercity train, 4.high-speed train - TGV 5. Flights 6. Conventional cargo truck, 7.large capacity trucks, 8.marshroute train, 9. River goods transport*

Figure 1 shows that the energy efficiency of rail transport is 2 to 3 times higher than the car. Rail transport is the best alternative to other modes of transport from the standpoint of environmental protection by energy consumption.

## **1.2. Engaging of surface area**

In terms of taking the necessary surface area for rail transport infrastructure needs to be considerably less land than road transport. The smaller the width of the surface area occupied by the rail track, is essential with complex terrain, and is particularly important in urban areas. Width 2-tracks of track light railway system to curb the 7.15 (m). The total width with a safety space of  $2 \times 0.7$  (m), is 7.75 (m). The necessary traffic areas, for the same volume of transport, with passenger cars are 42 to 48 times higher than rail systems for mass transport of passengers, which can result in energy savings of 18 to 32 times and achieves higher transport speeds 2.5 to 4 times, especially in the inner city area.

## **1.3. Environmental pollution**

The pollution of the atmosphere is the basic form of the negative impact of transport on the environment. Its level is constantly increasing, due to the constant increase in automobile transport, although the advanced training of junior structures the internal combustion engine reduced content of harmful substances in exhaust gases.

There are the following types of pollution:

- Local - located in the immediate vicinity of its source;
- Regional - which is dependent on spatial distribution of harmful products and partly depends on meteorological conditions, and
- Universal - which appears in the form of effects of greenhouse gases.

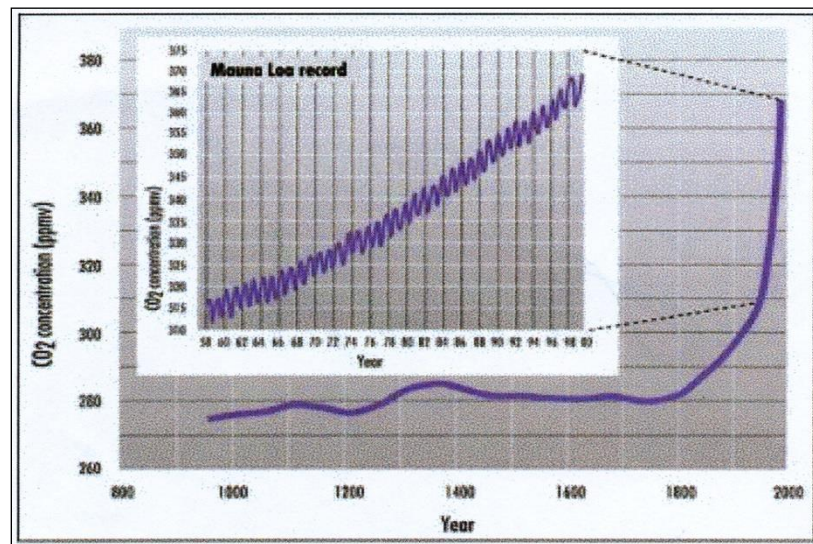
Based on data from 2005, the share of transport in the total volume of pollutants in the atmosphere caused by human activity, has reached:

- 63% in nitrogen oxides (NO<sub>x</sub>).
- 59% of the carbon monoxide (CO),
- 45% of the hard particles, which is dangerous to health demonstrated
- 42% in airborne organic non-metallic compounds,
- 39% in carbon dioxide (CO<sub>2</sub>), which is a major cause of greenhouse effect gases.

Within the transport sector, the share of rail transport in the harmful substances is 0.1 to 0.8% and automotive 94 to 99%. From here it is clear the importance of using different modes of transport in order to environmental factors.

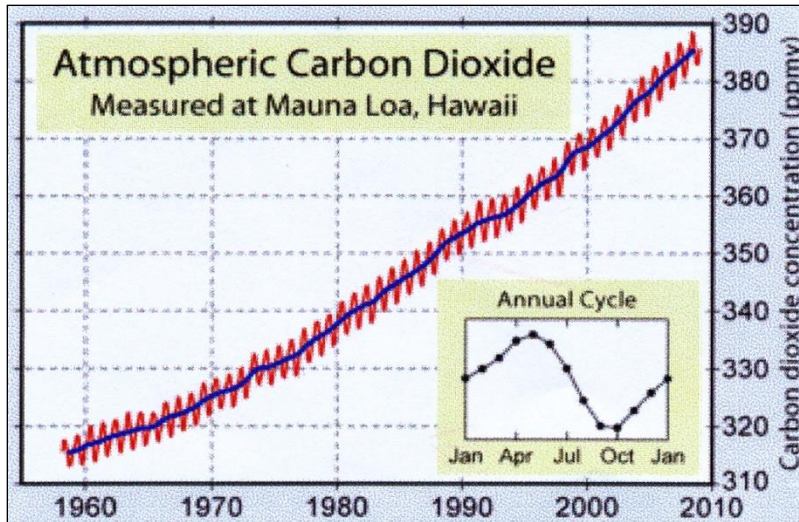
Environmental advantages of rail transport can be seen through:

- Widespread use of electric traction, which does not generate local air pollution,
- 30% of the electricity that is needed for traction, used for environmental clean sources: hydroelectric and nuclear power plants.



Source: [www.bom.gov.au](http://www.bom.gov.au)

*Figure 2. Change in the concentration of CO2 in the atmosphere over the last thousand years*



Source: [www.bom.gov.au](http://www.bom.gov.au)

*Figure 3. The sharp rise in CO<sub>2</sub> concentration is visible in the second half of the twentieth century*

Vehicle for transport	The needs of energy (MJ / pkm)	The specific amount of CO <sub>2</sub> emitted (g / km)
Suburban diesel train	0,78	59,6
Suburban electric train	0,85	47,7
Metropolitan	1,1	61,6
Light rail system	1,0	56,2
Articulated bus	1,17	89,4
High capacity bus	1,06	80,8
City bus	1,37	104,3
Intercity bus	0,96	74,5

*Table 1. The quantities emitted carbon dioxide (CO<sub>2</sub>)*

For passenger cars in the budget to take a CO<sub>2</sub> figure of 278 (g/pkm) in the 210 (g/passenger-kilometers) outside the city. This means that the increase in the share of rail transport in public transport contributes to the solution of energy and environmental problems.

#### 1.4. Safety

When considering various impacts on the environment in particular a safety is an important aspect in the transport. In relation to the volume of transport for each transport mode indicators mortality air and rail transport are approximately the same (0.25 and 0.18 killed per 1 billion passenger / km). This is about 75 times less than in the automotive transport (15 dead at 1 billion passenger / km). Effective policies in the field of security shall be considered as an important factor of keeping policy of public transport, which gives priority to the development of rail transport.

## 2. Impact of urban passenger transport vehicles and passenger cars on the environment

The main air pollutants, emitted by motor vehicles are carbon monoxide (CO), nitrogen oxide (NO<sub>x</sub>), various uncombusted hydrocarbons (C<sub>x</sub>H<sub>y</sub>), sulfur dioxide (SO<sub>2</sub>) and particulate matter (soot). In addition, the motor vehicles and broadcast a series of highly toxic components: benzene, formaldehyde, polycyclic aromatic hydrocarbons, lead, whose emissions associated with fuel quality and additives in the fuel. The level of emissions of basic pollutants is given in the following table:

Type of engine	CO(g/kWh)	C <sub>x</sub> H <sub>y</sub> (g/kWh)	NO <sub>x</sub> (g/kWh)
Otto engine	35,0	3,0	27,0
Diesel engine	4,0	1,1	7,0
Contemporary diesel engine	2,1	0,66	5,0
Engine on gas	1,0	0,15	2,15

**Table 2. The level of emissions of air pollution from vehicles with IC engines**

With assumption that the bus public transport has an average of 120 (kW) and the average occupancy rate of 40 (%), while passenger car (with OTTO engine) has an average of 55 kW, with an average of 1.5 passengers, receives the weight of emission of harmful substances is shown in the following table:

	CO (g/kWh)	C <sub>x</sub> H <sub>y</sub> (g/kWh)	NO <sub>x</sub> (g/kWh)
<b>Passenger car (Otto engine)</b>	<b>815</b>	<b>70</b>	<b>630</b>
<b>Bus (Diesel engine)</b>	<b>12</b>	<b>3,3</b>	<b>21</b>
<b>Engagement: passenger car / bus</b>	<b>68</b>	<b>21</b>	<b>30</b>

**Table 3. Comparison value relationship of noxious burning two vehicles with different types of IC engines and fuels**

From the table it can be seen that the ratio of pollutant combustion in cars and buses is very unfavorable for the individual vehicle traffic. This relationship would be more favorable for the benefit of the bus, which would use engines with natural gas. As in most cities, part of the transport needs of the population and carry out electric vehicles of public transport, and that in the future their role increase, directing public transport to public transport will significantly contribute to reduction of pollution of urban areas.

The noise caused by the movement of vehicles in the city, also leads to psychological and physiological disorders residents. Certain types of vehicles emitting noise following:

	<b>dB (A) middle value</b>	<b>dB (A) border</b>
<b>Passenger vehicle (1100 cc)</b>	<b>70</b>	<b>67-75</b>
<b>Passenger vehicle over 1600 (ccm)</b>	<b>72</b>	<b>68-77</b>
<b>Delivery Van</b>	<b>73</b>	<b>69-77</b>
<b>Trucks &amp; Buses</b>	<b>81</b>	<b>76-86</b>

<b>Motorcycle</b>	<b>77</b>	<b>72-86</b>
<b>Tram-old construction</b>	<b>81</b>	<b>76-86</b>
<b>Tram-new construction</b>	<b>75</b>	<b>73-77</b>
<b>Subway</b>	<b>75</b>	<b>73-77</b>

**Table 4. Types of vehicles and noise emissions**

The table above shows that a truck or bus is developing, under certain conditions, public transport, just as much noise as 10 passenger cars and passenger car causes typically 10 dB (A) less noise than a truck or bus. However, it is necessary to make a certain difference between the trucks and buses, because buses rule quieter. Compared with the passenger car, should bear in mind that the bus in their capacity, or the number of passengers transported, replaces 30-40 cars, which he in general traffic gives a relative advantage compared to passenger cars, but it certainly does not exclude the need to the noise generated by the bus is reduced to a tolerable measure.

Particular progress has realized an in modern construction trams, for which the appropriate solution of the main sources of noise (reducer, compressor, vibration of rotating masses, etc.) is reduced to a minimum.

### **3. Contingent measures to reduce the negative impact of public passenger transport on the environment**

To be able to define measures that will contribute to reducing pollutant emissions by the transport sector, it is necessary to observe the parameters on which it is possible to act. In addition to transportation management capabilities, in terms of limiting the use of certain categories of motor vehicles in narrow city centers and generally better organization, there are technical and technological resources which would enable the application of a substantial reduction in the emission of pollutants.

As control parameters that allow to define the measures for reducing emissions of pollutants wrecks are:

- Emissions in the exhaust gases;
- The composition of the fuel;
- Emissions of evaporation;
- Improving the efficiency of fuel use;



- The use of alternative fuels;
- Transportation Management.

Targeted action on specific control parameters were the introduction of more stringent legal regulations regarding the emission of pollutants, either stimulating economic measures, seeks to reduce polluting the environment.

In Bosnia and Herzegovina the first step in the prevention of environmental pollution by motor vehicles should be reflected in the gradual tightening of legal regulations.

Due to the large number of technical and technological innovations in the field of automotive industry in recent years imposed by the ongoing training of existing and future professionals in the field of transport, which will form the basis for improvement in terms of solving the problems of environmental protection and transport sector in general.

In terms of protection measures, there are three principles that can be applied to the reduction of air pollution and which can be combined in different ways:

- Reduction of content pollution from vehicles by:
  - Clean the exhaust (NO<sub>2</sub> and CO<sub>2</sub>)
  - The use of "pure" types of vehicles in sensitive areas
- Reducing the volume of traffic through the lateral prediction of traffic:
  - General reduction in traffic
  - Limits for heavy traffic (diesel vehicles)
- Traffic control in sensitive areas through:
  - Holding of heavy traffic outside urban areas
  - Inking of traffic in urban areas.

In front of the motor vehicle, are set stringent requirements in terms of fuel consumption, CO<sub>2</sub> emissions, and emissions of so-called conventional pollutants (CO, C<sub>x</sub>H<sub>y</sub>, NO<sub>x</sub> and particulates). Although the limits of conventional pollutants to the trucks from the beginning of their introduction reduced to individual components of more than 90%, provided for their further reduction of about 50% compared with the current European limit values (EURO III) to 2025 (Euro IV) . At the same time in the United States / California introduced the so-called. SULEV (Super Low Emission Vehicle) limit values are again less than anticipated value of EURO IV and more than 50%. However, in the future, the real challenge for designers of motor vehicles will be the reduction of CO<sub>2</sub>, since this show, when applying fuel in its nited contain carbon, is directly dependent on fuel consumption. In addition to the voluntary undertaking in terms of efforts to reduce CO<sub>2</sub> emissions by producers and associations of producers of motor vehicles, in the context of Europe had set targets for CO<sub>2</sub> limits, within Europe had set targets for emission limit values of CO<sub>2</sub> from passenger cars and to 120 g / km for 2014.

The main groups of measures to protect the environment from the effects of road transport are as follows:

1. ECONOMIC MEASURES - such as taxes, fees than for roads, taxation of private cars by introducing special taxes on parking, tax cuts for the use of "clean" fuels, etc.
2. SUCH PROTECTIVE MEASURES THAT AFFECT THE FREQUENCY AND MODE OF TRANSPORT - such as limiting the use of land, improving public transport, limiting parking spaces, efficient localization of housing and jobs properly locate shopping centers, etc.
3. MEASURES THAT REDIRECT ROAD TRANSPORT - such as road bypass, the construction of the tunnel as a bypass, limitation freight traffic in certain zones and so on.
4. PROTECTION MEASURES OR IMPROVEMENT MEASURES - such as the prevention of noise or air purification in the tunnel, planting trees alongside the roads and so on.
5. MEASURES RELATING TO VEHICLE - such as requirements for noise emissions and emissions from vehicles.

The largest source of noise in the community is traffic, or vehicles with internal combustion engines. Based on the results of the measurements can be in order to reduce the noise level to implement activities in the following directions:

1. Offset heavy and cargo, especially transit traffic, the roads outside densely populated urban core.
2. Switch off the noisy and dilapidated vehicles with the purchase and production of transport vehicles, which emit the lowest possible noise, carry out the modernization of the tram traction and electrification of public transport in general.
3. Application of new, modern coating on major roads to eliminate potholes and amortization of sound waves. You should anticipate a break with the hard surfaces to prevent transmission of vibrations from the road to the surrounding buildings, and maximum separation of pedestrian from road transport.
4. When planning new streets provide sufficient breadth thereof, as well as trees with broad leaves in two rows, in order to separate the road from the building. Raising the green zone should strive in all settlements, but insist that a busy and noisy street with a slope into a one-way, and so one way direction of the vehicle is from top to bottom.

The noise of variable intensity that occurs at intersections, when driving vehicles or their stops, adversely affects the nervous system of humans and must be eliminated by synchronizing traffic

lights on longer travel strokes. This is especially noticeable during evening hours so all efforts reduce the congestion of urban communication, emphasizing the use of public means of transport, have beneficial effects on the reduction of noise, taking into account the number of passengers carried on a bus or tram.

It is necessary to periodically make measurements of emissions of pollutants and combustion noise levels, analyze the obtained data, compared with the defined standards and values measured in the previous period and take appropriate actions to improve the situation.

## CONCLUSION

The experience of the company for public transport and local government cities of the EU, related to sustainable development are the roadmap to finding a solution that will make the system of public passenger transport in Sarajevo as a promoter of sustainable development of the city. The ultimate goal is to connect Sarajevo to "green" map of Europe.

Current situation in which the economy of Europe, particularly the poor state of BiH, should not create pessimism regarding the large financial needs of investments in the system of public transport. Supply and introduction into service of buses with environmentally "clean" IC engines should be gradually with the trend accelerating dynamics of purchasing new buses to replace buses with engines on conventional fuels. Raising awareness about environmentally "clean" the city's public transport, the harmonization of national standards and regulations with the EU, purchase environmentally "clean" buses, with the aim of reducing emissions of pollutants combustion, should be an imperative and an integral part of strategic plans to the public-transportation companies in Sarajevo , the Ministry of transport and communication of Sarajevo Canton, as well as other organs of local government and municipal and city authorities.

As the urban city neighborhoods and cities part of transport needs of citizens meets trams and trolleybuses, which use electricity to drive, it is necessary to pay attention to their share in the total number of means of transport in the future increase.

Special attention should be given to the encouragement of citizens (speed transport services, cost of transportation, etc.) To use the means of transportation of public transport instead of their cars, which would significantly contribute to the reduction of air pollution from emissions of pollutant combustion, reducing noise emission and load shedding roads or reducing traffic congestion.

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# ASUC Boro Petruševski - Skopje

## Makedonija

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### **OBRAZOVNIOT SISTEM VO MAKEDONIJA I ZNAČENJETO NA STRUČNOTO OBRAZOVANIE**

**Abstrakt:** Obrazovniot sistem vo Republika Makedonija gi odrazuva potrebite na opštествoto za obrazovanie, nauka, kako i ulogata na obrazovaniето i naukata za ekonomski, socijalni, tehnološki i kulturen razvoj na opštествoto vo celina. Stručnoto obrazovanie i obuka, poslednive godini zavzema značajno mesto vo R.M., osobeno vo delot na prisposoblivosta na onie koi gi zagubile svoite rabotni mesta vo uslovi na namaluvanje na javnoto i privatno finansiranje, kako i mogućnosta za obezbeduvanje na dovolno kompetencii i sposobnost za mobilnost vo rabota i učenje na onie mladi lugje i vozrasni , koi se, ili ke bidat vo procesot na obrazovanie i obuka. Do koj stepen može VET da ja ispolni svojata nova uloga, zavisi prvenstveno od obrazovnite politiki, od posvetenosta i kapacitetite na onie koi ja primenuvaat, najdobrite možni rešenija i na sposobnosta za efikasno iskoristuvanje na resursite i kapacitetite na raspolaganje na zemjata.

**Ključni zborovi:** obrazoven sistem, stručno obrazovanie, reformi, praktična obuka, post-sredno obrazovanie

## **Voved**

### **► OBRAZOVEN SISTEM VO R. MAKEDONIJA**

Obrazovniot system vo R. Makedonija se состоi od tri podsistemi:

Osnovno obrazovanie, koe e vo traenje od 9 godini, besplatno i zadolžitelno za site deca na voзраст od 6 do 15 godini, bez ogled na pol, religija i nacionalnost. Aktivnostite na osnovното obrazovanie se definirani i regulirani so Zakonot za osnovno obrazovanie i so Konceptijata za devetgodišno obrazovanie.

Sredno obrazovanie: opšto sredno obrazovanie (gimnazija), vo traenje od cetiri godini i stručno obrazovanie (stručni učilišta) i vremenitoe traenje od 2,3, ili 4 godini. Sredното obrazovanie e zadolžitelno i se состоi od site deca vo grupa na voзраст od 15 do 19 godini. Sredното obrazovanie e besplatno vo javnite sredni učilišta. Učenicite, isto taka, imaat zakonska možnost da se zapišat vo privatni sredni učilista. Sredното obrazovanie se vrši vo 99 javni (10 državni učilišta, 21 učilista na Grad Skopje i 68 opstinski učilista) i 13 privatni učilišta.

Visoko obrazovanie: sproveduva dodiplomski, magisterski i doktorski studii vo visokoobrazovnite institucii i institute koi se samostojni i nezavisni. Postojat 5 državni univerziteti i 14 privatni univerziteti vo R.Makedonija. Ovie aktivnosti se definirani i regulirani so Zakonoto za visoko obrazovanie.

Obrazovniot system isto taka gi vklučuva decata so posebni potrebi koi se zapisani vo učilistata so posebno obrazovanie ili vo ramkite na redovniot nastaven proces vo zavisnost od opciite na učenicite i nivnite roditeli. Postojat posebni nastavni planovi za ovie učilista. So donesuvanje na Zakonot za decentralizacija, osnovnite i srednite učilista stanaa nadležnost na opstinitite. Poseben prioritet na R.Makedonija e obrazovaniето za voзрастni, aktivnost koja e regulirana so Zakonot za obrazovanie na voзрастni i Zakonot za stručno obrazovanie.

Sistemot za obrazovanie za voзрастni e promoviran od strana na Centarot za obrazovanie za voзрастni, institucija formirana od strana na vladata, so cel da se dade pridones preku obrazovaniето za voзрастni za ostvaruvanje na socioekonomskite potrebi na Makedonija, za da se zadovolat potrebite na pazarot na trud i da im pomogne na pojedinci vo nivniot licen razvoj.

Obrazovaniето i kvalifikaciите vo oblata na stručното obrazovanie i obuka se steknati preku stručni vestini (steknuvanje na stručni vestini nisko nivo), sredno stručno obrazovanie so 3 ili 4 godini traenje, post – sredno stručno obrazovanie (stručno obrazovanie i majstorski ispit) i visoko stručno obrazovanie (javni i privatni visoki stručni skoli i programi za stručni univerziteti koi ne se del od akademskite programi.)

Staziranje e vkluceno vo nastavnite programi, i e del od aktivnite merki za trud na nacionalno i lokalno nivo. Staziranje, glavno e fokusirano na studentite i nevrabotente, a programite za staziranje im ovozmozua na rabotodavcite da identifikuvaat soodveten personal vo idnina. Zatoa nacionalnite i razvojni programi, nasoceni kon ova prasanje, vklucuvaaat pottiknuvanje na ovoj process.

## ► **REFORMI**

Vo poslednive dve decenii, golem broj na intervencii i reformski aktivnosti bea sprovedeni vo srednoto strucno obrazovanie vo R.Makedonija., so slednive karakteristiki.

► Naporite za zajaknuvanje na zakonodavnata sredina vo srednoto strucno obrazovanie

► Promeni vo strukturata na strucnoto obrazovanie i obuka preku:

- Zgolemuvanje na vremetraenje na zadolzitelnoto obrazovanie preku voveduvanje na zadolzitelnost na sredno obrazovanie,

- Voveduvanje na studiskite programi so razlicno vremetraenje I na razlicni nivoa na kvalifikacii,

- Vospostavuvanje na obrazovaniето na vozrasni kako sostaven element na sevkupniот sistem obrazovanie,

- Dopolnuvanje na mrezata na javnite ustanovi so privatni institucii,

► Voveduvanje na drzavna matura i eksterno ocenuvanje,

► Definiranje na Nacionalnata ramka na kvalifikacii,

► Podobruvanje vo rabotata na razvoj na novi standardi na zanimanja, kvalifikacii I revidirani nastavni programi za odredeni profile, glavno vo 2 I 3 godisno strucno obrazovanie i obuka,

► Pocetokot na decentralizacijata vo upravuvanjeto i rakovodenjeto i prenesuvanjeto na nadleznostite i odgovornostite od centralno na lokalno nivo,

► Promeni vo sistemot za finansiranje,

► Odredeni podobruvanja na opremata i fizicki objekti vo srednite ucilista,

► Obidi da se zajakne socijalnoto partnerstvo so potpisuvanje na konkretni memorandum megju dvete ministerstva i profesionalni tela odgovorni za strucnoto obrazovanie i obuka i komori, kako i megju oddelni ucilista I kompanii,

► Zajaknuvanje na institucionalnite kapacitete za poddrzka na strucnoto obrazovanie I obuka (vospostavuvanje na strucno obrazovanie i obuka na Sovetot I Centarot, i.t.n.)

► Inicijativi za modernizacija na instituciiе za strucno obrazovanie,

► Inovacii vo nastavnite programi (promena na celi, voveduvanje na novi predmeti, interdisciplinaren pristap i prilagoduvanje na nastavnite programi na potrebite na

klientite i sl.),

- ▶ Obuka na nastavnici od srednitate ucilista,
- ▶ Sozadavnje na inkluzivni ucilista,
- ▶ Napori za aktivno vklucuvanje na zasegnatite strani vo razvoj i procesite na donesuvanje na odluki,
- ▶ Vlea na privaten capital vo strucnoto obrazovanie i obuka,
- ▶ Orientacija kon efikasni politiki za obrazovanie

## **PRAKTIČNA OBUKA**

Prakticnata nastava e osnoven fundament na srednoto strucno obrazovanie, pa ottuka kvalitetot na srednoto strucno obrazovanie zavisi od kvalitetot na prakticnata nastava. Najgolem napredok vo oblata na strucnoto obrazovanie e postignat vo 3 godisnoto obrazovanie, pri sto pogolem akcent e staven na prakticnata obuka. Najgolemata pridobivka se gleda vo prisustvoto na prakticnata obuka, koja bese zastapena so okolu 17 % vo poslednive 3 godini na obrazovanie, a sega toa e od 30% do 50%, vo zavisnost od profesijata i obrazovnata pozadina. Vrz osnova na "Metodologijata za izrabotka na standardni zanimanja" (2009), razvieni se 51 standardi za zanimanja vo 13 profesionalni oblasti. Ravojot na standardi na zanimanja se bazira na principot na socijalen dijalog so vklucuvanje na site klucni partneri na nacionalno nivo vo definiranje na soдрzinata na zanimanja i kvalifikaciji, nivnata slozenost, i na potrebite na pazarot na trudot vo narednite godini.

Poradi faktot sto od prethodnite analizi moze da se sogleda deka dolgo vreme se soocuvavme so nekvalitetno zastareno 3 godisno obrazovanie, od osobeno znacenje se reformate koi se sprovedoa poslednive nekolku godini vo nasata zemja. Implementacijata na novite reformski priodi seuste e aktuelna i seuste se adaptira na uslovite vo naseto obrazovanie i naseto stopanstvo. Poradi toa sto 3 godisnoto obrazovanie e najvazno zanaetcisko obrazovanie, zatoa od ogromno znacenje se analizite koi se vodat za kvalitetot na nastavata, programata, kadarot, uslovite za prakticna rabota i moznostite za nejjino usovrsuvanje. Konkretno vo ASUC Boro Petrusevski, vo reformiraniot profil – avtomehanicar, procentot na prakticna nastava se zgolemi na 40%, od koi 1/3 se realizira vo kompanii. Vo ovoj obrazoven profil ima novina vo odnos na polaganjeto na završniot ispit, koj se bazira na nova ispitna prigrama spored koja se proveruvaat strucnitate i klucnitate kompetencii postignati i steknati pri realizacija na nastavnite programi i prakticnata rabota kaj rabotodavecot. Isto taka edna od novinite e izmenata vo ispitnata komisija za prakticniot del, koja e sostavena od pretstavnik od redot na socijalnite partneri na ucilisteto, sto voedno pridonesuva



steknatite vestini i znaenja, učenice da mozat da gi potvrdat i pred svoje rabotodavaci. So ova sorabotkata na ucilisteto i socijalnite partneri se podiga na povisoko nivo, bidejki socijalnite partneri na ovoj nacin ke imaat uvid vo kvalitetot koj ke se nudi na pazarot na trud, a istovremeno ke mozat da se sogledaat nedostatocite koi se pojavuvaat vo obrazovniot process i koi vo idnina bi trebalo da se korigiraat.

Sostojbata na sorabotka so socijalnite partneri i socijalniot dijalog, iako podobreni, seuste ne se na soodvetno nivo. Iako vo zemjata na socijalne plan se oformija konturite na trite socijalni partneri: pretstavnice na rabotnicite, pretstavnici na rabotodavacite I na drzavata, odnosno Vladata so svoje institucii i organi – kako represent na posirokote opstetveni interesi, sepak debatite na tema kontinuirano strucno obrazovanie vo kontekst na dozivotno ucenje, doprva zapocnuvaat.

## **POST – SREDNO OBRAZOVANIE**

Od golema vaznost se trite koncepcii koi se doneseni od strana na CSOO I MON, i toa koncepcija za post-sredno obrazovanie, koncepcija za strucno osposobuvanje I koncepcija za strucno obrazovanie na zanimanja, kako vazni dokumenti koi pretstavuvaat opsta ramka I pojdvna osnova za modernizacija na strucnoto obrazovanie.

Potrebata od post-sredno obrazovanie, ja nalozija novite opstestveno – ekonomski odnosi, brziot tehnicko – yehnoloski razvoj, se pogolemata pobaruvačka na visoko kvalifikuvana rabotna sila i process na globalizacija, i.t.n.

Post – srednoto obrazovanie, ovozmozuva steknuvanje na kvalifikaciji koi se naogjaat vo prostorot megju srednoto strucno i visokoto obrazovanie, prodlaboceni znaenja, vestini i kompetencii relevantni za pazarot na trudot i obezbeduva moznosti za napreduvanje vo natamosnoto obrazovanie, posebno vo visokoto strucno obrazovanie.

Post-serdnoto obrazovanie e nameneto za kandidati zainteresirani za ucenje I dousovrsvanje koi mozat da se grupiraat kako:

- **Kandidati so soodvetno obrazovanie i soodvetno rabotno iskustvo**

Vo ovaa grupa spagjaat:

- Kandidati so zavrseeno sredno strucno obrazovanie vo traenje od 4 godini, koi imaat soodvetno rabotno iskustvo od 2 godini
- Kandidati so zavrseeno sredno struco obrazovanie od 3 godini, koi imaat soodvetno rabotno iskustvo od 3 godini

- Kandidati so završeno gimnazisko I stručno gimnazisko obrazovanje, koi imaat soodvetno rabotno iskustvo od 3 godini i
- Kandidati so završeno sredno umetnicko obrazovanje, koi imaat soodvetno rabotno iskustvo od 3 godini.

- **Kandidati so soodvetno obrazovanje za kontinuirano post-sredno obrazovanje**

Vo ova grupa spagjaat kandidati so završeno sredno stručno obrazovanje vo traenje od 4 godini, koi sakaat svoeto obrazovanje da go prodolzat na post-sredno obrazovanje vrz osnova na kontinuirani programi, vednas po završuvanjeto na srednoto stručno obrazovanje vo traenje od 4 godini.

- **Kandidati koi imaat soodvetno obrazovanje i nesoodvetno rabotno iskustvo ili voopto nemaat rabotno iskustvo**

Ovie kandidati, za da steknat uslov za vlez vo post-srednoto obrazovanje, treba prethodno da sovladaat modul na znaenja I vestini, so sto ke se kompenzira nedostatokot na soodvetno rabotno iskustvo.

### ***Tipovi na post sredno - obrazovanje***

Spored specificnosta na zanimanjata na koi se odnesuva, potrebnoto prethodno obrazovanje i rabotno iskustvo, kako i nacinot na samoto steknuvanje, post-srednoto obrazovanje se kategorizira vo slednive tipovi:

- Tehnoloska specijalizacija;
- Nadzornicka specijalizacija;
- Instruktorska specijalizacija;
- Specijalizacija za avtonomni profili;
- Majstorstvo i
- Obuka za steknuvanje na del od integralna kvalifikacija ili steknuvanje na parcijalni kompetencii.

***Tehnoloskata specijalizacija*** e post-sredno obrazovanje koe podgotvuva kadri za operiranje so kompleksni tehnoloski procesi, postrojki, masini, aparati I uredi ili mobilni operativni sredstva. Taa se odnesuva na zanimanja koi baraat poslozeni kompetencii od onie opfateni vo obrazovniot profil sto go steknale vo srednoto stručno obrazovanje..

***Nadzornickata specijalizacija*** podgotvuva kadri za neposredno rakovodenje so izvršitelite vo operativnoto rabotenje (proizvodstvo i uslugi) I za koja vo podelbata na rabotata se potrebni kompetencii za vrsenje na funkcijata liniski menadzment

(predrabortnici, nadzornici, sefovi, kontrolori i sl.) . Toa znaci, neposredno rakovodenje so izvsitelite na rabotata koi imaat sredno ili ponisko nivo na obrazovanie.

**Instruktorska specijalizacija** e slicen tip so nadzornickata, no namesto na menadzerskite se odnesuva na steknuvanje na obucuvackite kompetencii za obuka na zanimanjata od svojot prethoden obrazoven profil. Svojata rabota, ovoj tip na kadri so post-sredno obrazovanie, ja vrsat kako instruktori vo ucilistata za sredno strucno obrazovanie i razni drustva i zdruzenija ili kako interni obucuvaci vo firmite za obuka na rabotno mesto na novi, nekvalifikuvani rabotnici, prekvalifikacija na postojni rabotnici ili mentorstvo na novoprimenite kadri za serdno obrazovanie.

**Specijalizacijata za avtonomnite profili od post-serdno obrazovanie** se odnesuva na zanimanjata koi pretpostavuvaat posiroko opsto obrazovanie I konkretni rabotni kompetencii. Ovoj tip na post-sredno obrazovanie, ovozmozuva na onie ucenici koi završile gimnazisko obrazovanie, a ne prodolzile na fakultet, da go prodolzat, ane se strucno osposobeni za rabota. Poradi toa treba d aim se dade moznost svoeto obrazovanie da go steknat so opredelno zanimanje, koe ke im ovozmozi vklucuvanje na pazarot na trudot.

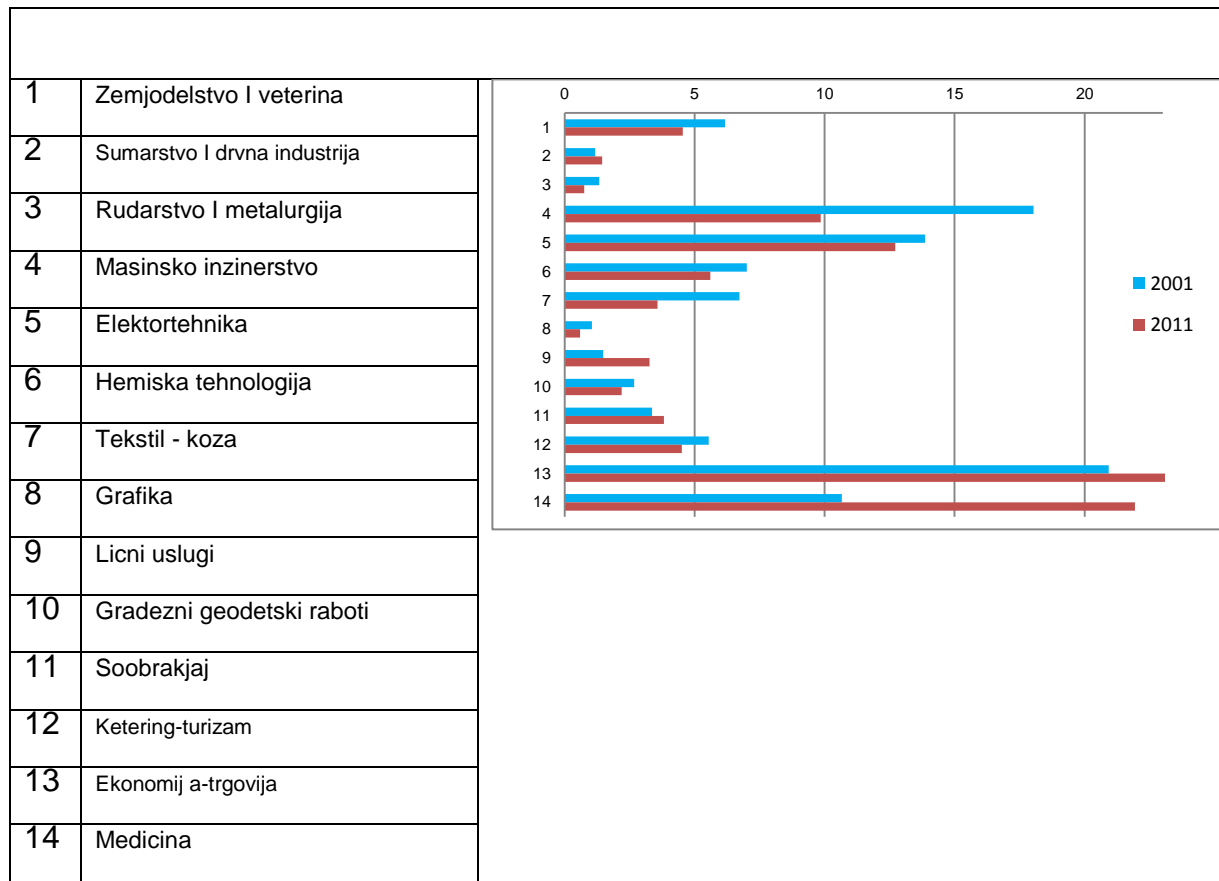
Obrazovnite profili na ovoj tip na post sredno obrazovanie, moze da bidat: deloven sekretar, tehnicki sekretar, bibliotekar, operater na informaticki sistemi, administrator vo razlicni dejnosti, arhivar vo razlicni dejnosti i sl.

**Majstorstvo** pretstavuva poseben vid post-sredno strucno obrazovanie. Za steknuvanje na zvanjeto – majstor, potrebno e uspesno završuvanje na majstorski ispit za odredena zanaetciska dejnost i moznost za samostojno vodenje na zanetciski dukjan i obucuvanje na ucenici i vozrasni..

**Obukata za steknuvanje na del od integralanata kvalifikacija ili steknuvanje na parcijalni kompetencii** e nameneta za onie kandidati koi sakaat da se dousovršat vo konkretna kvalifikacija I se obucuvaat vo ramkite na eden ili povekje moduli od konkretnata programa. Na kandidatite koi steknale sertifikat za vakvi kompetencii, pri vklucuvanje vo procesot na integralana kvalifikacija im se priznavaat sovladanite moduli od programata.

## ► INTERES ZA SOODVETNITE STRUKI

Od tabelata podolu, moze da se sogleda kako se dvizi interest za soodvetnite struki vo periodot od 2001 – 2011 god.



## ► MEGJUNARODNA SORABOTKA

Isto taka, od golemo znacenje vo procesot na ponatamosno revidiranje na trigodisnoto strucno obrazovanie, kako fundamentalen factor za vklopuvanje na nasite ucenici I vo evropskiot Pazar na trud, e megjunarodnata sorabotka. Vo poslednive nekolku godini, postojat moznosti za apliciranje za grant, za profesionalno usovrsuvanje na ucenici I nastavnici vo soodvetni institucii vo zemjite od EU. Imeno, strucnite zanimanja, avtomehanicar i avtotehnicar-mehatronicar bea nasiot focus I kreiravme nekolku proekti koi opfakjaa nastavnici I ucenici I novna prakticna obuka vo nekolku evropski drzavi kako sto se Svedska, Estonija, Litvanija, Spanija. Vo ovie drzavi ima visoko razvieni sistemi za prakticna obuka na ovoj obrazoven profil kako mnogu potreben na pazarot na trudot.

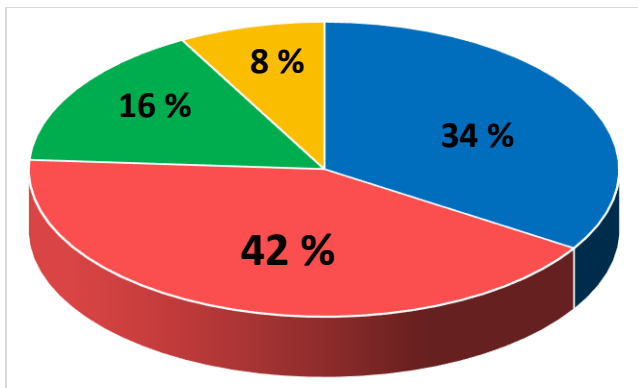
Od golemo znacenje e toa sto ucenicite imaa moznost direktno da se vklucat vo rabotniot process, da se zdojijiat so novi vestini vo ramkite na nivnata oblast, da

rakuvaat so mnogu posovremena oprema, da realiziraat dijagnostika na mehatronski sistemi kaj najsovremenite motorni vozila. Kako izlezni rezultati od realizacijata na ovie proekt se: steknuvanjeto na strucni kompetencii, vestini i znaenja, pottiknuvanje na interest kon steknuvanje na novi znaenja, rakuvanje so sovremena oprema i alat, usovrsuvanje vo procesot na odnesuvanje na rabotno mesto i zivotnata sredina, organizacija na rabota, timska rabota, rabota pod pritisok i sl. Pridobivkata e ogromna, bidejki ucenicite po zavrshvanjeto na mobilnosta, svoje iskustva gi disiminira vo svojata rabotna sredina i indirektno gi nametnaa potrebite od reformi vo strucnoto obrazovanie.

Steknatite strucni kompetencii i vestini ovozmozija ovie ucenici mnogu uspesno da se vklopate vo servise i pretprijatijata vo Makedonija, kade ja pokazaa svojata strucnost i sigurnost vo ona sto go rabotate, vednas bea vraboteni sirum Republikava, a neкои od niv najdoa odlicna rabota vo stranstvo. Od pogore iznesenovo sosema e ocigledno kolku megjunarodnata sorabotka e znacajna i kolku mnogu pridonese vo poletu na avtomehankata, ednostavno ovozmozuva obrazovanie po evropski standari i moznost za mobilnost pri vrabotuvanje, ne samo na nasiot tuku i na evropskiot Pazar na trud.

Isto taka i pridobivkite od iskustvata koi gi steknaa nastavnicite se ofromni. Tie gi z bogatija svoje znaenja i svoje pogledi kon profesijata, asvoeto iskustvo go prenesoa vo uzilisteto preku realiziranje na disiminacii i kratki specijalizirani kursevi. So ova sorabotka, pridobivka imaa site strucni nastavnici koi generalno, posle megjunardnoto iskustvo, vo golema mera go unapredija svoeto strucno znaenje, no i odnosot kon rabotata, znacenjeto na timskata rabota i pogolemata inicijativa za sozdavanje na socjalen dijalog vo dejnosta, pottiknati se za sledenje na tehnoloskiot razvoj i implementiranje vo nastavniot process (dozivotno ucenje), se zapoznaa so nastavnite planovi i program po evropski terk, nacinot na vodenje na dokumentacijata i sl. Seto toa vo idnina ke pridonese za pogolema uspesnost i kvalitet vo reformate na strucnoto obrazovanie, bidejki nastavnicite se vsusnost direktni ucesnici vo istite.

Vo intervjuoto so vklucenite 12 nastavnici, kade najpovekje go gledaat benefitot od megjunarodnoto iskustvo, odnosno vo sto najmnogu se razlikuva nasata prakticna nastava so evropskata, 4 (34 %) smetaat deka najgolema pridobivka im e toa sto se zapoznale i naucile da rabotate so posovremena oprema za prakticna obuka, 5 (42 %) se voshiteni od profesionalniot odnos kon kontinuiraniot profesionalen odnos vo dejnosta za nastavniot kadar, i samite se pottiknati za sledenje na tehnoloskiot razvoj i implementiranje vo nastavniot process (dozivotno ucenje), 2(16%) se impresionirani od moznosta za fleksibilnost na nastavnata programa, sto im otvori pole za adaptiranje na programata spored moznostite na ucenicite, i 1 (8%) orientiranost kon socijalno partnerstvo, kako moznost za kontinuirano unapreduvanje na prakticnata obuka.



34% - koristenje na moderna oprema

42% - usovrsuvanje na nastavnikot

16% - fleksibilni nastavni programi

8% - pointenzivno socijalno partnerstvo

Ovie proekti ni obezbedija i poseriozen dijalog so povekje socijalni partneri – kompanii, koi ni stanaa ramnopravni partneri recisi vo sekoj segment za unapreduvanje na strucnoto obrazovanje vo R.Makedonija.

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# ASUC Boro Petrushevski - Skopje

## Macedonia

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### **EDUCATIONAL SYSTEM IN MACEDONIA AND IMPORTANCE OF VOCATIONAL EDUCATION**

**Abstract:** *The education system in the country reflect the needs of society for education, science, and the role of education and science of economic, social, technological and cultural development of society.*

*Vocational education and training in recent years, occupies an important place in the Republic of Macedonia, in the process of adaptability of those who lost their jobs in conditions of reduction of public and private financing, and the ability to secure sufficient competencies and mobility working and learning for young people and adults, who are or will be in the process of education and training.*

*To what extent can VET to fulfill its new role, depends primarily on educational policies, the commitment and capacity of those who implement, the best possible solutions and the ability to effectively utilize the resources and capabilities available to the country.*

**Key words:** *educational system, vocational education, practical training, post-secondary education*



## ***Introduction***

### ***EDUCATIONAL SYSTEM IN MACEDONIA***

The education system in the country consists of three sub-systems:

***Primary education***, is a period of nine years, it is free and compulsory for all children aged 6 to 15, regardless of gender, religion and nationality. Activities of primary education is defined and regulated by the Law on Primary Education and the Conception of nine-year primary education.

Secondary education: general secondary education (high school), with duration of four years and VET (vocational schools) with the duration of two, three or four years. Secondary education is mandatory and consists of all children in the age group of 15 to 19 years. Secondary education is free in public schools. Students also have a legal opportunity to enroll in private high schools. Secondary education is conducted in 99 public (10 public schools, 21 schools of the City of Skopje and 68 municipal schools) and 13 private schools.

Higher education: conducts undergraduate, master's and doctoral studies in higher education institutions and institutes which are autonomous and independent. There are five public universities and 14 private universities in the country. These activities are defined and regulated by the Law on Higher Education.

The education system also includes children with disabilities, who are enrolled in schools of special education within the regular education process, depending on the preferences of the students and their parents. There are special curricula for these schools.

By adopting the Law on Decentralization, primary and secondary schools became under the responsibility of municipalities. Special priority of Macedonia is adult education, an activity that is regulated by the Law on Adult Education and Law on Vocational Education.

The system of adult education is promoted by the Center for Adult Education, an institution established by the government, with target to contribute through adult education for achieving socio-economic needs of Macedonia, to meet the needs of the labor market and to help to the individuals in their personal development.

Education and the skills in the field of vocational education and training are acquired through: vocational skills (acquisition of vocational skills low-level), secondary vocational education with 3 or 4 years duration, post-secondary vocational education (vocational education and craftsman exam) and high vocational education (public and private high schools and vocational programs for university studies, which are not the part of the academic programs).

The internship is included in the curriculum, and is a part of active labor measures at national and local level. The internship is mainly focused on the students and the unemployed, and internship programs allows employers to identify suitable staff for the future. Therefore, national and development programs targeting to this issue, include initiative for encourage of this process.

## **REFORMS**

In the last two decades, a number of interventions and reform activities were conducted in secondary vocational education in the country, with the following features:

- ▶ Efforts to strengthen the legislative environment in vocational education
- ▶ Changes in the structure of vocational education and training, through:
  - Increase the duration of compulsory education through the introduction of compulsory secondary education
  - Introduction of study programs with different durations and different levels of qualifications,
  - Establishment of adult education as an integral element of the overall education system
  - Supplementing the network of public institutions with private institutions,
- ▶ Introducing the state exam and external evaluation, ▶ Defining the National Qualifications Framework,
- ▶ Improving the work to develop new occupational standards, qualifications and revised curricula for specific profiles, mainly in two and three-year vocational education and training,
- ▶ Starting of decentralization in management and governance and transferring of competences and responsibilities from central to local level, ▶ Changes in the system of financing,
- ▶ Some improving of the equipment and physical facilities in vocational schools,
- ▶ Efforts to strengthen the social partnership by signing of concrete memoranda between the ministries and professional bodies responsible for vocational education and training and chambers, and between some vocational schools and companies,

- ▶ Strengthening the institutional capacity to support vocational education and training (establishment of vocational education to Training Council and the Centre, the Council for Adult Education and the Centre, etc.)
- ▶ Initiatives to modernize the institutions of vocational education
- ▶ Innovations into curricula (change the goals, introduction of new courses, interdisciplinary approach, and adjust the curriculum to the needs of clients, etc.)▶
- Training of teachers from vocational schools
- ▶ Creation of inclusive schools
- ▶ Efforts for active involvement of stakeholders and the process of decision making,
- ▶ Input of the private capital in vocational education and training
- ▶ Orientation to the effective education policies.

### ***PRACTICAL TRAINING***

The practical training is an essential fundament of vocational education, so the quality of secondary vocational education depends on the quality of practical teaching. The greatest progress in the field of vocational education has been achieved in the three-year education, with much emphasis is placed on practical training.

The greatest benefit was seen in the presence of practical training, which was represented by about 17% in the last three years of education, and now it is 30% to 50%, depending on the profession and educational background.

Based on "Methodology for preparation of occupational standards (2009)," are developed 51 standards for occupations in 13 professional areas. The development of occupational standards, are based on the principle of social dialogue involving of the all key partners at national level in defining the content of occupations and qualifications, their complexity and the needs of the labor market in coming years.

Because of the above analyzes can be seen that for a long time were faced with poor quality - three-year education, are particularly relevant the reforms which are implemented in recent years in our country. The implementation of the new reform approaches are still current and still is adapting to conditions in our education and our economy.

Because of the fact that three - education is the most important crafts level of education, so of great importance are analyzes that lead for quality of teaching, program, program staff, the conditions for practical training and possibilities for its improvement. Specifically in ASUC "BoroPetrushevski" in the reformed profile –car –

mechanic, percentage of practical training increased to 40%, of which 1/3 are implemented in companies.

In this educational profile has news regarding to the final examination, which is based on a new examination program, on which are checked vocational and key competencies achieved and gained in the process of implementation of the curriculum and practical work at the employer.

Also, one of the news is the change in the commission for the practical part of the final exam, which is composed by representative from the social partners of the school, which also contributes acquired skills and knowledge of students, to be able to verify to their future employers. So, the cooperation between the schools and social partners is raised to a higher level, because the social partners will have insight into the quality that will be available at the labor market, and in the same moment can be seen deficiencies in the educational process, which in future should be adjusted.

The condition of cooperation with-social partners and social dialogue although improved, still not are at an appropriate level. Although in the country, at the social plan areformed the contours of the three social partners: representatives of workers, representatives of employers and the state, ie the government and its institutions and its bodies, as a representative of the broader social interests, still the debates on the topic of continuing professional education in the context of lifelong learning, still started.

### ***POST – SECONDARY EDUCATION***

Of great importance are the three concepts that are adopted by VET and Ministry of Education, as following: the conception of post-secondary education, conception of vocational qualification and the concept of vocational education of occupations, as important documents, which are starting points for modernization vocational education in Macedonia.

The need of post - secondary education, are ordered the new socio - economic relations, rapid technical - technological development, the growing demand for highly skilled labor and also globalization process.

Post - secondary education enables the acquisition of qualifications which are in the space between vocational and higher education, profound knowledge, skills and competencies relevant to the labor market and provides opportunities for advancement into further education, especially in higher vocational education.

Post-secondary education is intended for candidates interested in learning and improvement, that can be classified as:

- **Candidates with adequate education and relevant work experience**

*This group includes:*

- *Candidates who have completed vocational education in the period of four years who have relevant work experience of 2 years;*
- *Candidates who have completed vocational education for a period of three years who have relevant work experience of 3 years;*
- *Candidates who have completed high school and vocational high school who have relevant work experience of 3 years*
- *Candidates with secondary art education who have relevant work experience of 3 years.*

- **Candidates with adequate education for continuing post-secondary education**

*This group includes applicants with completed secondary vocational education in the period of four years, who want their education to continue to post-secondary education based on continuous programs, immediately after secondary vocational education in the period of four years.*

- **Candidates with adequate education who have inadequate work experience or no work experience**

*These candidates to gain a requirement for entry into post-secondary education in advance to master module of knowledge and skills which will compensate for the lack of relevant work experience.*

### **Types of post-secondary education**

According to the specificity of the occupations concerned, the required prior education and work experience, and the type of acquisition, post-secondary education is classified into the following types:

- Technological specialization;
- Supervisor specialization;
- Instructor specialization;
- Specialization of autonomous profiles;

- Mastery
- Training for acquiring apart of integral qualification or acquisition of partial competencies.

**Technological specialization** is post-secondary education which prepares staff to operate the complex technological processes, plant, machinery and devices and mobile operating funds. It refers to occupations that require more complex skills than those covered by educational profile they have acquired in vocational education.

**Supervisory specialization** prepares the staff for direct management with the executors of the operations (manufacturing and services) for which are needed the competencies to perform the duties Line Management (supervisors, chiefs, controllers, etc.). This means direct management of work with the executors who have secondary or lower education.

**Instructor specialization** is similar as the supervisory specialization, but rather the managements competences, it refers to the acquisition of trainer's skills, to train the occupation of their earlier educational profile. This type of staff with post-secondary education, work as instructors in schools for vocational education and various associations or internal trainers in firms for job training of new, unskilled workers, retrain of existing workers or mentoring of new staff with secondary education.

**The specialization of the autonomous sections of post-secondary education** refers to occupations that assume broader general education and specific job competencies. This type of post-secondary education allows to those students who have completed secondary school and did not go to university, to continue while not professionally trained for work. Therefore, it should be given the opportunity to continue their education to post-secondary education and gain in a profession that would allow inclusion of the labor market.

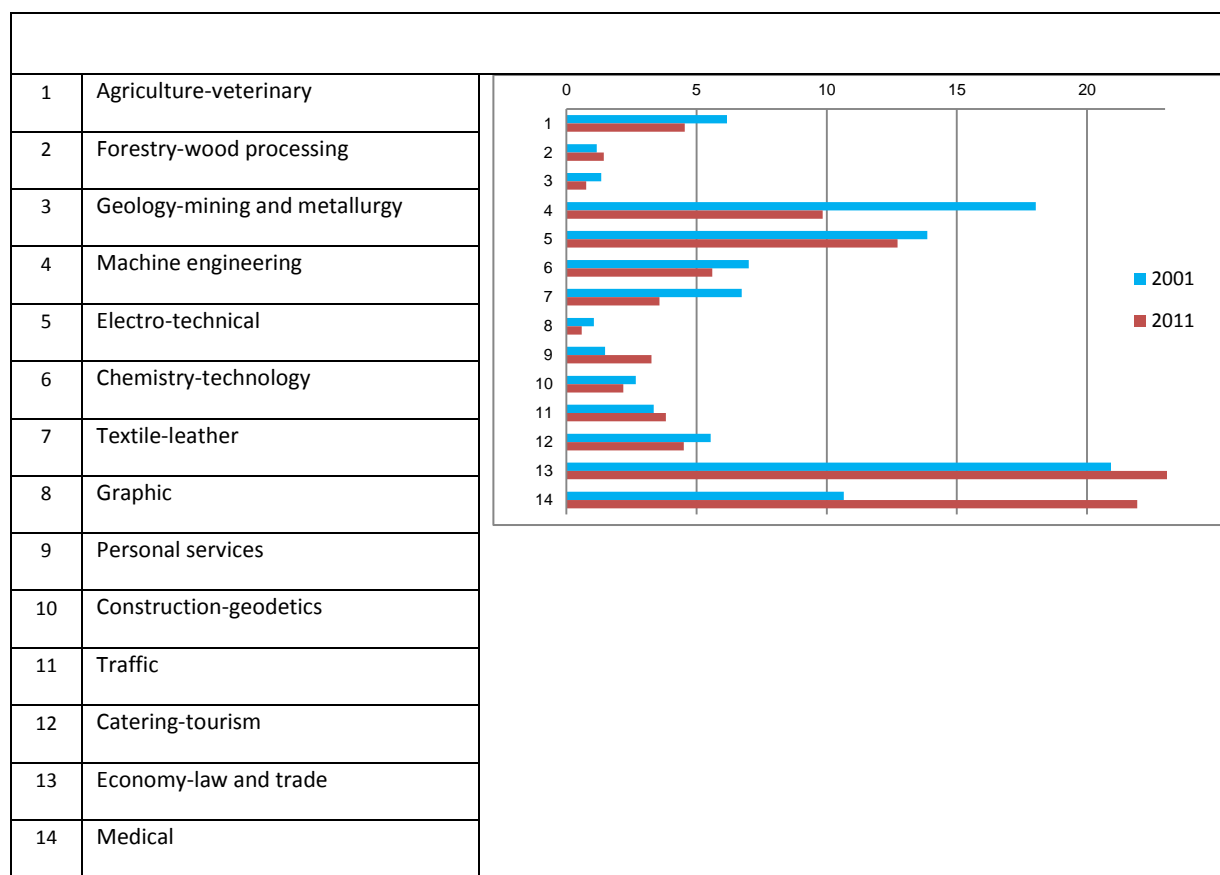
Educational profile of this type of post-secondary education can be: business secretary, technical secretary, librarian, operator of the information system administrator in various activities, archivist with the various activities and more.

**Mastery** is a special type of post-secondary vocational education. For obtaining the title of Master, requires successful completion of the master's exam for a particular craft. After completing the master's exam, the candidate acquires the title of Master of certain craft and ability to manage the craft shop and training of students and adults.

**Training for acquiring apart of integral qualification or acquisition of partial competencies** is designed for those candidates who want to upgrade in concrete qualification and trained within one or more modules of the specific program. Candidates who have acquired certificate these competences, in the process of including into the integral qualifications are recognized the modules of the program.

### **INTEREST FOR APPROPRIATE VOCATIONS**

From the table below, can be seen as moving interest for the appropriate occupations between the period between 2001 - 2011 year.



### **INTERNATIONAL COLLABORATION**

Also, of great importance in the process of revising the three-year vocational education as a fundamental factor for involving of our students in the European labor market, is an international cooperation. In recent years, there are opportunities for grant applications, for professional development of teachers and students in appropriate institutions in EU countries.

The professional occupations "car mechanic and car technician - mechatronics" were our focus and we created several projects that included teachers and students for their practical training in several European countries such as Sweden, Estonia, Lithuania and Spain. These countries have highly developed systems for practical training in this educational profile as much needed in the labor market.

It is very important that the students had the opportunity to be directly involved in the work process, to acquire new skills within their area, to handle many more modern equipment, to realize diagnosis of mechatronic systems in modern motor vehicles.

As the outputs from the realization of these projects are: the acquisition of professional competencies, skills and knowledge, encouraging the interest in acquiring new knowledge, handling with modern equipment and tools, improvement the process of work place environment, work organization, teamwork, work under pressure e.t.c.. There is a great benefit, because the students after completing the mobility, they disseminated their experiences in their working environment and indirectly imposed the need for reforms in vocational education.

Acquired professional competencies and skills, have enabled to these students successfully to be involved in the services and enterprises in Macedonia, where they demonstrated their expertise and confidence in what they do, and also were immediately employed in the country and some of them found a great job abroad. From the foregoing it is quite obvious how international cooperation is important and how much contribution in the field of mechanic simply enables education by European standards and opportunities for mobility in employment, not only in our labor market but also of the European labor market.

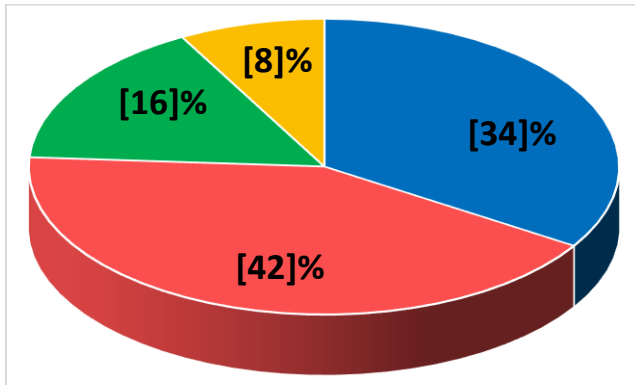
Also, the benefits from the experiences gained by teachers, are enormous. They enriched their knowledge and their views of the profession, and shared their experience at the school through the implementation and dissemination of specialized short courses.

Through this cooperation, benefits were a lot for all professional teachers. Generally after international experience, they greatly upgraded their professional knowledge, and also attitudes toward work, the importance of teamwork and greater initiative to create a social dialogue in the industry, are encouraged to follow technological development and implementation in the teaching process (lifelong learning), were introduced with the educational plans and programs as European, the way of keeping records, e.t.c.. All of this, in the future will contribute to greater effectiveness and quality in the reform of vocational education. Because the teachers are actually direct participants in the same.

In an interview with the 12 teachers included, where they see the great international experience, the results are as following: 4 (34%) believe that the greatest benefit is



learning to work with more modern equipment at the practical training, 5 (42%) were impressed by the professional attitude towards continuing professional development, 2 (16%) are impressed of the possibility of flexibility in the implementation of the curriculum which is ability to adapt the program according to the ability of students, and 1 (8%) think that oriented towards social partnership as an opportunity for continuous improvement of practical training.



34% - using modern equipment

42% - improvement of the teachers

16% - flexible educational programs 8% - intensive social partnership

These projects have provided us with more serious social dialogue, more social partners - companies that became an equal partners in almost each segment of promotion of vocational education in Macedonia.

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## HLADNA LOGISTIKA

### Povzetek:

Tovor, ki zahteva posebne temperaturne pogoje, se pomikavzdolž hladne verige. Hladna veriga je definirana kot logistično okolje, ki zajema ravnanje, skladiščenje in transport blaga, v katerem so zagotovljeni točno določeni temperaturni pogoji v nekem obsegu. Zaradi specifičnosti izdelkov, tovarsko izdelane verige zahteva posebne pogoje in obravnavo. Eden ključnih kriterijev za doseganje učinkovitosti skozi celotno hladno verigo za to predstavlja ravno zagotavljanje točno določenih temperaturnih pogojev. Stalno zagotavljanje ustreznih temperaturnih in drugih pogojev, tudi med transportom, je ključnega pomena za ohranjanje predpisane kakovosti izdelkov, dokler tinedosežejo končnega potrošnika. Časovne, temperaturne in druge nepredvidljive spremembe v času trajanja aktivnosti v verigi lahko močno vplivajo na kvaliteto in vrednost izdelkov. Prav zaradi ohranjanja kvalitete in vrednosti izdelkov je potrebno upoštevati naslednja dva faktorja (Zwierzycki et al., 2011, str. 762):

- izbiro ustreznega prevoznega sredstva s termalno izolacijo in ustreznokapaciteto;
- dobro organizacijo varovanja in raztovarjanja blaga (predvsem karsetiče priprave blaga), pri čemer se upošteva časovne dogovore in vremenske razmere.

Nadzornadtemperaturovveriginamomogočajo številna orodja in oprema kot so termometri; temperaturni snemalniki, ki omogočajo izpistermodiagrama; temperaturni indikatorji ipd.. Zagotavljanje in spremljanje temperature je še posebej pomembno med samim trajanjem transporta blaga na daljšerazdalje, saj je blago daljčasa izpostavljenorazličnim vremenskim razmeram.

**Ključne besede:** hladna veriga, temperaturni pogoji, temperaturni snemalniki, mejne vrednosti

## 1. Logistični transport v hladni verigi

Hladno verigo bi lahko definirali kot logistični sistem, ki omogoča zagotavljanje in vzdrževanje idealnih pogojev skladiščenja od proizvodnje blaga do uporabe določenega blaga. Surovine in sestavine je potrebno shranjevati v ustreznih pogojih, da se prepreči onesnaženje in škodljivi kvar. Živila, ki se pakirajo, skladiščijo, prevažajo, prodajajo ali se z njimi rokuje, je potrebno zaščititi pred onesnaženjem, ki lahko ogroža zdravje ljudi in zaradi katerega bi bila neprimerna za prehrano ljudi (Ur. l. RS 61/2000).

Pri logistiki hitro pokvarljivega blaga in izdelkov zajema hladna veriga celotnoustrezno ravnanje pri od začetne ga skladiščenja, manipulacije s tovorom, prevoz blaga in komčne manipulacije in rokovanja z blagom.

Kakovostne zahteve za transportne storitve po Kaltnekarju (1993, str. 349) govorijo, da je vrednotenje kakovostne storitve zelo težavno, ker se morajo upoštevati različni dejavniki, kojih je pogosto težko zajeti. Problem vrednotenja povečajo dodatne zahteve, ki jih v transport postavljajo uporabniki. Uporabniki ponavadi zahtevajo določene kvalitativne prednosti transportnih storitev kot je točnost oskrbe pri prevozu dragega ali občutljivega blaga, varnost prevoza, pri pokvarljivem blagu pa hitrost prevoza.



*Slika 1: Temperaturno nadzorovano skladišče živil Luka Koper .*

*Povzeto po.: [www.delo.si](http://www.delo.si)*

Sprememba prehranjevalnih navad, čedalje večja uporaba zdravil in drugih farmacevtskih izdelkov, pričakovanja glede svežega sadja in zelenjave v vseh letnih časih ter vnaprej pripravljene zamrznjene hrane . Vse to povečuje zahteve po prevozu in shranjevanju ohlajenih ali zamrznjenih izdelkov, pri katerih imamo opraviti s tako imenovano hladno verigo v logistiki.

V načinih skladiščenja se v svetu čedalje bolj uveljavlja skladiščenje izdelkov, v katerih se mora vzdrževati določen temperaturni režim, predvsem takšen pri nižjih temperaturah, ki izdelkom dalj časa omogoča ohraniti svežino in rok trajanja. Gre za računalniško nadzorovana skladišča z regulirano temperaturo, vlažnostjo in kroženjem zraka. To zagotavlja nespremenjeno kakovost blaga tudi pri daljšem skladiščenju.

## 2. Največ tveganj pri manipulaciji

Poraba ohlajenih izdelkov se v svetu vsako leto povečuje povprečno za tri do pet odstotkov. Tudi zato se zelo hitro povečuje število skladišč za ohlajene in zamrznjene izdelke ter število prevoznih sredstev za prevoz izdelkov, ki potrebujejo določen nizkotemperaturni režim. Gre torej za posebno vejo logistike, ki se ukvarja z upravljanjem hladne - hladne verige, v kateri je treba ves čas, to je od proizvodnje, prevzema blaga, prevoza, skladiščenja, komisioniranja, prevoza, distribucije in dostave do končnega uporabnika, poskrbeti za zahtevano temperaturo in jo nadzorovati.

To je treba najprej vzpostaviti, jo nato v vseh omenjenih fazah vzdrževati in tudi nadzirati. Za to skrbijo digitalni zapisovalci temperatur in računalniški sistem, ki nenehno spremlja in nadzira želeno temperaturo, shranjuje podatke o njej za potrebe kasnejšega preverjanja ali analiziranja. Najbolj kritične točke pri zagotavljanju zahtevane temperature v hladni verigi so pri manipulaciji, predvsem pri natovarjanju in raztovarjanju, ko je blago lahko izpostavljeno zunanjim vplivom višjih temperatur, in pri transportu. Zato je treba zagotoviti čim krajši čas manipulacije blaga pri prehodu iz proizvodnje in natovarjanju v transportna sredstva ter nato iz teh v skladišča. Enako velja, da je treba hitro in po vnaprej določenem načrtu opraviti manipulacijo blaga iz skladišča in natovarjanje na prevozna sredstva in nato iz teh do trgovin in njihovih hladilnih omar.

## 3. Vlaganja, tveganje in pomen sistema HACCAP

Specialna nizkotemperaturna skladišča zahtevajo velika vlaganja zaradi posebne izvedbe skladišč, ki imajo ustrezno toplotno izolacijo in so opremljena z agregati za vzdrževanje zahtevanega nizkotemperaturnega sistema. Zato imajo takšna skladišča visoke obratovalne stroške in stroške vzdrževanja ter veljajo za precej zahtevne in tvegane naložbe. Visoki fiksni stroški imajo zato pomemben vpliv na višino cen logističnih storitev v nizkotemperaturnih skladiščih in na cene takšnega skladiščenja. V takšnih skladiščih, v katerih so pri zelo nizkih temperaturah najpogosteje meso, ribe in morski sadeži, se uporabljajo posebne hladilne komore, kjer je temperatura nenehno pod lediščem. Poleg mesa, rib in morskih sadežev je v »hladni verigi« največ zelenjave in sadja, vendar ne pri tako nizkih temperaturah.



*Slika 2: Prevoz zdravil*

Vodenje »hladne verige« je najpogosteje usklajeno z mednarodno metodo zagotavljanja varne prehrane HACCP (Hazard Analysis Critical Control Point) na podlagi analize tveganja in ugotavljanja kritičnih kontrolnih točk. Uporablja se na vseh stopnjah proizvodnje živil in postopkov priprave, vključno s pakiranjem in distribucijo. HACCP se čedalje pogosteje uporablja tudi za neživilske panoge, kot so farmacevtska in kozmetična industrija, pri katerih je ravno tako pomembna hladna veriga.



*Slika 3: Transport cvetja*

*Povzeto po: [www.tesselaarflowers.com.au](http://www.tesselaarflowers.com.au)*

Sistem HACCP zahteva nadzor temperature hladilnih naprav, ukrepe pri prevzemu, transportu, skladiščenju in distribuciji zamrznjenih živil, navodilo za prevzem blaga v zamrznjene komore, navodila za čiščenje prostorov in evidence čiščenja ter še nekaj drugih zahtev. Notranji nadzor v podjetju skrbi za delovanje sistema HACCP.

#### 4. Skladišča za ohlajene in zmrznjene izdelke

V Sloveniji je po nekaterih ocenah med vsemi skladišči 15 odstotkov takšnih za ohlajene ali zmrznjene izdelke. Največ takšnih skladišč je v Luki Koper na terminalu za sadje (hitro pokvarljivo blago). Poleg sadja (banane, citrusi, jabolka, jagode), ki ga je največ, in zelenjave (krompir, paprika, paradižnik in druga zelenjava), skladiščijo tudi cvetje in lončnice ter nekaj zamrznjenega mesa, rib in mlečnih izdelkov.

Na terminalu za sadje imajo kondicionirano skladišče z možnostjo reguliranja vlage in temperature od 0 do +20 stopinj Celzija v velikosti 25.800 kvadratnih metrov, v katero lahko naložijo 14.300 palet, hladilnico za globoko zamrzovanje do -25 stopinj Celzija velikosti 2000 kvadratnih metrov, zmogljivosti 1500 palet, in zorilnico banan z zmogljivostjo 1800 ton na mesec.

Na terminalu je tudi dodatnih 250 zunanjih električnih priključkov za kontejnerje frigo. Zmogljivost praznjenja in nakladanja vozil na terminalu za sadje je 150 kontejnerjev na dan. Za nadzor temperature in razmer v hladilnih celicah skrbi računalniški sistem na način on-line.

Nizkotemperaturno skladišče ima tudi BTC Logistični center

Prve tri hladilne komore skupne površine 350 kvadratnih metrov so zgradili za Sparove potrebe, za katerega opravljajo logistiko, že pred več kot desetimi leti. Kmalu je bilo povpraševanje po skladiščenju blaga na nizkotemperaturnem režimu čedalje večje, tako da so hladilnico povečali na površino 1500 kvadratnih metrov in v njej ne skladiščijo le Sparove izdelke, ampak tudi izdelke drugih podjetij. Izdelke hladijo v dveh režimih, in sicer od dveh do osem stopinj Celzija in zamrznjene izdelke pri temperaturi od minus 18 do minus 25 stopinj Celzija. Za delovanje skladišča skrbi računalniški sistem. Še več drugih logističnih in trgovskih podjetij v Sloveniji ima skladišča za ohlajene ali zamrznjene izdelke, vendar so manjša od omenjenih.

#### 5. Informacijski tokovi

Popolnoma integriran informacijski tok distribucijske logistike dosežemo z informacijskovključitvijo prevoznikov, poleg drugih subjektov dobavnih verig (na primer pošiljatelj, prejemnik, carina, logistični centri) v ta tok. Koristi od tega ima špediter in prejemnik blaga. Pomembna korist je možnost dinamičnega optimiziranja transportne poti. Aktualizacija lahko poteka preko osebe, ki je v podjetju zadolžena na primer disponent, ali decentralno z medsebojnim usklajevanjem prevoznikov. Če zamud ali popolnih izpadov ni možno preprečiti, se o tem prejemnika obvesti kar iz vozila. V tim primeru lahko prejemnik pravočasno ukrepa in prilagodi proizvodnjo. Če je prejemnik pravočasno obveščen o zamudni dobavi blaga, lahko koordinira prevzeme blaga od različnih dobaviteljev in s tem povezano kontrolo prevzema blaga. V nasprotni smeri lahko kupec posreduje vozniku podatke o omejitvah pri dostavi (čakalni čas, vhod za prevzem blaga) ali morebitne podatke o povratni vožnji. Z integriranim informacijskim tokom distribucijske logistike je mogoče pospešiti tudi administrativna opravila.

Z uvedbo prenosnih računalnikov ima voznik možnost večino administrativnih del opraviti kar v vozilu. Prenosni računalnik zapisuje med drugim transportne razdalje, čas vožnje, čas mirovanja ter tehnične podatke. Za voznika je tudi informacijski medij glede naslovov kupcev in zaporedja transportne poti. Prek mobilnega omrežja je možna tudi neposredna povezava s prenosnim računalnikom in centralnim sistemom za obdelavo podatkov. Tako se lahko baza podatkov neprestano dopolnjuje z novimi podatki. Za informacijsko povezovanje z vozniki je primerna digitalna mobilna tehnologija GSM, ki omogoča govorno in podatkovno komunikacijo in zagotavlja skoraj brezhiben proces. Alternativa stacionarnim signalnim postajam je satelitska komunikacija in je primerna tam, kjer zaradi geografskih in drugih danosti ni mogoče zadostiti ustrezne pokritosti s signalom GSM, ali pa le te ni na voljo (Logožar, 2004, str. 177). Pri satelitskem komuniciranju skrbijo za prenos signala LEO (LowEarthOrbiting) sateliti, ki krožijo okoli zemlje ("Orbit" [LowEarth orbit], b. d.).



Slika 4: DataLogger Monarch 5396-0101 Track-It Temperature DataLogger w/ LCD Display

Pogoj za spremljanje vozil je, da je možno vsak trenutek določiti njihov položaj. Pri tem je podjetjem v veliko pomoč GPS (Global Positioning System), ki se vse bolj uveljavlja tudi v civilni rabi, in omogoča določitev položaja točke v prostoru na vsej zemeljski obli.

Osnovne predpostavke pri določanju pozicije s sistemom GPS so (Logožar, 2004, str. 177):

- v vsakem trenutku je znana natančna lega satelitov sistema GPS v vesolju;
- upoštevati je potrebno stanje atmosfere (predvsem ionosfere, ki zelo vpliva na delovanje GPS);
- položaj sprejemnika se določi s projekcijo razdalj do posameznih satelitov sistema GPS v prostoru;
- meritev razdalje poteka z meritvijo časa potrebnega za potovanje signala od satelita do sprejemnika;
- predvideva se, da so ure na satelitih in v sprejemniku absolutno točne.
- Tako sistem GPS omogoča, da se lahko z geografskimi koordinatami, ki jih posredujejo vsaj

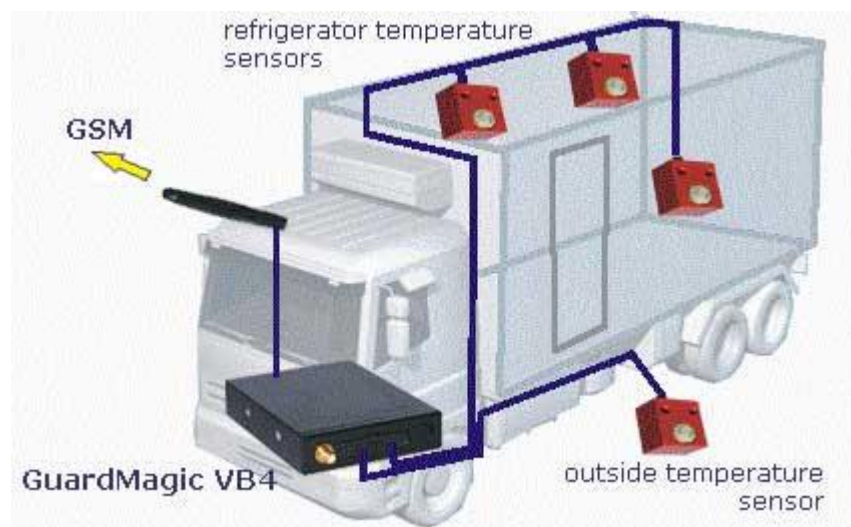
tri sateliti, do 10 metrov natančno določi položaj vozila, opremljenega z GPS sprejemnikom.

Pri delu je potrebno spoštovati standarde HACCP, IFS in AIB.

HACCP (Hazard Analysis and Critical Control Points) je zakonsko predpisan sistem za vse, ki delujejo v prehranski verigi. Nanaša se na izvajanje higienskih programov ter na nadzor in



obvladovanje kritičnih kontrolnih točk v procesu. IFS (International Food Standard) pa je standard za ocenjevanje dobaviteljev živilskih proizvodov, ki zagotavlja sposobnost dobavitelja za izpolnjevanje kriterijev kakovosti in varnosti živil. Standard AIB (Associates of Issuing Bodies), ki ga uporabljamo pri prevozu prehranskih izdelkov. AIB nadzira osebe, ki dela s tovorom, čistočo ter logistiko pri prevozu živil.



Slika 5: Aktivni nadzor temperature med prevozom

[www.guardmagic.com](http://www.guardmagic.com)

## 6. Zaključek

V logistiki, še posebej je to pomembno pri živilskih proizvodih, je sledljivost artikla že dolgo ena izmed temeljnih zahtev. V standardih je predpisan postopek sledljivosti, umika in odpoklica. To pomeni, da vemo v vsakem trenutku za vsak posamezni proizvod z določenim rokom uporabe, na katero prodajno mesto smo ga dostavili. V primeru potrebe po umiku izdelka prodajna mesta obvestimo v roku dveh ur po prejemu obvestila. Ta izdelek je zato lahko zelo hitro umaknjen s polic. Pooblaščen organizacija pa poskrbi, da se izdelek ustrezno umakne iz skladišč in primerno uniči.

Kako pri zagotavljanju standard IFS upoštevati smernice pri varovanju okolja? Razen pri transportu pri poslovanju ne pride do velikega onesnaževanja okolja. Ključna sta ločevanje odpadkov in možnost recikliranja.

Glavni potrošniki energentov pri delu so vozila in hladilni sistemi na vozilih ter seveda v hladilnici. Poleg uporabe sodobnih motorjev in hladilnih agregatov je tudi pri porabi energije pomembno, da je proces hladne verige neprekinjen in poteka brez prevelikih nihanj v temperaturi. Slednje poleg neoporečnosti prehranskih izdelkov za potrošnika, kar je primarni cilj naše dejavnosti, zagotavlja tudi energetska učinkovitost.

Dejstvo je, da nas ritem življenja prisiljuje k vedno večjemu nakupovanju že pripravljene hrane, ki zahteva temperaturni režim. Za primerjavo naj povem: v Sloveniji ocenjujemo, da se na prebivalca generira 5 evrov na leto za logistiko hladne verige v našem segmentu, v Franciji pa več kot 20 evrov. Seveda to delno pripisujemo tudi gurmanski kulturi Francozov.

Če se temperaturni režim med prevozom izdelkov podre je vprašanje kdaj se blago pokvari. Kot dober gospodar mora vsa veriga od proizvajalca do prodajnega mesta poskrbeti, da se to pred iztekom roka uporabe ne zgodi. Pa vendarle. V primeru suma, torej če živilo nima pričakovanih organoleptičnih lastnosti, videza, vonja in okusa, seveda svetujemo, da ga potrošnik vrne na prodajno mesto, kjer ga je kupil. Pri mlečnih izdelkih (jogurt, mleko, mlečni napitki, kefir ipd.) je lahko merilo napihnjenost embalaže izdelka.

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- splet
- zapiski (avtor FPP)



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COLD LOGISTICS

Abstract

Cargo, which requires specific temperature conditions, moves along cold chain. Cold chain is defined as environment including handling, storage and transport of goods, where specific temperature conditions are provided. Due to specificity of products, cargo requires special conditions and treatment through entire chain. One of key criteria for achieving efficiency throughout the entire cold chain is specific temperature. The continued provision of adequate temperature and other conditions (also during transport) are vital in maintaining requisite quality of products until reaching final consumer. Time, temperature and other unforeseen changes in duration of the chain can greatly affect the quality and value of products. In order to maintain quality and value of products it is necessary to consider the following two factors (Zwierzycycki et al., 2011, p. 762):

- appropriate means of transport with thermal insulation and sufficient production capacity;
- good organization of un/loading goods (especially preparation) taking into account timing arrangements and weather conditions.

Temperature control in the chain allows a number of tools and equipment such as thermometers; temperature recorders, which enable thermo diagram display; temperature indicators, etc. Ensuring and monitoring temperature is especially important during long distance transport of goods, as goods are exposed to various weather conditions for a longer period of time.

Keywords: cold chain, temperature conditions, temperature recorders, limits.

## 1. Cold chain logistics transportation

Cold chain could be defined as a logistic system that allows providing and maintaining ideal storage conditions from production of goods to use of certain goods. Raw materials and ingredients should be stored in appropriate conditions to avoid contamination and faulty goods. Foods that are packaged, stored, transported, sold or handled, should be protected from pollution that can endanger human health and which would make it unfit for human consumption (Ur. L. RS 61/2000).

Logistics of perishable goods and products covers the entire cold chain from proper handling of initial warehousing, manipulation with cargo, carriage of goods to final manipulation and handling of goods.

Quality requirements for transport services according to Kaltnekar (1993, p. 349) convey that evaluation of quality of services is very difficult as various factors, which are often difficult to capture, must be taken into account. Additional requirements imposed by transport users increase the problem of evaluation. Users typically require certain qualitative advantages of transport services such as accuracy and safety when transporting precious or sensitive goods, speed when transporting perishable goods.



Figure 1: Temperature-controlled food storage in Port of Koper ([www.delo.si](http://www.delo.si))

Change of eating habits, increasing use of drugs and other pharmaceutical products, expectations of fresh fruits and vegetables during all season and pre-prepared frozen

foods increase the demand of transport and storage of chilled or frozen products, i.e. cold chain logistics.

Storage methods, which are becoming more and more popular, require a certain temperature range, especially at low temperatures, which enables products to maintain freshness and shelf life for a longer period of time. These are computer-controlled warehouses with controlled temperature, humidity and air circulation. This ensures consistent quality of goods even with prolonged storage.

## 2. Risks involved in manipulation

Consumption of refrigerated products increases on average by three to five percent each year. Consequently, chilled and frozen products storage as well as vehicles for transporting products, requiring a certain low temperature regime, are on the rise. It is therefore a special branch of logistics, which deals with management of the cold chain, which should be all times, from production, picking of goods, transport, storage, transport, distribution and delivery to the user, temperature controlled.

First, temperature should be set up, then maintained and controlled at all stages. This is provided by a digital temperature recorder and a computer system that constantly monitors and controls desired temperature, stores information about it for the purpose of subsequent verification or analysis. The most critical point in providing the required temperature in the cold chain is at manipulation, particularly during loading and unloading when the goods may be subject to external influence of higher temperatures and transport. It is therefore necessary to ensure the shortest manipulation possible of goods in transition from production and loading on means of transport to warehouse. It is also necessary to quickly follow a predetermined plan to carry out the manipulation of goods from warehouse and loading on means of transport to stores and their refrigerators.

## 3. Investments, risk and importance of HACCP system

Special low-temperature warehouses require large investments as they have thermal insulation and are equipped with generators to maintain the required low-temperature system. Therefore, such places have high operating and maintenance costs and are subject to quite demanding and risky investments. High fixed costs therefore have a significant impact on the price level of logistics services in low temperature storage and price storage. Temperatures in these warehouses, which mostly store meat, fish and

seafood, are extremely low thus special cooling chambers with temperatures constantly below freezing are used. In addition to meat, fish and seafood vegetables and fruit are most common in the cold chain, but not at such low temperatures.



Figure 2: Transport of medicines

Cold chain management is consistent with international method of ensuring food safety HACCP (Hazard Analysis Critical Control Point) based on the hazard analysis and critical control points. It is used at all stages of food production and preparation processes including packaging and distribution. HACCP is increasingly used for non-food industries such as pharmaceutical and cosmetic industry, where cold chain is just as important.



Figure 3: Transport of flowers ([www.tesselaarflowers.com.au](http://www.tesselaarflowers.com.au)).

The HACCP system requires temperature controlled cooling devices, goods handling measurements, transportation, storage and distribution of frozen foods, instructions how to handle cargo in cooling chambers, instructions on how to clean premises and records on cleaning and a few other requirements. Company's internal control is responsible for HACCP system.

#### 4. Warehouses for chilled and frozen products

In Slovenia, according to some estimates, there are around 15 percent of storage intended for chilled or frozen products. Most of it is in Port of Koper at the Fruit Terminal (perishable goods). In addition to fruit (bananas, citrus fruits, apples, strawberries) and vegetables (potatoes, peppers, tomatoes and other vegetables), flowers and potted plants and some frozen meat, fish and dairy products are also stored there.

Fruit terminal is a conditioned warehouse with the possibility of regulating humidity and temperature from 0 to +20 degrees Celsius, measuring 25,800 square meters, which can hold up to 14,300 pallets, cold storage for deep freezing up to -25 degrees Celsius measuring 2000 square meters with room for 1500 pallets and banana ripening facilities with capacity of 1,800 tons/month.

The terminal also has 250 external reefer plug sockets. The capacity of un/loading vehicles at the fruit terminal is 150 containers a day. Temperature control and cooling conditions in cooling chambers are computer controlled.

Low-temperature storage can be seen in BTC Logistics Centre. First three cooling chambers, totalling 350 square meters, were built for Spar more than ten years ago. Soon there was a growing demand for storage of goods at low temperature, so the cooling chamber was enlarged to 1500 square meters so it can store other companies' products as well. The products are cooled in two regimes, ranging from two to eight degrees Celsius and frozen products at temperature of minus 18 to minus 25 degrees Celsius. It is computer system controlled.

Several other logistics and trading companies in Slovenia have warehouses for chilled or frozen products yet smaller than BTC Logistics Centre.

## 5. Information flows

Completely integrated distribution logistics information flow is achieved by inclusion of information carriers, in addition to other supply chain participants (sender, recipient, customs, logistics centres). Beneficiaries are freight forwarder and consignee. An important benefit is the ability to dynamically optimize transport routes. Actualization can be done by a person who is in charge of a company (ex.:disponent) or decentrally by mutual coordination carriers. If delays or complete cuts cannot be avoided, the recipient can be notified from the vehicle. Thus a recipient can take action to adjust production. If recipient is informed of delay or supply of goods in time, supply of goods from different suppliers and related control of goods can be coordinated. Vice versa, a buyer can send driver information on delivery (waiting time, point of entry) or possible information on return journey. Distribution logistics integrated information flow can also speed up administrative tasks. Laptops enable drivers to perform tasks in the vehicle. Laptops record transport distances, driving times, idle times and technical data. It is also an information providing buyers' addresses and transport route sequences. Direct connection to central data processing system is possible via driver's laptop network. Thus database is constantly updated with the latest information. Digital mobile technology GSM that enables voice and data communications and provides nearly flawless process is most appropriate. Alternativeto stationary signal is satellite communication, which is suitable where, due to geographical and other conditions, GSM signal is not adequately covered or not available (Logožar 2004, p. 177). Satellite communication is provided by LEO (Low Earth Orbiting) satellites orbiting the earth ("Orbit" [Low Earth orbit], b. D.).



Figure 4: Data Lodger Monarch 5396-0101 Track-It Temperature Data Logger w/LCD Display



The condition of vehicle monitoring is to be able to determine its position any time. Thus GPS (Global Positioning System) is very popular as it provides location and time information anywhere around the world.

Basic assumptions in determining position using GPS system (Logožar 2004, p. 177):

- precise location of GSM satellites in orbit is given at any time;
- consider the state of the atmosphere (especially the ionosphere, which greatly affects GPS function);
- receiver's position is determined by projection of distance to individual satellites in the GPS system area;
- distance measurement is carried out by measuring the time it takes for a signal to travel from satellite to recipient;
- it is assumed that time on satellites and receivers is absolutely accurate;
- GPS system allows that using geographic coordinates, provided by at least three satellites, can accurately determine the position of a vehicle equipped with a GPS receiver in a 10 m radius.

HACCP, IFS and AIB standards must be followed.

HACCP (Hazard Analysis and Critical Control Points) is a statutory scheme for all those involved in food chain. It refers to hygiene programs implementation and surveillance and control of critical control points in the process. IFS (International Food Standard) is a standard for evaluating suppliers of food products, which ensures the ability of supplier to meet the criteria of quality and food safety. Standard AIB (Associates of Issuing Bodies) is used in transport of food products. AIB supervise staff working with cargo, cleanliness and food transport logistics.

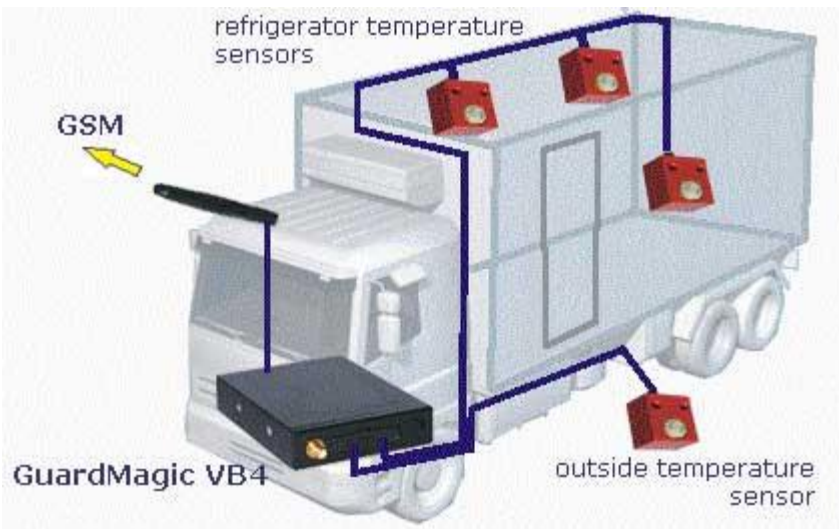


Figure 5: Active temperature control during transport (www.guardmagic.com)

## 6. Conclusion

In logistics, especially with food products, traceability has long been one of the most fundamental requirements. The standards prescribe traceability process, withdrawal and recall. This means that at any given moment every product with expiry date can be located. In case of product withdrawal stores should be notified within two hours of notification. This product can therefore be quickly removed from the shelves. The authorized organization shall ensure that the product is appropriately withdrawn from storage and appropriately destroyed.

How to ensure the standard IFS is followed protecting the environment? Except for transportation, environmental pollution is not large. The key is recycling.

The main consumers of energy are vehicles, cooling systems in vehicles and cold chambers. When it comes to energy consumption, it is of great importance that, in addition to modern engines and cooling units, the process of continuous cold chain takes place without excessive fluctuations in temperature. This, apart from the integrity of food products for consumer, which is primary objective of our activities, also ensures energy efficiency.

The fact is that our lifestyle increases purchase of ready-made food that requires temperature regime. Slovenia estimates that €5 per capita goes to cold chain logistics, while in France more than 20 euros per year. Of course, this is partly due to gastronomic culture of the French.

If temperature regime fails during transportation, the goods go off. The chain from manufacturer to retailer must make sure this does not happen. However, should you suspect the food does not have organoleptic characteristics, appearance, smell and taste, one should return it to the place where it was bought. In the case of dairy products (yogurt, milk, milk drinks, kefir, etc.) this can be measured by product packaging boost.

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# PROTECTIVE EQUIPMENT AT MOTORCYCLISTS AND CYCLISTS AS PASSIVE SAFETY SYSTEMS

## ЗАШТИТНАТА ОПРЕМА КАЈ МОТОРЦИКЛИСТИТЕ И ВЕЛОСИПЕДИСТИТЕ КАКО СИСТЕМИ ЗА ПАСИВНА БЕЗБЕДНОСТ

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**Резиме:** Сообраќајот, посебно патниот сообраќај претставува своевиден полигон на технички изуми на средства за задоволување на некои егзистенцијални и пошироки социјални, политички, економски и културни потреби на човекот, додека од друга страна, сообраќајот истовремено е многу сериозен извор на разновидни загрозувања, опасности и сообраќајни незгоди чии последици се: човечките животи, потешки и полесни повреди и големи материјални штети.

Користењето на двоточкастите возила (моторциклите, велосипедите) има предност во однос на користењето на автомобилот, кои предности се големи, како на пример заштеда на време, простор и пари, но сепак, заедно со пешаците претставуваат ранливи категории на учесници во сообраќајот, најповеќе се изложени на ризик во сообраќајот бидејќи не се заштитени со надворешен штит. Кај нив постои поголем ризик од повреда во секој судир со возила, па поради тоа потребно е спречување на таквите судири.

Со анализа на истражувањето и личното искуство, се проценува значајноста на секој фактор во настанувањето и развојот на сообраќајната незгода и се изведуваат одредени заклучоци за влијанието на начинот на користење на системите за пасивна безбедност врз последиците од сообраќајната незгода, што е од исклучителна важност при решавањето на оштетни побарувања, особено кај нематеријалните штети.

Во овој труд се претставени резултатите од истражувањата и од личното искуство на влијанието на системите за пасивна безбедност односно заштитната опрема кај моторциклистите и велосипедистите врз последиците од сообраќајната незгода. Сообраќајната незгода е комплексна и зависна од многубројни фактори и нивната меѓусебна поврзаност, што го прави користењето на системите за пасивна безбедност врз последиците од сообраќајната незгода (особено кога станува збор за нематеријални штети) многу значаен сегмент во вештачењата на сообраќајните незгоди.

Клучни зборови: пасивна безбедност, заштитна опрема, кацига, безбедност на сообраќајот, сообраќајни незгоди

**Abstract:** The traffic, especially road transport represents a proving ground for technical inventions of resources to meet the existential and broader social, political, economic and cultural needs of man, on the other hand, traffic simultaneously is a very serious source of various threats, dangers and accidents whose consequences are: human life, serious and minor injuries and major property damage.

Using two dotted vehicles (motorcycles, bicycles) has an advantage over the use of the car, which advantages are large, such as saving time, space and money, but with pedestrians represent vulnerable groups of road users, most are at risk in traffic because they are not protected by an external shield. Among them there is a greater risk of damage in each collision with vehicles, and therefore it is necessary to prevent such collisions.

By analyzing the research and personal experience, shall be assessed the importance of each factor in the creation and development of traffic accident and carried some conclusions for the impact of how the use of passive safety systems on the consequences of the accident, which is extremely important in determining compensation claims, especially for intangible damages.

This paper presents the results of research and personal experience of the impact of passive safety systems or protective equipment for motorcyclists and cyclists on the consequences of the traffic accident. Traffic accident is a complex and dependent on many factors and their interconnection, which makes use of passive safety systems on

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the consequences of the accident (especially when it comes to intangible damages) very important segment in the expertise of the traffic accidents.

**Keywords:** passive safety, protective equipment, helmet, traffic safety, traffic accidents.

## INTRODUCTION

Road transport represents a proving ground for technical inventions of means to meet the existential and broader social, political, economic and cultural needs of man, on the other hand, traffic simultaneously, is a very serious source of various threats, dangers and accidents with consequences: human life, serious and minor injuries and major property damage.

If you overcome the prejudice that two-wheeled vehicles (motorcycles, bicycles) we can ride only during summer time, with the proper equipment, you can drive ten months a year (this refers to the mountainous part of the country).

Motorbikes are most grateful in urban much crowd, that are often encountered in our cities. Due to the increasing lack of parking spaces, scooters respectively motorcycles or bicycles will save you a lot of time in looking of parking space, but there is less money for parking. Scooters are always the first ones among the traffic lights, and the columns behind you are not a problem.

Great is the fuel savings, the majority of scooters spend 3 to 5 litres per 100 km. Maintenance is also cheaper than cars, although they have a shorter service intervals. When all of these will gather, motorcycles are and rational advantage, or indeed a small number of those lovers of two wheels vehicles for purely rational reasons.

Using two wheels vehicles (motorcycles, bicycles) has an advantage over the use of the car, which are: cheaper to drive (due to low fuel consumption, and thus have less negative impact on the environment); lighter maintenance (fewer items that are readily available); less damage of the asphalt; simpler for parking (motorcycle occupies five times less space for parking in terms of the car); flexible in traffic; ride a motorcycle allows a special experience, contact with nature and sense of freedom.

On the other hand, apart from the numerous objective and subjective reasons for driving a motorcycle, there are those who are opposed to this view, which are: expensive specialized equipment required for driving; little space for luggage and passengers; not suitable for driving in winter conditions; no more comfortable for long journeys. Motorcycle has its weaknesses: between the bonnet and the body of motorcyclist is only protective gear and helmet; with motorcycle is harder to change the direction; long is the way of stopping; It can easily be turned over; weather conditions significantly affect the safety of driving.

Of course, the biggest reason not to go addition to driving a motorcycle - increased risk of accidents.

## ANALYSIS STATE CONDITIONING OF TRAFFIC SAFETY

In 2009, 53% of fatal injuries to cyclists occurred on roads outside populated areas. In 2012 the percentage decreased to 44%. The majority of cyclists killed on the

roads in urban areas and it is necessary to support measures to ensure their safety in traffic, helping to achieve jointly solution through - the free movement of all participants, making separate (from the road ) bicycle paths in urban and rural areas.

It is necessary also, to prepare informative material composed of maps of existing bike paths and brochures for advice on safe driving cyclists, conveniently located on the whole territory of the cities in Macedonia. Although the absolute number of cyclists killed shows a downward trend, their share in the total number of dead is still quite high, especially compared to the European average.

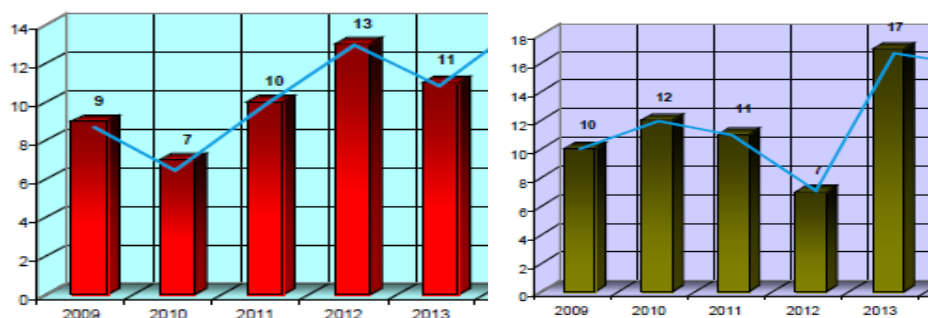


Chart 1. Summary, total number of killed cyclists and motorcyclists in traf.acc.(2009-2013)

Raising the level of safety for cyclists in road transport is a clear challenge for the period until 2020.

Compared with all other participants in road traffic, motorcyclists face the highest risk of fatal injuries, and at the same time they pose a big risk to other road users. Most of those killed motorcyclists belonging to the age group of 25-34 years. From the current experiences is showed that inappropriate speed driving and non-use of protective equipment is a major cause of tragic accidents. The number of sold motorcycles is steadily increasing, while there is a disproportionate amount of progress in the sold equipment for passive safety (helmets, suits, special shoes, reflective equipment ...). The trend of fatal accidents of motorcyclists in Macedonia is similar to other European countries.

Motorcycles represent only 0.5% of the total number of participants and approximately 10% of deaths road users.

For greater mobility in the future, inhabitants of the cities and municipalities will be encouraged to use bicycles and motorcycles, which will be realized through measures and activities to reduce the risk of death or injury due to a collision with a motor vehicle.

### Active and passive Safety of Motorcycles

Motorcycle with its constructive - technical and exploitation facility, maintenance and method of managing the traffic is one of the most important factors affecting traffic safety. In the most general case, the security systems of the motorcycle can be divided into two basic groups:

1. Systems of active safety (technical systems of the vehicle by its actions should contribute to reduce the probability of causing an accident) and

2. Passive safety systems (suitable interior design and technical systems fitted to the vehicle, as well as protective equipment for drivers whose main task is with their performance and action to reduce injuries to road users - driver, passengers and pedestrians).

For motorcycles as active safety systems can be enumerated the safety and efficiency of the braking system, the elements of lights and precise steering, safety-stability in straight line motion, safety tires, safety acquiring the curves, good brightness on the road when driving is in reduced visibility and at night, the representation of the elements of ergonomics and biomechanics and as systems for passive safety: the absence of the sharp elements and parts for motorcycles, protection of the knees of the driver, protection for feet at footrest of the legs, fire protection and appearance and height of the seat.

For drivers of motorcycles as active safety systems can include: timely and accurate response, a good sense of balance, ability for coordinated action of the management bodies, training and practiced procedure for appropriate actions to changes in traffic situations, and as systems for passive safety: protective helmet, protective clothing, protective bodice with AIR-BAG and protective gloves.

Different road conditions affect the maintenance of stability when driving a motorcycle. When we ride a motorbike, in the direction is acting a force of traction, the force of friction, the power of mass of the motorcycle and the resistance of air. When we are driving through the curves is acting the centrifugal force on the center of gravity of the motorbike.

Friction which is exercised between road and tire of the motorcycle is greater when is higher the quality of asphalt and tire friction also exceeds the roughened surface, but decreases the amount of water of asphalt, with more waters is occurred water wedge.

Possible dangers when driving a motorcycle are: poor health, because the wind cools the body, and the consequences may be different inflammatory, painful tensions and stiff neck, spine and joints disturbed stability due to slippery roads, mud, sand and rocks on the road; reduced visibility when driving at night, in rain and fog; strong lateral winds is threatened the stability of the motorcycle, which can lead to fall over the bike; suffering or injury to the driver in typical traffic accidents which interact (Figure1).

The most common types of accidents in which drivers interact motorcycles are: neglecting the rules of the priority of the crossing, and the accidents that occurred ends with serious bodily injury, disability or death to drivers; gust of vehicle forward, because the vehicle forward often brakes, surprising and strongly, which often ends with a gust of vehicle, if not keep enough distance; taking off from the road due to adjusted speed according to road conditions, errors in driving, collision of the motorcycle due to the mistakes of other road users.

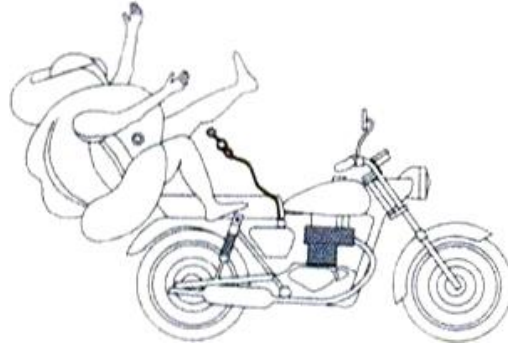


Figure1. Possible risk of rejection from motorcycle

## RESULTS

The influence of the vehicle type on the accident type and thus on the aggressive direction of the forces has already been clearly presented. Smaller motorized two-wheelers are hit more frequently by the accident opponent, while larger and heavier motorcycles more frequently collide head-on with their accident opponent(Figure 2). Bicycles and mopeds often have side impact by the left side, while at the motorcycles the direction of the collision is in the front of the vehicle.

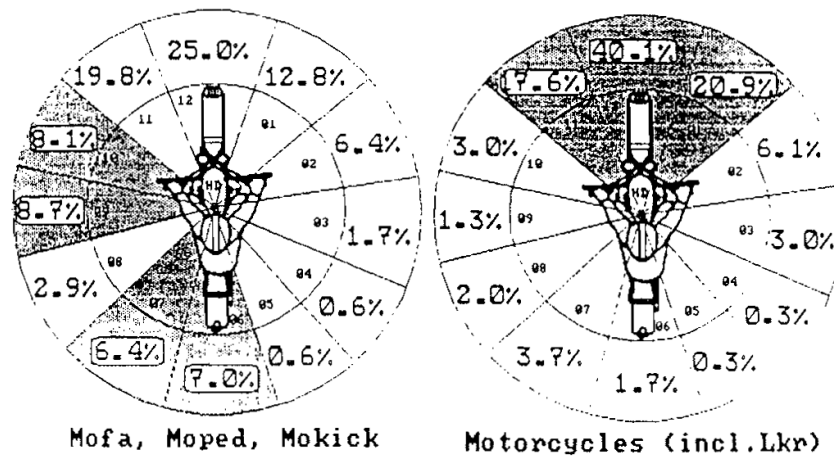


Figure 2. Distribution of the impact of the directions of the conflict at the two wheeled vehicles (groups)

For cyclists and motorcyclists in general, there are two possibilities of injuries: usual decline without colliding with a vehicle and an injury when a vehicle collides. In the falling, cyclists or motorcyclists may have injuries to their hands, especially the joints of the toes where the drivers often comes to twisted different body parts (dislocation).

In the clash of cyclists / motorcyclists with passenger car there are three stages: primary contact, throwing and buck off and falling. In contact with another vehicle or obstacle in front of him, injuring the driver or front passenger takes place in several stages: After the contact, the body comes forward, then back, and going several times. If the vehicle is hit from behind, head off back and neck injury occurs which is called "hitting of lash".



Also, there are frequent cases of injuries of traffic participants that, due to some primary diseases (fainting, epilepsy) as natural deaths for road users, due to heart attack, stroke, etc. There are other traffic accidents such as a collision of a pedestrian and bicycle, collision of a vehicle and child on three cycle, etc.

In the distribution of injuries which correspond to the two types of collisions: frontal and side impact (Figure 3) you can see the ratio of injuries to the lower extremities, which takes a large percentage and are almost equal with others. The difference between these two types of groups of accidents is displayed in head injuries. For the frontal collisions, it is therefore the main aim to reduce the risk of head injuries. Generally you can say that the injury risk for a motorcycle-user is lower when he is involved in a side-collision. In a frontal collision, in nearly every body region the frequency of injury is higher.

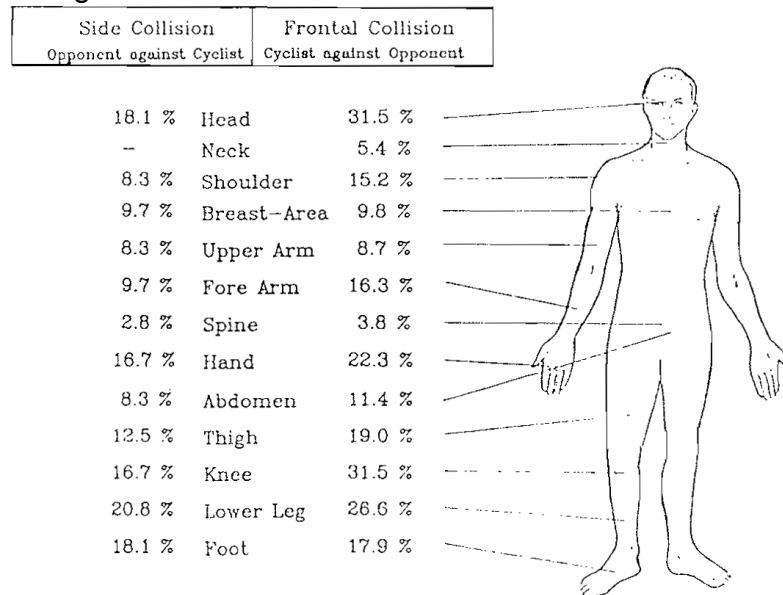


Figure 3. Distribution of injuries in frontal and side collision

From personal experience should mention that recently, it is happen an accident to me, me, as a driver of motorcycle scooter I was left injured. Driving in the right side, near the right edge of the road, on the right lane of the boulevard, from the left side, respectively in the left traffic line there were two vehicles, who were driving one after the other. For a moment, the rear vehicle began to overtake the front car, without checking that in the right lane was moving vehicle or motorcycle, without giving a sign cursor direction, it hampered my movement, and I was unable to capture other actions, I tried to brake, but I lost control and slid to the right, and struck the vehicle at the bottom of the right side, and I toppled to the ground. I was wearing a protective helmet, which protect me from a head injury, and from the ouster, although I was wearing a leather jacket, which gave me a little protection from injuries, still I got injuries on the hands, left elbow, right side of the front of the chest, right side of right leg. If I was wearing with a proper safety equipment on the motorbike, unless protective helmet, in that kind of an accident, I would have less injuries to the body.



Figure 4. Damage of the motorcycle, leather jacket and injuries in the body (after 10 days)

## DISCUSSION

Good protective gear is designed to help protect your body in a crash. It is your best defence in a crash. While protective gear can't prevent all injuries, it can reduce their severity and prevent some nasty injuries. It also keeps you comfortable and makes riding a more enjoyable experience. The right stuff costs money, so budget for it. If you don't wear the right stuff you may pay a much bigger price in pain and suffering after a crash.

As protection equipment, except the helmet, can be enumerated: a protective jacket (preferably with air bag composition), leather pants, leather gloves, high shoes or boots, sunglasses, protective belt.

### Helmet

Helmet is an essential part of protective equipment for motorcyclists, with wearing a helmet; motorcycle rider can save his life. In case of fall, a driver of the motorcycle, due to head injuries, had died a big number of drivers. More than half of drivers would be survivors of an accident, if they wore a helmet on their head. Helmet in many cases, can mitigate or eliminate harmful or fatal consequences. During the ride, helmet must be properly placed on the head and buttoned.

There are two types of helmets, ordinary and integrated helmets. Ordinary helmets are light and better protect the head, while the protection is reduced in blows to the face. Integrated helmets are closed, very safe and well protect the head and face. During the ride helmet must be closed, while the visor must be pulled down.



Figure 5. Ordinary and integrated helmets

The consequences of not wearing a helmet can be tragic (death, permanent disability, disfigurement of the face, etc.) and

when we are driving at low speeds. In the event of a fall from the motorcycle, suffering is inevitable. Not wearing the helmet on your head while driving is a misdemeanour.

Helmets can be made from a range of different materials which affect strength and impact absorption, as well as weight. This includes materials such as plastics, fibreglass and carbon fibre for the shell, and foam padding on the inside. More expensive helmets can provide better ventilation and may be made of lighter materials.

### Protective clothing (jacket and pants)

Gear (jacket) specifically designed to protect motorcyclists, scooter riders and their pillion passengers are made from quality leather or abrasion resistant synthetic material (commonly nylon or polyester). There is protective equipment in the form of jeans for motorcyclists who are with extra synthetic reinforcement. Seams should be strong and easy to refit. Patents should be firm and well stitched to the material. The material should be strong and remain during the accident, and cannot be lowered by the body or to slip along the road.

Equipment to protect you properly, it should be well incorporated. If it is very large, protector will not stand in the correct position during the accident. If it is too small size, it would be uncomfortable and would disrupt blood circulation in the hands and feet. Before we ordered the equipment, it is necessary to try to move with the equipment a few minutes, to bend and kneel down, and try to sit on a scooter or motorcycle to check the comfort.

Look for jackets and pants with built-in body armour. The armour can be made from a range of materials including plastic, moulded rubber and foam. It is possible to get jackets with armour designed to protect shoulders, elbows and the spine. Choose pants with body armour that protects your hips and knees. (Figure 6).

Different parts of the body have different injury risk levels in a crash (Figure 7). **Red Zone** needs impact protectors and high abrasion resistant materials.

**Yellow Zone** - is necessary to protect with extra layers of material. These areas include: shoulders, elbows, forearm, hips, the sides of the legs, knees and shins.



Figure 6. Protective clothing and body armour

**Blue Zone** -is an area with average risk of impact and abrasion (the other parts, the back of the torso, front side of the chest, back and front of the thighs, etc.).

**Green Zone** – can be made from mesh or materials for ventilation and elasticity, with relatively low abrasion for comfort (front part of the chest, below the arms, inside elbow, the front of the abdomen and groin, the inside of the thighs, the back of the knees and lower legs are usually covered with boots).

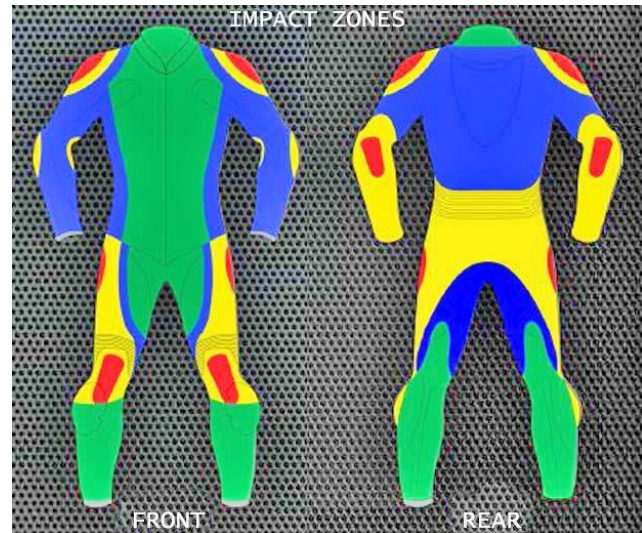


Figure 7. Injury risk zones

## Gloves

Good gloves for motorcycling come in strong leather or quality abrasion resistant synthetic material. They differ from other gloves, such as those made for skiing gardening or just for keeping your hands warm provide little, if any, protection. The right gloves come with extra reinforcement – such as padding or inserts – across the back of the hand and fingers, and on the palm. The right gloves need to be comfortable so you can use the controls and keep a grip on the handlebars. They must be a snug fit with a fastening for securing them around your wrist, so they can't come off in a crash.



Figure 8. Protective gloves

## Boots



The right motorcycle boots are purpose built, and have no laces, rings or other bits sticking out that can catch in a crash.

*Figure 9. Safety boots*

They have fastenings that cannot be released accidentally. Quality boots are made from the strongest grade leather or synthetics, such as resin-impregnated microfiber. There should be extra reinforcement around the toe, heel, ankle and shin area. These are areas at risk in a crash. The right boots are designed to stay securely on your feet and not be pulled off in a crash. So they need to be a snug fit, but still comfortable enough to walk around in.

Other than this safety equipment, it is desirable to use other protective equipment: sunglasses, protective belts, etc.

## CONCLUSION

Protective equipment helps to protect your body in the event of an accident. It is the best defence in the event of an accident. Although protective equipment cannot prevent all injuries, it can reduce the seriousness and prevent some nasty injuries. It also keeps you comfortable and makes driving more like a pleasant experience. If you are not wearing the right equipment, which can cost more money, you can pay a higher price in pain and will have a greater suffering after the accident.

Legislation in Macedonia, provide how the mandatory safety equipment to wear a helmet, but other protective equipment is mandatory. In the worldwide is campaign except the helmet, drivers and motorcycle riders must to wear other protective equipment, for the consequences of accidents to be smaller. For example, one campaign is "fool's gear, cool gear" which leads to increase awareness among drivers of two wheels vehicles, because they, like pedestrians, are the most vulnerable category of participants in road accidents.

# Fool's Gear

# Cool Gear

**HEAD.** Considered precious by sensible people, never exposed by the pros. When fully in view, allows immediate identification of unsafe person not using his or hers. Hand out rider education info on sight.

**HELMET.** Most important piece of protective gear a rider can use. Protects against head injury, windblast, cold, and flying objects. Full-face helmet recommended.

**EYES, EARS AND FACE.** Exposure leads to irritated eyes, noise-deafening windblast, and distracting impacts from bugs and road debris.

**FACESHIELD.** "Saves face." Any rider who's been hit in the face by stones, insects, or debris can tell you the benefits.

**HANDS.** *Au naturel* (not for long). Known to lock into curled position when exposed to cold; not genetically evolved to withstand abrasion.

**GLOVES.** Keep hands comfortable, functional, and protected. There's an infinite variety for all seasons.

**BARE LIMBS.** A phenomenon seen only in riders who think it's other people who crash. Subject to ridicule in riding circles.

**JACKET AND PANTS.** Long sleeves and sturdy trousers resist abrasion and protect against sunburn, dehydration, or hypothermia. Some riders wear padded gear with "body armor" for more protection. Light colors in the daytime and reflectivity at night make it easier for car drivers to see you.

**FLIP FLOPS.** Terminology for what sandals, toes and feet do upon contact with road surfaces, shift lever, brake pedal, or footrests.

**BOOTS.** Provide protection against foot and ankle injuries and give you a good grip on footrests or road surfaces.

**BOTTOM LINE.** Fool's gear identifies an unaware rider. Learn how to avoid embarrassment, ridicule and injury, while gaining valuable skills and knowledge by completing an MSF RiderCourse®.

**BOTTOM LINE.** Dress for the ride as well as for the crash. Proper riding gear allows you to enjoy the ride in comfort and helps minimize injury.

800.446.9227 or [www.msf-usa.org](http://www.msf-usa.org)  
or contact.



**The more you know, the better it gets.**

Figure 10. Campaign, "fool's gear, cool gear"

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# ЗАШТИТНАТА ОПРЕМА КАЈ МОТОРЦИКЛИСТИТЕ И ВЕЛОСИПЕДИСТИТЕ КАКО СИСТЕМИ ЗА ПАСИВНА БЕЗБЕДНОСТ

## PROTECTIVE EQUIPMENT AT MOTORCYCLISTS AND CYCLISTS AS PASSIVE SAFETY SYSTEMS

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**Резиме:** Сообраќајот, посебно патниот сообраќај претставува своевиден полигон на технички изуми на средства за задоволување на некои егзистенцијални и пошироки социјални, политички, економски и културни потреби на човекот, додека од друга страна, сообраќајот истовремено е многу сериозен извор на разновидни загрозувања, опасности и сообраќајни незгоди чии последици се: човечките животи, потешки и полесни повреди и големи материјални штети.

Користењето на двоточкастите возила (моторциклите, велосипедите) има предност во однос на користењето на автомобилот, кои предности се големи, како на пример заштеда на време, простор и пари, но сепак, заедно со пешаците претставуваат ранливи категории на учесници во сообраќајот, најповеќе се изложени на ризик во сообраќајот бидејќи не се заштитени со надворешен штит. Кај нив постои поголем ризик од повреди во секој судир со возила, па поради тоа потребно е спречување на таквите судири.

Со анализа на истражувањето и личното искуство, се проценува значајноста на секој фактор во настанувањето и развојот на сообраќајната незгода и се изведуваат одредени заклучоци за влијанието на начинот на користење на системите за пасивна безбедност врз последиците од сообраќајната незгода, што е од исклучителна важност при решавањето на оштетни побарувања, особено кај нематеријалните штети.

Во овој труд се претставени резултатите од истражувањата и од личното искуство на влијанието на системите за пасивна безбедност односно заштитната опрема кај моторциклистите и велосипедистите врз последиците од сообраќајната незгода. Сообраќајната незгода е комплексна и зависна од многубројни фактори и нивната меѓусебна поврзаност, што го прави користењето на системите за пасивна безбедност врз последиците од сообраќајната незгода (особено кога станува збор за нематеријални штети) многу значаен сегмент во вештачењата на сообраќајните незгоди.

Клучни зборови: пасивна безбедност, заштитна опрема, кацига, безбедност на сообраќајот, сообраќајни незгоди

**Abstract:** The traffic, especially road transport represents a proving ground for technical inventions of resources to meet the existential and broader social, political, economic and cultural needs of man, on the other hand, traffic simultaneously is a very serious source of various threats, dangers and accidents whose consequences are: human life, serious and minor injuries and major property damage.

Using two dotted vehicles (motorcycles, bicycles) has an advantage over the use of the car, which advantages are large, such as saving time, space and money, but with pedestrians represent vulnerable groups of road users, most are at risk in traffic because they are not protected by an external shield. Among them there is a greater risk of damage in each collision with vehicles, and therefore it is necessary to prevent such collisions.

By analyzing the research and personal experience, shall be assessed the importance of each factor in the creation and development of traffic accident and carried some conclusions for the impact of how the use of passive safety systems on the consequences of the accident, which is extremely important in determining compensation claims, especially for intangible damages.

This paper presents the results of research and personal experience of the impact of passive safety systems or protective equipment for motorcyclists and cyclists on the consequences of the traffic accident. Traffic accident is a complex and dependent on many factors and their interconnection, which makes use of passive safety systems on the consequences of the accident (especially when it comes to intangible damages) very important segment in the expertise of the traffic accidents.

**Keywords:** passive safety, protective equipment, helmet, traffic safety, traffic accidents.

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## ВОВЕД

Патниот сообраќај претставува своевиден полигон на технички изуми на средства за задоволување на некои егзистенцијални и пошироки социјални, политички, економски и културни потреби на човекот, додека од друга страна, сообраќајот истовремено е многу сериозен извор на разновидни загрозувања, опасности и сообраќајни незгоди чии последици се: човечките животи, потешки и полесни повреди и големи материјални штети.

Ако се надмине предрасудата дека двоточкастите возила (моторциклите, велосипедите) се возат само во текот на летното време, со соодветна опрема, може да се возат и десет месеци годишно (ова не се однесува на планинскиот дел на земјата).

Моторциклите се најблагодарни во градските гужви кои се почесто ги среќаваме во нашите градови. Поради се поголемиот недостаток на паркинг површини, скутерите односно моторциклите или велосипедите ќе ви заштедат многу време во тражење на паркинг простор, но и нешто помалку пари за паркинг. Со скутер секогаш сте меѓу првите на семафор, а колоните позади вас не претставуваат проблем.

Огромна е заштедата на гориво, најголем број на скутерите трошат од 3 до 5 литри на 100 km. Одржувањето е исто така поевтино отколку кај автомобилите, иако имаат пократки сервисни интервали. Кога сето тоа ќе го соберете, моторциклите се и рационално во предност, или навистина е мал бројот на тие љубители на дво точкасти возила за чисто рационални причини.

Користењето на двоточкастите возила (моторциклите, велосипедите) има предност во однос на користењето на автомобилот, кои се: поевтини се за возење (поради малата потрошувачка на гориво, а со самото тоа имаат помало негативно влијание врз животната средина); полесни се за одржување (имаат помалку елементи кои се лесно достапни); помалку го оштетуваат асфалтот; поедноставни се за паркирање (моторциклот завзема пет пати помал простор за паркирање во однос на автомобилот); флексибилни се во сообраќајот; возењето со мотоцикл овозможува посебно доживување, контакт со природата и чувство на слобода.

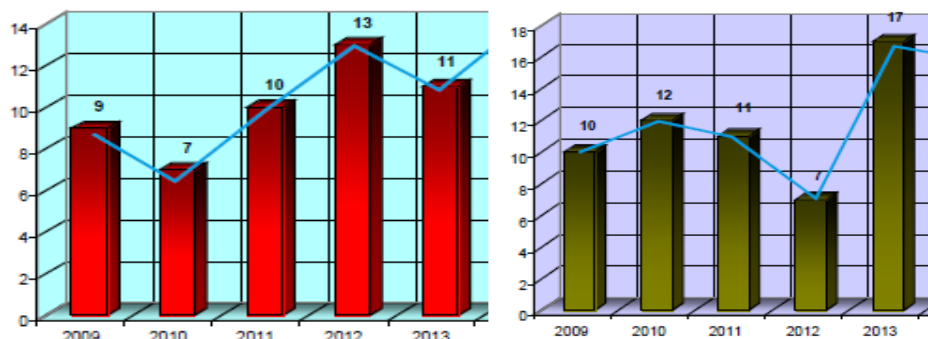
Од друга страна, освен бројните објективни и субјективни причини за возење со мотоциклите, постојат и оние кои се спротивни на овој став, кои се: скапа специјализирана опрема потребна за возење; мал простор за багаж и патници; не се погодни за возење во зимски услови; не се најудобни за долги патувања. Мотоциклот ги има и своите слабости: помеѓу хаубата и телото на мотоциклистот се наоѓа само заштитната опрема и кацигата; со мотоциклот потешко се менува правецот; подолг е патот на запирање; лесно може да се преврти; временските услови значајно влијаат на безбедноста на возење.

Секако, најголемата причина која не иде на прилог на возењето со мотоцикл е - зголемениот ризик од сообраќајни незгоди.

## АНАЛИЗА НА СОСТОЈБАТА НА БЕЗБЕДНОСТА ВО СООБРАЌАЈОТ

Во 2009 година, 53% од фаталните повреди на велосипедистите се случиле на патиштата надвор од населените места. Во 2012 година процентот се намалил на 44%. Мнозинството од велосипедистите загинале на патиштата во урбаните средини и затоа е неопходно да се даде поддршка на мерките за обезбедување наивна безбедност во сообраќајот, помагајќи да се постигне солидарно решение на проблемот преку слободно движење на сите учесници, со изработка на одвоени (од коловозот) велосипедски патеки и во урбаните и во руралните средини.

Потребно е, исто така, да се подготви информативен материјал составен од мапа на постоечки велосипедски патеки и брошури за совети за безбедно возење на велосипедистите, соодветно поставени на целата територија во градовите во Р. Македонија. Иако апсолутниот број на велосипедисти кои загинале покажуваат трендна опаѓање, нивното учество во вкупниот број на загина тие сè уште прилично високо, особено во споредба со европскиот просек.



Графикон 2. Преглед на вкупен број на загинали велосипедисти и мотоциклисти во сообраќајни незгоди во периодот од 2009-2013

Подигањето на нивото на безбедност за велосипедистите во сообраќајот на патиштата претставува јасен предизвик за периодот до 2020 година.

Во споредба со сите останати учесници во сообраќајот на патиштата, мотоциклистите се соочуваат со највисок ризик од смртоносни повреди и во исто време тие претставуваат голем ризик и за останатите учесници во сообраќајот. Најголем број од загиналите моторциклисти припаѓаат на возрастната група од 25-34 години. Од сегашните искуства се покажува дека несоодветната брзина на возење и неупотребата на заштитна опрема се главна причина за трагични незгоди. Бројот на продадени мотоцикли постојано расте, а во исто време постои несразмерен напредок во количината на продадена опрема за пасивна безбедност (кациги, одела, специјални чевли, рефлектирачка опрема...). Трендот на фатални незгоди на мотоциклистите во Р. Македонија е сличен на другите европски земји.

Моторциклистите претставуваат само 0,5 % од вкупниот број на учесници и приближно 10% од вкупниот број на загинали учесници во патниот сообраќај.

За поголема мобилност, воиднинажителитенаградовитеиопштинитекебидатпоттикнуванивокористењеनावелосипеди и моторцикли, кое ќесеостварувапрекумеркииактивностизанамаалувањенарискотзазагинувањеилиповредикакопоследичана судир со моторно возило.

## АКТИВНАТА И ПАСИВНАТА БЕЗБЕДНОСТ КАЈ МОТОЦИКЛИТЕ

Мотоциклот со своите конструктивно - технички и експлоатациони средства, одржување и начинот на управување во сообраќајот претставува еден од најзначајните фактори кои влијаат врз безбедноста во сообраќајот. Во најопшт случај, системите за безбедност на мотоциклот можат да се поделат во две основни групи:

1. Системи за активна безбедност (технички системи на возилото кои со своето делување треба да придонесат за намалување на веројатноста да дојде до сообраќајна незгода) и

2. Системи за пасивна безбедност (соодветен дизајн на ентериерот и технички системи вградени во возилото, како и заштитна опрема на возачите чија основна задача е со нивната изведба и делување да се намалат повредите на учесниците во сообраќајот - возачот, патниците па и пешаците).

Кај мотоциклите како системи за активна безбедност може да се набројат: безбедноста и ефикасноста на системот за сопирање, елементи на лесна и прецизна управљивост, безбедност-стабилност при праволиниско движење, безбедни гуми, безбедност во совладување на кривините, добра осветленост на патот при возење во намалена видливост и ноќе, застапеност на елементите на ергономија и биомеханиката, додека како системи за пасивна безбедност се: отсуство на оштрите елементи и делови кај мотоциклите, заштита на колената на возачот, заштита за стопалата на ослоните за нозе, заштита од пожар и облик и висина на седиштето.

Кај возачите на мотоциклите како системи за активна безбедност може да се набројат: благовремено и точно реагирање, добар осет на равнотежа, способност на координирано дејство на управувачки органи, тренинг и извежбана постапка за адекватни дејствија на промени на сообраќајни ситуации, додека како системи за пасивна безбедност се: заштитна кацига, заштитно одело, заштитна облека, заштитен прслук АИР-БАГ и заштитни ракавици.

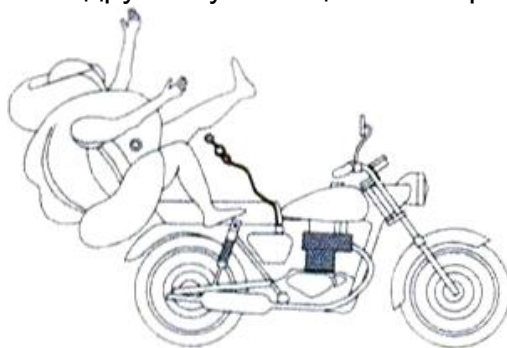
Различните услови на патот влијаат врз одржувањето на стабилноста при возење со мотоцикл. При возење со мотоциклот во правец делува влечната сила, силата на триење, силата на маса на мотоциклот и отпорот на воздух. При возење низ кривини делува и центрифугалната сила врз тежиштето на мотоциклот.

Триењето кое се остварува помеѓу коловозот и гумата на мотоциклот, е поголема кога е поголем и квалитетот на асфалтот и гумата, исто така триењето е поголемо на рапава површина, но се намалува со количината на вода на асфалт, што повеќе вода настанува воден клин.

Можните опасности при возење со мотоцикл се: нарушено здравје, бидејќи ветерот го разладува телото, а последиците може да бидат различни воспаленија, болни напнатости и вкочување на вратот, леѓата, рбетот и зглобовите;

нарушената стабилност поради лизгавиот коловоз, калта, песокот и камењата на коловозот; намалена видљивост при возење ноќе, по дожд и магла; јакиот бочен ветер го загрозува стабилноста на мотоциклот, при што може да дојде до паѓање или превртување на мотоциклот; страдање или повреди на возачот во типичните сообраќајни незгоди во кои содејствуваат (Figure 1).

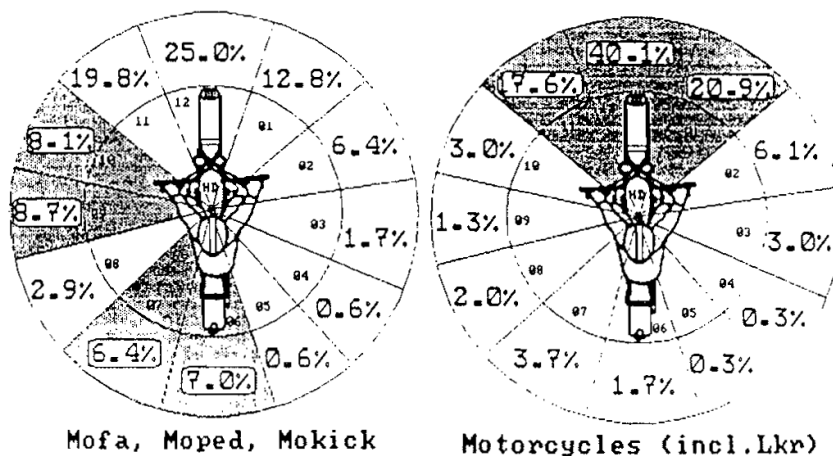
Најчестите видови на сообраќајни незгоди во кои содејствуваат возачите на мотоцикли се: непочитување на правилата на првенство на минување, при што во правилата на незгодите кои настанале завршуваат со тешки телесни повреди, инвалидитет или смрт на возачите; налет на возилото напред, бидејќи возилото често напред изненадувачки и силно сопира, што најчесто завршува со налет на возилото, ако не држи доволно растојание; излетање од коловозот, поради неприлагодена брзина според условите на патот, грешки во возење, судир на мотоциклот поради грешките на другите учесници во сообраќајот.



Слика 11. Можна опасност од отфрлување од мотоцикл

## РЕЗУЛТАТИ

Влијанието на видот на возилото врз видот на незгодата и врз правецот на движењето на силата е јасно претставено. Помалите моторни двоточкасти возила се многу почесто удрени од опонентите во незгодите отколку поголемите и потешки моторни двоточкасти возила кои имаат челен судар со опонентите (Figure 2). Велосипедите и мопедите најчесто имаат страничен судир од левата страна, додека кај мотоциклистите правецот на судир е во чело на возилото.



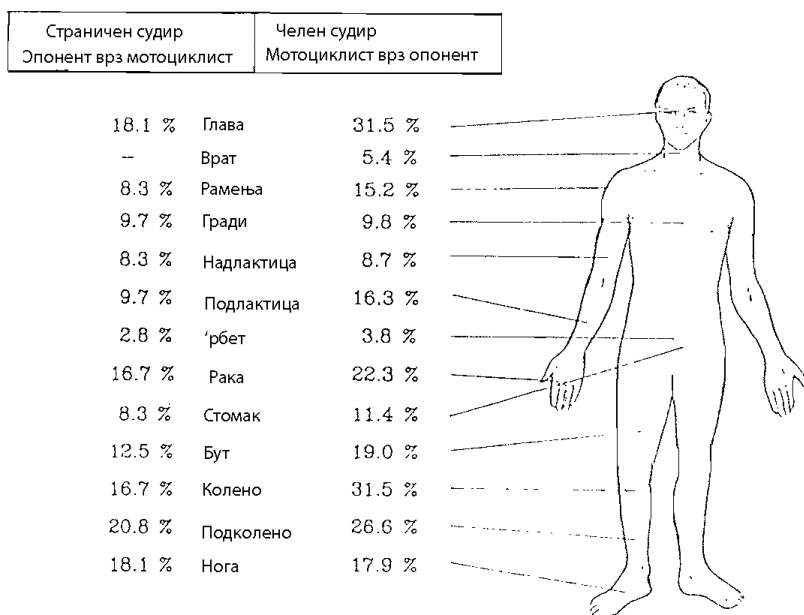
Слика 12. Дистрибуција на влијанието на правците на судир кон двоточкасти возила (во групи)

Кај велосипедистите и мотоциклистите, воопшто, постојат две можности на повреди: обичан пад без судир со возило и повреда кога се судира со возило. Кај падот, велосипедистите или мотоциклистите може да имаат повреди на рацете, посебно на зглобовите на палците каде често кај возачите доаѓа до ишчашување (дислокација).

Кај судирот на велосипедистите/мотоциклистите со патнички автомобил постојат три фази: примарен контакт, фрлање и отфрлување и паѓање. При контакт со друго возило или препрека пред себе, повредувањето на возачот или совозачот се одвива во неколку фази: после контактот, телото иде напред, потоа се враќа назад, и се случува неколку пати. Доколку возилото се удира од позади, главата се одвраќа назад и настанува повреда на вратот која се вика „удар на камшик“.

Истотака, не се ретки случаевите на повреди на учесниците на сообраќајот, кои поради некои примарни заболувања (незвестица, епилепсија) како природни смрти на учесниците во сообраќајот, поради инфаркт, мозочен удар, итн. Постојат и други сообраќајни незгоди, како што се судир на пешак и велосипедист, судир на возило и дете на тротинет, итн.

Во дистрибуцијата на повредите кое коренспондира со двата вида на судири: челен и страничен судир (Figure 3) може да се види односот на повредите кон долните екстремитети, кои земаат голем процент и се скоро равни со другите. Разликата на овие два вида групи на незгоди се прикажува во повредите на главата. Кај челните судири е главната цел да се намали ризикот на повредите. Воопшто, може да се рече дека ризикот од повредите за мотоциклистите е пониска кога тој е инволвиран во страничен судир. Во челен судир, во приближно секој дел на телото, интензитетот на повредите е поголем.



Слика 13. Дистрибуција на повредите при страничен и челен судир

Од лично искуство треба да напоменам, дека неодамна ми се случило сообраќајна незгода, јас како возач на моторцикл скутер, останав повреден.

Возејќи се право, близу десниот раб на коловозот по десната сообраќајна лента на булеварот, од левата страна односно левата сообраќајна лента имав две возила кои се возеа едно по друго. За миг, задното возило, почна да го прстигнува предното возило, без да се увери дека во десната сообраќајна лента се движи возило односно моторцикл, и без да даде знак со покажувачот на правецот, со тоа што ми го попречи движењето, и неможејќи да превземам други дејствија, пробав да сопирам, но изгубив контрола и се лизнав на десната страна, и го удрих возилото во долниот дел во десната страна, и јас се соборив на земја. Носев заштитна кацига, која ме заштити од повредите на главата, и од соборувањето, иако носев кожна јакна која малку ме штитеше од повредите, сепак добив повреди на рацете, односно дланките, левиот лакт, десната страна од предниот дел на градите, десната страна на десниот бут. Доколку носев соодветна заштитна опрема на мотоциклот, освен заштитната кацига, на тој вид на незгода, ќе имав помалку повреди на телото.



Слика 14. Оштетувања кај моторот, кожната јакна и повреди во телото (после 10 дена)

## ДИСКУСИЈА

Добрата заштитна опрема е дизајнирана за да помогне да се заштити вашето тело во случај на сообраќајна незгода. Тоа е најдобра одбрана во случај на незгода. Иако заштитната опрема не може да ги спречи сите повреди, тоа може да ја намали сериозноста и да спречи некои непријатни повреди. Таа, исто така ве држи удобно и го прави возењето повеќе како пријатно искуство. Правата опрема чини пари; ако не се носи права опрема, може да се плати поголема цена во болка и да има поголеми страдања по незгодата.

Како заштитана опрема, освен кацигата може да се набројат: заштитна јакна (по можност со аир баг состав), кожни панталони, кожни ракаици, високи кондури или чизми, наочари за сонце, заштитен појас.

## Кацига

Кацигата е најважен дел на заштитната опрема на мотоциклистите, со нејзиното носење возачот на мотоциклот може да го спаси својот живот. Во случај на пад на возачот од мотоциклот поради повреди на главата, умираат голем број на возачи. Повеќе од половина на возачите би ја преживеле сообраќајната несреќа да би носеле кацига на главата. Кацигата во голем број на случаи може да ги ублажи или отстрани штетните или смртни последици. Во текот на возењето кацигата мора да биде правилно поставена на глава и закопчана.

Постојат две видови на кациги, обични и интегрирани кациги. Обичните кациги се лесни и добро ја штитат главата, додека заштитата е намалена кај ударите во лице. Интегрираните кациги се затворени, многу се безбедни и добро ја штитат главата и лицето. Во текот на возењето мора да бидат затворени, додека визирот спуштен.



Слика 15. Обична и интегрирана кацига

Последиците од неносење на кацига може да бидат трагични (смрт, траен инвалидитет, обезличување на лицето, итн.) и при возење со помали брзини. Во случај на пад од мотоциклот, страдањата се неминовни. Неносењето на кацигата на глава во текот на возењето претставува прекршок.

Кацигата може да се направи од широката палета на различни материјали кои влијаат на сила и апсорпција од удар, како и тежината. Ова ги вклучува материјалите како пластика, стаклени влакна и јаглородни влакна за школката, и баласт од пена во внатрешниот дел. Поскапите шлемови (кациги) може да обезбедат подобра вентилација и може да се направат од полесни материјали.

## Заштитна облека (јакна и панталони)

Облеката треба специјално да биде дизајнирана за да ги заштити мотоциклистите, и возачите на скутери и нивните патници, и треба да биде изработена од квалитетна кожа или синтетички материјал отпорен на абразија (најчесто најлон или полиестер). Постојат и заштитна опрема во вид на фармерки за мотоциклисти, кои се со екстра синтетичко засилување. Шевовите треба да бидат цврсти и лесно да се закопчат. Патентите треба да бидат цврсти и добро зашиени за материјалот. Материјалот треба да биде цврст и да остане за време на незгодата, и да не може да се спушти по телото или да се лизга по должина на патот.



Слика 16. Заштитна облека и оклоп за телото

Опремата за да ве заштити правилно, треба да биде добро вклопена. Ако е многу голема, заштитниците нема да ви стојат во правилна положба за време на

незгодата. Ако е премногу мала големина, ќе биде непријатно и ќе ја прекине циркулацијата на крвта во рацете и нозете. Пред да се порача опремата потребно е да се проба, да се движиш со опремата неколку минути, да се свиткате и да клекнете доле, и да пробате да седнете на скутер или моторцикл за да ја проверите удобноста.

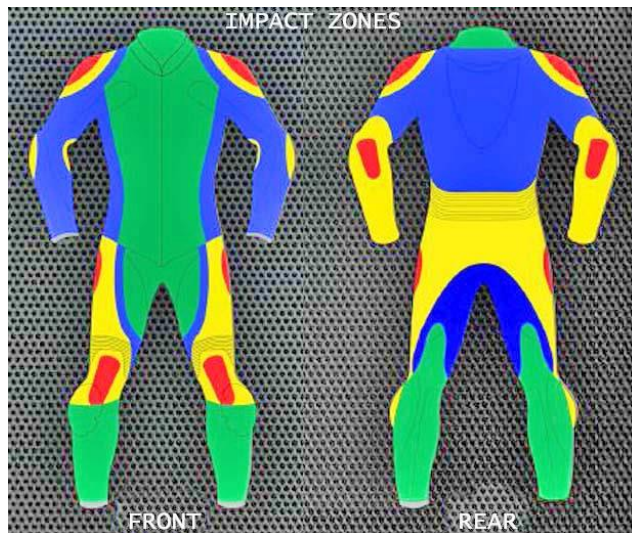
Треба да се бараат јакни и панталони кои имаат вградено оклоп за телото. Оклопот може да се направи од различни материјали, вклучувајќи, пластика, лиена гума и пена. Оклопот на јакната треба да ги заштити рамењата, лактите и 'рбетот, додека оклопот на панталоните треба да ги заштити колковите и колената (слика 6).

Различните делови на телото имаат различно ниво на ризик на повреди од незгоди (слика 7). Кај **црвената зона** потребни се штитници при удар и материјали со висок отпор на абразија.

**Жолтата зона** потребно е да се заштитат со екстра слоеви на материјал. Во овие зони спаѓаат: рамења, лакти, подлактица, колкови, страни на нозете, колена и потколениците.

**Сината зона** претставува површина со среден ризик на влијание и абразија (останатите делови, задниот дел на торзото, предната страна на градниот кош, задниот и предниот дел на бутите, итн).

**Зелената зона** – може да се направи од мрежа или материјали за вентилација и еластичитет со релативно ниско ниво на абразија за удобност (преден дел на градите, под рацете, внатрешната страна на лактите, предниот дел на стомакот и препоните, внатрешноста на бутите, задниот дел на колената и долниот дел на нозете се обично покриени со чизми).



Слика 17. Зона на ризик на повреди





## Ракавици

Добри ракавици за мотоциклистите се тие ракавици направени од силна кожа или квалитетен синтетички материјал кои се отпорни на абразија. Се разликуваат од другите ракавици кои што се за скијање, градинарство или тие што ги држат вашите раце топло, и служат малку за заштита на рацете. Правите ракавици за мотоциклисти се прават со екстра засилување, како што се со баласт или влошки, во задниот дел на раката и прстите. Ракавиците треба да бидат удобни, за да можете да ги користите контролните уреди и да држите контрола врз рачките. Тие мора да се вклопат со прицврстување околу зглобот на раката, за да не може да падне од раката после незгодата.

## Чизми

Мотоцикличките чизми се наменски изградени, немаат конци, прстени или други парчиња, кои може да се фатат за време на незгодата. Тие имаат закопчување кои не можат да бидат ослободени случајно. Квалитетните чизми се направени од најсилниот степен на кожа или од синтетика, како што е смолата на микрофиберот. Чизмите треба да имаат екстра прицврстување околу прстите, петата, глуждот и околу потколеницата. Овие површини се во ризик за време на незгодата. Правите чизми се дизајнирани да останат безбедно на вашите нозе, и да не се извадат за време на незгодата. Значи, тие треба да се припијат кон телото, но сепак доволно удобни за да се шетате во нив.

Освен ова заштитна опрема, пожелно е да се користат и останата заштитна опрема: наочари за сонце, заштитен појас, итн.



Слика 19. Заштитни  
чизми

## ЗАКЛУЧОК

Заштитна опрема помага да се заштити вашето тело во случај на сообраќајна незгода. Тоа е најдобра одбрана во случај на незгода. Иако заштитната опрема не може да ги спречи сите повреди, тоа може да ја намали сериозноста и да спречи некои непријатни повреди. Таа, исто така ве држи удобно и го прави возењето повеќе како пријатно искуство. Ако не се носи права опрема, која може да чини повеќе пари, може да се плати поголема цена во болка и да има поголеми страдања по незгодата.

Законските прописи во РМ предвидуваат како задолжителна заштитна опрема да се носи кацига, но другата заштитна опрема не е задолжителна. Во

светот се води кампања да освен кацигата, возачите на моторциклите и велосипедистите да носат и друга заштитна опрема за последиците од сообраќајните незгоди бидат што помали. На пример една кампања е „Опрема на будали или кул опрема“, која се води за да се зголеми свеста кај возачите на двоточкастите возила, бидејќи тие како пешаците се најранлива категорија на учесниците во сообраќајните незгоди.

**Fool's Gear** **Cool Gear**

**HEAD.** Considered precious by sensible people; never exposed by the pros. When fully in view, allows immediate identification of unsafe person not using his or hers. Hand out rider education info on sight.

**HELMET.** Most important piece of protective gear a rider can use. Protects against head injury, windblast, cold, and flying objects. Full-face helmet recommended.

**EYES, EARS AND FACE.** Exposure leads to irritated eyes, noise-deafening windblast, and distracting impacts from bugs and road debris.

**FACESHIELD.** "Saves face." Any rider who's been hit in the face by stones, insects, or debris can tell you the benefits.

**HANDS.** *Au naturel* (not for long). Known to lock into curled position when exposed to cold; not genetically evolved to withstand abrasion.

**GLOVES.** Keep hands comfortable, functional, and protected. There's an infinite variety for all seasons.

**BARE LIMBS.** A phenomenon seen only in riders who think it's other people who crash. Subject to ridicule in riding circles.

**JACKET AND PANTS.** Long sleeves and sturdy trousers resist abrasion and protect against sunburn, dehydration, or hypothermia. Some riders wear padded gear with "body armor" for more protection. Light colors in the daytime and reflectivity at night make it easier for car drivers to see you.

**FLIP FLOPS.** Terminology for what sandals, toes and feet do upon contact with road surfaces, shift lever, brake pedal, or footrests.

**BOOTS.** Provide protection against foot and ankle injuries and give you a good grip on footrests or road surfaces.

**BOTTOM LINE.** Fool's gear identifies an unaware rider. Learn how to avoid embarrassment, ridicule and injury, while gaining valuable skills and knowledge by completing an MSF RiderCourse®.

**BOTTOM LINE.** Dress for the ride as well as for the crash. Proper riding gear allows you to enjoy the ride in comfort and helps minimize injury.

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or contact

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SAFETY FOUNDATION®

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Слика 20. Кампања „Опрема на будали или кул опрема“

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## Preventivne mjere osiguranja cestovnih prometnica u Gorskom kotaru od naleta vozila na divljač



**Svjetlana Glad, dipl.ing.**

**Tanja Burić, dipl.ing.**

## **SAŽETAK**

### **Preventivne mjere osiguranja cestovnih prometnica u Gorskom kotaru od naleta vozila na divljač**

U središnjem dijelu Republike Hrvatske smještena je regija Gorski kotar kroz koju prolazi jedan od značajnijih cestovnih pravaca „Zagreb-Rijeka“ koji povezuje kontinentalni dio zemlje sa primorskim.

Po svojoj reljefnoj strukturi Gorski kotar se ubraja u brdsko-planinsku regiju što uvelike određuje i karakter prometnica koji kroz njega prolaze (usponi, padovi, krivine oštri lukovi i dr.).

Klimatski uvjeti u Gorskom kotaru izvori su opasnosti koji posebno u zimskom periodu mogu ugroziti sigurnost odvijanja cestovnog prometa kao što su skliski i zaleđeni kolnici, smanjena prohodnost uslijed većih količina snijega.

Reljefni karakter Gorskog kotara, s obzirom da je to pretežno područje prekriveno šumom koja je stanište brojnih divljih životinja (srneća divljač, medvjedi, lisice, zečevi...) predstavlja poseban izvor opasnosti u sigurnosti odvijanja cestovnog prometa uslijed naleta divljih životinja na sama vozila.

U našem radu pokušat ćemo ukazati na problem koji mogu izazvati naleti divljači na cestovna vozila pri čemu mogu nastati nezgode s materijalnim štetama na vozilima, lakše prometne nesreće s ozljedama sudionika, te stradavanja i ozljeđivanja samih životinja od kojih neke predstavljaju i ugrožene vrste.

Kako su naleti divljači na cestovna vozila dosta česti na prometnicama u našoj regiji bilo da se radi o lokalnim, županijskim, državnim cestama ili čak i na samim autocestama istaknut ćemo važnost prevencije i onemogućavanja prilaska divljači na prometnice kako bi se povećala sigurnost odvijanja cestovnog prometa.

Da bi se podigla razina sigurnosti odvijanja prometa i smanjila opasnost od naleta divljači na vozila potrebno je uložiti više sredstava u samu signalizaciju, kao i opremu koja će divlje životinje odvraćati od prelaska preko prometnica bilo da se radi o električnim ogradama, zvučnim efektima i ostalo.

## Cestovna mreža Gorskog kotara

Gorski kotar je regija smještena u središnjem sjeverozapadnom dijelu Republike Hrvatske kroz koju prolaze značajniji prometni pravci koji povezuju kontinentalni dio zemlje sa primorskim.

Kroz kratki povijesni pregled razvoja cestovne mreže Gorskog kotara možemo reći da je davne 1726. godine započeta izgradnja prve prometnice koja je prolazila kroz Gorski kotar, a to je bila „Karolinska cesta“ koja se uglavnom protezala nenastanjenim terenom, udolinama i teškim planinskim prijevojima. Upravo to je uvjetovalo 1803. godine početak izgradnje Lujzijanske ceste koja je danas kategorizirana kao državna cesta i koristi se u odvijanju cestovnog prometa povezujući Karlovac sa Rijekom.

U novijoj povijesti razvoju cestovne mreže doprinosi i izgradnja moderne auto-ceste A3 „Bosiljevo-Rijeka“.

Ceste Gorskog kotara uglavnom su kategorizirane kao:

Kategorija ceste	Duljina u km (kroz Gorski kotar)
Auto cesta A3 (Bosiljevo-Rijeka)	87
Državne ceste	160,90
Županijske ceste	52,90
Lokalne ceste	117,80
Ukupno	418,60

## Opasnostu sigurnosti odvijanja cestovnog prometa na prometnicama Gorskog kotara - nalet vozila na divljač

Jedna od specifičnosti u sigurnosti odvijanja cestovnog prometa na prometnicama Gorskog kotara je opasnost naleta vozila na divljač. U posljednje vrijeme sve je češća pojava prelaska divljači preko cesta, a zastupljena je na svim kategorijama cestovnih prometnica u Gorskom kotaru bilo da se radi o lokalnim, županijskim i državnim cestama pa čak i na auto-cesti koja bi trebala u tom pogledu predstavljati prometnicu sa najmanjim rizikom naleta vozila na divljač.

Gorski kotar je brdsko planinska regija prekrivena šumom koja predstavlja stanište brojnim divljim životinjama, a s obzirom da se stanište divljih životinja mijenja i divljač se sve više približava naseljenim područjima u potrazi za lakšim pronalaskom hrane, u današnje vrijeme sve je veća pojava divljači na prometnicama (slika1.i 2.).

Prema provedenom istraživanju na prvo mjesto ćemo staviti srneću divljač (srne, jeleni, košute) kao mogući izvor opasnosti, a zatim medvjede i u nešto manjoj mjeri divlje svinje, zečeve, lasice jer oni prema provedenom istraživanju predstavljaju manju opasnost u sigurnosti odvijanja cestovnog prometa.

Najčešći slučajevi su kada vozilo naleti na divlju životinju, dok su nešto rjeđi slučajevi kada upravo divlja životinja naleti na vozilo. Uglavnom se smatra da je vozač odgovoran kod nastanka prometne nezgode (s manjom ili većom materijalnom štetom) ili prometne nesreće (s lakšim ili težim ozljedama) jer je on taj koji je mogao prilagoditi brzinu kretanja vozila kako bi na vrijeme mogao reagirati i izbjeći nalet. Najveću opasnost za divljač po život predstavljaju teretna motorna vozila, dok nalet motocikla ili putničkog automobila može uzrokovati samo materijalnu štetu na vozilu i biti manje opasno po život životinje.



Slika 1.i 2. Divlje životinje na cesti

## Sigurnosne mjere sprečavanja nastanka prometnih nezgoda/nesreća kod naleta vozila na divljač

Sredstva koja se koriste kako bi se izbjegle mogućnosti naleta vozila na divljač odnosno upozorilo vozača na mogućnost nastanka nezgode na lokalnim, županijskim i državnim cestama uglavnom se temelje na postavljanju znakova opasnosti „divljač na cesti“ (slika 3.).



Slika 3. Prometni znak opasnosti „Divljač na cesti“

Auto-ceste se u tom slučaju osiguravaju fizičkim barijerama odnosno postavljanjem zaštitnih ograda (slika 4.) kako bi se spriječio prelazak životinja preko tih prometnica s obzirom da su one namijenjene za brza kretanja vozila (130 km/h) pri čemu je vozaču vrlo teško na vrijeme izreagirati i izbjeći nalet na divlju životinju.



Slika 4. Zaštitna ograda uz auto-cestu



Također prateći prirodno kretanje životinja na kritičnim mjestima uz zaštitnu ogradu uz autocestu postavlja se i zvučna signalizacija (slika 5.) koja prilikom nailaska i približavanja životinje zaštitnoj ogradi uključuje visokofrekventne zvukove koji odbijaju životinju s tog područja.



Slika 5. Uređaj zvučne signalizacije

Na dionici auto-cesta „Bosiljevo-Rijeka“ koja prolazi kroz Gorski kotar zabilježeni su slučajevi da divlje životinje kao što su srne znaju preskočiti zaštitnu ogradu ili da medvjedi znaju „spustiti“ odnosno popesti se preko žice zaštitne ograde koja im ometa njihov prirodni tok kretanja.

Upravo iz tog razloga uz zaštitnu ogradu postavljena je na pojedinim mjestima na cijeloj dionici kroz Gorski kotar i električna oграда (slika 6.) koja ima ulogu odbijanja životinja od same prometnice.



Slika 6. Električna oграда uz auto-cestu

Kako se ipak ne bi narušio životni prostor životinja i presjekao njihov prirodni tok kretanja upravo na auto-cestama koje su ograđene zaštitnim ogradama kako bi se povećala sigurnost kretanja vozila i smanjio rizik od naleta vozila na divljač, divljim životinjama je osiguran na određenim dionicama prirodni prelazak preko takve prometnice (slika 7.).



Slika 7. Prijelaz za divlje životinje na auto-cesti

Ukoliko se divlja životinja zatekne s one strane zaštitne ograde i to uz samu prometnicu ophodarske službe i obavještajni centar auto-cesta moraju na vrijeme reagirati i prometnom signalizacijom upozoriti vozače na mogućnost naleta na divlju životinju, a potom uz što manji rizik životinju navesti prema rampi (slika 8.) koja će joj omogućiti prelazak preko ograde.



Slika 8. Rampa za izlaz životinja s auto-ceste

## Odgovornost za štetu koju uzrokuje divljač

Zakon o cestama sadrži odredbe vezane za odgovornost za štetu nastalu na javnoj cesti zbog naleta na divljač koja kaže da pravna osoba koja upravlja javnom cestom odgovara za navedenu štetu ako javna cesta nije označena prometnom signalizacijom i opremom sukladno propisima.

Zakon o lovstvu kaže da je vozač odgovoran za štetu na vozilima koja nalete na divljač na cesti ako nije prilagodio vožnju dopuštenoj brzini (tako da može pravovremeno postupiti), prometnim pravilima ili prometnim znakovima. U suprotnom za štetu odgovaraju osobe koje gospodare prometnicom na kojoj je šteta nastala, samo iznimno odgovara ovlaštenik lova i to samo ako je šteta nastala za vrijeme skupnog lova.

Zakon o javnim cestama kaže da se prometni znakovi, signalizacija i oprema postavljaju na javnoj cesti na temelju Prometnog projekta a za one ceste koje nemaju prometni projekt mjerodavno je postojeće stanje prometne signalizacije i opreme. Izmjene projekta ili postojećeg stanja moguće je ostvariti samo uz prethodnu suglasnost ministra odnosno Ureda državne uprave u županiji nadležnoj za poslove prometa. Dakle ne može pravna osoba koja upravlja prometnicom po svom izboru postaviti prometni znak "Divljač na cesti" i uz taj znak ograničiti brzinu na nekom dijelu ceste (oni ni ne znaju gdje su granice lovišta odnosno na kojim mjestima divljač učestalo prelazi cestu). Sporno je da štetu na vozilima od divljači ili obrnuto snosi pravna osoba koja gospodari prometnicom a nije ni mjerodavna postaviti prometni znak "Divljač na cesti", niti ograničiti brzinu.

Nepredvidivo je kojom brzinom se kreće neko motorno vozilo, a kojom brzinom trči neka divljač pogotovo ako se sudar dogodi na području šume, kao što je čitavo područje gorskog kotara i kod smanjene vidljivosti. Postavlja se pitanje gdje su te granice ograničenja prometa odnosno tko treba odgovarati za nastalu štetu?

Na mreži prometnica Gorskog kotara su postavljeni prometni znakovi koji upozoravaju vozače na divljač ali isto tako postoje i mjesta gdje divljač prelazi cestu gdje tih znakova nema.

Da li je moguće sva ta mjesta označiti i zaštititi, odnosno tko će snositi odgovornost?

Trenutna postupanja u praksi su:

- svi vozači u slučaju naleta vozila na divljač zovu policiju i lovačka društva radi uviđaja, utvrđivanja štete i eventualne predaje divljači lovcima osim ako je divljač pobjegla;
- nakon toga vozači prijavljuju štetu osiguravateljima a lovačka društva i osiguravatelji ih upućuju na naknadu štete kod pravnih osoba koja gospodare prometnicama ili njihovih izvođača,
- vozači ne priznaju da bi oni bili odgovorni za štetu odnosno izjavljuju da su vozili sukladno prometnim znakovima te očekuju da im se nadoknadi šteta na oštećenom vozilu;

- policija vrši uviđaje prometne nezgode i o tome sastavlja zapisnik (konstatira gdje i kada se dogodila prometna nezgoda sa eventualnim tragovima dijelova divljači na oštećenim vozilima te sa eventualnim upisom o stanju prometne signalizacije u smislu da li postoji kakav prometni znak);
- pravne osobe koje gospodare prometnicama ili njihovi izvođači kada prime zahtjev za naknadu štete u pravilu isti odbijaju jer smatraju da nema njihove odgovornosti za ovakve štetne događaje i da je odgovornost na lovačkim društvima;
- lovačka društva odbijaju zahtjeve vozača i osiguravateljskih društava odnosno priznanje odgovornosti za štetu i upućuju oštećene vozače na pravne osobe koje gospodare prometnicama;
- osiguravatelji u ovom trenutku odbijaju isplatiti štete jer to niti ne smiju bez priznanja odgovornosti bilo od strane lovačkih društava ili od strane pravnih subjekata koji gospodare prometnicama.

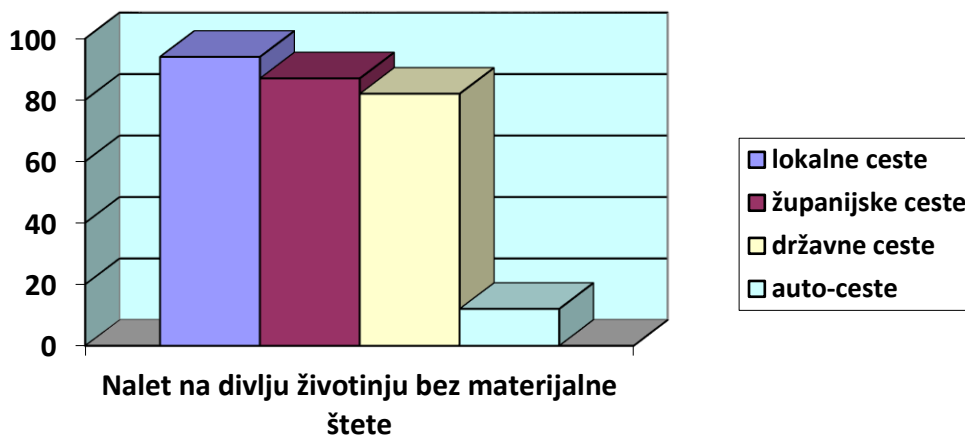
U zakonu je unijeta nejasna odredba koju tumači svatko na svoj način i koja onemogućava brzo i jednostavno rješavanje problema odgovornosti podmirjenja štete nastale kod naleta divljači na vozilo ili obratno. Svi sudionici ovakvih događaja imaju svoje stajalište smatrajući da odgovornost leži na nekom drugom a ne na njima.

Rješavanje ovog problema svedeno je na odluku suda koja se temelji u većini slučajeva na objektivnoj odgovornosti koja se treba rješavati posebno za svaki pojedini slučaj ovisno o okolnostima nezgode.

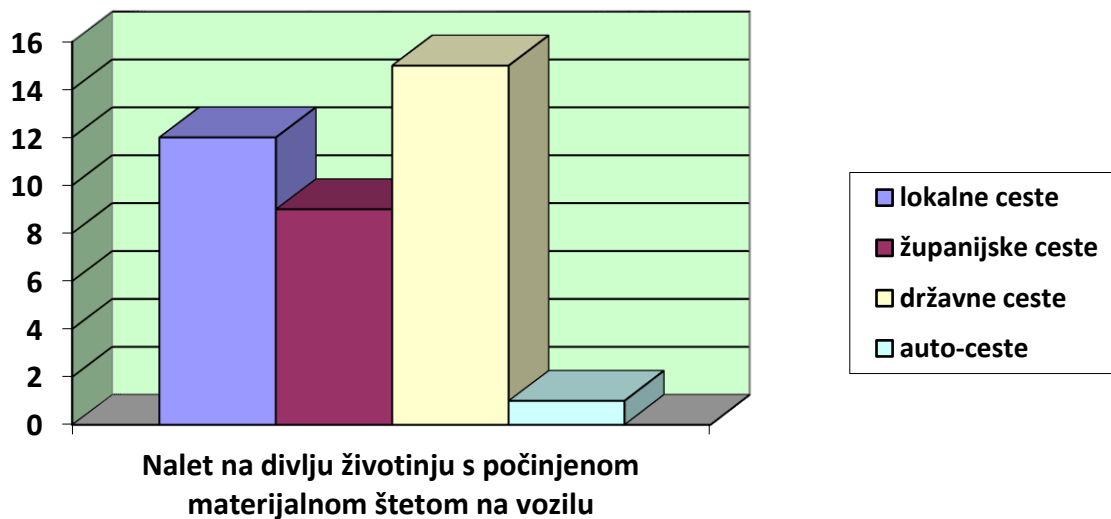
## Rezultati provedene ankete sa vozačima koji su upravljali vozilom na prometnicama Gorskog kotara

Prema provedenom anketnom istraživanju na 100 ispitanika koje smo provele sa sudionicima koji su se kretali cestovnim motornim vozilima (osobni automobili, motocikli, teretna motorna vozila – kamion) lokalnim cestama, županijskim cestama i državnim cestama Gorskog kotara i na izlazu s auto-cesta „Bosiljevo-Rijeka“ – Kikovica došli smo do sljedećih podataka:

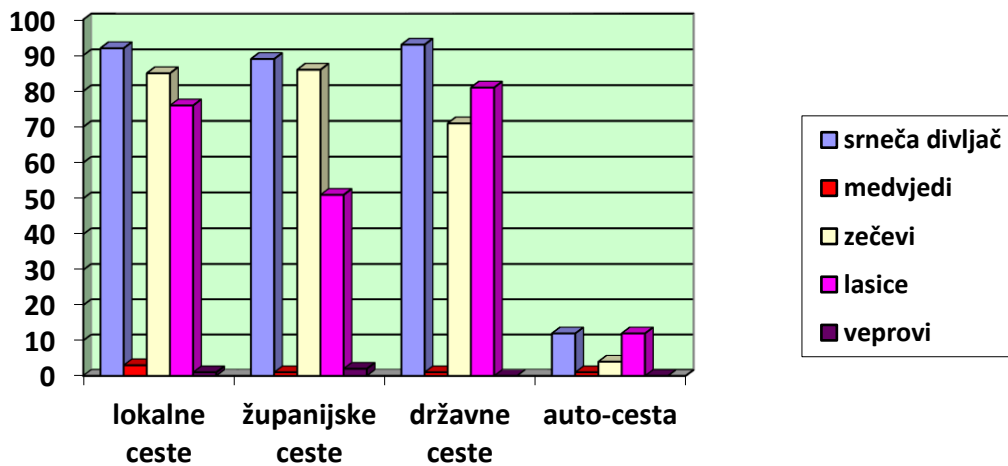
a) broj ispitanika koji su se kretali motornim vozilima na prometnicama Gorskog kotara i imali susret s divljom životinjama bez počinjenih materijalnih šteta (srna, medvjed, lasica, zec...)



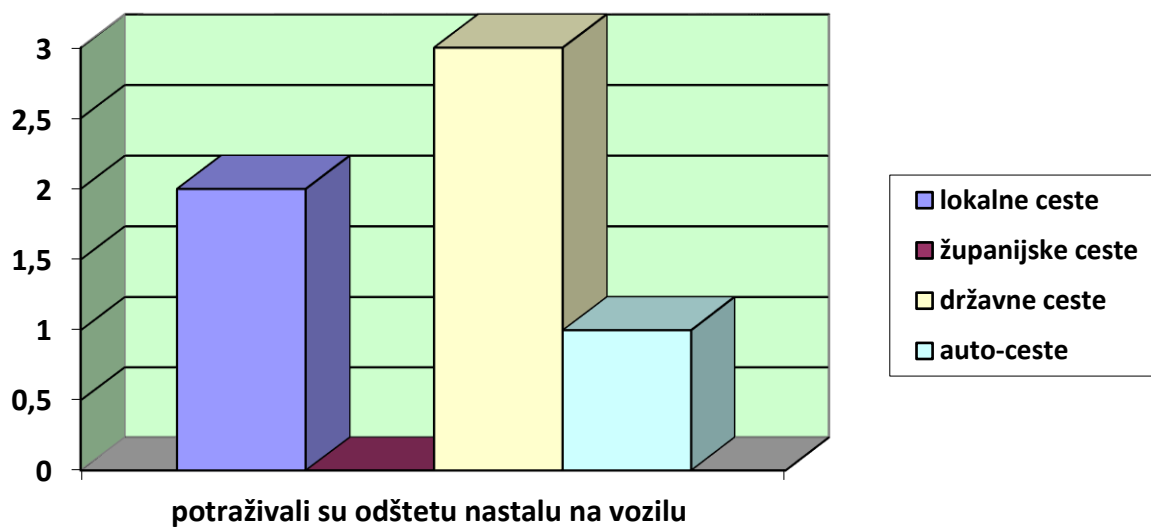
b) broj ispitanika koji su vozilom naletjeli na divlju životinju i pritom počinili materijalnu štetu



c) vrsta divljači s kojom su se ispitanici najčešće susretali na cestama Gorskog kotara



d) broj ispitanika koji su potraživali odštetu nastalu od naleta divljači na vozilo



## **Prijedlozi sigurnosnih mjera sprečavanja nastanka šteta od naleta vozila na divljač**

Kao što smo već prethodno spomenule divlje životinje mijenjaju svoje stanište i približavaju se naseljima, a ujedno samim tim obitavaju u blizini prometnica, kako bi lakše pronašle izvor hrane.

Ukoliko bi lovačka društva raspolagala statističkim podacima gdje se nalazi kritična točka na kojoj životinje prelaze prometnice, mogli bi im u tim područjima uzimajući u obzir radijus njihovog kretanja, osigurati hranu i zaklon podalje od naseljenog mjesta i prometnica.

Na kritičnim mjestima gdje je zabilježen veći postotak prelaska divljači preko prometnica, a tu se prvenstveno misli na lokalne, županijske i državne ceste bilo bi dobro raznim zvučnim sredstvima koja bi se aktivirala nailaskom životinje odvratiti je od prelaska preko prometnice ili postaviti razna mirisna odbojna sredstva koja bi ih također udaljavala.

Unatoč i tim mogućim mjerama kojima bi se možda udaljile divlje životinje od prometnica, teško je kontrolirati njihovo kretanje, jer one imaju prirodno određene putanje kojima se učestalo kreću u svom prostoru.



Literatura:

Zakon o cestama (NN 84/11, 22/13, 54/13, 148/13, 92/14)

Zakon o lovstvu (NN 140/05, 75/09, 14/14)

Ključne riječi:

divljač, ceste, odgovornost za štetu



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## Preventive provisions to ensure the roads in Gorski kotar from collisions of wild animals with vehicles



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### **ABSTRACT**

## **Preventive provisions to ensure the roads in Gorski kotar from collisions of wild animals with vehicles**

The region of Gorski kotar is situated in the central part of the Republic of Croatia and one of the most important road routes goes through it, which connects the continental and the littoral area of the country.

For its relief structure, Gorski kotar is the mountainous region which largely determines the character of the road which goes through it (upgrades, declines, sharp turns, et al).

Climate conditions in Gorski kotar are the sources of danger that in the period of winter, especially, may endanger the safety of road traffic such as slippery and icy pavements and reduced mobility due to large quantities of snow.

The relief character of Gorski kotar, considering that it is the area mainly covered by forest and the habitat to many wild animals( deer, bears, foxes, rabbits etc.), represents a particular source of danger in the safety of road traffic due to the collisions of wild animals on the vehicles.

In our work, we will try to point out a problem caused by the collisions of wild animals on the vehicles when accidents can occur with material damage to the vehicles, minor traffic accident with injured participants, and death and injury to the animals themselves and some of them are endangered species.

We will feature the importance of prevention and preventing the animals' approach to the roads in order to increase the safety of road traffic because the collisions of wild animals with the vehicles are very often in our region on local roads, county roads, state roads or even on highways.

To improve the level of the safety of traffic and reduce the risk from the collisions of wild animals with vehicles, it is necessary to invest more resources in the signalling as well as in the equipment to deter wild animals from crossing roads with electric fences, sound effects etc.

### The road network of Gorski kotar

Gorski kotar is a region situated in the middle north-western part of The Republic of Croatia through which goes significant road directions that connect the continental and the littoral area of the country.

Through a brief historical overview of the road network development of Gorski kotar, we can say that the construction of the first road that passed through Gorski kotar was started in 1726 and that was the „Karolina road“ which passed through uninhabited areas, valleys and mountain ranges. That was the reason why in 1803 the construction of a new road named „Lujzijana“ was started. Today, this road is categorized as a state road and it connects Karlovac with Rijeka.

In recent history of the road network development is the construction of the modern A3 Highway „Bosiljevo-Rijeka“.

Roads of Gorski kotar are categorized as:

Road Category:	Lenght in km (through Gorski kotar)
Highway A3 (Bosiljevo-Rijeka)	87
State roads	160,90
County roads	52,90
Local roads	117,80

Total	418,60
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## Dangers in safety of road traffic in Gorski kotar – Wildlife Vehicle Collision

One of the specific things about the safety of road traffic in Gorski kotar is the danger of wildlife vehicle collisions. Lately, the animal's crossings of the roads are more common and notable on every road category in Gorski kotar. It is the same if we talk about local, county or state roads or even the highway which should provide the least amount of danger from wildlife vehicle collisions.

Gorski kotar is the mountainous region mainly covered by forest and the habitat to many wild animals, considering that the habitat of the animals is changing and the animals are coming closer to the inhabited areas in search for food. Nowadays, there is an increasing occurrence of wildlife on the roads. (picture 1 and 2).

According to the research, as a potential source of danger, in the first place are the deer (roe deer, hart, doe) then the bears and to less extent the wild boars, rabbits and weasels.

The most common cases are when a vehicle hits the animal instead of the animal running onto the vehicle. Mostly, it is considered that the driver is responsible for the accident (with small or big material damage) or the accident (with minor or major injuries) because he could have adjusted the speed of the vehicle to react in time and avoid the animal. The greatest danger for wildlife are cargo vehicles while a motorcycle or a family car can just cause material damage on the vehicle and be less dangerous.



Picture 1 and 2 Wild animals on the road

## Safety measures to reduce the number of wildlife vehicle collisions

The resources that are used to avoid possibilities of wildlife vehicle collision or alerting the driver of the possibility of an accident on local, county and state roads are usually road signs that say „Wild animals on the road“ (picture 3).



Picture 3 Road sign of danger „Wild animals on the road“

Highways are provided by physical barriers and fences for protection (picture 4) to stop animals crossing those roads since they are meant for fast vehicle movements (130 km/h) at which it is hard for the driver to react in time and avoid the animal.



Picture 4 The highway fence

Also, by following the natural movements of the animals, sound signallization is placed on the critical spots along the safety fence (picture 5) which, if the animals wander near the fence, turns on high-frequency sounds which repel the animal from that area.



Picture 5 Sound signallization device

On the parts of the highway „Bosiljevo-Rijeka“ which goes through Gorski kotar were cases where wild animals like deer jump over the fence or bears climb over the fence which disturb their natural movements.

Because of that, on certain parts of the highway next to the safety fence, there is an electrical fence, too (Picture 6) to repel the animals from the road on the entire section in Gorski kotar.



Picture 6 Electrical fence along the highwa

In order not to disturb the natural habitat of animals and their natural flow of movement, on the highways which are protected by fences to increase the safety of vehicles and animals, the animals are provided with natural crossings over the road. (Picture 7).



Picture 7 Natural crossing over the highway

If an animal is on the other side of the fence, close to the road itself. The patrolling services and the highways intelligence center must react in time and with traffic signallization warn the drivers to the possibility of wildlife vehicle collision and then with the minimum risk, lead the animal to a ramp (Picture 8) that will provide it a way to go over the fence.



Picture 8 A ramp to exit the animals from the highway



## Responsibility for damage caused from wild animals

The Law on Roads contains regulations connected with the responsibility for damage on the public road caused by wildlife vehicle collision that says that the legal entity who manages public road is not marked correctly with traffic signalisation and equipment according to the regulations.

The Hunting Act determines that the driver is responsible for any vehicle damage in wildlife vehicle collision if he didn't adopt the speed (so that he can react in time) according to the traffic regulations or to the traffic signs. Otherwise, for damage are responsible entities who manages the road where the damage is ensued. Only exceptionally for damage is responsible authorized hunting association and if only the damage is ensued during the hunt.

The Law on Public Roads determines that based on The traffic project, the traffic signs, signalling and the equipment are set on the public road and for those roads that haven't got The traffic project, relevant is the existing state of traffic signals and equipment. The project changes or the changes to the current situation can be achieved only with the prior approval of the Minister and The State Administration Office in the county competent for transport. Therefore, the legal entity who manages the road can not place a traffic sign „Wild animals“ on the road and next to it the speed limit on the road willingly ( they do not know where are the hunting boundaries, apropos where the animals crossing the road frequently). It is controversial that the legal entity who manages the road defrays the vehicle damage from the wild animal or vice versa because he is even not competent to set up a traffic sign „Wild animals“ or the speed limit. It is unpredictable how fast the motor vehicle is moving and how fast the wild animal is running, especcially if the accident happened in the forest area as the area of Gorski kotar and because of reduced visibility. The question is where are those boundaries of traffic restrictions apropos who needs to take over the caused damage?

On the road network in Gorski kotar are placed the traffic signs that warning the drivers to wild animals but there are the places equally, where the wild animals crossing the road and there's no signs.

Is it possible to mark and protect all those places apropos who will take over the responsibility?

The current procedures in practice are:

- all the drivers in the case of the wildlife vehicle collision call the police and The Hunting Association because of investigation , determining damages and eventual conveyance of the wild animals to the hunters, except if the wild animal escaped;
- then, the drivers report the damage to the insurance and the Hunting Associations refer them the damage compesation for legal entities who manages the roads or to their contractors,
- the drivers do not take over the responsibility of damage apropos they declare that they were driving according to the traffic signs and expect to get the vehicle damage compensation;

- the police carried out the accident investigations and writes the report (notes where and when the accident happened with eventual trace parts of the wild animals on the damaged vehicles and possible entry of the state of trafficsignals, whether there is any traffic sign);
- when the legal entities who manages the roads or their contractors receiving the damage compensation request, they generally bounce it because they consider they have no responsibility on those adverse events, they consider the responsibility to the Hunting Associations ;
- the Hunting Associations bounce the drivers' and the insurance requests and the recognition of damage liability and they suggest the drivers to the legal entities who manages the roads;
- In this moment the insurance refuses to pay damages because they can not do that without the recognition of damage liability either by the Hunting Associations or by legal entities who manages the roads.

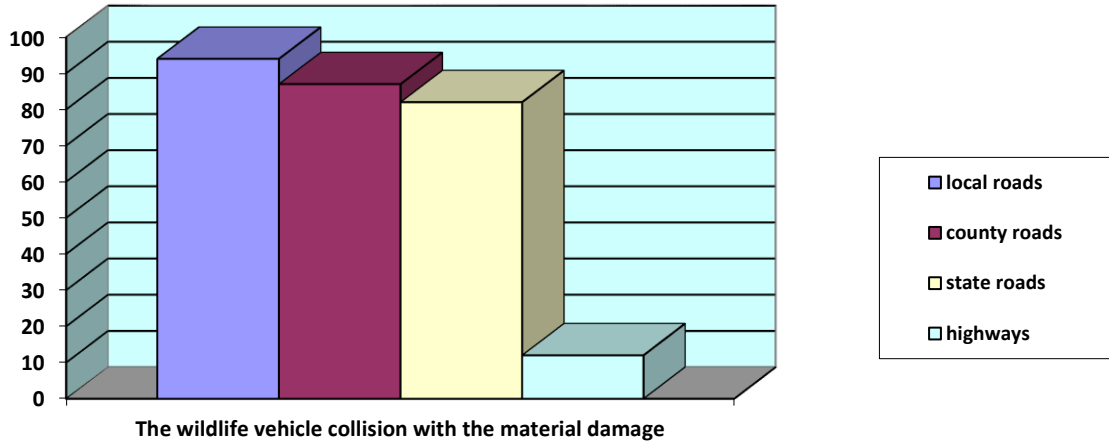
In the law, there is a very unclear regulation that is interpreted by each in its own way and that disables a quick and simple solution to the problem of recognition of the damage liability resulting in wildlife vehicle collisions. All participants in those accidents have their own point of view considering that the responsibility is not their.

Solving this problem has been reduced to the court's decision which in most cases is based on the strict liability that should be dealt separately in each case depending on the circumstances of the accident.

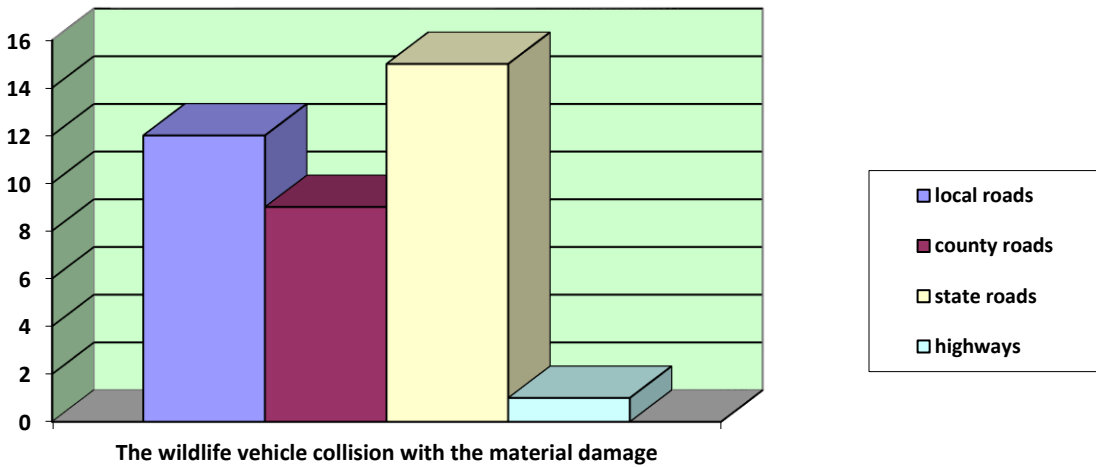
### **The survey results with the drivers who were driving the vehicles on the roads of Gorski kotar**

According to the survey with a hundred participants who were driving the vehicles (cars, motorcycles, commercial vehicles – lorries) on the local roads, county roads and state roads of Gorski kotar and at the exit from the highway „Bosiljevo – Rijeka-Kikovica“, we came up with the following data:

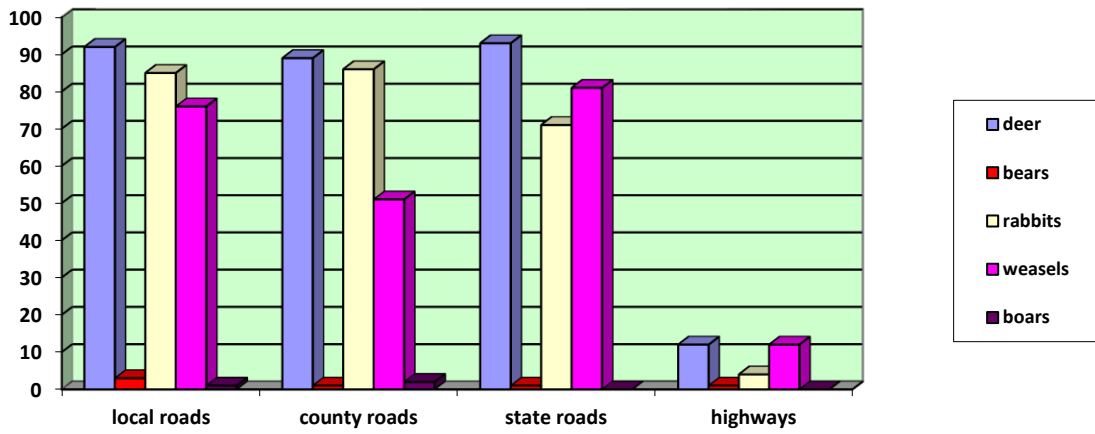
- a) the number of participants that were driving by vehicles on the roads of Gorski kotar and had an encounter with wild animals without the material damages (deer, bear, weasel, rabbit...)



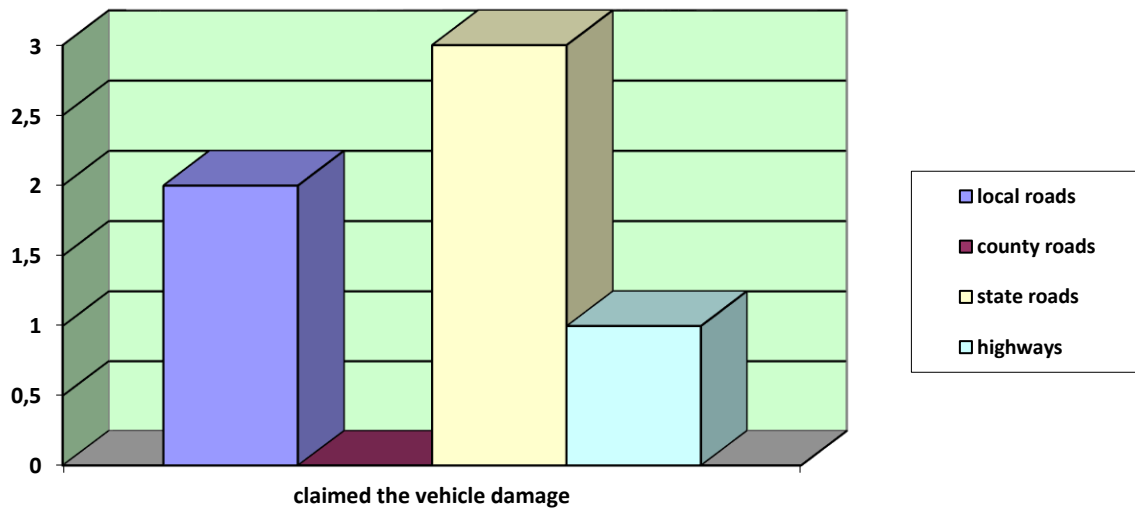
b) the number of participants who had the wildlife vehicle collision with the material damage on the vehicle



c) the most common deer species met by participants on the roads of Gorski kotar



d) the number of participants who required the damages resulting by the wildlife vehicle collision



## **The suggestions of the safety measures to prevent the occurrence of the damages by the wildlife vehicle collisions**

As we mentioned before, the wild animals are changing their habitats and they get closer to the places and by that they come near the roads to find the source of food.

If the Hunting Associations possessed statistics of the critical point where the wild animals crossing the roads, they could help them in those areas, taking into account the radius of their movement, provide food and the shelter away from inhabited places and roads.

At critical points where there is a higher percentage of crossing wild animals over the roads especially we think here about local, county and state roads, it would be very good to deter the animals to cross over the roads by sound effects or by putting the various fragrant reflecting means to deter them.

Despite those possible provisions that might have moved away the wild animals from the roads, it is very difficult to control their movement because they have their naturally certain paths which they use in their area frequently.

Literature:

The Law on Roads (NN 84/11, 22/13, 54/13, 148/13, 92/14)

The Hunting Act (NN 140/05, 75/09, 14/14)

Key words:

wild animals, roads, responsibility for damage



## Vodik – čisto gorivo

### POVZETEK

Človek je z izumom avtomobila uresničil željo po raziskovanju okolja in potovanju tudi na večje razdalje. Od konca 19. stoletja, ko so se pričeli pojavljati prvi uporabni avtomobili, je avtomobilska industrija postala glavna in najmočnejša gospodarska panoga. V zgodovini avtomobilizma so se uporabljali različni načini pogona in s tem tudi različni viri pogonske energije. Na začetku razvoja avtomobilov so se najprej pojavili prototipi avtomobilov na električni pogon. Z izpopolnitvijo motorja z notranjim izgorevanjem je le-ta postal glavni način pogona vozil v obliki bencinskega ali dizelskega motorja. Električna vozila so bila postavljena na stranski tir predvsem zaradi dragih, takrat nekvalitetnih baterij in kratkega dosega.

Prva energetska kriza leta 1973 je ponovno obudila razmišljanje o drugih načini pogona, predvsem na električno energijo in vodik. Vse večja gostota prometa in s tem vedno večji delež onesnaževanja ozračja s strani prometa, visoke cene naftnih derivatov in izboljšava ter pocenitev Li-ion baterij so bili razlogi, da so po letu 2000 na ceste najprej ponovno pripeljali hibridni in električni avtomobili. Danes vsi vodilni svetovni proizvajalci avtomobilov poleg, za sedaj, klasičnih vozil z motorjem na notranje izgorevanje, pošiljajo na trg tudi serijska hibridna vozila in vozila na električni pogon.

Pogon na vodik, kot najbolj razširjen element v vesolju, se prav tako še bori za svoje mesto v avtomobilski industriji. Vodik je lahko pogonsko gorivo klasičnega motorja z notranjim izgorevanjem. V tem primeru se bistveno zmanjša onesnaževanje okolja, ostanejo pa ostale slabe lastnosti motorjev z notranjim izgorevanjem. Drugi, bolj obetaven način uporabe vodika, je proizvodnja električne energije v gorivnih celicah, kar prinaša čisto okolje in hkrati boljši izkoristek v primerjavi z motorji z notranjim izgorevanjem. Tehnologija pridobivanja vodika in izdelave gorivnih celic postaja vse cenejša, s tem pa tudi večja možnost, da postane tudi vodik eden izmed nizkoogličnih alternativnih virov pogona.

Obstajata tudi enostavna in poceni možnost pridobivanja mešanice vodika s primesjo kisika (HHO) v vodikovem generatorju. Ta plin se prek sesalnega voda dovaja skupaj z zrakom v izgorevalni prostor klasičnega motorja z notranjim izgorevanjem. V motorju izboljša izgorevanje ter doda nekaj energije, s tem se nekoliko zmanjša poraba goriva, zaradi boljšega izgorevanja, predvsem pri starejših motorjih, se zmanjša tudi izpust škodljivih delcev v ozračje.

Tak vodikov generator sem pred tremi leti izdelal tudi sam in ga vgradil v vozilo. Teoretična pričakovanja so se v mojem primeru pokazala kot resnična.

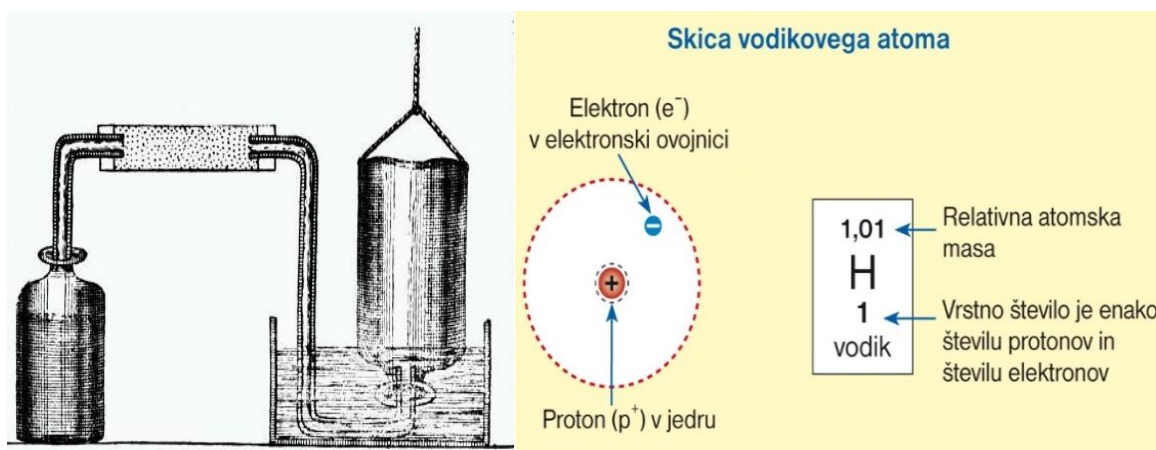
## 1 UVOD

Vodik je eden najstarejših kemijskih elementov v vesolju. Kljub izredno majhni gostoti zajema masa vodika 75% mase celotnega vesolja, po številu atomov pa je vodikovih atomov kar okoli 90%. Je glavni element v sestavi zvezd, sonca in tudi Zemlje. Vodik z oznako H je na prvem mestu periodnega sistema. Pri normalnih pogojih je plin brez barve in vonja, je 14,4-krat lažji od zraka, utekočini pa se pri temperaturi  $-252,8^{\circ}\text{C}$ .

Njegov atom je sestavljen iz enega protona in enega elektrona, je najenostavnejši kemični element. Vsi drugi elementi so sestavljeni iz kombinacij te osnovne oblike. V naravi v samostojni obliki ne nastopa, vedno je vezan v spojinah.

Na Zemlji je večina vodika vezanega v vodi in organskih spojinah, veliko ga je v fosilnih gorivih. Nekatere alge in bakterije proizvajajo v plinastem stanju.

Plinasti vodik so prvič umetno pridobili v zgodnjem 16. stoletju z mešanjem kovin inkislin. V letih 1766–1781 je angleški fizik Henry Cavendish pri svojih poizkusih odkril gorljiv plin vodik in dokazal, da nastopa kot samostojen element. Ugotovil je, da pri izgorevanju kot stranski produkt tvori vodo. Po tej lastnosti je francoski kemik Antoine-Laurent de Lavoisier leta 1783 vodik poimenoval hidrogen, kar v grščini pomeni vodotvoren.



Slika1: Cavendisheva priprava za pridobivanje vodika, skica vodikovega atoma

Vir: <https://eucbeniki.sio.si>

Večina vodika v vesolju je v plazmatski obliki, kjer vodikov proton in elektron nista povezana, s tem ima zelo dobro električno prevodnost in emisivnost ter proizvaja svetlobo Sonca in zvezd.

## **2 RAZLOGI ZA UPORABO VODIKA KOT VIRA ENERGIJE**

Vodik je v vezani obliki praktično neomejen obnovljiv vir energije, ki ima od vseh uporabljenih virov energije, z izjemo jedrske, največjo energijsko vrednost na masno enoto. Pri izgorevanju ne povzroča okolju nevarnih emisij. Kljub visoki energijski vrednosti in lahki vnetljivosti je celo manj nevaren kot bencin. V primeru puščanja se plin hitro razprši v zrak. V primeru vžiga zgori hitro, oddaja samo desetino izsevane toplote ogljikovodikov in zgori 7% »hladnejše« kot bencin. Opeklino nastanejo samo ob neposrednem stiku s plamenom. Ni nevarnosti zastrupitve in zadušitve z dimom, saj vodik pri gorenju ne oddaja ogljikovega dioksida ali monoksida.

Vir energije	Način skladiščenja	Specifična energija (kWh/kg)
vodik	tekoči vodik (-253°C)	33,4
	kovinski hidrid	0,58
naravni plin	tekoče stanje (-162°C)	13,9
propan	tekoče stanje	12,9
metanol	tekoče stanje	5,6
bencin	tekoče stanje	12,3
Pl. olje	tekoče stanje	11,6

V tovarni BMW so izvajali teste na rezervoarjih z vodikom. Sedemdeset minut so jih greli s plameni na 900 °C, jih luknjali in celo mečkali, dokler niso počili. Največkrat je vodik skozi razpoke stekel ven in se izgubil v ozračje, nekajkrat se je tudi vnel, v nobenem primeru pa ni eksplodiral.

## **3 NAJPOGOSTEJŠI NAČINI PRIDOBIVANJE VODIKA**

Največ vodika se pridobiva z reformiranjem zemeljskega plina in ostalih ogljikovodikov. Najčistejši način pridobivanja vodika je elektroliza vode, ki je po do sedaj uporabljenih postopkih energijsko potratno, saj porabimo več energije, kot je energijska vrednost pridobljenega vodika. Te postopke znanstveniki izboljšujejo in razvijajo nove, učinkovitejše.

### **Pridobivanje vodika z elektrolizo vode**

Elektroliza je elektrokemijski proces dovajanja električne energije na elektrode, potopljene v raztopini, nastane kemijska reakcija, pri kateri se izloči vodik. To je energijsko najmanj učinkovit postopek, saj za eno enoto energije vodika potrebujemo skoraj dve enoti električne energije. Najpogosteje se uporabljajo naslednji postopki:

- elektroliza vodne raztopine kalijevega hidroksida (30% KOH),
- membranska elektroliza vode,
- elektroliza vodne pare.



### **Pridobivanje vodika iz ogljikovodikov**

Pri tem postopku razstavimo ogljikovodike (zemeljski plin, nafta, premog, biomasa, alge) na njihove sestavine: vodik, ogljik in druge elemente. Najpogosteje se uporabljajo naslednji postopki:

- parna reformacija,
- piroliza ali delna oksidacija ogljikovodikov,
- termokemični procesi.

### **Cepitev vode pri visokih temperaturah nad 1700°C**

Vodo lahko razcepimo na vodik in kisik tudi s segrevanjem nad 1700°C, do temperature 3000°C je razcep vode nepopoln. Postopek je še tehnološko neizpopolnjen in drag.

### **Anaerobna korozija**

Do izločanja vodika prihaja tudi pri oksidaciji železa brez prisotnosti kisika.

### **Biološki načini pridobivanja vodika**

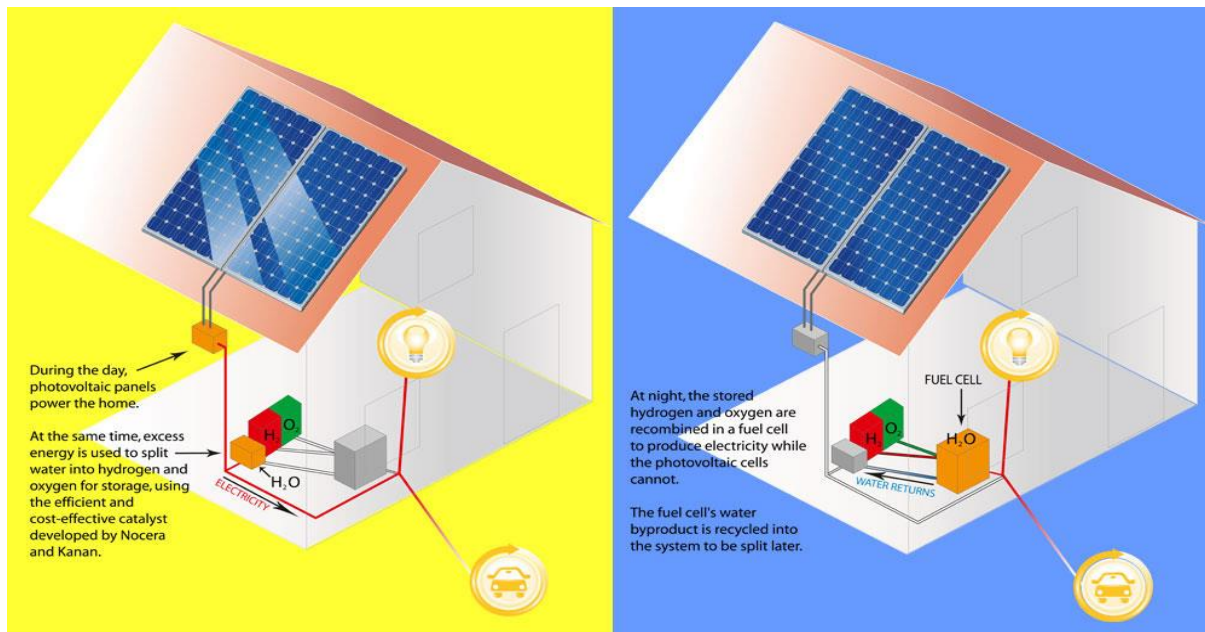
Pri fotosinteziv zelenih rastlinah v prvi fazi nastajanja rastlinskega tkiva pride do cepitve vode na vodik in kisik, a se pri tem vodik ne sprosti. Kljub temu je možno pridobivati molekularni vodik z izkoriščanjem modro-zelenih alg in bakterij pod anaerobnimi pogoji ob dodatku encimov.

Obetaven je tudi biološki način pridelave vodika iz organskih ostankov, ki nastanejo pri obdelavi odpadnih vod. V fotobioreaktorjih gafototropični mikroorganizmi predelajo v vodik. Kljub visoki proizvodni cenije postopek smiseln, saj sta rezultat očiščena voda in pridobljen vodik.

### **Obetavni postopki pridobivanja vodika v razvoju.**

Solarni reaktor, ki izkorišča koncentrirano sončno svetlobo za segrevanje vode do visoke temperature, v katero se doda prah cinkovega oksida. Pri reakciji pride do izločanja vodika, uporabljen cinkov oksid pa se lahko večkrat uporabi za reakcijo, ni izpustov škodljivih snovi v ozračje.

Katalizator za ločevanje vodika in kisika pri sobni temperaturi z dovodom majhne količine električne energije z dobrim izkoristkom. Katalizator temelji na kobaltovem fosfatu. Vizija postopka je pridobivanje poceni električne energije za gospodinjstvo in vodika za pogon vozila.



Slika 2: Prikaz možnosti oskrbe z električno energijo in pridobivanje vodika s katalizatorjem  
 Vir: <http://www.rtvsllo.si/znanost-in-tehnologija/revolucija-v-pridobivanju-energije/90913>

#### **4 SKLADIŠČENJE VODIKA**

Vodik je težko skladiščiti predvsem zaradi izredno majhne gostote in majhnih molekul, hkrati je podvržen reagiranju z ostalimi elementi. Vodik reagira tudi s kovinami, zato se počasi izgublja z difundacijo skozi kovinske rezervoarje. V plinasti obliki se vodik skladišči v večplastnih rezervoarjih iz aluminija, jekla in karbonskih vlaken pod tlakom od 200 pa tudi do 700 barov. Za skladiščenje v tekočem stanju je poraba energije za utekočinjenje in vzdrževanje temperature pod  $-253^{\circ}\text{C}$  zelo velika in lahko znaša celo do 40% energijske vrednosti vodika.

Za shranjevanje v obliki kovinskih hidridov kovino (lantan (La), titan (Ti), nikelj (Ni) in magnezij (Mg)) zdrobijo na drobna zrna tako, da je njihova površina čimvečja. Iz teh kovin izdelajo zlitine za matrice v rezervoarju, v katere se veže vodik pri povišanem tlaku. Za ponovno sprostitvev vodika iz kovine je potreben dovod toplote.

Shranjevanje vodika v ogljikove nanocevke je podoben način shranjevanja kot prikovinsko-hidridni tehniki, omogoča veliko akumulacijo vodika v mikroskopskih porah cevke, talahko znaša do 65 % celotne mase nanocevk.

V razvoju je poceni in varen način shranjevanja vodika v tableto iz amonijaka. Vodik je v tableti lahko shranjen poljubno dolgo, ko ga potrebujemo, se le-ta s pomočjo katalizatorja sprosti iz amonijaka. Prazno tableto je za ponovno uporabo potrebno obnoviti z novim amonijakom.

Nemški in nizozemski znanstveniki so razvili preprost in pocen način za cepitev vode na vodik in kisik s pomočjo sončne svetlobe na principu fotosinteze, s tem postaja vodikova tehnologija še realnejša.

## **5 UPORABA VODIKA**

Danes letna proizvodnja vodika znaša več deset milijonov ton, večinoma ga uporabljajo v kemični industriji, na primer pri proizvodnji metanola, klorovega vodika in amonijaka, kot zaščitni plin pri toplotni obdelavi, hidrogeniranju maščob in olj, pri varjenju, redukciji kovinskih oksidov do elementov, v živilski tehnologiji, steklarski industriji in elektroniki. Kot pogonsko gorivo raket ga že več kot pol stoletja uporabljajo v vesoljskem programu. Vodik se uporablja tudi pri avtogenem varjenju aluminija, pri rezanju kovin pod vodo in pri rezanju s plazmo ter kot hladilni plin za generatorje. V laboratorijih ga uporabljajo za doseganje izredno nizkih temperatur. V zadnjem času se vse pogosteje uporablja kot vir energije v gorivnih celicah za proizvodnjo električne energije v vesoljskih postajah, za pogon osebnih vozil, avtobusov, plovil, letal. Ob vse boljših tehnologijah in nižjih cenah pridobivanja vodika se v zadnjem času pojavljajo tudi poskusi uporabe vodika za oskrbo objektov z električno energijo.

Če se vodik proizvede po postopku brez izpustov škodljivih snovi v okolje, je vodik pravi vir energije za čistejšo prihodnost planeta.

## **6 UPORABA VODIKA V AVTOMOBILSKI INDUSTRIJI**

Vodik je mogoče uporabiti za pogon prilagojenih vozil s klasičnim motorjem z notranjim izgorevanjem ali za vozila z vgrajenimi gorivnimi celicami, ki obratno od elektrolize spajajo vodik in kisik v vodo, pri tem pa nastaja električna energija za pogon elektromotorjev.

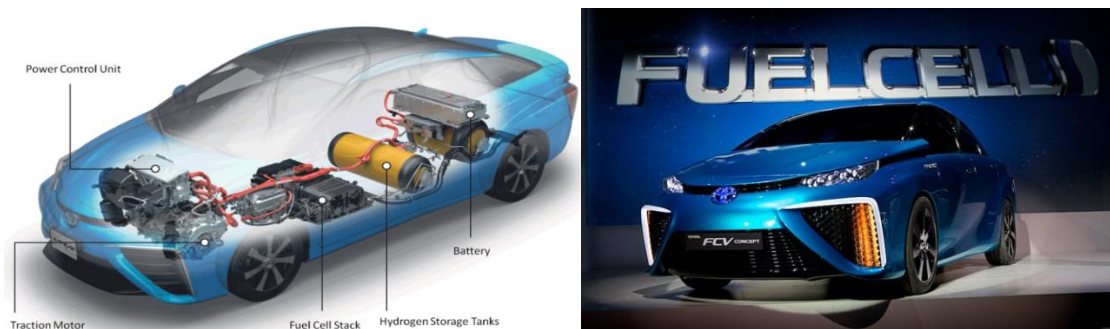
V času naftne krize je kar nekaj proizvajalcev vozil prilagodilo serijske modele za pogon na vodik z vgradnjo dodatnega rezervoarja za vodik. Tako vozilo je lahko delovalo na vodik ali na bencin podobno kot vozila na avtoplin. V primeru delovanja na vodik vozilo ni onesnaževalo okolja, ostal pa je slab izkoristek motorja z notranjim izgorevanjem, ki z velikimi toplotnimi izgubami ne presega 30% .

Kot obetavnejši način se je pokazal pogon vozil z elektriko, pridobljeno v gorivnih celicah. Princip delovanja gorivne celice je iznašel sir William Robert Grove leta 1839, a se razvoj takrat ni nadaljeval zaradi izuma motorja z notranjim izgorevanjem in nizkih cen fosilnih goriv. Gorivne celice so pričeli ponovno razvijati po letu 1960 za potrebe NASE v vesoljskem programu. Avtomobilska industrija je pričela vlagati v razvoj gorivnih celic in vozil s pogonom na elektriko, pridobljeno v gorivnih celicah v času prve naftne krize, še intenzivneje pa po podpisu Kjotskega protokola, ki zavezuje 141 držav podpisnic, da zmanjšajo izpust toplogrednih plinov in s tem omejijo podnebne spremembe.

Gorivne celice ne delujejo kot toplotni stroji, saj delujejo neposredno skemičnoreakcijo in v električno energijo pretvorijo okoli 83% energije vodika. V avtomobilu se električna energija pretvori v mehansko s pomočjo elektromotorja, ki ima prav tako za 80% mnogo boljši izkoristek od motorja z notranjim izgorevanjem. Na ta način je mogoče doseči skupni izkoristek vozila do 66%. Izkoristek Honda FCX Konceptimna gorivne celice znaša, na primer, 60% .

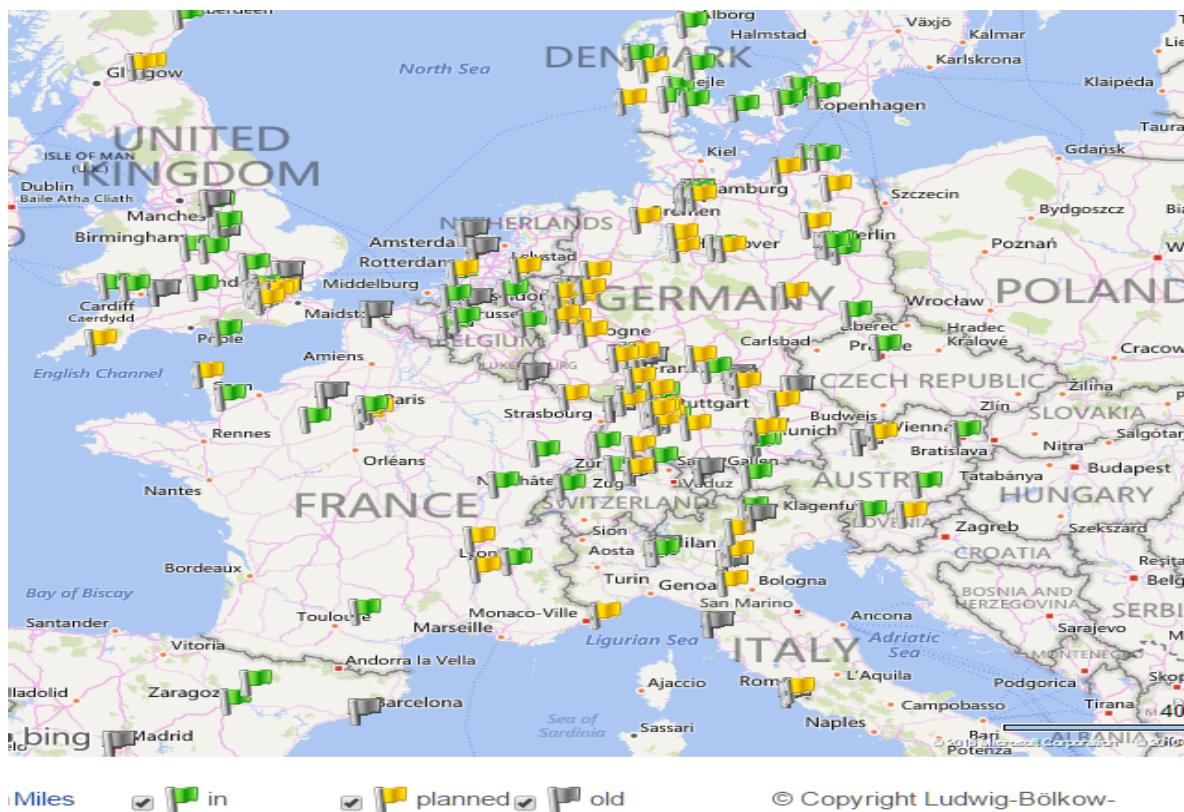
Gorivne celice so postale manjše, lažje, zanesljivejše ter manj občutljive na nizke temperature, hkrati pa postajajo cenovno dostopnejše. V zadnjih letih večina vodilnih avtomobilskih proizvajalcev na svetovnih avtomobilskih salonih predstavlja tudi koncepte vozil z gorivnimi celicami.

Toyota je v sredini leta 2015 pričela s prodajo serijskega modela na gorivne celice z imenom Mirai. Vozilo ima doseg do 500 kilometrov z enim polnjenjem vodika, ki traja 3minute.Hondin FCX Clarityss pogonom nagorivne celice pa naj bi imel doseg kar okoli700kilometrov.Poleg omenjenih podjetij se z razvojem vozil na gorivne celice intenzivno ukvarjajo pri Daimlerju, General Motorsu, BMW-ju,Hyundaiju, Audiju, Nissanu.



Slika 3: Toyota Miray s pogonom na gorivne celice. Vir: [www.h2euro.org](http://www.h2euro.org).

Bistvena prednost vozil na gorivne celice v primerjavi s klasičnimi električnimi vozili je v veliko večjem dosegu, kratkem času polnjenja in nizkem ogljičnem odtisu. Z manjšim številom gibljivih delov pa je tudi manj možnosti za okvare in večja življenjska doba. Največji problem pri hitrejši uveljavitvi vozil na vodikove gorivne celice je majhno število polnilnih mest. Trenutno je na svetu 214 črpalk z vodikom, od tega 95 v Evropi. Eno vodikovo črpalko imamo tudi v Sloveniji, na bencinski črpalki v Lescah.



Slika 4: Zemljevid evropskih vodikovih črpalk. Vir: <http://www.netinform.net>

Tehnologija gorivnih celic in pridobivanje vodika postajata vse cenejša, zato strokovnjaki napovedujejo, da bodo avtomobili na vodikove gorivne celice do leta 2025, ob ustrezni politični podpori in izgradnji mreže polnilnih mest, prisotni v veliko večjem številu.

Tehnologija vodikovih gorivnih celic pa se uvaja tudi v drugih vrstah transportnih sredstev, kot so avtobusi, tramvaji, tovornjaki, letala, plovila pa tudi skuterji in kolesa.

Kitajsko podjetje Sifang je razvilo tramvaj, ki ga bodo v celoti pogonjale vodikove gorivne celice. Njegova najvišja hitrost je 70 km/h, sprejme 380 potnikov. S polnim rezervoarjem bo tramvaj lahko prevozil 100 km, za polnjenje pa bo potreboval le tri minute.

Ajdovsko podjetje PIPISTREL namerava v letošnjem letu izdelati letalo z vodikovimi gorivnimi celicami za štiri potnike.



Slika 5: Avtobus in tramvaj na gorivne celice. Vir: [www.ubergizmo.com](http://www.ubergizmo.com), [www.esvet.si](http://www.esvet.si)

## **7 NAJPOGOSTEJŠE VRSTE GORIVNIH CELIC**

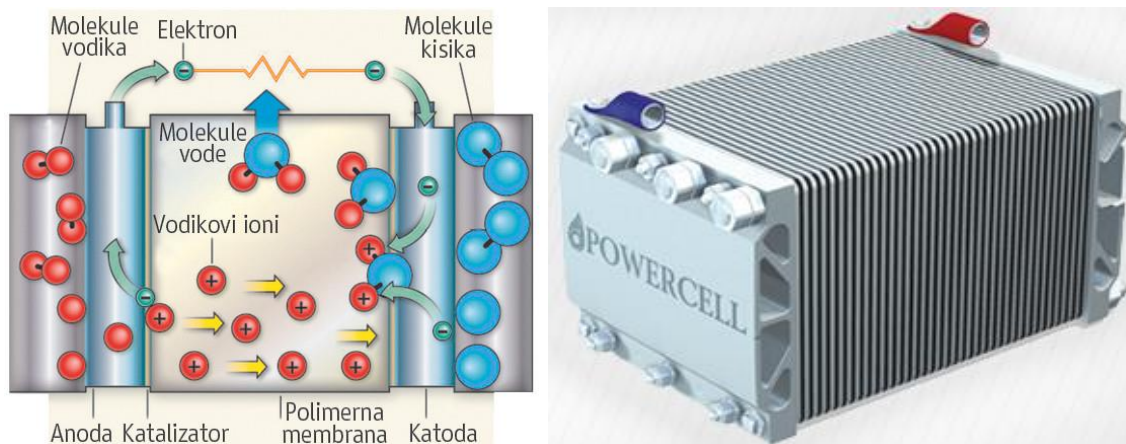
**PEMFC** – gorivna celica z membransko izmenjavo protonov. Na anodi se razgradi molekula vodika na dva protona in dva elektrona, na katodi pa se reducira kisik. Za njih je značilen hiter zagon. Za delovanje potrebujejo čisti vodik. Idealnegorivnecelicezavozila.

**AFC** –alkalna gorivna celica. Elektrolit v celici je kalijev hidroksid (KOH), kot katalizatorji na katodi in anodi pa se uporabljajo drage kovine. Uporablja se v ameriškem vesoljskem programu. Novejše celice delujejo na temperaturi med 23 in 70 °C.

**PAFC** – gorivna celica, v kateri je elektrolit fosforna kislina. Uporablja se v sistemih za soproizvodnjo toplote in električne energije-

**MCFC** –elektrolit gorivne celice so staljene karbonatne snovi. Uporablja se za industrijske in vojaške namene. Deluje pri visokih temperaturah od 600 do 1000 °C. Za delovanje ne potrebujejo vodika (kot gorivo), saj se ta proizvede v gorivni celici iz zemeljskega plina, propana ali dizelskega goriva.

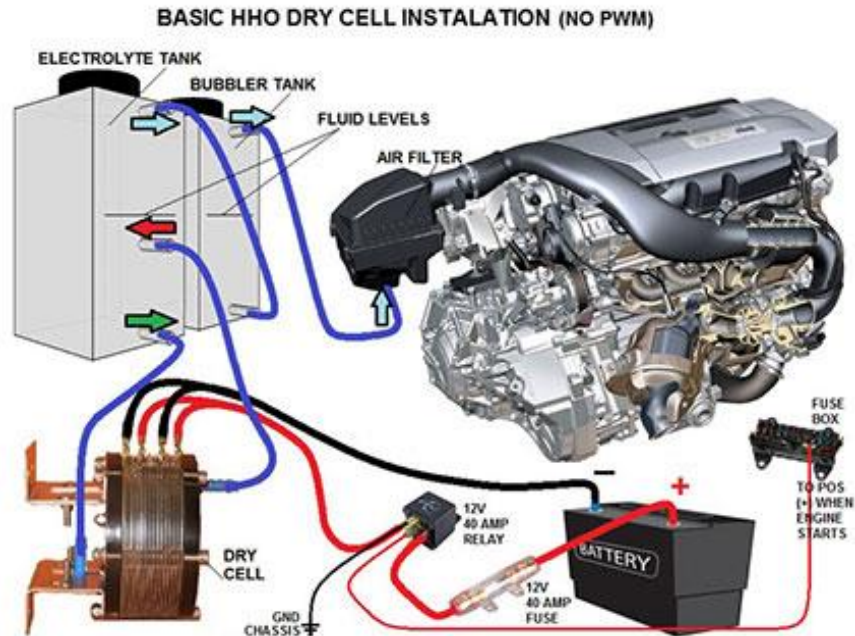
**SOFC** – elektrolit je trden keramičen material indijev oksid. Deluje pri temperaturi okoli 1000 °C. Kot gorivo uporabljamo različne plinske zmesi, ki vsebujejo vodik. Molekule razpadejo v sami napravi.



Slika 6: Direktna membranska gorivna celica (DMFC) <http://www.euromobil.si/gume/clanek/vodik-gorivo-prihodnosti>

## **8 ZMANJŠANJE IZPUSTA CO<sub>2</sub> S POMOČJO »HHO GENERATORJA«**

Mešanico plina, vodika in kisika je mogoče proizvajati tudi s tako imenovanim HHO generatorjem. Zaprta celica je sestavljena iz pozitivnih, negativnih in nevtralnih plošč, potopljenih v elektrolit. Z dovodom enosmerne električne toka se prične na ploščah izločati mešanica vodika in kisika. Tako pridobljeno mešanico plina se prek sesalnega voda vodi v klasični bencinski ali dizelski motor z notranjim izgorevanjem. Dovedeni plin omogoči popolnejše izgorevanje obstoječega goriva, ki s tem odda nekoliko več energije motorju z notranjim izgorevanjem, zaradi boljšega izgorevanja je hkrati tudi manjši izpust ogljikovega dioksida (CO<sub>2</sub>) v ozračje. Večji učinek takega generatorja je predvsem opazen pri motorjih z notranjim izgorevanjem starejšega tipa. Teoretično naj bi bilo pri takih motorjih mogoče prihraniti tudi do 30% goriva. Pri sodobnejših motorjih pa je ta učinek manjši.



Slika 7: Način vgradnje HHO generatorja. Vir: <http://www.auto-hydrogen-usa.com>.

Pred tremi leti sem tudi jaz izdelal različico HHO generatorja in ga vgradil v vozilo KIA Carnival. V mojem primeru se je poraba goriva dejansko zmanjšala, odvisno od režima vožnje, do približno 15%. Pri kontroli emisij izpušnih plinov na tehničnem pregledu so bile te le 5 % dovoljenih.

## HHO System



Slika 8: Dovod plina HHO. Vir: <http://www.staforhho.com>



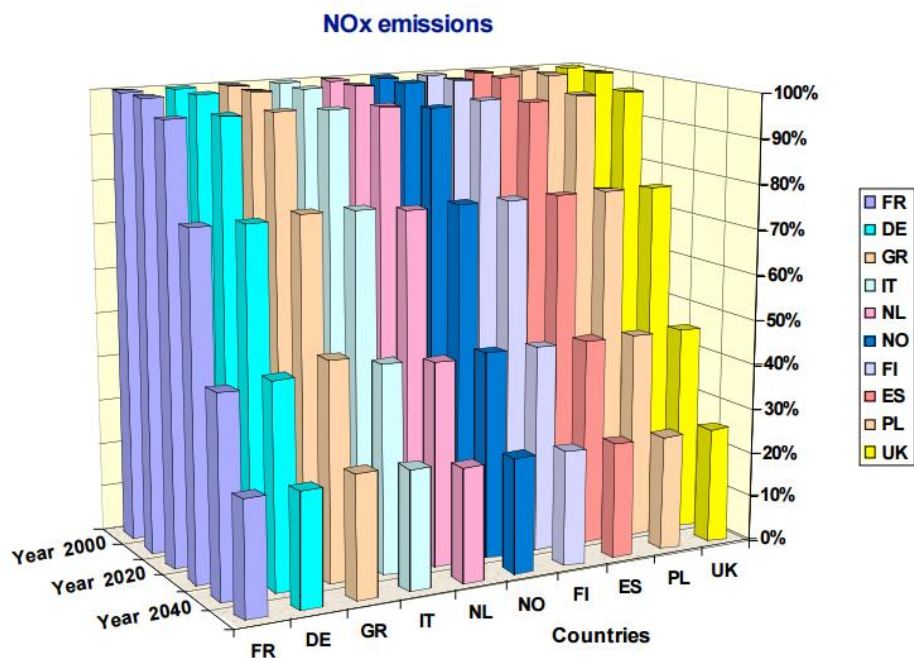
## 9 ZAKLJUČEK

Po prvi energetske krizi v sedemdesetih letih prejšnjega stoletja, so znanstveniki in raziskovalci pričeli intenzivno iskati nov vir pogonske energije, ki bi nadomestil dosedanjo uporabo fosilnih goriv. Ta so v naravi v omejenih količinah, z uporabo za pogon vozil v cestnem prometu pa vedno bolj onesnažujejo okolje z izpusti CO<sub>2</sub> in ostalih škodljivih emisij. Trenutno je največji korak narejen na področju električnih vozil, ta pa imajo še številne pomanjkljivosti. Električna vozila so primerna za vožnjo v urbanih središčih, omejena z majhnim dosegom, dolgim časom polnjenja, dragimi in težkimi baterijami s premajhno kapaciteto

Glede na to, da je vodika na Zemlji in v vesolju praktično v neomejenih količinah, hkrati razvijajo cenejše, enostavnejše načine proizvodnje, boljše, varnejše načine skladiščenja ter bistven napredek pri tehnologiji vodikovih gorivnih celic, ki imajo stranski produkt vodo, je uporaba vodika za pogon vozil vedno bolj logična.

Vodikova vozila so v osnovi električna vozila, le da se elektrika za pogon proizvaja neposredno v gorivni celici, potreben je odporen rezervoar za vodik in manjša baterija. Taka vozila imajo doseg in čas polnjenja primerljiva z vozili na bencinski ali dizelski pogon. Število vodikovih črpalk po svetu počasi, a vztrajno raste. V Kaliforniji jih načrtujejo do leta 2020 100, v Nemčiji do leta 2023 kar 400. Japonci naj bi jih do leta 2025 imeli že okoli 800, Južna Koreja pa do leta 2030 okoli 500.

Strokovnjaki napovedujejo, da je mogoče v cestnem prometu z vlaganjem v vodikovo tehnologijo z ustrežno politično in finančno podporo zmanjšati emisije škodljivih plinov do leta 2040 tudi do 80 %.



Graf 1: Napoved zmanjšanja izpusta toplogrednih plinov v desetih članicah EU z uvedbo vodikove tehnologije

Vir:<http://cordis.europa.eu>

Spodnji dom nizozemskega parlamenta je z večino glasov sprejel sklep, da po letu 2025 ne bo dovoljena prodaja novih vozil z bencinskimi ali dizelskimi motorji, kar je še dodaten razlog za razvoj tudi vodikove tehnologije.

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## Hydrogen – pure fuel

### **SUMMARY**

The invention of the automobile made it possible for the man to fulfil his dream of exploring his environment and his wish to also travel longer distances. Since the end of the 19th century, when the first useful cars emerged on the market, the automotive industry has become the main and most powerful industry. Throughout the automotive history cars used different drives and consequently different fuels. At the very beginning the first car prototypes were electrical. Yet with the improvements of the internal combustion engine these kinds of engines became the leading source of engine power, using either petrol or diesel. Electric vehicles were side tracked because of expensive and at that time low-quality short range batteries.

The first energy crisis in 1973 awakened the idea for other sources of energy, especially electricity and hydrogen. The higher traffic density also meant higher air pollution. Furthermore, high prices of oil derivatives and the improved and cheaper Li-ion batteries after 2000 presented further reasons for the renewed introduction of first hybrid and later electric cars. Today all leading world car manufacturers beside the traditional internal combustion engine cars also produce serial hybrid vehicles and electrically powered vehicles.

Hydrogen as the most widely spread element in the universe is also making its way in the automotive industry. Hydrogen can be the fuel of the traditional internal combustion engine. This would mean significantly less pollution, but the disadvantages of internal combustion engines remain unchanged. Another, more promising use of hydrogen is the production of electric energy in fuel cells, which means a clean environment and a higher efficiency when compared to internal combustion engines. The technology of extracting hydrogen and the production of fuel cells is becoming cheaper, which increases the possibilities for the hydrogen to become one of the low carbon alternative sources of power.

There is also a simpler and cheap alternative of making the mixture of hydrogen with oxygen (HHO) in a hydrogen generator. This gas is then supplied together with air through inlet manifold into the combustion chamber of a traditional internal combustion engine. It improves the combustion in the engine and also adds some energy. It reduces the fuel consumption due to better combustion. Also, the emission of harmful gases in the air is reduced, especially in older engines.

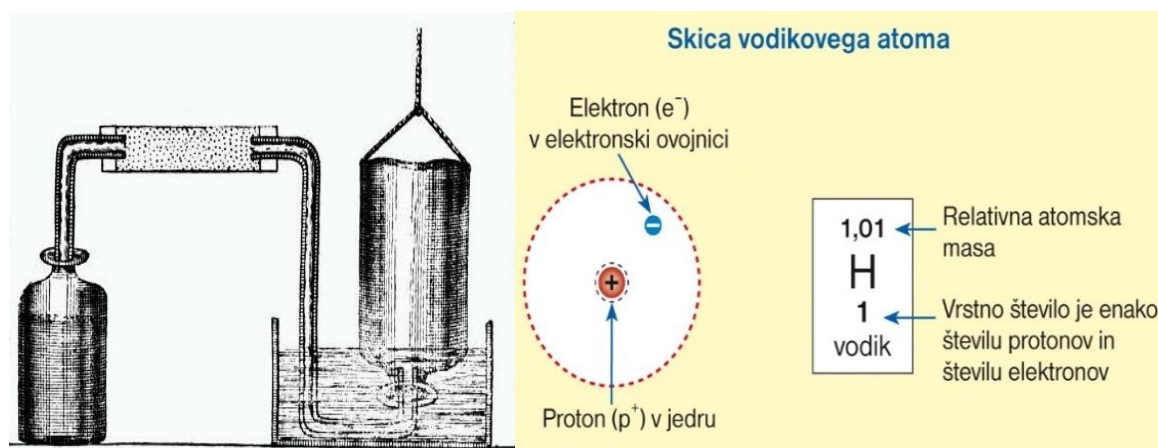
I made such a hydrogen generator myself several years ago. I built it into my car. Theoretical expectations turned out to be true.

## 1 INTRODUCTION

Hydrogen is one of the oldest elements in the universe. Although it is of very low density, 75% of the mass of the entire universe consists of it, and it makes up to 90% of all atoms in the universe. It is also the main element in the structure of the stars, the sun and the Earth. It is the first element in the periodic table of elements. At room temperature it is a colourless and odourless gas which is 14.4 times lighter than air. It liquefies at the temperature of  $-252,8\text{ }^{\circ}\text{C}$ .

The atom of hydrogen consists of one proton and one electron which makes it the simplest element. All other elements consist of different combinations of this basic form. On our planet, hydrogen does not occur in its pure form, but always in combination with other elements. Most of it occurs in combinations with water, as well as in organic matter. There is a lot of it in fossil fuels. Also some algae and bacteria produce it.

Already in the early 16th century hydrogen in gas form was first produced by mixing metals and acids. Between 1766-1781 the English physicist Henry Cavendish discovered a combustible hydrogen gas while he was experimenting. He proved that it occurs as an independent element. He found out that it produces water when burned. In 1783 Antoine-Laurent de Lavoisier named it hydrogen after this characteristic. In Greek it means water creator.



Picture 1: Cavendish's apparatus for making and collecting hydrogen, the sketch of the atom of hydrogen

Source: <https://eucbeniki.sio.si>

Most of the hydrogen in space is in plasma state. As plasma, hydrogen's electron and proton are not bound together, which results in very high electrical conductivity and high emissivity, and it produces sunlight and the light of other stars.

## **2 REASONS FOR USING HYDROGEN AS AN ENERGY SOURCE**

Hydrogen in its bound form is a practically unlimited renewable source of energy. Compared to other sources of energy it has the highest calorific value per mass unit. The exception is naturally the nuclear energy. When it burns, it does not emit environmentally dangerous substances. Although it has a high calorific value and is easily flammable, it is even less dangerous than gasoline. In case of a leakage it rapidly disperses into the air. In case of combustion it burns quickly and emits only a tenth of the emitted heat of hydrocarbons and burns 7%

Vir energije	Način skladiščenja	Specifična energija (kWh/kg)
vodik	tekoči vodik (-253°C)	33,4
	kovinski hidrid	0,58
naravni plin	tekoče stanje (-162°C)	13,9
propan	tekoče stanje	12,9
metanol	tekoče stanje	5,6
bencin	tekoče stanje	12,3
Pl. olje	tekoče stanje	11,6

“colder than gasoline. Burns can occur only in a direct contact with the flame. There is no danger of poisoning or smoke suffocation, as hydrogen does not emit carbon dioxide or monoxide when burning.

In the BMW factory tests on hydrogen tanks have been carried out. For 70 minutes they were heated at the temperature of 900 °C, they made holes in them, they crushed them until they burst. Most of the time the hydrogen flew out through the cracks and dispersed in the atmosphere, a few times it caught fire, but it never once exploded.

## **3 MOST COMMON WAYS OF PRODUCING HYDROGEN**

Most of the hydrogen is produced by steam reforming of natural gas and other hydrocarbons. The electrolysis of water is the purest method of producing hydrogen. Yet it is an energy wasteful process as more energy is used to produce it than it is its calorific value. These processes are being improved by scientists. They are developing new more efficient processes.

### **Producing hydrogen with water electrolysis**

Electrolysis is an electrochemical process during which a low voltage current is run through the electrodes submerged in a solution. A chemical reaction occurs, in which hydrogen is produced. From the energy point of view this is the least efficient process, as for one unit of hydrogen almost two units of electrical energy are needed. The most frequently used processes are the following:

- electrolysis of a water solution with potassium hydroxide (30 % KOH),
- membrane water electrolysis,
- watervapour electrolysis.

### **Producing hydrogen from hydrocarbons**

In this procedure we separate hydrocarbons (natural gas, oil, coal, biomass, algae) into their components: hydrogen, carbon and other elements. The most frequently used processes are:

- steam reformation,
- pyrolysis or partial hydrocarbon oxidation,
- thermochemical processes.

### **Water splitting technology at high temperatures above 1700 °C**

Water can be split into hydrogen and oxygen also by heating it to temperatures above 1700 °C; at the temperature of 3000°C this split is imperfect. The process is technologically imperfect and expensive.

### **Anaerobic corrosion**

Hydrogen is discharged during iron oxidation without the presence of oxygen.

### **Biological ways of hydrogen production**

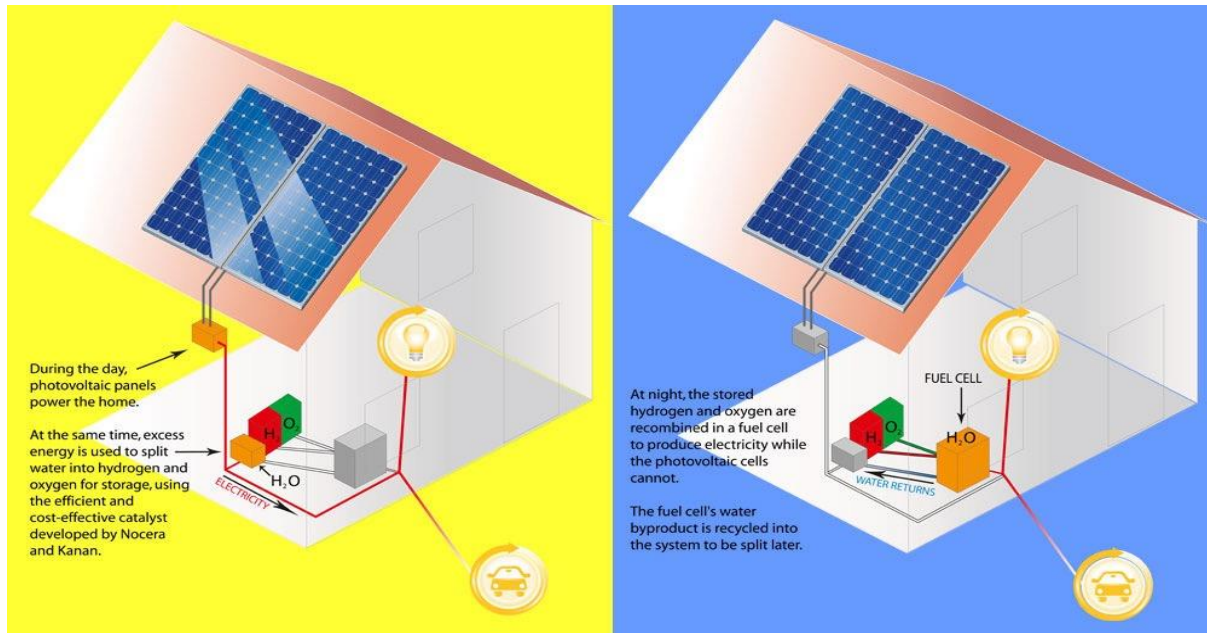
During the first phase of the plant tissue formation during the process of photosynthesis in green plants the water splits into hydrogen and oxygen, but the hydrogen isn't released. Nevertheless, it is possible to produce molecular hydrogen using blue-green algae and bacteria in anaerobic conditions when the right enzymes are added.

The biological production of hydrogen from organic waste water remains is also promising. Phototropic microorganisms transform it into hydrogen in photo bioreactors. Although the production costs are high the process is reasonable, as its results are cleaned water and hydrogen.

## Promising procedures of hydrogen production in development

Solar reactor uses concentrated sunlight to heat water to a high temperature to which zinc oxide powder is added. During the procedure hydrogen is produced, the used zinc oxide powder can be reused for the same procedure, there are no harmful gas emissions.

The catalyst to split hydrogen from oxygen at room temperature with the import of a small amount of electrical energy with high efficiency. The catalyst is based on cobalt phosphate. The vision of the procedure is producing cheap electrical energy for households and hydrogen as fuel.



Picture 2: Shows the possibility of producing electrical energy and hydrogen using a catalyst  
Source: <http://www.rtvsllo.si/znanost-in-tehnologija/revolucija-v-privobivanju-energije/90913>

## 4 HYDROGEN STORAGE

It is very difficult to store hydrogen because of its low density and small molecules. At the same time hydrogen is likely to react with other elements. It reacts also with metals, which means it slowly gets lost through the metal tank's walls. In its gas form hydrogen is stored in tanks made of aluminum, steel carbon fibers under the pressure of 200 and up to 700 bars. To store liquid hydrogen, the use of energy for liquefying and keeping the temperature under  $-253^{\circ}$  is so high it can amount to 40% of hydrogen calorific value.

Metal hydrides such as lithium (La), titanium (Ti), nickel (Ni) and magnesium (Mg) are crushed into small grains in such a way that their surface is as big as possible. These metals are then used to make alloys for tank matrixes into which hydrogen is bound at higher pressure. To release the hydrogen from the metal a source of heat is needed.

The storage of hydrogen in carbon nanotubes is similar to the metal-hydride technique. It enables large accumulation of hydrogen in the microscopic pores of the nanotubes, which can reach 65% of the total nanotubes mass.



A cheap and safe hydrogen storage in the form of an ammonium salt tablet is being developed. Hydrogen can be stored in the tablet until it is needed. It is released from it with a catalyst. The empty tablet is renewed with new ammonium if it is used again.

German and Dutch scientists have developed a simple and cost efficient method of splitting water into hydrogen and oxygen. Sunlight working on the principle of photosynthesis is used. With this, hydrogen technology is becoming more realistic.

## **5 HYDROGEN USE**

Yearly production of hydrogen is currently several tens of tons. It is mostly used in chemical industry, for example, in production of methanol, chlorine hydrogen and ammonium, as a kind of protection gas in thermal treatments, for hydrogenation of fats and oils, in welding, in metallic ore reduction, in food industry, glass manufacturing and electronics. It has been used as fuel in space crafts for more than half a century. Its further use is in atomic hydrogen welding, cutting metals under water, cutting with plasma and as a rotor coolant for generators. In laboratories it is used to reach very low temperatures. Recently it has been used as a source of energy in fuel cells to generate electricity on space stations. It fuels automobiles, buses, vessels and planes. As better and cheaper technologies are becoming available attempts are made to use hydrogen to supply facilities with electricity.

If hydrogen is produced without harmful emissions into the environment, it can become a true source of energy for a cleaner future of the planet.

## **6 THE USE OF HYDROGEN IN CAR INDUSTRY**

Hydrogen can be used as fuel in adapted conventional vehicles with an internal combustion engine or in vehicles with inbuilt fuel cells which contrary to electrolysis bind hydrogen and oxygen into water. During this procedure electricity is generated to run electric motors.

In the times of oil crises several manufacturers adapted their serial models to hydrogen fuel by fitting their vehicles with an additional hydrogen tank. Such a vehicle could run on hydrogen or petrol similarly as gas powered vehicles. When the vehicle used hydrogen, it did not pollute the environment, yet the efficiency of the internal combustion engine was low. Due to huge heat losses it did not surpass 30%.

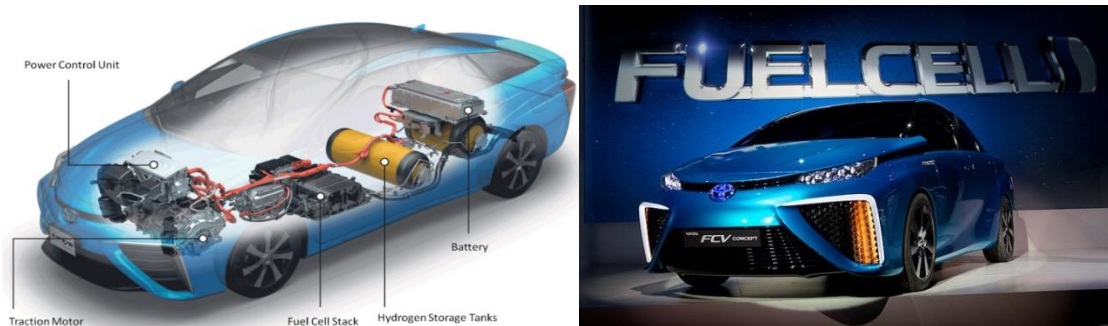
Cars powered by the electricity produced in fuel cells turned out to be more promising. The operating principle of fuel cell was invented by Sir William Robert Grove in 1839, but at that time this invention was not developed further because of the invention of the internal combustion engine and the low prices of fossil fuels. Fuel cells were again being developed after 1960 for the needs of the NASA space programme. The car industry began investing into their development and the development of electricity driven cars generated in fuel cells at the time of the first oil crisis. These efforts intensified after 141

states signed the Kyoto treaty binding them to reduce the emission of greenhouse gases and thus limit the climate changes.

Fuel cells do not operate as heat machines. They use a chemical reaction to convert 83% of hydrogen energy to electrical energy. In a vehicle the electro motor converts electrical energy to mechanical energy. Such an electric motor is by 80% more efficient than an internal combustion engine. In this way the total efficiency of the vehicle can amount to 66%. Honda's FCX Konceptim fuel cell vehicle has the efficiency of 60%.

Fuel cells have become smaller, lighter, more reliable, and less susceptible to low temperatures. At the same time their prices are more accessible. In recent years most of the leading car manufacturers have presented fuel cell vehicles in world car salons.

In 2015 Toyota began to sell a serial model of a fuel cell car Mirai. The vehicle has the range of 500 kilometres with one tankful of hydrogen which takes 3 minutes to fill.. Honda's FCX Clarity which is run by fuel cells is supposed to do 700 kilometres. Besides the above mentioned companies, companies such as Daimler, General Motors, BMW, Audi and Nissan are also seriously working on the development of fuel cell vehicles.



Picture 3: Toyota Miray – the fuel cell driven car. Source: [www.h2euro.org](http://www.h2euro.org).

Some of the main advantages of fuel cell cars when compared to electrical cars are the range, short filling up time and low carbon imprint. A lower number of moving parts also means fewer breakdowns and a longer lifespan. The biggest problem obstructing a faster introduction of hydrogen fuel cell cars is the small number of filling stations. Currently there are 214 hydrogen pumps worldwide, 95 of which are in Europe. There is one hydrogen pump also in Slovenia at a petrol station in Lesce.

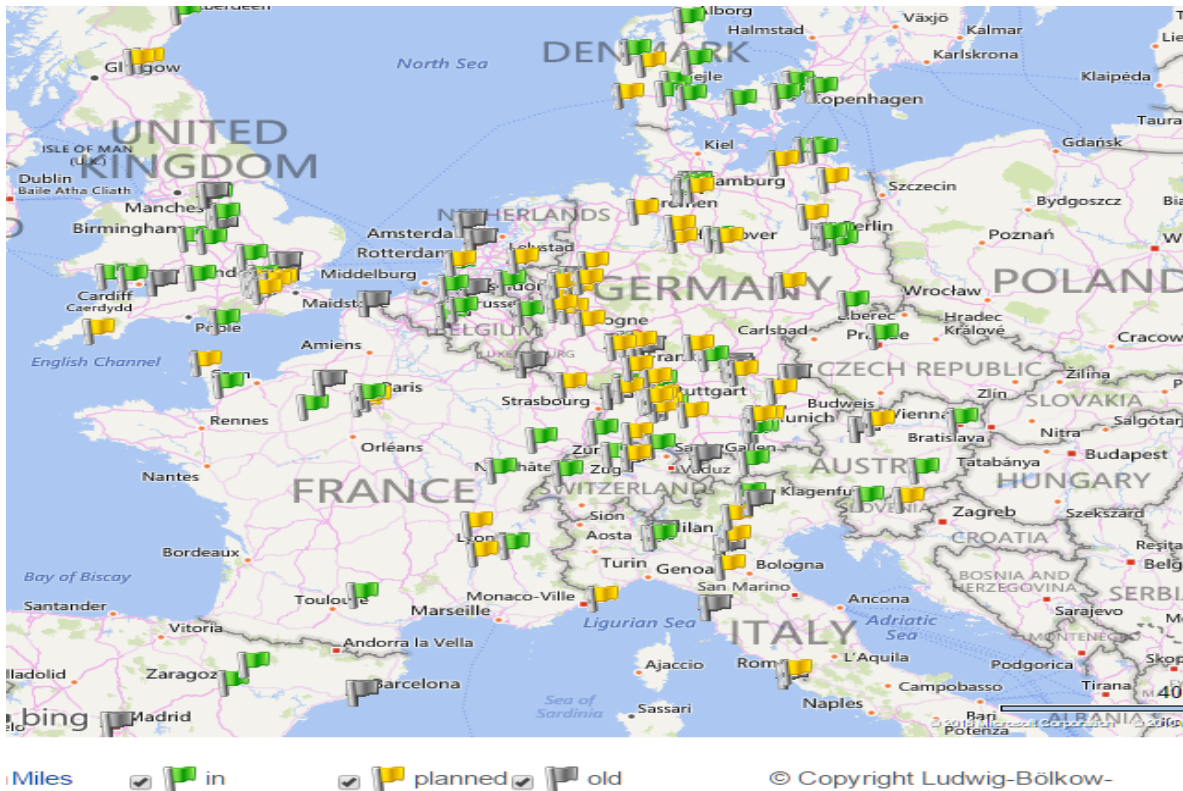


Figure 4: Hydrogen tank stations map. Source: <http://www.netinform.net>

The fuel cell technology and hydrogen production are becoming cheaper. That's why the experts predict that, given the appropriate political support and the better network of filling up stations, the number of hydrogen fuel cell cars will have increased by 2025.

The fuel cell technology is being introduced also in other means of transport such as buses, trams, lorries, planes, vessels as well as in scooters and bicycles.

The Chinese company Sifang has developed a tram that will be fully driven by hydrogen fuel cells. Its top speed will be 70km/h; it will carry 380 passengers. The tram will do 100 kilometres on a tankful and it will take only three minutes to fill it up.

This year the company PIPISTREL from Ajdovščina intends to build a hydrogen fuel cell plane for four passengers.



Picture 5: A fuel cell bus and tram. Source: [www.ubergizmo.com](http://www.ubergizmo.com), [www.esvet.si](http://www.esvet.si)

## **7 THE MOST COMMON FUEL CELL TYPES**

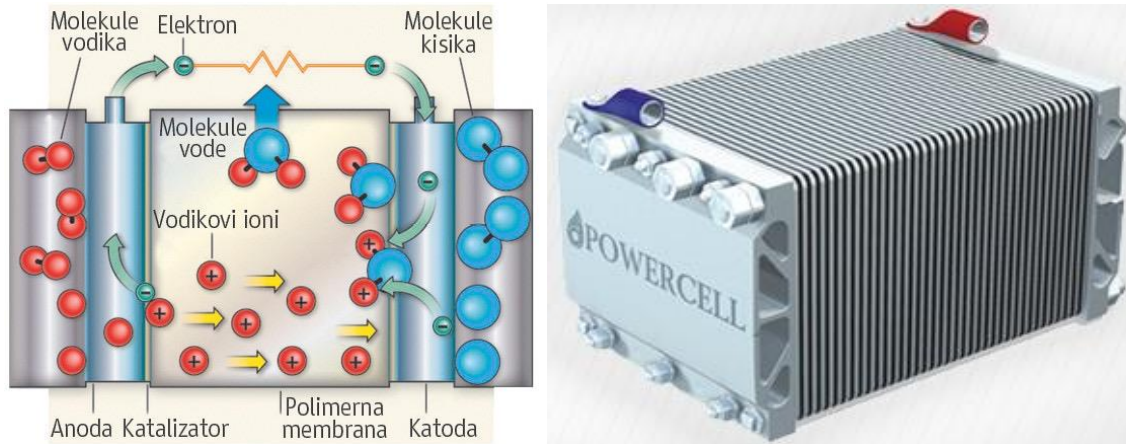
**PEMFC** – a fuel cell with a proton-exchange membrane. The hydrogen molecule splits at the anode into two protons and two electrons. Oxygen is reduced at the cathode. Quick start-up is its typical characteristic. Pure oxygen is required for its operation. These are ideal fuel cells for vehicles.

**AFC** – an alkaline fuel cell. These fuel cells use a solution of potassium hydroxide (KOH) in water as the electrolyte. Precious metals are used as catalyst at the anode and the cathode. These kinds of cells are used in the American space program. Newer cells of this kind operate at the temperature between 23 and 70 °C.

**PAFC** – a fuel cell that used phosphoric acid as electrolyte. Such cells are used in systems producing heat and electricity.

**MCFC** – molten carbonate salt mixture is the electrolyte in these cells. They are used for military and industry applications. They operate at high temperatures from 600 to 1000 °C. They do not need hydrogen (as fuel) to operate, as hydrogen is produced in the fuel cell from natural gas, propane or diesel fuel.

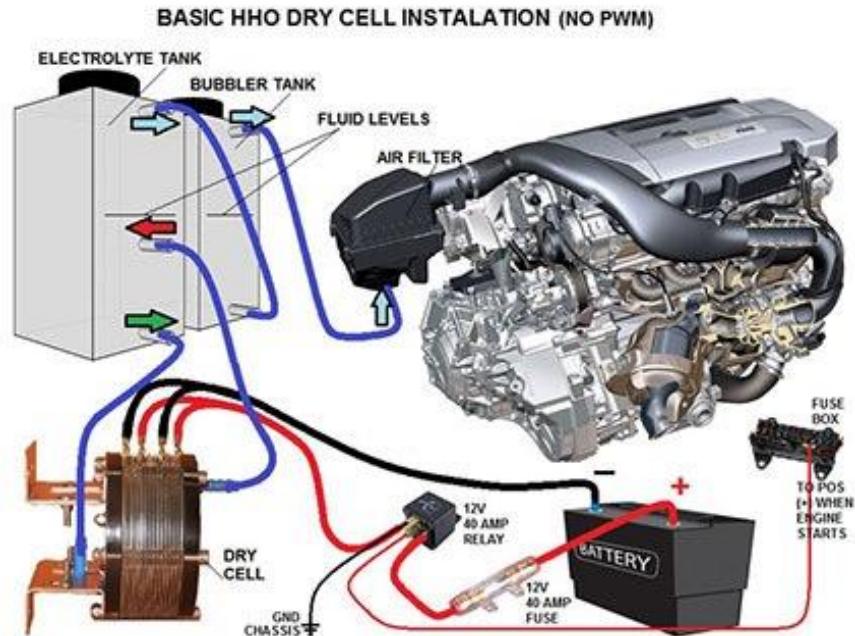
**SOFC** – hard, ceramic material indium oxide is used as electrolyte. Such cells operate at high temperatures of about 1000 °C. Different gas mixtures containing hydrogen are used as fuel. Molecules fall apart in the cell.



Picture 6: Direct membrane fuel cell (DMFC) <http://www.euromobil.si/gume/clanek/vodik-gorivo-prihodnosti>

## **8 REDUCTION OF CO2 EMISSIONS WITH HHO GAS GENERATOR«**

It is also possible to produce a mixture of hydrogen and oxygen with the so called HHO gas generator. A closed cell consists of positive, negative and neutral plates submerged in the electrolyte. By running a direct current through it, a mixture of hydrogen and oxygen begins to gather on the plates. The Hydrogen gas produced is then directed toward the engines combustion chamber, via the air intake manifold, where it mixes with your usual carbon based fuel and there both are ignited. This allows your carbon based fuel to burn better which gives your internal combustion engine more power. Because of this there are less CO2 emissions into the air. The increase of the Combustion Efficiency is especially noticeable in older internal combustion engines. Theoretically, up to 30% of fuel saving could be achieved in such engines. In more modern engines the effect is lower.



Picture 7: An example of assembling HHO generator. Source: <http://www.auto-hydrogen-usa.com>.

Three years ago I built an HHO generator myself for my car KIA Carnival. In my case the fuel consumption was really lower, to about 15% depending of course on the driving manner. The MOT check of exhaust gases showed only 5% of allowed levels.

## HHO System



Picture 8: Gas supply HHO. Source: <http://www.staforhho.com>

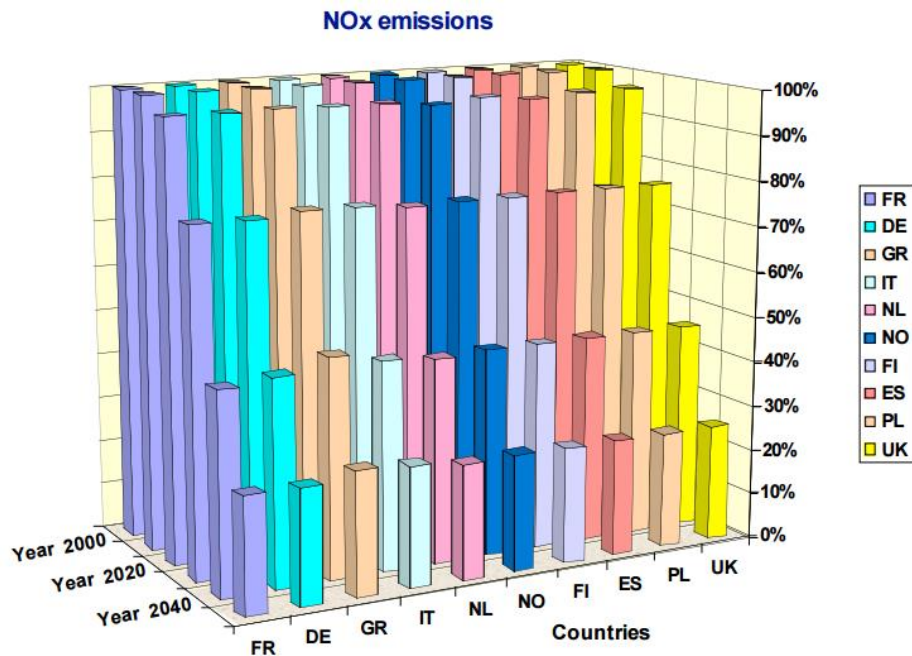
## 9 CONCLUSION

After the first energy crisis in the seventies, scientists and researchers began an extensive search for a new source of fuel that could replace the use of fossil fuels. Fossil fuels are not an unlimited source and when used in road traffic they pollute the environment with CO<sub>2</sub> emissions and other harmful substances. Currently the greatest advancement has been made in the field of electric vehicles which have numerous shortcomings. Electric vehicles are suitable for urban centres, they have a limited range, take a long time to fill up, their batteries are expensive and heavy and have a too low capacity.

Regarding the fact that hydrogen is abundant on Earth and in the universe, scientists are developing a cheaper, simpler production, better and safer ways of storage and are making an effort to a significant advancement in the fuel cell technology. As these cells have water as a by-product, the use of hydrogen driven vehicles is increasingly more logical.

Hydrogen vehicles are basically electric vehicles with the difference that the power is generated directly in the fuel cell, the only thing necessary is the hydrogen resistant tank and a smaller battery. The number of hydrogen filling stations is slowly but consistently growing worldwide. In California a hundred such stations are planned by the end of 2020, in Germany 400 by 2023. The Japanese should have about 800 by 2025 and South Korea about 500 by 2030.

Scientists predict that it could be possible to reduce the emissions of harmful gases by 80% by 2040 if investments are made into hydrogen technology for road traffic and of course with the right political and financial support.



Graph 1: Prediction of lower emissions of greenhouse gases in then EU members after the introduction of hydrogen technology.

Source: <http://cordis.europa.eu>

The lower house of the Dutch Parliament adopted with a majority of votes a resolution that after 2025 the sale of new petrol or diesel engine cars will be banned. This is another good reason for the development of hydrogen technology.

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## ŠOLSKI CENTER CELJE

### Srednja šola za kemijo, elektrotehniko in računalništvo

Eva Boh, profesorica angleščine in angleške književnosti

## OCENJEVANJE ZNANJA TUJEGA JEZIKA V PROGRAMU LOGISTIČNI TEHNIK

### POVZETEK:

Namentegačlanka je opis procesa priprave testa za ocenjevanje znanja tujega jezika za srednješolski izobraževalni program logistični tehnik.

Najprej bom ugotovila oceno znanja v kontekst in opisal razred, program in šolo, za katero so namenjeni pripravljene smernice ocenjevanja znanja. Glavni del tega članka je namenjen analizi primerov testov. Najprej je predstavljen smiselni vrstni red nalog v testu, nato sledi predstavitev in analiza vsake izbrane naloge posebej. Ta vsebuje smernice za smiselno tvorbo navodil, razložitev, kakšno znanje posameznik preverja, ponazoritev specifičnih lastnosti naloge in koncupredstavi še sistem dodeljevanja točk.

V zaključku članka še enkrat povzamem celoten proces sestavljanja testov, galočiod pilotnega testa in preverjanja znanja in poudarim pomembne faktorje, ki igrajo ključno vlogo pri tem.

Ključne besede: strokovna angleščina, ocenjevanje jezikovnega znanja, angleščina kot tuj jezik

## 2. INFORMACIJE O CILJNI SKUPINI

### 2.1 OPIS ŠOLE IN IZOBRAŽEVALNEGA PROGRAMA

Test, kiga opisujem v tem članku, je namenjen preverjanju in ocenjevanju znanja v programulogističnitechnikpripoukustrokovneangleščinetegaprogramanaSrednjišolizastoritvenedejavnosti in logistikonaŠolskemcentruCelje.

#### 2.1.1 ŠOLA

Srednjašolazastoritvenedejavnosti in logistiko je srednjastrokovna in poklicnašola, kiizobražujedijakezalogističnetehnike in jihatkopripravljazastrokovnodelona tem področju, torejpričakujemo, dabodozaposleni v organizacijahoziromadruhih institucijahnapodročjulogistike in transporta.

#### 2.1.1 PROGRAM

Program logističnitechnik je štiriletni program srednješolskegaizobraževanja.Dijakiimajopolegsplošnoizobraževalnihpredmetovstrokovne module in praksonadelovnemestu. Izobraževalni program pa vključujetudidodatneinteresnedejavnosti.

Angleščina je delsplošno-izobraževanegapredmetnika v vsehštirihletihšolanja. Izvaja se po 3 uretedensko.Šolanje se konča s poklicnomaturo, delkatere je lahkoitudiangleščinakotizbirnipredmet.

### 2.3 PREDMETNIK

Kogovorimo o srednjemtehniškemizobraževalnemprogramu, je učninačrtpoučevanjaangleščinepovezan z ostalimistrokovnimi moduli, karpomeni, da za ta predmetnipredpisanegaenotnegaučneganačrtaministrstva, pristojnegazašolstvo, pač pa je ta zastavljenintegrirano s preostalimi moduli programa.

Takoimajoučiteljiboljstvobodnoizbiropripoučevanjurazličnih tematik in s tem večjomožnostprilagajanjastroki. Tudipodrobnejšoizvedboučneganačrtalahkopredvidijoučiteljisam i in jo poenotijo v okviruučiteljskegaaktivategapredmeta.

To učiteljemomogoča tudi večjo svobodno prisestavljanje pisnih preizkusov znanja, saj se lahko učiteljsamodloči, nakaterisnovibopoudarek. Pravzato pa je še bolj pomembno, da so snovalci testov pri tem zelo dobro teoretično podkovani o preverjanju in ocenjevanju znanja.

Tako naj bitipičen test ocenjevanja znanja vključeval in preverjal znanje naslednjih elementov:

- Strokovna terminologija obravnavanih tem
- Ponovitev splošnega besedišča
- Raba slovničnih časov
- Obravnavavsebinskih tem
- Besedotvorje
- Tvorjenje krajšegapisnegasestavka.

### 3. ANALIZA

#### 3.1 VRSTNI RED NALOG

Naloga mora biti razporejena v smiselnem vrstnem redu. Najprej moramo upoštevati, da mora biti test sestavljen tako, da sledi logični potezavnosti.

Naloga mora biti razporejena po temah, začeni s temi, kiso jih v razredu obdelati najprej, kot ponovitveno teme, sledijo pa najjimnaloge s temi povrstnem redu, ki je enakronološki redu obravnavanja tempri pouku.

Test naj vsebuje naloge, ki bodo potezavnost smiselno razporejene. Prva naloga test naj bo kognitivno manj zahtevna. Zasnovana naj bo kot ogrevanje, hkrati pa naj ne bo le samasebinamen, pač pa žedejansko preverjanje določeno znanje. Naloga, ki sledi, naj bo ena izmed zahtevnejših, kot na primer rabaslovničnih časov, saj mora oprijeti naloge, ki jihkratitakopostavljatiglagole v pravilne oblike, kot bitipozorninabralnorazumevanje. Za to potrebujejo veliko merozbranosti, ki je nazačetkutesta še dovolj velika, zato je smiselno takšno nalogo postaviti kot drugo.

Nazadnje je prizasnovite stepomembno z vidikavrstnega redanalogsedejstvo, da ne sme raven težavnostisleditikoninuiranikrivulji. Tako sinaj zahtevna naloga nikoli ne sledijo zaporedoma, pač pa se temu izognemo z dodatnimi nalogami, ki so zasnovane, na primer, s pomočjo povezovanja ali v oblikikrajših povedi, ki zahtevajo manj branja.

#### 3.2 TIPI NALOG

V tem razdelku si bomo ogledali posamezne tipe nalog, ki so najbolj primerni za preverjanje in ocenjevanje tujejezikovnega znanja zalogistične tehnike.

Vsak test naj bi večinoma vseboval objektivne tipe nalog, seveda pa ne smemo zanemariti bolj subjektivnih tipov. Kombinacijo in pomen vključevanja obeh je poudarila tudi Heaton, saj pravi, da vsak dober test vsebuje tako subjektivne, kot tudi objektivne tipe nalog. (Heaton, 27).

Za ponazoritev tega je v nadaljevanju predstavljenih 6 tipov nalog. Poleg razlage je predstavitev vsakega tipa naloge dopolnjena še s smernicami za pravilno oblikovanje navodil, poudari, kakšno znanje posamezne naloge zahteva in kako mora biti oblikovana, da znanje aresizmeri in kakoga ovrednotiti s točkovnikom.

## Naloga 1: BESEDIŠČE

Zelo uporabna vaja za testiranje besedišča, ki jo priporoča tudi Heaton v svoji klasifikaciji, je vaja dopolnjevanja (62). Da ne prihaja do nerazumevanja, morajo biti navodila napisana zelo pozorno. Zelo preprosto je namreč preverjati besedišče zgolj s prevajanjem fraz, še enostavneje pa je napisati sopomenko ali se izogniti iskani besedni zvezi, tako da dijaki napišejo le besedo s podobnim pomenom. Eden izmed načinov, da se temu izognemo, je, da napišemo prvo črko iskane besede, obstajajo pa še druge možnosti, kot so na primer okvirčki posameznih črk v besedi, ki tako določajo število črk in s tem eliminirajo druge možne rešitve.

Drug način testiranja besedišča, ki ga želimo preveriti, pa je s pomočjo vizualnega materiala. Čeprav Heaton pravi, da je takšen način testiranja primeren predvsem za mlajše učence . Primeren pa je tudi pri strokovni angleščini, še posebej, če ga vključimo kot vajo za ogrevanje. Uporaba fotografij je tudi zelo uporabna, kadar želimo, da testirani uporabi točno določeno besedo, ne da bi za testiranje ravno te besede morali uporabiti sorodne fraze, ki bi lahko nakazovale na rešitev (149).

## Naloga 2: SLOVNIČNI ČASI

Navodila pri teh nalogah morajo biti tvorjena tako, da z njimi dosežemo dvoje. Zagotoviti morajo nekakšen kontekst, kot uvod v besedilo ter tako pomagajo dijakom pri bralnem razumevanju. Morajo pa tudi poudariti, da naj dijaki poiščejo "najbolj primerno" rešitev, s čimer eliminiramo pomemben problem pravih in napačnih rešitev. Stranks prav tako verjame, da je potrebno učencem dati možnost, da pretehtajo, katera rešitev je bolj verjetna in bolj primerna, s čimer jim sporočamo, da je možnih več rešitev in ozaveščano, da so med njimi manjše, a pomembne razlike v pomenu (336).

Naloge, ki vključujejo spremembe besed, testirajo sposobnost rabe pravih oblik slovničnih časov in glagolskih oblik (Heaton 48) v specifičnih kontekstih in situacijah. Poleg preverjanja slovničnega znanja pa pri takšni nalogi do določene mere preverjamo tudi bralno razumevanje, ki je potrebno za uspešno reševanje te naloge.

Da bi popolnoma ocenili znanje časov moramo zagotoviti dovolj sobesedila ter tako izločiti možnost več rešitev. Da pa bi še bolj pomagali pri razumevanju besedila, lahko nalogo oblikujemo v zgodbo in ne preverjamo znanja le s posameznimi povedmi. Kot pravi Heaton (44), je to ena glavnih prednosti rabe zgodbe. Poleg tega pa še Byrd (52) ugotavlja, da je dobro uporabiti primer reševanja naloge na začetku in tako spomniti dijake na določeno pravilo, še posebno v stresni situaciji testiranja znanja. Prav tako je lahko besedilo izbrano glede na tematiko ali področje, ki je dijakom še posebej blizu, v našem primeru odstavek, ki se navezuje na logistiko, kar še izdatno pomaga pri bralnem razumevanju.

### Naloga 3: POVEZOVANJE

Namen navodil pri nalogah povezovanja pomenov je izpostaviti, da le ena beseda ustreza določeni povedi, sicer je lahko takšna vaja zavajajoča, saj navadno vsebuje naloga več besed, kot je predvidenih povedi, s katerimi jih moramo povezati. Če v navodilih ne bi eksplicitno izpostavili, da so nekatere besede odveč, bi učenci morda mislili, da morajo iz danih besed tvoriti besedne zveze in v poved vstaviti več kot le eno besedo.

Pomembna pri temu tipu nalog je tudi njena zasnova, saj kot pravi Heaton (59), ja takšna vaja precej bolj učinkovita, če uporabimo le besede, ki pripadajo isti besedni vrsti. Tako je na primer seznam izbranih besed, ki jih želimo testirati, lahko sestavljen le iz samostalnikov. Avtor prav tako izpostavi problem premajhne izbire, zato je potrebno na seznam uvrstiti vsaj dve dodatni besedi, da nimajo pri reševanju zadnje povedi dijaki rešitve že podane. S tem prav tako zmanjšamo možnost ugibanja (Heaton 59). Na takšen način lahko resnično testiramo izbrane besedne zveze in preprečimo dijakom, da bi zgolj povezovali besede s povedmi, glede na njihov položaj v povedi, kar je tudi glavna prednost naloge. Slabost te vaje pa je to, da so besede že podane in jih je za rešitev naloge potrebno poznati le pasivno, ne pa tudi aktivno uporabljati v povedi in napisati pravilno črkovanje.

### Naloga 4: BESEDOTVORJE

Pri vajah besedotvorja je najpomembnejše pravilno oblikovanje navodil naloge, saj moramo izpostaviti, da obstaja le ena pravilna rešitev, kot to pove na primer navodilo "V okvirčke napiši pravilno obliko besed v oklepaju." Nepravilna formulacija pa bi na primer bila: "Napiši najbolj primerno obliko besede.", saj bi tako učenci morda mislili, da morajo tvoriti tudi različne slovnične strukture.

V primeru angleščine za logistične tehnike, je takšna naloga posebej primerna za preverjanje znanja splošnega vokabularja in besednih družin, manj pa za testiranje strokovne terminologije, saj morajo pri tej nalogi dijaki tvoriti novo besedo iz iste besedne družine s pomočjo besedotvornih vzorcev. To je uporabno za splošno izrazoslovje, le redko pa pride v poštev za strokovne termine.

Da bi rešitev naloge bila pravilna, je potrebno pri tem tudi bralno razumevanje, zato ta vaja preverja tudi to jezikovno zmožnost.

Čeprav je črkovanje že dano v korenu besede, pa se ta vaja osredotoča na dijakovo sposobnost tvorjenja nove besede znotraj besedne družine z uporabo različnih predpon in končnic. Seveda je najpomembnejše, da veliko besed v tem procesu spremeni črkovanje, pravi Madsen (30). Dodaja pa tudi, da je ravno zato še toliko bolj pomemben vsebinski kontekst takšne naloge, saj bi

pomanjkanje le tega omogočalo več možnih rešitev (Madsen 28). Ravno zato je dobro uporabljati zgodbo in ne le posamezne povedi. Ker pa je to zelo zahtevna vaja, je priporočljiva pomoč s primerom reševanja.

### Naloga 5: DEFINICIJE

Ta naloga je naloga objektivnega tipa in sloni na definiranju besed. Navodila te naloge morajo podati rabo besed, ki pomagajo dijakom pri formuliranju definicij. To je zelo dobra vaja za strokovno angleščino, saj ponazarja realne situacije, v katerih bodo angleščino uporabljali logistični tehniki. Definicije ne smejo biti slovarske, pač pa morajo pri tej nalogi dijaki s svojimi besedami razložiti podane izraze.

Čeprav Heaton (62) pravi, da je takšna naloga zelo neživljenjska, saj testira pismenost z znanjem besedišča, pa je pri strokovni angleščini smiselna, saj morajo logistični tehniki znati razložiti na primer določene procese njihovim strankam in ravno zato je testiranje te jezikovne zmožnosti ključnega pomena.

Weir (152) še dodaja drugo prednost vizualne stimulacije, saj dijaki z njeno pomočjo lažje razberejo pomen in ne potrebujejo veliko časa za branje sicer dolgih tekstov, ki bi jim natančno opisali navodila za sestavek.

### 3.3 RAZLAGA OCENJEVANJA NALOG

Vaje z besediščem se morajo ocenjevati glede na pravilnost zapisa in njihovega pomena. Pri lažjih vajah, ki že vsebujejo prvo črko in število črk v besedi naj bo pravilen odgovor vreden 0,5 točke, sicer pa 1 točko. Beseda, ki je narobe zapisana, se oceni z 0 točk, saj je namen te vaje prav preveriti zmožnost črkovanja.

Vaja slovničnih časov se ocenjuje po dveh načelih. Vsak odgovor je vreden 0,5 točke za pravilno izbiro glagolske oblike in 0,5 točke za pravilen zapis le te. Raba napačnega pomožnega glagola ali nepravilnega glagola kot pravilnega, se smatra kot slovnična napaka in ne napaka črkovanja. Napačno črkovanje bi na primer bilo v primeru netočne rabe končnic ali napačno zapisane besede, kjer to ne vpliva na pomen.

Pri nalogi povezovanja so pravila ocenjevanja zelo jasna. Točka se dodeli za pravilno povezan termin in poved, tako da je ta smiselna. Če je beseda prepisana napačno, se točke ne odštevajo, saj ta naloga ne testira črkovanja in bi kaznovanje z odbitkom točk torej pomenilo, da testiramo pravilno prepisovanje, kar pa je seveda nesmiselno.

Pri besedotvorju pa je, kot je že v navodilu predvideno, za dodeljeno točko potrebno napisati pravilno obliko besede glede na dani kontekst. Poleg tega pa mora biti zapis na novo tvorjene



besede popolnoma točen. Napačno črkovanje je ocenjeno z 0 točk, saj ta naloga preverja sposobnost črkovanja različnih izpeljank posamezne besede. Ker naloga temelji na sobesedilu, od katerega je posamezna rešitev močno odvisna, je prav tako kaznovana napačna raba končnic, na primer množine.

Malo manj transparentno je ocenjevanje pisanja definicij. Vsak odgovor naj bi bil sestavljen iz 0,5 točke za točnost in 0,5 točke za pravilen pomen, saj tako ocenimo dijakovo kompleksno znanje besede. Dodatne 0,5 točke pa se dodeli za pravilno oblikovanje povedi, rabo kolokacij, kjer je to potrebno in tvorjenje definicij z vsemi njenimi prvinami. Dijaki pri tej nalogi ne izgubljajo točk za napačno črkovanje.

Pisanje pisnega sestavka je najbolj subjektivna vaja in tako tudi podvržena najbolj subjektivni oceni. Da pa bi bila kljub temu primerna za veljaven test, mora biti ravno ta naloga opisana z najbolj objektivnimi navodili za ocenjevanje. Ker je sestavek del preverjanja zmožnosti pisnega sporočanja, lahko pri ocenjevanju te naloge uporabimo standardni obrazec ocenjevanja eseja in ga prilagodimo za potrebe ocenjevanja kratkega pisnega sporočanja. Tako mora biti fokus ocenjevanja sestavka na naslednjih kategorijah sestavka: na razponu uporabljenega besedišča, slovnici in številu napak pri črkovanju. Vsaka kategorija se ocenjuje numerično z lestvico, in sicer: 0 točk za neprimerno, 0,5 točk za slabo, 1 točko za povprečno, 1,5 za dobro in 2 točko za odlično izpolnjevanje posamezne kategorije. Dolžina in vezljivost sestavka nista bistvenega pomena zaradi zelo kratkega odstavka in zato nista ocenjevana. V primeru, da pa bi ta bil sestavljen iz več kratkih povedi, ki bi presegle predpisano število povedi v navodilu, pa se od celotnega seštevka točk pri tej nalogi odbije 1 točka, saj bi to pomenilo, da je sestavek napisan zelo slabo ali uporablja preveč preprosto tvorbo povedi, da bi te lahko bile smiselno povezane v tekoč sestavek.

#### 4. ZAKLJUČEK – Opis in refleksija procesa sestavljanja testa

V procesu pisanja testa je naprej pomembno imeti v mislih testirance.

V primeru logističnih tehnikov mora tako biti test strokovne angleščine sestavljen tako iz preverjanja znanja splošne angleščine kot tudi tehničnega izrazoslovja, ki ga predpisujejo moduli izobraževalnega programa.

Da bi dobro zasnovali test, moramo strogo slediti učnim ciljem kurikula. Kurikul tega programa pa se močno razlikuje od kurikula angleščine za splošnoizobraževalni program gimnazije. Ta program namreč predpostavlja rabo angleščine s poudarkom na specifičnih temah, povezanih s strokovnim področjem logistike, ki pa je seveda zelo drugačen od pouka splošne angleščine. Tako je pomembno najti pravo ravnotežje med strokovnim in splošnim tudi na testu.

Test je vedno smiselno pilotno testirati, hkrati pa je preverjanje znanja pred ocenjevanjem tudi predpisano s šolsko zakonodajo. S pilotiranjem testa se izognemo njegovim nejasnostim, prav tako pa damo dijakom povratno informacijo o tem, koliko že znajo in kje so še morebitne vrzeli v njihovem znanju.

Ta članek daje vpogled v celoten proces nastanka testa. Pri tem sem sama opazila, kako zahtevna je sestava dobrega testa in katere pomembne elemente mora vsebovati. Še posebej zanimivo se mi zdi, kako veliko možnih rešitev najdejo dijaki, kako pomembno je vedeti, kaj določena naloga dejansko testira in česa ne ter kako težko je najti ravnovesje med zajemanjem preveč snovi s posamezno vajo v testu ali s testiranjem premalo znanja na celotnem testu.

Ugotavljam tudi, da ni največji izziv pripraviti kvaliteten test, pač pa tega tudi oceniti pravično. Da bi s testom resnično ocenili dijakovo znanje, moramo predvideti dober kriterij ocenjevanja posameznih nalog.

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## **SCHOOL CENTER CELJE**

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#### **FOREIGN LANGUAGE ASSESSMENT FOR STUDENTS OF LOGISTICS**

##### **ABSTRACT:**

In this research paper I will describe the process of writing a test paper for the programme in technical upper secondary education, namely the program for logistic technicians.

To begin with, I will put the testing into context. I will describe the class, the programme and the school for which the assessment guidelines are intended. The major part of this paper is the analysis of the test. I will firstly discuss the order of the tasks and comment on it, present the most appropriate tasks on a test and analyse each one separately in terms of the type of task, comment on instructions, explain what the task tests, and additionally explain specific characteristics of the task, as well as add the scoring system. In the analysis I will also explain the criteria for assessment. In the conclusion I will reflect on the whole process of creating such a test, explain the piloting of this test and emphasize important issues raised during this process.

Key words: English for specific purposes (ESP), language assessment, English as a second language (ESL).

## 2. INFORMATION ON THE TARGET GROUP

### 2.1 Description of school and programme

The test I am describing is intended for the programme Logistic technicians. For the test I chose a typical ESP class, which is a class of this programme on Srednjašolazastoritvenedevnosti in logistiko, on ŠolskicenterCelje.

#### 2.1.1 SCHOOL:

Srednjašolazastoritvenedevnosti in logistiko is a secondary school for logistic technicians. This is an upper-secondary technical school educating students to become professionals in the field of logistics, giving them the opportunity to work in companies, large organisations, transport firms and other institutions which deal with logistics and transport.

#### 2.1.2 PROGRAMME:

The logistics technician is a four-year long technical upper secondary education and educates students to become experts in the field of logistics. Students have general education subjects, technical modules and practical training education. The programme also includes special interest activities.

English is one of the general education subjects in all four years of the studying, three hours per week. Their schooling finishes with the vocational matura exam at the end of the programme, on which apart from other compulsory subjects students may also choose English as an elective subject.

### 2.3 CURRICULUM

Being a technical upper secondary programme in which English is a subject which is connected to other technical modules, there is no standard curriculum by Ministry of Education and Sport. Instead it is left to the teacher to decide what to include, which topics to leave out and which to emphasize more in this subject. Therefore, the curriculum is written by teachers.

This may present a challenge for the test writers, as it is up to the teacher to decide what should the focus be put on. That is why it is even more important to be skilful in testing and assessing learners' knowledge.

For example, a prototypical test should include the assessment of the following language elements:

- technical vocabulary items which were dealt with
- revision of general vocabulary items
- the use of tenses
- topic discussion
- a form of word formational exercise
- a short writing exercise.

### 3. ANALYSIS

#### 3.1 THE ORDER OF TASKS

Tasks in a test should be ordered in a meaningful way.

Firstly, the test should be designed so that the tasks follow according to difficulty.

Secondly, tasks should also be arranged according to topics, starting with the older topics which were introduced at the beginning and followed by the topics according to the chronological order as they were dealt with in class.

Thirdly, the test should have a logical distribution of the difficulty. It should start with the easiest task which is also cognitively less challenging. Due to its design it serves as a warm up, but at the same time it should not be meaningless. It is recommended that the following exercise is one of the most difficult ones, such as a task on the formation of English tenses, as students are required to put the verbs into the correct forms and at the same time have to understand the context in order to do that. Since the testees' concentration is still very high at this point it is logical to place this task right after the first exercise which serves as a warm up.

Finally, the order of the exercises should also be broken in terms of difficulty every now and then, in order not to have several very demanding tasks in a row. To avoid having two quite challenging tasks together, put another task in between, which is designed as a matching task for instance, and in a form of sentences, so that there is less reading.

#### 3.2 TASK TYPES

This section of the research paper deals with the types of tasks that are most appropriate for the language testing and assessing for logistics technicians.

To begin with, the test should mainly consist of objective type items; however, there may also be subjective type items included, as Heaton points out: "A good classroom test will usually contain both subjective and objective test items." (27).

To illustrate this I have selected six tasks and the analysis of each task includes an explanation of the type of task used, reasons for different formulations of instructions, it specifies what the task tests and includes additional comments on the structure of the task, as well as presents the scoring.

## Task 1: VOCABULARY TASKS

A very useful task is according to Heaton's classification a completion item type of task and can be used for testing vocabulary (62). To avoid possible misunderstandings or the production of less appropriate solutions in such a task, be sure to write the instructions carefully. It is very tempting for instance, to check vocabulary by asking students to translate the phrases, but even more tempting is the possibility that the students will try to avoid the item you are looking for in a test and will try to replace the solution with a synonym or another phrase which is similar in meaning. One possible solution to this problem is to provide the first letter of the word you are looking for, but of course there are also other possibilities, such as providing a gap for each letter of the word you are trying to test.

Another way of avoiding possible misunderstanding is to provide a visual aid. Although Heaton explains that "[i]n this type of recognition item [where] the stem is replaced by a picture [...] is clearly very appropriate at the elementary stages" (53). However, you may use it, in spite the fact that your group of testees may be at a more advanced level, if you include it in your test as a warm-up activity. Pictures are also very useful, as Hughes points out, when we want testees to use the specific lexical item, without having to use similar vocabulary ourselves to create the task (149), which I have already pointed out above.

## Task 2: TENSES TASKS

"The inflection form" (45) as Madsen labels this kind of tasks focuses on the use of tenses.

The instructions should be formed in such a way that they try to achieve two things. Firstly, they need to provide a bit of context as an introduction, helping the students with comprehension. Secondly, emphasizing to "[c]hoose the most appropriate forms of verbs written in brackets" eliminates an important problem of right and wrong answers. Stranks believes "[...] asking learners to consider which is more likely or more appropriate allows them to perceive that choices are available, and that there are subtle meaning differences between the choices." (336)

"Items involving the changing of words [tests the testees'] ability to use correct tenses and verb forms" (Heaton 48) in specific contexts and situations. In addition to testing grammar, also reading skills are tested as a certain degree of comprehension is necessary for the successful completion of the task.

In order to truly assess the mastery of certain tenses a lot of context must be provided to reduce the number of possible correct answers to the minimum. To even further help testees in the comprehension the task are sometimes also formed into a story and not just sentences in isolation. This is according to Heaton a major advantage of using a passage rather than separate sentences in isolation in completion type test (44). In addition, the task contains one example,



which is, according to Byrd, very useful “to help in recalling a rule/concept (especially in test situation)” (52). Also the topic of the text used should be related to the field of logistics, which additionally helps the learners in their reading comprehension.

### Task 3: MATCHING ITEM TASKS

The purpose of the instructions in this type of a task is to point out that only one word fits into a sentence, otherwise the task might be misleading. Having a list of more words provided than needed, testees might think they are required to form a multi-word units, which is why such a formulation of the instructions is necessary to avoid potential misunderstandings.

What is important in the construction of such a task is the formulation of the task, as according to Heaton “[i]t is much more effective to test words from the same word class [...]” (59) that is why the list of items is selected in such a way that all matching items should be a part of the same part of speech – for example, nouns. He also emphasizes the problem of having too little choice; that is why at least two additional vocabulary items should be added so that there is not only one word left for the last sentence (Heaton 59) and thus also the possibility of guessing is reduced. Such a careful selection of vocabulary items enables the testing of meaning and prevents testees to simply match the provided items with the first word in a sentence, which is a great advantage of the task. Disadvantage of having selected vocabulary items already provided is the possibility of knowing a word just passively and not being able to actively produce it and provide the correct spelling.

### Task 4: WORD FORMATION TASKS

In a word formation exercise the wording of the instructions is important, namely it presupposes there is only one possibility by saying “Write the correct form of words in brackets into the gaps.” and not “Write the most appropriate form” as this was the case in tasks for tenses.

In the case of the logistic technicians, such a task is appropriate for testing the knowledge of general vocabulary and word families, and not so much for the expert and field-related vocabulary, as it tests testee’s ability to form the new words out of the given words by using word formational patterns. That can be done with the general vocabulary, but rarely it is useful when testing technical terminology.

In order for the solution to be correct comprehension of the text is very important, therefore also reading skills are tested in this task.

While the spelling of words is already provided this task tests how well testees are able to spell new words within a word family and use different prefixes and suffixes. “An advantage is that many words need spelling changes when suffixes are added.” (Madsen 30). He also emphasizes that context preparation plays an important role in such a task, as poor context allows for more correct answers (Madsen 28) and for this reason it is advisable to use a story, and not just sentences. Being a very challenging task, there should be an example, illustrating how the task should be completed.

#### Task 5: DEFINITIONS TASKS

This task is an objective type item based on the usage of definitions. The instructions provide some context which helps testees to formulate their definitions better. This is also a very good ESP task and reflects real-life situations in which logistic technicians may find themselves. This task demands using more simple language and not providing dictionary definitions, as learners are encouraged to express a notion in their own words.

Although Heaton argues this type of task is of very little use, as it tests writing ability combined with a knowledge of word meanings (62) I find it very important and useful, as it is absolutely necessary for the students of logistics to be able to explain certain procedures or the names of machines to their clients and likewise is the testing of this ability of crucial importance.

#### Task 6: WRITING TASKS

This is a subjective type item, focusing on writing a short paragraph. The instructions should be designed in such a way that they both, avoid ambiguity of the topic and at the same time “stimulate testees’ imaginative powers” (Heaton 143) by using a picture, for instance. He also points out another advantage of using visual stimulus instead of written prompts in the instructions is to avoid the problem of testees reproducing the phrases and sentences contained in the instructions (142).

This task tests testees’ ability to write a few sentences on, for example, giving advice, directions, recommendations, or instructions to a client. This task should be included as it tests the testees’ “ability to organise ideas and express them in his or her own words, which is a skill essential for real-life communication.” (Heaton 144).

Weir believes another advantage of using stimuli, such as a picture is that testees do not have to spend a lot of time on decoding a lengthy text on which they have to write a paragraph (152).

### 3.3 EXPLANATION OF SCORING

Vocabulary tasks in general should be scored according to the accuracy of spelling and meaning. If the task is made easier by having the first letter and the number of letters already provided testees' answer has to be completely correct to get 0.5 point, otherwise the correct answer should be assessed with 1 point. Any word containing a spelling mistake is considered to be wrong and such a solution is marked with zero points, as the task also tests the ability to spell.

A task testing tenses is divided into two focal points in terms of assessment. Each answer consists of 0.5 point for the correctly chosen verb form and 0.5 point for the correct spelling. The misuse of auxiliary and irregular verbs is considered as grammatical mistakes and not as spelling mistakes. Spelling mistakes are for example, incorrectly added suffix without the obligatory word changes or a wrongly spelled word provided the mistake does not affect the meaning of the misspelled word.

A task with matching items is very clear-cut. The point is received if the appropriate word is put into the sentence, so that the sentence is meaningful. If the word is misspelled points are not deducted, as the task does not test spelling and would thus assign points for correctly copying of the words, which is pointless.

With word formation, obviously, as the instructions already demand, to score a point the word form has to be correctly used according to the context. In addition the word has to be spelled correctly. A misspelled word is marked with 0 points, as this task test the ability to spell the variant of a word belonging to another word class. As the task heavily relies on the context and thus tests reading comprehension the lack of plural endings, being a suffix, is also considered to be a mistake.

Providing definitions is a bit trickier to assess. Each answer should consist of 0.5 point for the correctly and meaningfully described lexical item, which shows testee's knowledge of the item. Another 0.5 point is gained for the appropriate word order, the usage of collocations where necessary and the wording of the definition in general. Testees do not lose points for spelling mistakes in this task.

And lastly, the most ambiguous of them all to assess is a writing task, which should therefore, have the strictest rules of them all in order to be objective enough for the test to be valid. Being a very short paragraph it is impossible to use the criteria for the usual assessment of essays. Therefore the focus here should be on the following characteristics: the range of vocabulary, grammar used and the number of spelling mistakes. Each category is marked numerically on the scale, which may be described in the following way: 0 points for inappropriate, 0.5 point for

poor, 1 point for average, 1.5 points for very good and 2 points for excellent. The length and the cohesion of the paragraph are not of great importance due to the shortness of the task. However, if the sentences are very short and exceed the prescribed length for two or more sentences (i.e. providing 4 or less short sentences or 10 or more sentences) 1 point should be deducted from the total score on the task, as such a paragraph is either poorly written or uses too simple and too short sentences which are not appropriately linked together.

#### 4. CONCLUSION - Description of and reflection on process of creating the test

In the process of writing a test it is first important to have your testees in mind.

In the case of students of logistics, the ESP test should take not only the knowledge of English in general, but also the technical modules of a programme into consideration.

To be able to create a test one must strictly follow the learning goals of the curriculum. The curriculum of this programme differs a lot from the general upper-secondary education curriculum. The programme includes English as a subject which focuses on different aspects related to the field of study and therefore differs from English as a general education subject. Here it is important to find the right balance in terms of what to include in the test and what not.

It is always advisable, as well as obligatory by the law, to pilot the test and correct any ambiguity as well as give learners some feedback on their knowledge and point out what they need to work on more.

To sum up, this paper has given me a remarkable insight into the process of creating a test. I have realised how challenging it is to create a good test, as there are so many factors one must consider in this process. I found it amazing how many different possibilities students may come up with, how important it is to be aware of what the task tests and what not and how difficult it is to find a balance between not testing too much in one exercise and too little with the whole test.

I have realised that the greatest challenge, however, is not to just create the tasks, but also to reassure you will assess the testees' knowledge fairly. To achieve that one must truly prescribe the assessment criteria carefully.

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# JU SREDNJA ŠKOLA ZA SAOBRAĆAJ I KOMUNIKACIJE SARAJEVO

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## UČENJE NA DALJINU

### Sažetak

Današnje doba modernih tehnologija i globalizacije donosi brze promjene u svim aspektima ljudskog života. Svakim danom stvaraju se nove informacije, a opći razvoj kontinuirano zahtijeva nova znanja i vještine. Javlja se potreba za što bržim, pravovremenim obrazovanjem koje će istovremeno biti otvoreno, široko dostupno.

Informatičko društvo u kojem živimo zahtijeva konstantno prilagođavanje obrazovnog sistema tržišnim promjena. Promjene se intenzivno dešavaju te se javlja nemogućnost usaglašavanja tržišnih zahtjeva za obrazovnim kadrovima.

Cjeloživotno učenje, vandredno polaganje ispita, dokvalifikacija i prekvalifikacija učenika, predstavlja mogućnost koju nude obrazovne ustanove kako bi se usaglasile sa tržištem. Metode koje se preporučuju za primjenu cjeloživotnog učenja je učenje na daljinu. Primjenom učenja na daljinu obrazovne ustanove bi mogle povećati kvalitet pružanja usluge i na taj način vandrednim učenicima ponuditi inovativni način educiranja.

**Ključne riječi: cjeloživotno učenje, učenje na daljinu, platforme za primjenu učenja na daljinu.**

### 1. Uvod

„Dok je tehnologija dvadesetog stoljeća izazvala revoluciju u komunikacijama i dovela do informacijskog društva, naše su obrazovne institucije još uvijek zaleđene u industrijskoj revoluciji“).  
Bates šaljivo opisuje (1995.)

Kad je riječ o obrazovnim procesima, nalazimo se u vremenu informacijskih i komunikacijskih sistema i savremenih tehnologija. Klasični nefleksibilni obrazovni sistemi više nisu u mogućnosti u potpunosti odgovoriti potrebama savremenog čovjeka. Globalna informatizacija cijeloga društva je prešla mogućnosti klasičnih obrazovnih sistema. U tom smislu pokrenute su ozbiljne znanstvene rasprave i pokrenuti projekti o primjeni novih informacijsko-komunikacijskih tehnologija u procesima obrazovanja.

Jedan od najvećih iskoraka u evoluciji klasičnog nastavno-obrazovnog procesa predstavlja učenje na daljinu, odnosno učenje putem interneta. Praksa u svjetskim obrazovnim institucijama

dokazuje da je pedagoško-didaktički značaj učenja na daljinu izuzetno veliki, pogotovo za one koji se, zbog obaveza, ne mogu potpuno posvetiti klasičnom načinu školovanja, kakav je uobičajen na našim prostorima. S obzirom na stručnu usmjerenost naših obrazovnih institucija, osećamo posebnu odgovornost da podignemo svijest o prednostima koje ovakav vid učenja pruža.

Zahvaljujući intenzivnom razvoju informacionih tehnologija, nastava ima mnogo prostora da postaje sve modernija i inspirativnija, svestranija, kvalitetnija i interaktivnija u odnosu na tradicionalni model. Oslobođena je prostorno-vremenskih ograničenja, što znači da naši učenici, studenti i polaznici u svakom trenutku i na svakom mjestu mogu pristupiti informacijama, što im automatski ostavlja više vremena za samostalan rad i razmjenu mišljenja sa profesorima.

## 2. Cjeloživotno učenje

Cjeloživotno učenje odnosi se na "svaku aktivnost učenja tokom cijeloga života radi unaprjeđenja znanja, vještina i kompetencija u okviru osobnoga, građanskog, društvenog ili profesionalnog djelovanja pojedinca". Ono obuhvaća učenje u svim životnim razdobljima (od rane mladosti do starosti) i u svim oblicima u kojima se ostvaruje (formalno, neformalno i informalno).

Učenje je pritom kontinuirani proces u kojem su rezultati i motiviranost pojedinca za učenje u određenom životnom razdoblju uvjetovani znanjem, navikama i iskustvima učenja stečenima u mlađoj životnoj dobi. Uz koncept cjeloživotnog učenja najčešće se vezuju ciljevi ekonomske prirode, primjerice postizanje veće konkurentnosti i trajne zapošljivosti. S druge strane ne smiju se zanemariti jednako važni ciljevi koji pridonose aktivnijoj ulozi pojedinca u društvu. Ti su ciljevi poticanje društvene uključenosti, razvoj aktivnoga građanstva te razvijanje individualnih potencijala pojedinaca.

Koncept cjeloživotnog učenja, razvijen u šezdesetim godinama prošlog stoljeća, odgovor je na problem neusklađenosti između obrazovanja mladih i odraslih (Pastuović, 1999.). Usredotočenost tradicionalne pedagogije na probleme osnovnoškolskog odgoja i općeg obrazovanja djece te andragogije na obrazovanje odraslih, rezultirali su nedostatkom teorije koja bi integrirala spoznaje o obrazovanju i učenju kroz sva životna razdoblja. Takvo stanje pogodovalo je razvitku teorije i koncepta cjeloživotnog učenja kao integriranog pristupa proučavanju učenja kao trajnog procesa.

U proteklih četrdeset godina cjeloživotno učenje se od početne ideje razvilo u dominantno načelo i orijentaciju razvoja brojnih nacionalnih obrazovnih sistema. Jedna od najboljih metoda za cijeloživotno učenje koja se sve više primjenjuje unutar obrazovnog sistema, je učenje na daljinu.

## 3. Učenje na daljinu

Kada se govori o učenju na daljinu često je u upotrebi niz termina: Distance Learning, Distance Training, Distance Education, eLearning (e-Learning, „e“Learning), Online (On-line) Education,



Virtual Instruction, Virtual Education, Virtual Classrooms, Electronic Classroom, Blended Learning...

Shvatanje ovih termina kao sinonima nije slučajno. Svima njima zajedničko je da pretpostavljaju proces učenja u kojem su izvor znanja i primalac fizički udaljeni i u kojem je njihov odnos posredovan primjenom ICT-a, a pojedinačno oslikavaju nijansiranje opcija unutar samog procesa učenja na daljinu.

Mnoge osobe, kojima tradicionalni načini obrazovanja iz bilo kojeg razloga ne odgovara (npr. osobe poslom vezane za mjesta gdje ne postoje odgovarajuće obrazovne institucije, starije osobe, osobe s poteškoćama u razvoju, osobe koje ne mogu uskladiti svoje obveze sa zahtjevima obrazovnih institucija), danas se sve više, a posebno uz korištenje savremenih informacijsko komunikacijskih tehnologija, obrazuju na daljinu.

### 3.1. Povjest učenja na daljinu

Pionir Distance Learning-a bio je Isaac Pitman, učitelj stenografije. On je primjenio učenje na daljinu u radu sa svojim studentima još 1840. godine u Engleskoj. Zadavao im je da prepisuju kratke poruke iz Biblije i vraćaju mu na pregled poštom. Održavao je komunikaciju sa studentima širom zemlje i podjednako uspješno im prenosio znanje. Takav način obučavanja studenata, preteča današnjeg učenja na daljinu, pokazao je odmah svoju kvalitativnu, ekonomičnu, pragmatičnu stranu i slobodniju, u odnosu na tradicionalne metode. Učenje na daljinu se na početku svog razvoja primarno upotrebljavalo korištenjem poštanskog sistema pružajući mogućnost obrazovanja ljudima koji su bili sprečeni da prisustvuju nastavi u klasičnim školama. Tako je prvi stepen razvoja učenja na daljinu bio ustvari Correspondence Learning. Koristile su ga žene zbog isključenosti iz programa institucionalnog obrazovanja koje je bilo namjenjeno tada samo muškarcima, zatim, zaposleni građani koji su bili na radnim mjestima tokom održavanja nastave i oni koji su živjeli isuviše daleko od obrazovnih centara.

Otkriće radija, 1920. godine, i prispjeće televizije, 1940. godine, podstaklo je razvoj novih mogućnosti za učenje na daljinu. Novim medijima, putem kojih se i obrazovni program emitovao, slušateljstvo se proširilo do nemjerljivih granica. Učenje na daljinu dobija time potpuno drugačiju dimenziju i postaje već nezaobilazan način saznavanja. Komercijalizacijom Interneta čitav proces učenja na daljinu biva olakšan, obogaćen većom ponudom specijalističkih programa i stepenom slobode koju imaju korisnici u izboru programa, kao i načina pohađanja.

### 3.2. Promjene u obrazovanju

Tradicionalni pristup podučavanju putem predavanja kao središnjeg dijela obrazovnog procesa pokušava se zamjeniti sa nekim e\_oblikom učenja. Iz tog razloga obrazovne ustanove moraju proći kroz cijeli niz promjena.

Učenje na daljinu (distance learning, distance education) može se definisati kao obrazovanje ili obuka koja se nudi polaznicima na različitom mjestu odnosno fizički udaljenima od predavača ili izvora informacija. U praksi je učenje na daljinu puno složenije od ove definicije jer uključuje korištenje novih tehnologija i novih interaktivnih nastavnih metoda. Ovaj metod otvara mogućnosti za doživotno učenje, daje šansu za dobijanje diploma i sertifikata od gotovo svakog

onlajn univerziteta na svijetu. Ono se odvija na Internetu i studenti, učenici, mogu da dobiju diplomu a da nisu kročili u klasičnu učionicu.

Problem obrazovnog sistema je što se kroz vrijeme značajno povećala količina gradiva koje polaznik mora usvojiti, a način predavanja se nije mijenjao vjekovima. Za tolike količine gradiva sadašnji sistem je nedovoljno efikasan, polaznici često ne dobiju znanja potrebna za nastavak školovanja, tako da postoji nesrazmjernost između predznanja potrebnog za prelazak na viši nivo (npr. napredovanje od godine do godine, prelaz sa srednjoškolskog na visokoškolski nivo, itd.). Količina informacija koju polaznici moraju usvojiti ubrzano raste. Zahvaljujući današnjem stepenu razvoja ukupna količina znanja na planeti udvostruči se svakih sedam godina, a dnevno otprilike nastane deset hiljada naučnih radova. Za kvalitetniji obrazovni proces, neophodne su po Ivanu Novoselu „Nove potrebe i uslovi:

- povećana količina informacija,
- korištenje tehnologije,
- saradnja i timski rad,
- dodatna obuka,
- promejna demografije ucenika,
- selektivnost pri odabiru obrazovne ustanove i
- povećana potražnja za obrazovanjem” [2]

Razvojem informacione i komunikacione tehnologije došlo je do proboja u područje edukacije i pokazalo se da pravilnom primjenom računara u obrazovanju mogu da se riješe mnogi problemi nastali u obrazovnom procesu. Dodatna obuka je potrebna kako bi se ostalo u toku. Osoba koja je usvojila jedan stepen znanja ne može računati sa tim da će mu to znanje biti dovoljno za cijeli život. Tempo kojim se potrebno znanje mijenja zavisi od struke, ali računa se da u prosjeku za pet godina znanje koje se dobilo studiranjem više nije dovoljno za obavljanje posla. U većini ustanova kao primaran način prenošenja znanja koriste se predavanja. Iako predavanja mogu biti efikasan način za prenošenje znanja, ona to za većinu polaznika nisu. Istraživanja na polju efikasnosti predavanja pokazala su da ona ne mogu poslužiti kao izvor za sticanje veština razmišljanja, rješavanja problema i nisu pogodna kao baza za cijeloživotno učenje. Klasičan pristup podučavanju kakav je prisutan u današnjem obrazovanju potpuno je neprimjeren svijetu oko njega. Hijerarhijski top\_down pristup koji je osnova klasičnog pristupa edukaciji, u kojem je gradivo podjeljeno u čvrsto definisane cijeline, predavač podučava, a polaznik sluša i čita, ne pružaju dobar uvid u predznanje polaznika. Često se dešava da polaznik gubi želju za učenjem, kada se primora da sluša i uči gradivo koje mu je već poznato ili kada je gradivo preobimno i ne može da ga prati. Mora da se vodi računa o različitim predznanjima polaznika, odnosno polazniku mora omogućiti da nastavi svoje obrazovanje i nadogradi svoje znanje od „mjesta gdje je stao”. Tendencija promjena obrazovnog sistema je da trenutni sastav koji za svoj centar ima predavača, bude izmjenjen tako da u centru bude polaznik. Takva struktura bi bila mnogo fleksibilnija. Znanju je moguće pristupiti sa više mjesta, a vrijeme i tempo učenja, kao i izbor dijela gradiva se prilagođava polazniku. Da bi se ostvario takav pristup obrazovanju potrebno je promjeniti način na koji se održava nastava.

### 3.3. Promjena uloge nastavnika

U nastavnom procesu uticaj tehnologije može se posmatrati sa stanovišta svakog od elemenata obrazovanja: polaznika, predavača, sadržaja/programa ili konteksta u kojem se navedeni elementi nalaze. Predavač podstiče i usmjerava i na taj način polazniku pomaže da informacije transformiše u svoje znanje. Pri tome predavač mora naći načine na koje će preoblikovati svoje tradicionalne vještine u nove, razviti nove paradigme poučavanja i savladati nove vještine. Zavisno od ostalih elemenata obrazovanja uloga predavača će se i različito transformisati. Tehnologija neće zamjeniti ulogu predavača već će mu poslužiti da kvalitetnije i prihvatljivije ostvari svoj obrazovni cilj pri čemu mu je vrlo važna institucionalna podrška. Odnos između tradicionalnog načina predavanja i potreba savremenog društva.

### 3.4. Odnos e- learning i učenja na daljinu

E-learning kao oblik obrazovanja postoji na više načina: kao potpuno samostalan oblik, ali i kao sastavni dio ili dopuna klasičnog obrazovanja. Klasifikacija modela obrazovanja vrši se najčešće na osnovu stepena razlike u načinu učenja pa je uobičajeno navođenje tri pristupa:

- Tradicionalni model- zadržava sve elemente klasične nastave, a Internet je resurs koji polaznici mogu da koriste u računarskom kabinetu.
- Prelazni model- zadržava tradicionalne elemente, može obuhvatiti rad u računarskom kabinetu ili kompjuterizovanoj učionici, može se koristiti elektronska pošta. Prelazni model koristi Internet, ne samo kao dopunski resurs, već kao alternativni način distribuiranja obuke i saradnje. Predavači mogu postaviti materijal za kurs na Web server, mogu omogućiti polaznicima da šalju svoje vežbe preko e-mail-a ili da međusobno saraduju preko foruma.
- Model učenja na daljinu- on-line smješta cijelokupan nastavni materijal, vježbe i resurse. Polaznici u potpunosti razmjenjuju ideje i informacije preko Interneta, na šta se ovaj model oslanja. Omogućuje polaznicima obuku prema sopstvenoj dinamici i individualne konsultacije preko elektronske pošte, elektronskih konferencija ili na lokalnoj mreži ili u višekorisničkom domenu. Kod ovog modela, predavači mogu da koriste video prenos preko Interneta u realnom vremenu.[3] Iako se e\_learning i učenje na daljinu često izjednačuju, nije reč o istim oblicima obrazovanja: postoje vrste e\_obrazovanja koje se ne odvijaju online, a isto tako postoje i oblici učenja na daljinu koji ne koriste ICT (na primjer, dopisni kursevi na daljinu putem obične pošte).

Među glavnim prednostima e-learninga su:

- Vremenska i prostorna fleksibilnost– polaznici nezavisno od vremena i prostora, a time obrazovanje postaje dostupno i onima kojima dolazak u učionicu ne bi bio moguć, zbog geografske udaljenosti ili zdravstvenih poteškoća,
- Interakcija (komunikacija) između studenta i nastavnika koja se odvija putem računara (e-mail, forumi...) pa je često neposrednija i intenzivnija nego komunikacija u razredu. Pitanja se postavljaju slobodnije, bez straha od autoriteta predavača te tako mogu doći do izražaja i studenti koji inače ne komuniciraju uživo.

- Komunikacija i grupni radna zajedničkim projektima između polaznika međusobno čime se razvijaju socijalne i komunikacijske vještine i dolazi do izražaja konstruktivan princip učenja,
- Korištenje interaktivnih sadržaja za učenje i različitih medija (uz tekst i slike i zvuka, videa, animacija, simulacija,...) za prezentovanje sadržaja i dostupnost sadržaja 24 sata online. Uz to, sadržaji za učenje mogu biti prilagođeni pojedinim studentima, na primjer mogu se dodati sadržaji za one s nižim predznanjem, kao i za napredne studente koji žele naučiti više. [5]

Dosadašnja iskustva su pokazala da se mora skrenuti pažnja na uvođenje sistema učenja na daljinu u svim sferama, kao jednu od mogućnosti dopune klasičnom načinu obrazovanja. Internet je savršen za postavljanje virtualne sredine za učenje. Polaznici mogu da uče u svom rodnom gradu, a da se školuju u drugom gradu ili inostranstvu. Ukoliko imaju pristup kompletnoj bazi materijala za učenje, mogu da razviju veću autonomnost u procesu učenja. Polaznici imaju veću kontrolu i mogućnost da upravljaju tokom svog učenja, a uloga predavača se pretvara u ulogu mentora. Časovi nisu ograničeni na radne sate regularnih škola i univerziteta, tako da svi mogu da iskoriste priliku za doživotno učenje. Učenje na daljinu mijenja navike i polaznika i predavača. Uspješni polaznici razvijaju upornost i organizacione sposobnosti, a predavači postaju veštiji u upotrebi tehnologije.

#### 4. Zaključak

U sistemu učenja na daljinu, bez obzira koliko se on razlikovao od tradicionalne nastave, mora se voditi računa o zadovoljavanju osnovnih didaktičkih principa. Učenje na daljinu može poboljšati učenje na više načina; ono i polaznicima i predavačima donosi iskustvo rada na internetu. Internet polazniku uvijek pruža nove informacije, što dovodi do svjesne aktivnosti polaznika i razvoja, odnosno napretka u radu. Učenje na daljinu daje šansu polaznicima da steknu nove vještine i kvalifikacije i da se razvijaju u novim pravcima. Racionalizacija nastave sprovodi se racionalnim promjenama u nastavnim postupcima da bi se dobio kvalitetniji učinak i bolji rezultat. Obrazovanje klasičnim metodama ima neke značajne nedostatke. Jedan od najvećih je neophodnost prisustvovanja mjestu odvijanja nastave. Drugi značajan problem je što je nastava prilagođena tzv. prosječnom učeniku, čime su uskraćeni oni koji ne spadaju u tu kategoriju, bilo da je proces ovladavanja znanjem za njih prespor ili prebrz. Širenjem primjene računara i Interneta razvijene su nove tehnike obrazovanja, koje sve zajedno zovemo e\_obrazovanje (e\_Education ili e\_Learning) i zahvaljujući kojima se navedeni problemi uspješno prevazilaze.

Srednje škole su se odlučile na ovakav potez iz više razloga. Preko ovih platformi nastavnici su postavljali svoja predavanja i imali mogućnost da daju više obrazloženja i uputstava nego što bi to stigli da kažu na jednom času. Takođe, postoji mogućnost da se zadaju zadaci i vježbe. Ovakav vid učenja je pogodan za učenike jer mogu da pristupe predavanjima na bilo kojem mjestu, u bilo koje vrijeme i sva predavanja i vježbe će im biti dostupni pa vrlo lako mogu da se vrate na prethodna gradiva u slučaju da nisu nešto naučili. Pokazalo se da je ovakav način učenja efikasan i pogodan kako za učenike tako i za nastavnike jer je razbijena monotonija obične učionice i učenikima je omogućena interaktivnost preko računara. Najznačajniji napredak je primjećen u učenju stranih jezika i informatici. Školama je bitan ovaj način učenja jer se detaljno prati rad i napredovanje svakog učenika i vrši se kontrola i nadzor rada svih nastavnika.

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**DISTANCE LEARNING**

**Abstract**

Today's era of modern technology and globalization, bringing rapid change in all aspects of human life. Every day creates new information and general development continuously requires new knowledge and skills. There is a need for faster, timely education, which will also be open, widely available.

Information society in which we live requires a constant adjustment of the education system to market changes. Changes are occurring intense and occur impossibility of harmonizing market requirements for educational staff.

Lifelong learning, part-examination, additional training and retraining of students, is the possibility offered by educational institutions in order to comply with the market. The methods are recommended for implementation of lifelong learning is distance learning. The application of distance learning educational institution might increase the quality of service and so extraordinary to offer students an innovative way of educating.

**Keywords: lifelong learning, distance learning platform for the application of distance learning.**

**1. Introduction**

"While the technology of the twentieth century caused a revolution in communications and led to the information society, our educational institutions are still frozen in the Industrial Revolution").

Bates jokingly describes (1995)

When it comes to educational processes, we are in a time of information and communication systems and modern technologies. Classic inflexible educational systems are no longer able to fully respond to the needs modern man. Global informatization the whole society has moved opportunities classic educational system. In this regard have been initiated serious scientific debate and launch projects on the application of new information and communication technologies in education.

One of the biggest breakthroughs in the evolution of the classical teaching-learning process represents a learning or learning through the internet. The practice in the world-wide educational institutions proves that the pedagogical-didactic character of distance learning is extremely high,

especially for those who, due to his obligations, I can devote myself to the classical method of education, as is common in our region. Due to the specialized skills of our educational institutions, we feel a special responsibility to raise awareness of the benefits that this type of learning provides.

Thanks to intensive development of information technology, teaching has a lot of room to becoming more modern and more inspiring, more versatile, better and more interactive than the traditional model. Freed the space-time limitations, which means that our students and trainees at any time and in any place can access the information, they are automatically leaves more time for independent work and exchange views with professors.

## 2. Lifelong learning

Lifelong learning refers to "any activity of lifelong learning in order to improve the knowledge, skills and competences within a personal, civic, social or professional activity of the individual." It encompasses learning at all stages of life (from early childhood to old age) and in all forms in which (formal, non-formal and informal).

Learning is a continuous process in which the results and motivation for learning in a certain period of life depend on the knowledge, habits and learning experiences acquired at a younger age. With the concept of lifelong learning is most often associated objectives of an economic nature, such as achieving greater competitiveness and long-term employability. On the other hand must not be ignored equally important goals that contribute to the more active role of the individual in society. These are the objectives of fostering social inclusion, the development of active citizenship and the development of individual potential of individuals.

The concept of lifelong learning, developed in the sixties of the last century, the answer to the problem of mismatch between the education of young people and adults (Pastuović, 1999). The focus of traditional pedagogy to problems of primary education and general education of children and adult education to adult education, resulted in a lack of theory which would integrate the concept of education and learning through all stages of life. This situation has given rise to the development of the theory and the concept of lifelong learning as an integrated approach to the study of learning as a continuous process.

In the past forty years lifelong learning from the initial idea developed into the dominant principle and orientation of the development of many national education systems. One of the best methods for lifelong learning, which is increasingly applied within the education system, the distance learning.

## 3. Distance Learning

When we talk about distance learning is often used set of terms: Distance Learning, Distance Training, Distance Education, eLearning (e-Learning, „e“Learning), Online (On-line) Education, Virtual Instruction, Virtual Education, Virtual Classrooms, Electronic Classroom, Blended Learning...

Understanding these terms as synonymous is not accidental. They all have in common is that they assume a learning process in which the source of knowledge and the recipient of physical distance and in which their relationship is mediated by using ICT, and individually reflect shading options within the process of distance learning.

Many persons, where traditional methods of education for any reason does not match (eg. People work related to the places where there are no appropriate educational institutions, the elderly, persons with disabilities, persons who can not match their commitments with the requirements of educational institutions) today more and more, especially with the use of modern information and communication technologies, education in the distance.

### 3.1. The history of distance learning

Pioneer of Distance Learning and was Isaac Pitman, shorthand teacher. He applied the learning to work with their students more in 1840 in England. Inflict on them to prescribe short messages from the Bible and returned to him for review by mail. Maintained communication with students across the country and equally successfully passed their knowledge. This method of training students, the forerunner of today's distance learning, showed immediately it's qualitative, economical, pragmatic side and freer, compared to traditional methods. Distance learning is at the beginning of its development was used primarily by using the postal system by providing educational opportunities to people who were unable to attend teaching in traditional schools. Thus, the first stage of the development of distance learning was actually Correspondence Learning. They were used by women due to exclusion from the program istitucionalno education which was meant only then men, then, employed people who were in the workplace during the lectures and those who lived too far away from training centers.

The discovery of radium, in 1920, and the advent of television, in 1940, encouraged the development of new opportunities for distance learning. New media, through which the educational program aired, the audience expanded to immeasurable limit. Distance learning gets a completely different dimension of time and becomes more inevitable way of knowing. Commercialization of the Internet the process of distance learning becomes easier, more enriched range of specialist programs and the degree of freedom that the people in the choice of programs, as well as ways to attend.

### 3.2. Changes in education

The traditional approach to teaching through lectures as a central part of the educational process of trying to replace with some e\_oblikom learning. For this reason, educational institutions need to go through a whole series of changes.

Distance learning (distance learning, distance education) can be defined as education or training offered to participants at a different place or physically away from the speakers or sources of information. In practice, distance learning is much more complex than this definition because it involves the use of new technologies and new interactive teaching methods. This method opens up opportunities for lifelong learning, provides an opportunity to receive diplomas and



certificates from almost any online university in the world. It takes place on the Internet and students, students can obtain a degree without having set foot in a conventional classroom.

The problem of the education system is that over time significantly increase the amount of material that the student must adopt a way of teaching has not changed for centuries. For such a large amount of material present system is inefficient, participants often do not get the knowledge necessary to continue their education, so that there is a disproportion between the knowledge required to move on to a higher level (eg. The progression from year to year, the transition from high school to higher education level, and so on. ). The amount of information that participants must adopt growing rapidly. Thanks to today's level of development of the total amount of knowledge in the world doubles every seven years, a day approximately occurs ten thousand scientific papers. For quality educational process, are essential John Novosel "New needs and requirements:

- increased amount of information,
- use of technology,
- cooperation and teamwork,
- additional training,
- change issues demographics of students,
- selectivity when choosing educational institutions and
- increased demand for education "[2]

With the development of information and communication technologies, there was a breakthrough in the area of education and has been shown that proper application of computers in education can solve many of the problems arising in the educational process. Additional training is required in order to remain up to date. A person who has adopted a degree of knowledge can not count on a team that will put this knowledge be enough for a lifetime. The pace at which the required skills change depending on the profession, but it is estimated that an average of five years to obtain knowledge that studying is not enough to do the job. In most institutions as the primary mode of transmission of knowledge are used lectures. Though lectures can be an effective way to transfer knowledge, it is for most participants are not.

Research in the field of efficiency of lectures have shown that it can not serve as a source for the acquisition of thinking skills, problem solving and are not suitable as a base for lifelong learning. The classic approach to teaching that exists in today's education is completely inappropriate to the world around him. Hierarchical top\_down approach that is the basis of the classical approach to education, in which the material is divided into tightly defined units, lecturer teaching and student listens and reads, do not provide a good insight into the knowledge of participants. Often, the student loses the desire to learn, when it is forced to listen and learn the material that was already known, or when the material is overeating and not to accompany him. He must take account of the different knowledge of the group, that student must be allowed to continue their education and build on their knowledge of "where it left off." The tendency to change the education system is that the current composition having as its center has trainers, be amended so that the center is polaznik.Takva structure would be more flexible. Knowledge can be accessed from multiple locations, and the time and pace of learning, as well as a selection of parts material adapts to the learner. In order to achieve such an approach to education is necessary to change the way of instruction.

### 3.3. The changing role of teachers

In the teaching process, the impact of technology can be seen from the perspective of each of the elements of education: students, lecturers, content / program or the context in which the following items are. Lecturer encourages and directs and thus helps the student to transform information into their knowledge. In doing so, the teacher must find ways to transform their traditional skills in new, develop a new paradigm of teaching and learning new skills. Depending on other elements of the educational role of the lecturer will be transformed differently. The technology will not replace the role of lecturers but will it serve you better and more acceptable to achieve their educational goal with him is a very important institutional support. The relationship between traditional ways of learning and the needs of modern society.

### 3.4. The relationship of e-learning and distance learning

E-learning as a form of education there are a number of ways: as a completely independent form, but also as a component or complement to traditional education. The classification model of education takes place mostly on the basis of the degree of difference in the learning mode and is commonly guidance on three approaches:

- Traditional model- retains all the elements of classical teaching, and it is a resource that students can use in a computer cabinet.
- Interim model- retains traditional elements may include work in the computer cabinet or computerized classroom, you can use e-mail. The transitional model using the Internet not only as a supplementary resource, but as an alternative method of distributing training and cooperation. Teachers can set the course materials on the Web server, can enable students to send their exercises via e-mail or to cooperate via the forum.
- Model learning daljinu- on-line places an intact teaching material, exercises and resources. The participants fully share ideas and information over the Internet, to which this model depends. Allows participants training to its own dynamics and individual consultation via e-mail, electronic conferences or on the local network or in a multi-user domain. In this model, teachers can use the video transmission over the Internet in real time. [3] Although e\_learning and distance learning is often equated, not reco same forms of education: there are types e\_obrazovanja that do not run online, but there are also forms distance learning who do not use ICT (for example, correspondence courses remotely via regular mail).

Among the main advantages of e-learning are:

- Time and space fleksibilnost- participants regardless of time and space, and thus education becomes available to those who arrive in the classroom would not have been possible, due to geographical distance or health problems,
- The interaction (communication) between students and teachers that takes place via computer (e-mail, forums ...) and is often more immediate and more intense than communication in the classroom. Questions to ask freely, without fear of authority lecturers and so can come to the fore and students who normally do not communicate live.

- Communication and teamwork on joint projects between the participants each other thereby develop social and communication skills and prominent constructive principle of learning,
- Using interactive learning content and different media (with text and pictures and sound, video, animation, simulation, ...) for presenting the content and availability of content 24 hours online. In addition, learning materials can be tailored to individual students, for example, may be added to the contents of those with low prior knowledge, as well as for advanced students who want to learn more. [5]

Past experiences have shown that they draw attention to the introduction of distance learning in all spheres, as one of the possibilities amending classic way of education. The Internet is perfect for setting up a virtual learning environment. Participants can learn in his home town, and to go to school in another city or abroad. If you have access to the complete database of learning materials, can develop greater autonomy in the learning process. Participants have greater control and the ability to manage during their learning, and the role of trainers is transformed into the role of mentor. Classes are not limited to the working hours of regular schools and universities, so everyone can take advantage of the opportunity for lifelong learning. Distance learning and changing habits of students and lecturers. Successful participants develop persistence and organizational skills, and teachers become more adept at using technology.

#### 4. Conclusion

In the system of distance learning, no matter how he differed from traditional teaching, must take into account the satisfaction of basic didactic principles. Distance learning can improve learning in several ways; what the participants and lecturers brings experience on the Internet. Internet participant always provides new information which leads to the conscious activity of students and development, and progress in work. Distance learning provides an opportunity for participants to gain new skills and qualifications and grow in new directions. The rationalization of teaching involves the rational changes in teaching methods in order to obtain better performance and a better result. Education classical methods has some significant drawbacks. One of the biggest is the need to attend the place of teaching. Another significant problem is that teaching is adapted so. the average student, which are deprived of those who do not fall into that category, whether it is the process of mastering knowledge for them too slow or too fast. More use of computers and the Internet have been developed new techniques of education, which all together call e\_obrazovanje (e\_Education or e\_Learning) and thanks to which the aforementioned problems successfully overcome.

Secondary schools have decided to make this move for several reasons. Through this platform, teachers were asking their lectures and had the ability to give more explanation and guidance than they would have time to say at one time. Also, there is a possibility to receive assignments and exercises. This kind of learning is suitable for students because they can access courses anywhere, at any time and all lectures and exercises will be available to them so very easily to return to the previous material in case you have not learned anything. It turned out that this method of learning efficient and convenient for both the students and the teachers because he broken the monotony of a regular classroom and students enabled interactivity through a computer. The most significant improvement was observed in the study of foreign languages and

informatics. Schools are an important way to learn this because it closely follows the work and progress of each student and initiates control and supervision of the work of all teachers.

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## **NAVIDEZNI VPIS ŠTUDENTOV V TERCIARNEM IZOBRAŽEVANJU V SLOVENIJI**

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## POVZETEK

Navidezni vpis študentov na področju terciarnega izobraževanja je danes v Sloveniji fenomen, ki ga drugod po Evropi skoraj ne poznajo. Raziskave kažejo, da le dobro polovico študentov, ki se vpisujejo na višje, visoke in univerzitetne šole, študij dejansko tudi zanima. Druga polovica pa ja tistih, ki se vpisujejo predvsem zaradi študentskega statusa in iz njega izhajajočih koristi. Namen prispevka je opozoriti javnost na razsežnost navideznih vpisov v terciarnem izobraževanju. Glede na dostopne podatke smo ugotovili, da je delež potencialnih navideznih vpisov v višješolske programe v študijskem letu 2012/13 znašal kar 53,2 %. Kratkoročno navidezni vpis sicer študentom prinaša določene ugodnosti, dolgoročno pa je za vse deležnike škodljiv. Vlada RS v zadnjem času s pomočjo aplikacije eVŠ in nekaterimi zakonskimi ukrepi skuša zajeziti navidezni vpis, vendar bi bilo smiselno komplementarno uvesti še nekatere dodatne ukrepe, kot je na primer preverjanje znanja s področja študija, kamor se bodoči študent želi vpisati.

**Ključne besede:** navidezni vpis, terciarno izobraževanje, študenti, študentski status

## 1 NAVIDEZNI VPIS V TERCIARNEM IZOBRAŽEVANJU

Navidezni vpis študentov na področju terciarnega izobraževanja je danes v Sloveniji še vedno pereč problem. Raziskave kažejo, da le dobro polovico študentov, ki se vpisujejo na višje, visoke in univerzitetne šole, študij dejansko tudi zanima. Zaradi dejstva, ker navidezni vpis za enkrat še ni pravno opredeljen, ga Ministrstvo za izobraževanje in šport (v nadaljevanju MIZŠ) ne more spremljati niti vsebinsko niti statistično (Navidezni vpisi v programe višješolskega in visokošolskega izobraževanja, str. 27, 2014). Po ocenah MIZŠ lahko o obsegu navideznih vpisov v daljšem časovnem obdobju sklepamo na podlagi določenih kazalnikov, povezanih z učinkovitostjo terciarnega izobraževanja, kot so prehodnost študentov iz prvega v drugi letnik, delež študentov, ki študijskih programov niso dokončali v rokih, predvidenih za dokončanje le-teh, z upoštevanjem koriščenja absolventskega staža, delež študentov, ki so se vpisali v prvi letnik, vendar so zbrali premajhno število kreditnih točk (KT) za vpis v višji letnik, vendar dovolj KT za ponavljanje letnika v naslednjem študijskem letu, pa tega niso storili.

Na državnem nivoju se je evidentiranja navideznih vpisov lotila Študentska organizacija Slovenije (ŠOS), ki je že leta 2010 predstavila metodologijo, na podlagi katere naj bi s pomočjo matematične enačbe izračunali delež navidezno vpisanih študentov. Ta izračun je tudi edini, ki nam ga je uspelo pridobiti iz ustreznih virov. Podatki glede te problematike na osnovi ŠOS-ove enačbe so bili predstavljeni v Revizijskem poročilu Računskega sodišča z naslovom »Navidezni vpisi v programe višješolskega in visokošolskega izobraževanja«. Metodologijo smo podrobneje predstavili v drugem poglavju tega prispevka. Obenem pa je treba poudariti, da z uporabo zgoraj omenjene metodologije ne zajamemo le študentov, ki so se vpisali v terciarno izobraževanje zaradi koriščenja ugodnosti. Obstajajo tudi še drugi

razlogi. Nekateri (tudi zelo dobri) študenti na primer ugotovijo, da jih izbran študij ne veseli, zato ga prekinajo in počakajo na prepis. »Spet druge 'potegne' študentska svoboda, ker mislijo, da bodo lahko opravili obveznosti zgolj s študijem v izpitnih obdobjih, v vmesnem času pa bodo živeli brezskrbno življenje. Ne nazadnje lahko študenti v prvem letniku doživijo marsikaj, kar vpliva na potek študija – bolezen, poškodbo, smrt v družini. Veliko je tudi mladih, ki v srednji šoli »pregorijo« in potrebujejo nekaj časa zase. Vse opisane kategorije študentov bi zlahka šteli med fiktivno vpisane, če bi gledali zgolj podatke o opravljenih obveznostih, čeprav imajo nekateri od teh resne načrte s študijem in se ne vpišejo zgolj zaradi statusa. Zadeva je v današnjem času pripeljala tako daleč, da so navidezni študentje pripravljani plačati tudi izredni študij, če jim ne uspe pridobiti statusa študenta po rednem načinu študija. V nadaljevanju prispevka sledijo analiza podatkov o navideznem vpisu v določenem časovnem obdobju, predstavitev glavnih prednosti in slabosti navideznega vpisava relevantne deležnike ter sprejeti ukrepi, ki naj bi zajezili število navidezno vpisanih študentov v terciarnem izobraževanju.

## **2 ANALIZA PODATKOV O NAVIDEZNEM VPISU V TERCIARNEM IZOBRAŽEVANJU**

### **2.1 Metode raziskovanja**

V teoretičnem delu prispevka smo uporabili predvsem deskriptivno metodo, s katero smo opredelili navidezni vpis. V nadaljevanju smo pri analiziranju kvantitativnih podatkov uporabili še metodo analize dokumentacije, metode deskriptivne statistike (absolutne frekvence, odstotni deleži) ter metodo komparacije. Podatke smo pridobili iz sekundarnih virov.

### **2.2 Podatki o navideznem vpisu v terciarnem izobraževanju v Sloveniji**

V skladu z v prvem poglavju omenjeno enačbo število navideznih vpisov generacije  $n$  dobimo tako, da številu vseh vpisanih v prvi letnik v letu  $n$  odštejemo vsoto ponavljavcev in prvič vpisanih v drugi letnik v letu  $n+1$ , končni rezultat pa delimo s številom vseh vpisanih v prvi letnik leta  $n$ . Delež navidezno vpisanih študentov je bil v omenjenem študijskem letu bistveno višji v višješolskem kot visokošolskem izobraževanju. Na podlagi te metodologije razumemo potencialni navidezni vpis kot vpis osebe, ki se v naslednjem študijskem letu ni vpisala v 2. letnik niti ni 1. letnika ponavljala, pri čemer nam ni znano, ali je imela ta oseba za to upravičene razloge ali ne. V skladu s to enačbo število navideznih vpisov generacije  $n$  dobimo tako, da številu vseh vpisanih v prvi letnik v letu  $n$  odštejemo vsoto ponavljavcev in prvič vpisanih v drugi letnik v letu  $n+1$ , končni rezultat pa delimo s številom vseh vpisanih v prvi letnik leta  $n$  (Navidezni vpisi v programe višješolskega in visokošolskega izobraževanja, 2014, str. 29). Podatke smo prikazali v Tabeli 1 in Tabeli 2.

Tabela 1: Prikaz izračuna potencialnih navideznih vpisov v višješolske študijske programe za izbrani študijski leti (Računsko sodišče, 2014)

Študijsko leto (1)	Prvič vpisani v 1. letnik v letu n (2)	Ponavljavci 1. letnikov v letu n+1 (3)	Prvič vpisani v 2. letnike v letu n+1 (4)	Št. potencialnih navideznih vpisov v letu n (5)=(2)-(3)-(4)	Delež potencialnih navideznih vpisov v letu n (6)=(5)/(2)*100
2011/12	4839	214	1897	2728	56,4
2012/13	4381	236	1816	2329	53,2

Tabela 2: Prikaz izračuna potencialnih navideznih vpisov v visokošolske študijske programe za izbrani študijski leti (Računsko sodišče, 2014)

Študijsko leto (1)	Prvič vpisani v 1. letnik v letu n (2)	Ponavljavci 1. letnikov v letu n+1 (3)	Prvič vpisani v 2. letnike v letu n+1 (4)	Št. potencialnih navideznih vpisov v letu n (5)=(2)-(3)-(4)	Delež potencialnih navideznih vpisov v letu n (6)=(5)/(2)*100
2011/12	16587	2657	10649	3281	19,8
2012/13	15914	2533	9920	3461	21,7



Iz Tabele 1 je razvidno, da je v študijskih letih 2011/12 ter 2012/13 znašal ocenjen delež navideznih vpisov v višjih šolah kar dobrih 50 % (2728 oz. 2329 oseb) študentov ene generacije, kar je po našem mnenju zelo veliko in zahteva takojšnje ukrepanje. Tabela 2 prikazuje ocenjeno število in delež navideznih vpisov v VŠZ. Ta delež je v obravnavanem časovnem obdobju znašal okoli 20 % (3281 oz. 3461 oseb) vseh študentov ene generacije, kar je tudi zelo velik delež. Izračunali smo tudi, da je bilo v študijskem letu 2012/13 v 1. letnik terciarnega izobraževanja vpisanih 20295 študentov, od tega 5790 fiktivno, kar predstavlja 28,5 % vseh študentov 1. letnika na višjih in visokih šolah skupaj.

Pri tem je treba poudariti tudi dejstvo, da ocena navideznega vpisa, izračunana na osnovi te metodologije, gotovo ni povsem točna, saj so med navideznimi študenti upoštevani tudi tisti študentje, ki so res želeli študirati, pa jim zaradi določenih okoliščin (bolezni, materinstvo, prezahtevnost študijskega programa ipd) ni uspelo opraviti zadostnega števila študijskih obveznosti oziroma zbrati dovolj kreditnih točk (KT), da bi bodisi napredovali v višji letnik bodisi ponavljali letnik.

### **2.3 Prednosti navideznega vpisa**

Prednosti navideznega vpisa obstajajo predvsem za študente. V manjši meri, ampak vendarle, je (predvsem v preteklosti) navidezne vpise tolerirala tudi država, saj je s tem lahko prikazovala nižjo stopnjo brezposelnosti. Tudi nekaterim izobraževalnim ustanovam je navidezni vpis do določene mere ustrezal, saj so tako lahko pridobili sredstva za izvedbo nekaterih študijskih programov, ki jih sicer ne bi mogli izvajati. Velja tudi opozoriti, da se trenutne prednosti dolgoročno lahko obrnejo tudi v slabosti. V nadaljevanju sledi podrobnejša predstavitev prednosti navideznega vpisa za študente. Študentje z vpisom v kateri koli program terciarnega izobraževanja pridobijo status študenta. Le-ta jim omogoča nekatere ugodnosti, kot so:

- subvencionirani stroški prevoza,
- subvencionirani stroški prehrane (možnost koriščenja študentskih bonov),
- subvencionirani stroški bivanja, bodisi v študentskem domu, bodisi pri zasebnih najemodajalcih,
- možnost opravljanja študentskega dela preko študentskih napotnic,
- možnost pridobitve štipendije.

Poleg tega so osebe s statusom študenta do dopolnjenega 26. leta starosti tudi zdravstveno zavarovane preko enega izmed staršev, kar pomeni, da jim ni potrebno plačevati dopolnilnega zdravstvenega zavarovanja. Po podatkih Finančne uprave RS (FURS) se osebam, ki delajo preko študentskih napotnic, poleg splošne davčne olajšave, ki jo lahko uveljavljajo vsi slovenski davčni rezidenti (3302,70 €), pripada še dodatna splošna olajšava za dijake in študente v vrednosti 3217,12 € za letne skupne prihodke do vrednosti 10866,37 €, za prihodke do 12570,89 € pa znaša omenjena olajšava 1115,94 €. Če so prihodki v posameznem davčnem letu višji, mu ta olajšava ne pripada. Omenjeni dve olajšavi se dijaku oz. študentu priznata le, če ga v svoji davčni napovedi kot vzdrževano osebo ni navedel že drug davčni rezident. Študentom, ki so mlajši od 26 let oziroma ki se na enovit magistrski študij vpišejo najkasneje v letu, ko dopolnijo 26 let (za največ 6 let), se prizna še posebna osebna davčna olajšava, ki v letu 2015 znaša

2477,03 €. Pogoji za uveljavljanje te olajšave je poleg statusa študenta ali dijaka opravljanje dela na podlagi študentske napotnice.

Navidezno vpisanim študentom torej zgoraj omenjene ugodnosti omogočajo predvsem nemoteno opravljanje dela in s tem pridobivanje zaslužka. Seveda moramo ob tem poudariti, da so mnogi mladi ljudje v takšno obliko dela tako rekoč prisiljeni zaradi lastnega preživetja ter preživetja njihovih družinskih članov. Za osebe s statusom študenta je takšna oblika dela tudi s finančnega vidika najsprejemljivejša, saj je še zmeraj ugodnejša, kot če bi študent zaslužek prejemal kot samostojni podjetnik (višji prispevki) oziroma preko avtorske ali podjemne pogodbe.

## **2.4 Slabosti navideznega vpisa**

Slabosti navideznih vpisov študentov se manifestirajo na več področjih. Omenili bomo le najpomembnejša področja. Eno izmed pomembnih področij je zagotovo trg dela. Le-tega bi bilo potrebno urediti tako, da bi v večji meri omogočal zaposlovanje mladih diplomantov. Večina fiktivnih študentov bi namreč precej raje imela redno delo, kot pa delala preko študentske napotnice, saj bi jim tekla delovna doba, bili bi pokojninsko in invalidsko zavarovani in beležile bi se jim delovne izkušnje. Upravičeni bi bili tudi do rednega letnega dopusta, povračil za prevozne stroške in prehrano ipd.

V povezavi s tem lahko sklepamo, da fiktivni študentje delajo tudi »medvedjo uslugo« državi. Vse osebe s statusom študenta namreč niso vpisane v evidence brezposelnih oseb, čeprav to v določeni meri dejansko so. Marsikateri fiktivni študent bi bil prijavljen na zavodu za zaposlovanje, če si ne bi s pridobitvijo statusa omogočil dela prek študentske napotnice. Tako se s pridobljenim fiktivnim statusom potencialno prenesejo iz evidence registrirano brezposelnih oseb v evidenco študentov. Stopnja brezposelnosti je zato seveda nižja, kar s pridom v svojih političnih nastopih poudarjajo določeni politiki.

Naslednja slabost je ta, da zaradi fiktivnih vpisov prihaja do prekomernih stroškov financiranja za študijske programe terciarnega izobraževanja oziroma do potencialnih izgubljenih prihodkov državnega proračuna. Pri tem predpostavljamo, da fiktivno vpisani študenti koristijo določene ugodnosti (npr. davčne ugodnosti), ki jim jih omogoča študentski status. Če teh ugodnosti ne bi mogli koristiti, torej če ne bi bili vpisani v izobraževalne programe, tudi ne bi mogli uveljavljati posebnih davčnih olajšav in bi bili zato prihodki v proračun opazno višji, pa smo v tem primeru upoštevali le dohodninski vidik. Če pa bi se te osebe redno zaposlile, pa bi bili prihodki v proračun države še višji. Zaradi omejenega prostora ne bomo navajali konkretnih izračunov, vendar lahko zatrdimo, da gre za visoke zneske. Sklenemo lahko, da imajo fiktivni vpisi negativen učinek na javne finance.

Fiktivni vpisi imajo po našem mnenju tudi negativen vpliv na družbo kot celoto. Sklepamo lahko, da fiktivno vpisan študent ne bo pridobil višje izobrazbe, zato investicija države v študenta, ki se vpiše le zaradi koriščenja študentskih ugodnosti, nima pričakovanega učinka, saj študent ne pridobi znanj študijskega programa, v katerega se je vpisal. Tako obstaja realno tveganje, da intelektualni potencial

navidezno vpisanega študenta ostaja neizkoriščen. Taka oseba bo v prihodnosti zaradi nižje izobrazbe imela težave pri iskanju zaposlitve, večja bo možnost, da pristane med brezposelnimi, kar pa spet negativno vpliva na javne finance. Tudi če se ta oseba zaposli, bo njen finančni prispevek v proračun države zaradi nedosežene višje oz. visoke izobrazbe najverjetneje nižji, kot bi bil, če bi študij uspešno zaključila.

Slabost navideznega vpisa je tudi ta, da so v določene študijske programe z omejitvijo vpisa ne morejo vpisati nekateri študenti, ki pa si res želijo študirati. V skladu z nekaterimi raziskavami pa naj bi navidezni vpis povzročal tudi večje težave pri osamosvajanju in ustvarjanju družine.

Po ocenah Računskega sodišča RS so potencialni stroški (Navidezni vpisi v programe višješolskega in visokošolskega izobraževanja, 2014, str. 32) navideznega vpisa v terciarnem izobraževanju od leta 2010 – 2013 znašali skoraj *50 milijonov evrov*, ob predpostavki, da je vsak potencialno navidezno vpisan študent koristil 3 pravice, in sicer *dohodninsko olajšavo, pravico do subvencionirane prehrane in pravico do zdravstvenega zavarovanja*. Po našem mnenju so zgoraj omenjene analize pregledne in uporabne, saj podajo uporabniku jasno sliko, kako pereč problem je navidezen vpis v slovenskem terciarnem izobraževanju. V nadaljevanju bomo predstavili nekaj ukrepov, ki so oz. še bodo sledili omenjenim analizam.

## **2.5 Ukrepi za omejitev navideznega vpisa**

Na Ministrstvu za izobraževanje in šport (MIZŠ) se v zadnjih letih tudi vse bolj zavedajo problematike navideznih vpisov, zato so že sprejeli nekatere ukrepe, nekateri pa so še v pripravi. Sprejet je že bil Zakon o spremembah in dopolnitvah Zakona o višjem strokovnem izobraževanju (ZVSI-A, Ur. l. RS 100/2013). Ta zakon je močno posegel predvsem v višješolsko izobraževanje, tako na področju same organizacije in delovanja višjih šol kot tudi na to, da višje šole niso več enostaven izhod v sili za študentski status. Za študente so ključne tri spremembe, in sicer se v višje šole ne more več redno vpisati oseba, ki je bila v preteklosti že 3 leta vpisana v visokošolski študijski program, pri omejitvi vpisa v višje šole imajo sedaj prednost kandidati, ki pred tem še niso bili redno vpisani v kateri koli študijski program v terciarnem izobraževanju ter zakonska ureditev možnosti, da lahko višje šole osebe, ki ne izpolnjujejo predpisanih študijskih obveznosti (in zato nimajo opravičljivih razlogov) tudi izključijo. Kot tehnična pomoč pri preprečevanju fiktivnih vpisov služi tudi evidenca eVŠ, ki je vedno bolj izpopolnjena. MIZŠ načrtuje v kratkem tudi »povezavo baz podatkov srednješolskega izobraževanja in terciarnega izobraževanja in zakonske spremembe na področju srednjega šolstva, saj se sedaj mnogo oseb zaradi statusa vpisuje na srednje šole« (Hanžič, 2014, str. 4).

Z zgoraj omenjenim zakonom je torej država naredila prvi resnejši korak k omejevanju fiktivnih vpisov. Še vedno pa ni urejeno področje izobraževanja za odrasle in fiktivnih vpisov – kar pa se obeta z novim zakonom o visokošolskem izobraževanju.

Sklepamo lahko, da lahko z uporabo zgoraj omenjenih izračunov le ocenimo število navidezno vpisanih študentov; za enkrat pa ne moremo z gotovostjo izračunati njihovega točnega števila, saj ne obstajajo

ustrezne uradne evidence in pripadajoča pravna podlaga. MIZŠ želi v prihodnje močno zmanjšati število navideznih vpisov. Nekaj korakov je bilo pri tem že narejenih, kot so uvedba eVŠ, skrajšanje statusa študenta.

### 3 EVALVACIJA IN ZAKLJUČEK

Na koncu prispevka želimo še enkrat poudariti, da je navidezni vpis izredno pereč problem v slovenskem terciarnem izobraževanju. Ponuja sicer mnoge socialne ugodnosti študentom in jim s tem omogoča opravljanje študentskega dela, vendar je po našem mnenju dolgoročno za te študente škodljiv, saj lahko kasneje eskalirajo mnoge slabosti fiktivnega vpisa, kot so težave pri iskanju redne zaposlitve, neizkoriščen intelektualni položaj posameznika, težave pri ustvarjanju družine in še mnoge druge.

Kljub temu da fiktivno vpisani študentje negativno vplivajo na javne finance, se vse od leta 1990 v tej smeri s strani države ni naredilo veliko. Upamo si trditi, da je takšno stanje do določene mere ustrezalo tudi državi, saj se je na tak način tudi prikrivalo dejansko stanje na trgu dela. Na tak način se je navidezno prikazovala nižja stopnja brezposelnosti, kot bi dejansko ustrezala razmeram na trgu dela.

Strinjamo se tudi z rektorjem Univerze v Mariboru, ki je za časnik Delo povedal, da bi fiktivni vpis lahko preprečili tudi tako, da bi pred vpisom v izobraževalni program preverjali znanje študentov z določenega področja in tako zagotovili, da se v študijski program lahko vpišejo le tisti, ki bi uspešno opravili takšno preverjanje (Rak, 2015, str. 4).

Predvidevamo, da se bo v prihodnje delež fiktivnih vpisov bistveno zmanjšal, in sicer predvsem zaradi polne uvedbe sistema eVŠ ter zakonskih sprememb. Upamo pa tudi, da bodo v prihodnje potencialni študentje tudi znali realneje oceniti, ali so sploh sposobni za študij. Žal se v Sloveniji trenutno še zmeraj preveč poudarja le argument, da mora biti študij dostopen vsem, ki si to želijo, in sicer ne glede na finančne zmožnosti, hkrati pa se ne omenja pomembnega dejstva, da za študij ni sposobna kar celotna populacija, ki zaključí srednješolsko izobraževanje. Menimo, da bi tudi z doslednim upoštevanjem dejstva, da naj študirajo le za to sposobni, bistveno prispevali k večji kakovosti v terciarnem izobraževanju.

Naš prispevek bi sklenili z mislijo, da nas le znanje krepi in povezuje, kar je razvidno iz Slike 1. Fiktivni vpisi pa zagotovo niso pot h krepitvi znanja, ampak ravno obratno.



Slika 1: Pomen znanja (MFDPŠ, 2015)

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## **FICTITIOUS ENROLLMENT OF STUDENTS AT TERTIARY EDUCATION IN SLOVENIA**

Svit Koren, BSc

## ABSTRACT

The fictitious enrollment of students in the field of tertiary education in Slovenia is today a phenomenon that is almost unknown in the rest of Europe. Research studies show that only half of students who enroll in senior high school and university studies are actually interested in study. The second half enroll mainly because of student status and the resulting benefits. The purpose of this paper is to raise public awareness about the magnitude of the virtual entries in tertiary education. According to available data, we found out that the proportion of potential fictitious entries in higher education programs in the academic year 2012/13 amounted to 53.2%. In a short-term the fictitious enrollment of students bring certain benefits to them. Otherwise, in the long term is fictitious enrollment harmful for all stakeholders. Government of the Republic of Slovenia has been recently (through the application of the ESS and certain legal measures) trying to curb the fictitious enrollment. However, it would make sense to introduce some additional measures, such as verification of knowledge in the field of study where the prospective student seeks to enroll.

**Key words:** fictitious enrolment, tertiary education, students, student status

## 1 THE FICTIOUS ENROLLMENT IN TERTIARY EDUCATION

The fictitious enrollment of students in tertiary education in Slovenia today remains a huge problem. Researches has shown that only half of students who enroll in senior high school and university are actually interested in study. The fact is that the fictitious enrollment is not defined by the law, so the Ministry of Education and Sports (hereinafter MIZŠ) cannot monitored it neither by content nor by using statistical methods (Fictitious enrollments in programs of tertiary education, p. 27, 2014). According to estimates of MIZŠ can fictitious enrollment over time be concluded on the basis of certain indicators related to the efficiency of tertiary education, as students transition from the first to the second year, the proportion of students whose study programs are not completed within the time limits provided for the completion of The CDU those with respect to utilization of pre-graduation students, the proportion of students who have enrolled in the first year, but they collected an insufficient number of credits (ECTS) for enrollment in the next year, but enough credits for repeating a year in the next academic year, but failed to do so.

At the national level, the recording fictitious enrollments embarked Student Organisation of Slovenia (SOS), which already in 2010 presented a methodology by using mathematical equations to calculate the number of virtual enrolled students. This calculation is also the only one that we managed to obtain from the appropriate sources. Information about this problem on the basis of SOS's equations were presented in the audit report of the Court of Auditors entitled "Fictitious enrollments in programs of tertiary education." The methodology has been presented in detail in the second section of this paper. At the same time, it

should be noted that by using the above mentioned methodology we do not only involve students who are enrolled in tertiary education in order to reap benefits. There are also other reasons. Some (very good) students, for example, found out that they selected study they were not interested in, so they interrupt it and wait for the transcript. "Others are 'pulled' into student freedom, because they think that they can carry out the obligations merely by studying during exam periods, in the meantime, they want to live a carefree life. Finally, students in the first year can experience everything that affects the course of the study - disease, injury, death in the family. There are also many young people, who are "burn out" after finishing the high school and need some time for themselves. All these categories of students would be easily qualified as virtual students, if we were looking only for the purpose of completion liabilities, although some of them have serious plans to study and do not enroll only because of their status of being student. This case was led so far that the virtual students are willing to pay for a part-time studies if they fail to obtain student status by the ordinary mode of study. The remainder of the paper is an analysis of data on virtual enrollment in a given period of time, the presentation of the main advantages and disadvantages of the fictitious enrollment for the relevant stakeholders and to take measures to curb the number of virtual students enrolled in tertiary education.

## **2 ANALYSIS OF DATA ON FICTIOUS ENROLLMENT IN TERTIARY EDUCATION**

### **2.1 Research Methods**

The theoretical part was mainly undertaken by use of a descriptive method by which we could define fictitious enrollment. Below, we analyzed the quantitative data by using the methods of data analysis, descriptive statistics (absolute frequencies, percentages) and comparison. Data were collected from secondary sources.

### **2.2 Information about the fictitious enrollment in tertiary education in Slovenia**

In accordance with in the first chapter of the above-mentioned equation number of fictitious enrollment generation  $n$  obtained by dividing the total number of students enrolled in the first year in year  $n$  minus the sum of repeaters and first enrolled in the second year in year  $n + 1$ , the final result is divided by the total number of students enrolled in the first year year  $n$ . The rate of fictitious enrolled students was in that academic year was significantly higher in senior high school education than in academic education. Based on this methodology, we understand the potential virtual registration as a sign of the person in the next academic year is neither enrolled in the 2nd year 1st year nor repeated, nor it is not known whether that person had justifiable reasons or not. According to this equation, the number of virtual entries generation  $n$  obtained by dividing the total number of students enrolled in the first year in year  $n$  minus the sum of repeaters and first enrolled in the second year in year  $n + 1$ , the final result is divided by the total number



of students enrolled in the first year of n (Virtual enrollments in programs of tertiary education, 2014, p. 29).

The data is shown in Table 1 and Table 2.

Table 1: The calculation of potential fictitious enrollments in the senior high school education curricula for selected academic years (ECA, 2014: [http://www.rs-rs.si/rsrs/rsrs.nsf/I/K199DA65C75952D04C1257CED0030DA82/\\$file/FiktivniVpisi.pdf](http://www.rs-rs.si/rsrs/rsrs.nsf/I/K199DA65C75952D04C1257CED0030DA82/$file/FiktivniVpisi.pdf) .)

Academic year (1)	First enrolled in the first year of study in year n (2)	Repeaters of 1. study year in the year n+1 (3)	First enrolled in the 2. study year in the year n+1 (4)	Number of potential fictitious enrollments in the year n (5) = (2) - (3) - (4)	Percent of potential fictitious enrollments in the year n (6) = (5) / (2) * 100
2011/12	4839	214	1897	2728	56,4
2012/13	4381	236	1816	2329	53,2

Table 2: The calculation of potential virtual entries in the higher education curricula for selected academic years (ECA, 2014: [http://www.rs-rs.si/rsrs/rsrs.nsf/I/K199DA65C75952D04C1257CED0030DA82/\\$file/FiktivniVpisi.pdf](http://www.rs-rs.si/rsrs/rsrs.nsf/I/K199DA65C75952D04C1257CED0030DA82/$file/FiktivniVpisi.pdf) .)

Academic year (1)	First enrolled in the first year of study in year n (2)	Repeaters of 1. study year in the year n+1 (3)	First enrolled in the 2. study year in the year n+1 (4)	Number of potential fictitious enrollments in the year n (5) = (2) - (3) - (4)	Percentage of potential fictitious enrollments in the year n (6) = (5) / (2) * 100
2011/12	16587	2657	10649	3281	19,8
2012/13	15914	2533	9920	3461	21,7

From Table 1 it is clear that in the academic years 2011/12 and 2012/13 amounted to estimated share of fictitious enrollments in the colleges of more than 50% (or 2,728. 2,329 persons) students of one generation. This is in our opinion very high number and requires immediate action. Table 2 shows the estimated number and percentage of virtual entries in HEIs. This proportion in this period amounted to about 20% (or 3281. 3461 persons) of all students in one generation, which is also a very large share. We also calculated that in the academic year 2012/13 in the first year of tertiary education 20,295 students were enrolled, of which 5,790 fictitious, representing 28.5% of all students in the 1st year college or university together.

In this context it should be noted the fact that the assessment of fictitious enrollments calculated on the basis of this methodology is certainly not entirely accurate, since among the fictitious students are also taken into account those students who really wanted to study but (due to certain circumstances (sickness, maternity, etc.) has failed to carry out a sufficient number of study obligations or gather enough credits (ECTS) in order to either progress to the next study level or repeat the year.

### 2.3 Advantages of fictitious enrollment

Benefits of fictitious enrollment are mainly for the students. To a lesser extent, but nevertheless, (especially in the past) the fictitious enrollment has been tolerated by the state, since this might have shown a lower unemployment rate. Even some educational institutions are apparently entering to some extent correspond, because they can obtain funding to carry out certain courses which would otherwise not be able to run. It is also worth noting that the current long-term benefits can also turn into weaknesses. The

following is a detailed presentation of the benefits of virtual entry for students. Students with enrollment in any program of tertiary education acquire the status of a student. The latter have certain advantages, such as:

- subsidized transportation costs,
- subsidized food costs (the possibility of using student vouchers)
- subsidized cost of living, either in the dorm, either from private landlords
- The possibility to provide student work through a student referrals,
- the possibility of obtaining a scholarship.

In addition, persons with student status until the age of 26 also health insurance through one of the parents, which means that they do not need to pay supplementary health insurance. According to the Financial Administration (PARS) persons working via student referrals, in addition to general tax relief that can be claimed by all Slovenian tax residents (€ 3,302.70), belonging to additional general tax relief for students in the amount of 3217, € 12 for an annual total revenues to the value of € 10,866.37 for revenue to € 12,570.89 amounts mentioned allowance € 1,115.94. If the revenues in each fiscal year are higher, it does not belong to this relief. The two reliefs are granted only if the student is in their tax return mentioned as a dependent tax resident. To students, who are younger than 26 years or who are in master's study enrolled at the age of 26 years (up to 6 years), is recognized a special personal tax allowance, which in 2015 amounted to € 2,477.03. Condition for the exercise of this relief is in addition to the status of the student or student's performance on the basis of student referrals.

Fictitious enrolled students the above-mentioned advantages allow the smooth performance of his duties, thereby earning. Of course, we have to point out the that many young people whowork are almost forced to, in order to survivethemselves and their family members. For persons with student status is this form of work from a financial point of view acceptable, because it is still more favorable than if the student received an income as an entrepreneur (higher contributions) or via copyright or a contract.

#### **2.4 Disadvantages of fictitious enrollment**

Disadvantages of fictitious enrollment of students is manifested in several areas. We will mention only the most important areas. One of the important areas is certainly the labor market. The latter should be regulated so as to largely enable the employment of young graduates. Most of the virtual students would rather prefer to have a regular job, rather than working through student referrals, as they showed seniority were to pension and disability insurance and recorded to have work experience. Eligible were also to annual leave, reimbursement for transportation costs and food and the like.

In connection with this we can conclude that the fictitious students work as "a disservice" country. All persons with student status are not entered in the register of unemployed persons, although in fact they are

unemployed. Many fictional students would be registered at the employment office, if they could work through student referrals. Thus, by acquiring the status of a deemed potentially can be transferred from the records of registered unemployed persons in the records of students. The unemployment rate is therefore naturally lower, which is conveniently in their political appearances a highlight for some politicians.

Next disadvantage is that (due to the fictitious enrollment) it comes to excessive financing costs for the study programs of tertiary education and the potential loss of revenue for the state budget. It is assumed that a fictitious enrolled students benefit from certain advantages (eg. Tax benefit), supported by a student status. If the students would not be able to use these benefits, that is, if they were not enrolled in educational programs, they would also not be able to apply specific tax relief and would therefore the revenue of the state budget would be clearly higher, if we consider only the income tax aspect. However, if these persons were gainfully employed, would revenues in the state budget be even higher. Due to limited space we will not mention specific calculations, but it can be said that this amount is very high. We can conclude that the fictitious entries negative impact on public finances.

Fictitious enrollment has in our opinion negative impact on society as a whole. We can conclude that a fictitious enrolled student will obtain a higher education, and government investments in the student that enrolls only to capitalize on student benefits, no expected effect, because the student does not obtain knowledge of the study program, in which he/she is enrolled. Thus, there is a real risk that the intellectual potential of virtual enrolled students remains untapped. Such a person will have, due to lower education, difficulties in finding a job, the greater the possibility that he/she becomes unemployed, which in turn has a negative impact on public finances. Even if that person is employed, his/her financial contribution to the state budget (due to failure to higher education respectively) will be likely lower than it would be if the person successfully completed his/her study.

The next disadvantage of fictitious enrollment may be that in certain study programs with limited enrollment cannot enroll some students, who really want to study. According to some studies it is expected that fictitious enrollment can even lead to greater difficulties in gaining independence and creating a family.

According to estimates by the Court of Audit, the potential costs of (Fictitious enrollments in programs of tertiary education, 2014, p. 32), the fictitious enrollment in tertiary education since 2010-2013 amounted to almost 50 million, assuming that each potentially apparently enrolled student 3 benefit rights, namely personal income tax relief, the right to subsidized food and right to health insurance.

In our opinion, the analysis mentioned above are transparent and useful as they make to the user a clear picture of how pressing the problem of fictitious enrollment in Slovenian tertiary education is. Below we present some of the measures that can follow the scientific analysis.

## **2.5 Measures to restrict the fictitious enrollment**

The Ministry of Education and Sports (MIZŠ) has been in recent years also increasingly aware of the problem of fictitious enrollment, so they have already taken some steps, but many of them are still in preparation. The Law on Amendments and Supplements to the Law on higher vocational education (all-A, Ur. L. RS 100/2013) has already been implemented in the Slovene legislation.

This law is strongly interfered especially in higher education, both in terms of their own organization and functioning of colleges as well as the fact that colleges are no longer an “easy escape” for student status. For students there are three key changes, namely in college can no longer regularly enroll a person who has been in the past 3 years recorded in the higher education study program with limited enrollment, in entering college now the advantage is given to candidates who were not previously regularly enrolled in any program of study in tertiary education, and the regularization possibility that colleges can exclude students who do not meet the necessary academic requirements (and therefore no justifiable reasons). As technical assistance in preventing fictitious enrollments also serves as a record of the ESS, which is increasingly sophisticated. MIZŠ plans shortly also "link databases of secondary education and tertiary education and legislative changes in the field of secondary education, because now a lot of people because of their status enrolled in secondary schools" (ALTA 2014, p. 4).

With the above-mentioned law the state took the first serious step in limiting fictitious enrollments. Still, it is regulated the area of adult education and fictitious enrollments - but is promising a new law on higher education.

We can conclude that using the aforementioned calculations only estimate the number of virtual students enrolled; for once, we cannot safely calculate their exact number, as there are no relevant official records and related legal basis. MIZŠ wants to continue to strongly reduce the number of virtual entries. Some steps have been made for this, such as the introduction of EVS reduction of student status.

## **3 EVALUATION AND CONCLUSIONS**

In the end we would like to stress once again that the fictitious enrollment is extremely pressing problem in Slovenian tertiary education. It offers many social benefits for students and hence enable them to perform student work, but in our view it is harmful for these students because it can subsequently escalate many weaknesses, such as difficulties in finding employment, untapped intellectual status of an individual, difficulties in creating a family and many others.

Despite the fact that fictitious registered students have a negative impact on public finances, since 1990 in this direction has not been done much by the state. We can assume that this situation to a certain extent also corresponded to the state, because in this way the actual situation on the labor market was cocealed. In this way, the lower unemployment rate was displayed.

We also agree with the Rector of the University of Maribor, who said that fictitious enrollment may also be prevented before enrolling in an educational program if we verified the knowledge of students in a given sector and thus ensure that the study program can eterl only those who successfully passed such a test (Rak, 2015, p. 4).

It is anticipated that in the future the share of fictitious enrollments will decrease significantly, mainly due to the full introduction of the system eVŠ and legislative changes. We also hope that in the future, potential students will also be able to realistically find out whether they are even capable to study.

Unfortunately, in Slovenia there are currently still too much emphasis on only argument that there should be studies accessible to those who wish to do so, and regardless of financial capabilities, but there is not mentioned an important fact that all the population, which completed secondary education, is not capable for studying. We believe that even with strict adherence to the fact that the study is only for capable students we could significantly contribute to increased quality in tertiary education.

By the end we can say that we are sure that knowledge connects us as shown in Figure 1. Fictitious enrollments are definitely not the way to build and strengthen knowledge, but just the opposite.



Picture 1: Themeaningofknowledge

Source: (MFDPS, 2015: [http://:www.mfdps.si](http://www.mfdps.si))

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## JUSREDNJA ŠKOLA ZA SAOBRAĆAJ I KOMUNIKACIJE SARAJEVO

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### OSNOVE STRATEGIJE SIGURNOSTI DRUMSKOG SAOBRAĆAJA U BOSNI I HERCEGOVINI

#### Sažetak

Osnovni cilj, predmet i namjena Polaznih osnova strategije sigurnosti drumskog saobraćaja u Bosni i Hercegovini (2008.–2016.) je da se, primjenom odgovarajućih metoda istraživanja, osigura neophodna kvantitativna i kvalitetna identifikacija kompleksnog sistema sigurnosti drumskog saobraćaja. Opredjeljujući motiv za ovakav pristup je činjenica da je sistem sigurnosti saobraćaja u Bosni i Hercegovini, tako i u Federaciji Bosne i Hercegovine, sa stanovišta programskih i razvojnih osnova neistražen u postojećim uvjetima te je kao takav nepotpuno determinisan. Program sigurnosti treba da predstavlja sintezu naučnog, praktičnog i stručnog rada institucija BiH, čija je obaveza i dužnost da stvore sigurnost svih učesnika u saobraćaju. U izradi programa treba prihvatiti pozitivna iskustva i praksu evropskih zemalja čijim integracijama BiH teži.

Ključne riječi: **strategije sigurnosti, drumski saobraćaj, bezbjednost saobraćaja**

#### 1. Uvod

Polazne osnove strategije sigurnosti drumskog saobraćaja u Bosni i Hercegovini (2008.–2016.) urađene su prema zahtjevu Vlade Federacije Bosne i Hercegovine a proistekle su iz potrebe da se stručno istraže i determinišu uvjeti i činiooci koji opredjeljuju mjesto i ulogu sigurnosti drumskog saobraćaja Bosne i Hercegovine, odnosno Federacije Bosne i Hercegovine.

Drumski saobraćaj u Bosni i Hercegovini regulisan je na državnom i entitetskim nivoima, a donošenjem državnog zakona o sigurnosti saobraćaja na putevima u Bosni i Hercegovini ovaj segment saobraćaja treba da se definiše i realizuje na državnom nivou svakako potpomognut entitetskim institucijama (ministarstvima prometa/saobraćaja, ministarstvima unutarnjih/unutrašnjih poslova, ministarstvima obrazovanja/prosvjete, ministarstvima zdravstva, direkcijama za puteve/ceste i dr.).

Osnovni cilj, predmet i namjena Polaznih osnova strategije sigurnosti drumskog saobraćaja u Bosni i Hercegovini (2008.–2016.) je da se, primjenom odgovarajućih metoda istraživanja, osigura neophodna kvantitativna i kvalitetna identifikacija kompleksnog sistema sigurnosti



drumskog saobraćaja. Opredjeljujući motiv za ovakav pristup je činjenica da je sistem sigurnosti saobraćaja u Bosni i Hercegovini, tako i u Federaciji Bosne i Hercegovine, sa stanovišta programskih i razvojnih osnova neistražen u postojećim uvjetima te je kao takav nepotpuno determinisan

Za realizaciju elemenata Polaznih osnova strategije sigurnosti obavljena su sveobuhvatna fundamentalna istraživanja po svim osnovama funkcionisanja i razvoja sigurnosti u saobraćaju. Dinamične promjene u okruženju Bosne i Hercegovine (privredne, političke, pravne, tehničko-tehnološke itd.) uzrokovane su nedostatkom adekvatne dokumentacije i istraživanja. U obradi Polaznih osnova strategije sigurnosti korišteni su različiti dostupni izvori kao i dokumentacije koji tretiraju sadašnje stanje sigurnosti drumskog saobraćaja u Bosni i Hercegovini. Iskorišteni su podaci koji se nalaze u okvirima institucija Bosne i Hercegovine, od visokoškolskih institucija (Fakulteta za saobraćaj Univerziteta u Sarajevu), tako i podaci ministarstava unutrašnjih poslova, direkcija za ceste, statističkih zavoda i dr. Također, obavljeno je i neposredno proučavanje sistema sigurnosti zemalja iz okruženja BiH, kao i strategijski pravci sigurnosti u saobraćaju Evropske unije.

U sadašnjim uvjetima postoje sve nužne pretpostavke i realne mogućnosti za uspješnu realizaciju svih u studiji izloženih ciljeva i zadataka prihvatanjem državnih i entiteskih opredjeljenja u ovoj oblasti.

Isto tako, sigurnost u saobraćaju kao dinamičan sistem nalaže potrebu preduzimanja adekvatnih inicijativa i mjera u narednom periodu, kao prirodan nastavak istraživanja u okvirima sistema sigurnosti, što podrazumijeva otvaranje procesa i osiguravanjem sistematskih tematskih istraživanja vezanih za unapređenje i optimalan razvoj sistema sigurnosti u Bosni i Hercegovini.

## 2. Polazne osnove strategijskog planiranja

Smisao strategijskog planiranja predstavlja osnove za organizovano predviđanje i usmjerevanje razvoja u pojedinoj oblasti. Procesom planiranja treba da se razumije priroda rizika sa kojima se oni koji planiraju suočavaju, nakon čega je potrebno odrediti alternativne pravce akcija kojima će se maksimizirati ciljevi sa minimalnim rizikom. Strategijski plan definiše izlaze za akcione planove (preko kojih se realizuje strategija), koji trebaju da zadovolje kriterije kontinuiteta, konzistentnosti i uspješnosti, uz uspostavljanje dobrih odnosa sa građanima i stručnom javnošću. Proces strategijskog planiranja u sigurnosti drumskog saobraćaja treba da se orijentiše kroz državnu strategiju i strategije koje će se realizovati kroz ministarstva saobraćaja i ministarstva unutrašnjih poslova kao i ostalih institucija društva koje u svojoj oblasti imaju segment sigurnosti saobraćaja (ministarstva obrazovanja, prostornog uređenja, zdravstva i dr.).

Na skici 1. prikazan je sistem strategija koje je neophodno usvojiti i sačiniti da bi se sveobuhvatno realizovali zacrtani planovi, mjere i ciljevi u oblasti sigurnosti u saobraćaju.

STANJE I KARAKTERISTIKE SIGURNOSTI SAOBRAĆAJA		DRŽAVNA STRATEGIJA SIGURNOSTI SAOBRAĆAJA			
STRATEGIJA SIGURNOSTI SAOBRAĆAJA MUP-a		STRATEGIJA SIGURNOSTI SAOBRAĆAJA MPiK		STRATEGIJA DRUGIH SUBJEKATA DRUŠTVA KOJI SE BAVE SIGURNOŠĆU SAOBRAĆAJA	
VIZIJA SVRHA RADA	PRIORITETI CILJEVI KRATKOROČNI DUGOROČNI	STRATEGIJE ZA OSTVARENJE CILJEVA	AKCIONI PLANOVI	STRATEGIJE ZA OSTVARENJE CILJEVA	AKCIONI PLANOVI
RESURSI: OGRANIČENJA: ŠANSE: PRIJETNJE					

**Skica 1: Shema strategija neophodnih za poboljšanje sigurnosti saobraćaja u BiH**

Strategijom sigurnosti drumskog saobraćaja se definiše razvoj i funkcionisanje sistema sigurnosti drumskog saobraćaja Bosne i Hercegovine i izraz je njenog opredjeljenja da bude dio regionalnih i globalnih sistema sigurnosti saobraćaja. Strategija tretira državne interese, sigurnosne ciljeve, sigurnosne rizike i izazove, moguće reagovanje države Bosne i Hercegovine na te rizike i izazove, kao i strukturu sistema državne sigurnosti drumskog saobraćaja.

Strategija predstavlja osnovni dokument koji definiše pojam i smjernice sigurnosti drumskog saobraćaja države Bosne i Hercegovine, sa jasno definisanim ciljevima. Također su definisane mjere koje tretiraju pitanja sigurnosti drumskog saobraćaja, a koje je neophodno preduzeti da bi se ostvarili zacrtani ciljevi. Polazne osnove strategije treba da posluže kao osnova reforme sektora sigurnosti drumskog saobraćaja a mogu se mijenjati i prilagođavati u mjeri inoviranja i unapređenja sistema sigurnosti. Na području Bosne i Hercegovine, kao i u entitetima i kantonima, preduzimaju se određene aktivnosti, ali one ne funkcionišu kao zaokružen sistem sigurnosti saobraćaja (program).

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Polazne osnove strategije sigurnosti drumskog saobraćaja trebaju da potvrde državno opredjeljenje Bosne i Hercegovine, kao i entiteta u Bosni i Hercegovini, da preduzme sve neophodne aktivnosti kako bi zadovoljila uvjete za njenu integraciju u evropske akcione programe sigurnosti u saobraćaju.

Polazne osnove strategije treba da posluže kao osnova reforme sektora sigurnosti drumskog saobraćaja a mogu se mijenjati i prilagođavati u mjeri inoviranja i unapređenja sistema sigurnosti. Na području Bosne i Hercegovine, kao i u entitetima i kantonima, preduzimaju se određene aktivnosti, ali one ne funkcionišu kao zaokružen sistem sigurnosti saobraćaja (program) s utvrđenim sadržajima, metodama (način i sredstva realizacije), rokovima, nosiocima aktivnosti i praćenjem efekata, što ukazuje na potrebu koordiniranja i praćenja svih programa sa državnog nivoa. Osnovni nedostatak i vrlo malih pojedinačnih programa u dosadašnjem periodu je nepraćenje i nevrednovanje rezultata koji se postižu pa je teško vrednovati prednosti poduzetih mjera u odnosu na druge mjere ili akcije, racionalni utrošak sredstava itd.

Iskustva nekih saobraćajno razvijenih zemalja s ovakvim programima (Japan, Kanada, Švedska, Finska, Francuska, SAD i dr.) su veoma pozitivna. Programi moraju, pored stručne, dobiti podršku javnosti i političke sredine. Upravljanje sigurnošću saobraćaja (upravljanje rizicima u saobraćaju, odnosno saobraćajnim nezgodama) predstavlja veliki izazov za svaku državu zbog kompleksnih i raznovrsnih sadržaja aktivnosti i specifičnosti u sprečavanju saobraćajnih nezgoda. Države ove izazove rješavaju na različite načine. Neke države su proteklih godina uspješno razvile i koordiniraju nacionalnu strategiju radi reduciranja ovih pojava. Ovakva politika i programi sigurnosti saobraćaja koji su proistekli iz nje, dala je dobre rezultate u smanjenju saobraćajnih nezgoda i ukupnih šteta koje nastaju u njima. Upravljanje sigurnošću saobraćaja, između ostalog, podrazumijeva institucije osposobljene da sistematski prate, identifikuju probleme i efikasno reaguju radi stvaranja sigurne sredine za sve učesnike u saobraćaju.

Osnovni preduvjeti koje treba implementirati da bi se moglo upravljati sigurnošću saobraćaja, između ostalog, su:

- sveobuhvatan, stabilan sistem organizacije društva, uz opći nivo angažovanja društvene zajednice (šira društvena osnova, odnosno uključivanje većeg broja institucija),
- poboljšanje strukture mjera društvene intervencije kroz preuzimanje većeg broja, prije svega, preventivnih mjera,
- dati odgovarajuće mjesto sigurnosti saobraćaja među općepriznatim potrebama društva,
- definisanje ciljeva i strateških aktivnosti kojima će se ti ciljevi ostvariti na podlozi izučenih pojava oblika i uzroka saobraćajnih nezgoda,
- programirani pad smanjenja broja saobraćajnih nezgoda, što podrazumijeva postojanje kvalitetnih, stručno utemeljenih, osmišljenih, konkretnih, ekonomski opravdanih, praktično provodljivih programa i planova sigurnosti saobraćaja,
- pouzdan informacioni sistem, sa podacima koji su stručno eleborirani i dostupni velikom broju institucija,
- sistematska primjena stručno verifikovane politike, prakse i racionalno korištenje resursa sigurnosti saobraćaja,
- postojanje državnog tijela za sigurnost saobraćaja, kao koordinacionih tijela za sigurnost saobraćaja na svim nivoima administrativnog organizovanja,
- ozbiljne i osposobljene naučne institucije koje se na multidisciplinarn način bave izučavanjem problema sigurnosti saobraćaja i primjenom odgovarajućih mjera,
- definisanje jasne uloge institucija u sistemu sigurnosti saobraćaja, posebno odnos između organa uprave i drugih institucija,
- definisanje odgovornosti institucija za stanje u ovoj oblasti,
- stalno praćenje, preispitivanje i unapređenje rada institucija,
- stalno praćenje i vrednovanje uloge, učinka, efekata, dometa i granica svake mjere društvene intervencije koja se preduzima.

Najracionalniji korak radi osposobljavanja društvenih struktura da uspješno mogu upravljati sigurnošću saobraćaja u ovom momentu je donošenje Akcionog programa sigurnosti saobraćaja na nivou Bosne i Hercegovine, pomoću koga bi se konkretno definisala i realizovala strategija sigurnosti u ovoj oblasti. Akcioni program sigurnosti saobraćaja u kome bi se definisali ciljevi, strateške aktivnosti za realizaciju tih ciljeva, određeni prioriteti po principu relevantnosti i ugradili ostali potrebni instrumenti, predstavljao bi, pored ostalog, i neku vrstu scenarija za preduzimanje, prije svega, mjera i aktivnosti koje ne zahtijevaju velika ulaganja društvenih

aktivnosti. Svojim sadržajima i ciljevima programi i planovi sigurnosti saobraćaja trebaju biti društveno poželjni, kvalitetni, stručno utemeljeni, osmišljeni, konkretni, ekonomski opravdani kao i praktično provodivi.

### 3. Evropske strategije sigurnosti drumskog saobraćaja

U okvirima EU u posljednjih deset godina (1996.-2006.) donesen je niz dokumenata koji imaju za cilj podizanje nivoa sigurnosti drumskog saobraćaja. Osnovna dva dokumenta EU koja obuhvaćaju elemente koji se odnose na sigurnost drumskog saobraćaja su:

- Bijela knjiga
- Akcioni program cestovne/drumske sigurnosti.

Akcioni program drumske sigurnosti sadrži statističke podatke saobraćajnih nezgoda, nivo članica zemalja, pregled legislativa EU o sigurnosti na cestama, izbor projekata od strane komisije i neke obaveze izvršene od strane građana u okviru Evropske povelje o sigurnosti na cestama. U okviru Akcionog programa nalazi se šezdeset mjera koje zajedno čine aktivnosti neophodne za povećanje sigurnosti u saobraćaju. U okviru Akcionog programa sigurnosti u saobraćaju EU, izdvojene su tri karakteristične grupe za sigurnost saobraćaja i to:

- korisnici drumske infrastrukture,
- tehnologija vozila i
- drumska infrastruktura.

U okviru datih dokumenata, a koji imaju za cilj smanjenje broja saobraćajnih nezgoda, posebno su obrađene kategorije učesnika u saobraćaju koje imaju specifičnosti kretanja i učestvovanja u saobraćaju a to su:

- djeca i omladina (predstavlja niz mjera koje se odnose na poboljšanje stepena sigurnosti djece u automobilima, kamionima i autobusima),
- mladi ljudi (edukacija i preventiva zbog saobraćajnih nezgoda koje se dešavaju vikendima i u kasnim večernjim satima),
- stariji građani (edukaciju starijih osoba o njihovim mogućnostima/nemogućnostima u kretanju i učestvovanju u saobraćaju),
- pješaci i biciklisti (regulisanje prednje površine svih novih vozila koje će biti manje opasne za pješake, kao i primjena ostalih uređaja za indirektno gledanje, radi eliminisanja mrtvih uglova),
- motociklisti i vozači mopeda (primjena novih tehničkih dostignuća kod mopeda i motociklista, kao i oblikovanje zakonske regulative tako da se uvodi postepeni pristup najjačim motociklima).

U aprilu 2007. na snagu su stupili novi propisi Evropske unije o drumskom saobraćaju koji bi trebali podići nivo sigurnosti i poboljšati uvjete rada vozača komercijalnih vozila.

### 4. Dosadašnja iskustva u Bosni i Hercegovini u tretiranju drumskog saobraćaja

Izradom Master plana razvoja saobraćaja u Bosni i Hercegovini predviđene su aktivnosti na daljnjem proučavanju svih potencijalnih saobraćajnica u Bosni i Hercegovini. Planirane saobraćajne potrebe do 2020. godine ukazuju na to da će na pojedinim dionicama, posebno u blizini velikih gradova, biti neophodno izvesti građevinske intervencije koje će omogućiti viši nivo usluge i sigurnosti u saobraćaju. Master plan saobraćaja predstavlja koncept osnovne mreže razvoja glavnih koridora, a razmatraju se glavni longitudinalni i transverzalni pravci kroz Bosnu

i Hercegovinu. Prema predloženom, 4.073 (km) glavne mreže cesta u Bosni i Hercegovini čine međunarodni koridori, primarni prvi pravci (1.908 km) i primarni drugi pravci (1.170 km). Ciljevi i interesi dugoročnog društveno-ekonomskog i prostornog razvoja.

U Bosni i Hercegovini u oblasti planiranja saobraćajne infrastrukture svodi se na sljedeće:

- stvoriti zakonsku i institucionalnu osnovu u Bosni i Hercegovini, kompatibilnu s EU regulativom, da buduća saobraćajna mreža predstavlja osnovu za ostvarivanje planiranog ukupnog razvoja,
- da se kroz obnovu, rekonstrukciju i dogradnju naslijeđene mreže i izgradnju nove mreže ove usklade sa potrebama i zahtjevima proisteklim iz nove državno-teritorijalne podjele,
- kroz realizovanje konkretnih projekata rekonstrukcije i izgradnje savremene drumske infrastrukture generisati ukupan ekonomski razvoj,
- osigurati troškovno-efektivni drumski saobraćaj,
- smanjenje saobraćajnih nezgoda i
- smanjenje negativnog uticaja na okoliš, uz poštivanje domaćih i evropskih normi.

S druge strane, Svjetska banka je u proteklom periodu realizovala jedan projekt u podsektoru cesta u Bosni i Hercegovini, pod nazivom “Projekt sigurnosti i upravljanja cestama”. Ovaj projekt je započeo 2003., a završio se 2007. godine. Dio ovog projekta se odnosi na sanaciju postojeće mreže magistralnih cesta u Bosni i Hercegovini, a unutar datog programa je izrađena studija “Studije prioriteta rekonstrukcije i sanacije crnih tačaka na magistralnim cestama u oba entiteta BiH”. U sklopu navedenog projekta bile su predviđene sljedeće aktivnosti:

- formiranje baze podataka sigurnosti na cestama,
- provođenje javnih kampanja, i
- formiranje baze podataka o cestama i mostovima uz snimanje saobraćaja.

Navedene aktivnosti trebale su poboljšati tehničke osnove za upravljanje cestama, animiranje procesa povećanja svjesnosti potrebe za poboljšanom sigurnošću na cestama i uspostavljanje operativnih sistema neophodnih za realizaciju programa sigurnosti na cestama. Ono što je karakterisalo ovaj projekt, koji je u vrlo skromnim elementima implementacije realizovan, bilo je sljedeće:

- velika raznolikost statističkih podataka vezanih za saobraćajne nezgode i nedostatak sistematičnog prikupljanja i obrade istih na svim nivoima države BiH,
- nedostupnost svih traženih podataka o saobraćajnim nezgodama od policije kao osnovnog izvora podataka neophodnih za kvalitetnu izradu,
- odsustvo sistematičnog brojanja saobraćaja na cestama i
- nedostupnost podataka o osnovnim tehničkim elementima magistralnih cesta.

## 5. Cilj strategije sigurnosti drumskog saobraćaja u Bosni i Hercegovini

Sistem sigurnosti saobraćaja je vrlo složen, upravo zbog širine problema koji variraju po vrsti, prirodi i načinu utjecaja. Zbog toga je teško upravljati ovim sistemom, jer se ne mogu nikad potpuno obuhvatiti svi elementi. Za efikasno poduzimanje ciljeva i aktivnosti koje će dovesti do smanjenja uzroka nastanka saobraćajnih nezgoda, neophodno je imati pouzdane rezultate analize i provjerena saznanja koja će doprinijeti sigurnijoj sredini za sve korisnike drumskog saobraćaja. Plan i ciljevi aktivnosti na polju sigurnosti potrebno je da čine strateške, operativne i dodatne aktivnosti koje će obuhvatiti sljedeće stavke:

- jasno definisane programe aktivnosti,
- obim i kvalitet preciziranih ciljeva aktivnosti,
- jasno definisane nosioce aktivnosti,
- definisanje načina izvršenja aktivnosti i
- praćenje i vrednovanje rezultata programa i aktivnosti.

Smanjenje broja saobraćajnih nezgoda kao i smanjenje broja poginulih za oko 5 % na godišnjem nivou, odnosno 30 % na period od 6 godina, predstavljalo bi realne okvire koji su ostvarivi. Navedeno smanjenje kako ukupnog broja poginulih tako i ukupnog broja saobraćajnih nezgoda moguće je implementirati uz poduzimanje jasno definisanih mjera i aktivnosti na svim poljima sigurnosti kao i u svim organizacionim oblicima države Bosne i Hercegovine.

Isto tako, neophodno je naglasiti da bez poduzetih adekvatnih mjera na polju sigurnosti u drumskom saobraćaju u narednom periodu podrazumijevalo bi se povećanje kako ukupnog broja saobraćajnih nezgoda tako i broja poginulih. Prema ovom prognoziranom razvoju broja saobraćajnih nezgoda na području Bosne i Hercegovine u 2013. godini, imali bismo oko 49.731 saobraćajnu nezgodu, odnosno 572 poginule osobe, što svakako ne treba dozvoliti.

Naprijed navedeni podaci poboljšanja stepena sigurnosti u drumskom saobraćaju Bosne i Hercegovine do 2016. godine podrazumijevali bi također da bi BiH bila svrstana u zemlje sa srednjim brojem saobraćajnih nezgoda i brojem poginulih u saobraćajnim nezgodama u Evropi.

## 6. Zaključak

Polazne osnove strategije sigurnosti drumskog saobraćaja trebaju da potvrde državno opredjeljenje Bosne i Hercegovine kao i entiteta u Bosni i Hercegovini da preduzme sve neophodne aktivnosti kako bi Bosna i Hercegovina zadovoljila uvjete za njenu integraciju u evropske akcione programe sigurnosti u saobraćaju. Polazne osnove strategije sigurnosti drumskog saobraćaja za period 2008.-2016. godina tretira sistem sigurnosti koji Bosna i Hercegovina, odnosno entiteti žele da ostvare, koristeći elemente postojećeg sistema i usvajajući nove elemente. Imajući ovaj pristup u vidu, strategija treba da osigura političko-pravnu osnovu za suštinsku reformu sektora sigurnosti drumskog saobraćaja, kao i za normativno prilagođavanje i daljni razvoj sistema sigurnosti drumskog saobraćaja.

Na osnovu izvršenih detaljnih analiza, ciljeva i mjera u polaznim osnovama strategije sigurnosti drumskog saobraćaja mogu se rezimirati sljedeće konstatacije:

- Opći nivo sigurnosti saobraćaja na području Bosne i Hercegovine a tako i entiteta nije adekvatno praćen i korelativan sa razvijenošću ostalih aktivnosti u segmentu saobraćaja, što ukazuje na neophodnost u reagovanju društva radi spašavanja života svih učesnika u saobraćaju kao i od velike materijalne štete nastale usljed dešavanja saobraćajnih nezgoda;
- Na bazi karakteristika i ocjena sadašnjeg stanja svih faktora sigurnosti u saobraćaju (čovjeka, ceste, vozila i okoline), kao i pratećih aktivnosti u sigurnosti u saobraćaju
- Efikasno reagovanje društva na negativne pojave u saobraćaju sa odgovarajućim sistemom zaštite ljudi i materijalnih dobara, zahtijeva implementaciju smišljenog, sveobuhvatnog, planskog i sinhronizovanog sistema raznih i uzajamno povezanih organizacionih, odgojnih, obrazovnih, tehničkih, ekonomskih i drugih mjera i aktivnosti, da bi se stanje sigurnosti u saobraćaju svelo u društveno prihvatljive granice.

Problemi koji se posljednjih godina javljaju u segmentu sigurnosti u saobraćaju proizašli su, dobrim dijelom, iz nepostojanja zakonske regulative na nivou Bosne i Hercegovine. Donošenjem Zakona o osnovama sigurnosti saobraćaja na putevima u Bosni i Hercegovini i njegova implementacija u svim segmentima ustroja države i njenih institucija stimulisalo je procese u sektoru sigurnosti cestovnog saobraćaja. S tim da je potrebna njegova daljnja modernizacija i reagovanje u segmentima gdje se Zakon u dosadašnjoj implementaciji pokazao nedorečen, odnosno neefikasan.

Na području Bosne i Hercegovine, kao i na entitskom i kantonalnom nivou, preduzimaju se određene aktivnosti, ali one ne funkcionišu kao zaokružen sistem sigurnosti saobraćaja (program) s utvrđenim sadržajima, metodama (način i sredstva realizacije), rokovima, nosiocima aktivnosti i praćenjem efekata, što ukazuje na potrebu koordiniranja i praćenja svih programa sa državnog nivoa. Osnovni nedostatak i vrlo malih pojedinačnih programa u dosadašnjem periodu je nepraćenje i nevrednovanje rezultata koji se postižu pa je teško vrednovati prednosti poduzetih mjera u odnosu na druge mjere ili akcije, racionalni utrošak sredstava itd. Program sigurnosti treba da predstavlja sintezu naučnog, praktičnog i stručnog rada institucija BiH, čija je obaveza i dužnost da stvore sigurnost svih učesnika u saobraćaju. U izradi programa treba prihvatiti pozitivna iskustva i praksu evropskih zemalja čijim integracijama BiH teži. Konačni program sigurnosti u saobraćaju treba da ukloni uzroke saobraćajnih nezgoda kako bi saobraćajnih nezgoda bilo manje, jer bavljenjem posljedicama i analizom ne otklanjamo uzroke, koji svojom progresijom iz dana u dan povećavaju broj posljedica.

## LITERATURA

Izvor: Zavod za statistiku FBiH, Zavod za statistiku RS i Statistički biro Distrikta Brčko za 2016. godinu.

Urađeno na broj stanovnika BiH od 3.864.255 stanovnika.

Na osnovu međunarodne definicije, daje 30 % veće vrijednosti



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**BASIC SECURITY STRATEGY OF ROAD TRANSPORT  
IN BOSNIA AND HERZEGOVINA**

**Abstract**

The main goal, object and purpose of the starting points for the strategy of road traffic safety in Bosnia and Herzegovina (2008-2016) is that, by applying appropriate research methods, provide the necessary quantitative and qualitative identification of a complex system of road traffic safety. The main motive for this approach is the fact that the system of traffic safety in Bosnia and Herzegovina, and in the Federation of Bosnia and Herzegovina, from the standpoint of programming and development base unexplored in existing conditions and as such is not fully determined. The program security should be a synthesis of scientific, practical and professional work of state institutions, with the responsibility and duty to create the safety of all road users. In developing the program, Bosnia should take positive experiences and practices of European countries whose integration it seeks.

**Keywords: security strategy, road traffic, traffic safety**

**1. Introduction**

Basic Security Strategy of road transport in Bosnia and Herzegovina (2008-2016) was made per request of the Government of the Federation of Bosnia and Herzegovina and stemmed from the need to professionally explore and determine the conditions and factors that determine the place and role of road traffic safety in Bosnia and Herzegovina and the Federation of Bosnia and Herzegovina.

Road transport in Bosnia and Herzegovina is regulated at the state and entity levels and by adopting a state law on traffic safety on the roads in Bosnia and Herzegovina this segment of transport should be defined and implemented at the national level, certainly helped by the entity institutions (Ministries of transport, Ministry of internal Affairs, Ministry of education, health departments, directorates for roads, etc.).

The main goal, object and purpose of the starting points for the strategy of road traffic safety in Bosnia and Herzegovina (2008-2016) is that, by applying appropriate research methods, provide the necessary quantitative and qualitative identification of a complex system of road traffic safety. The main motive for this approach is the fact that the system of traffic safety in Bosnia and Herzegovina, and in the Federation of Bosnia and Herzegovina, from the standpoint of programming and development base unexplored in existing conditions and as such is not fully determined.



For the implementation of elements of the Starting safety strategy comprehensive fundamental research on all grounds of functioning and development of traffic safety were conducted. The dynamic changes in the surroundings of Bosnia and Herzegovina (economic, political, legal, technical and technological, etc.) are caused by a lack of adequate documentation and research. In dealing with the Starting safety strategy different available sources and documents that deal with the current state of road traffic safety in Bosnia and Herzegovina were used. The used data is contained in the framework of the institutions of Bosnia and Herzegovina, the institutions of higher education (Faculty of Transport, University of Sarajevo), and Ministry of Internal affairs, Directorate for Roads, statistical agencies etc. Also, the system of security of the neighboring countries of Bosnia and Herzegovina, as well as the strategic directions of traffic safety the European Union was carried out and directly studied.

In the current conditions, there are all necessary prerequisites and real opportunities for successful implementation of the objectives and tasks of accepting the state and entity commitments in this area presented in the study.

Also, traffic safety as a dynamic system requires the need to take adequate initiatives and measures in the future, as a natural continuation of research in the framework of the security system, which includes the opening of the process and ensuring systematic thematic research related to the improvement and optimal development of the system of security in Bosnia and Herzegovina .

## 2. Starting points of strategic planning

The purpose of strategic planning is the basis for forecasting and organized steering of development in a particular area. The planning process should be to understand the nature of the risks faced by those who plan, after which it is necessary to identify alternative courses of action that will maximize the objectives with a minimal risk. The strategic plan defines the outputs for action plans (through which the strategy is implemented), which need to meet the criteria of continuity, consistency and performance, along with the establishment of good relations with the public and the professional community. The process of strategic planning in the road traffic safety should be oriented through a national strategy and the strategies that will be implemented through the Ministry of Transport and Ministry of Internal affairs and other institutions which have in its field a segment of traffic safety (Ministry of Education, zoning, health, etc. ).

Figure 1 shows the system of strategies to be adopted and prepared to comprehensively realize these objectives, measures and targets in the field of traffic safety.

STANJE I KARAKTERISTIKE SIGURNOSTI SAOBRAĆAJA		DRŽAVNA STRATEGIJA SIGURNOSTI SAOBRAĆAJA			
STRATEGIJA SIGURNOSTI SAOBRAĆAJA MUP-a		STRATEGIJA SIGURNOSTI SAOBRAĆAJA MPiK		STRATEGIJA DRUGIH SUBJEKATA DRUŠTVA KOJI SE BAVE SIGURNOŠĆU SAOBRAĆAJA	
VIZIJA SVRHA RADA	PRIORITETI CILJEVI KRATKOROČNI DUGOROČNI	STRATEGIJE ZA OSTVARENJE CILJEVA	AKCIONI PLANovi	STRATEGIJE ZA OSTVARENJE CILJEVA	AKCIONI PLANovi
RESURSI; OGRANIČENJA; ŠANSE; PRIJETNJE					

**Figure 1: Diagram of strategies necessary to improve traffic safety in BiH**

Strategy of road traffic safety defines the development and functioning of the safety of road transport in Bosnia and Herzegovina and is an expression of its commitment to be part of regional and global systems of traffic safety. The strategy treats national interests, security objectives, security risks and challenges, possible reactions of the state of Bosnia and Herzegovina to these risks and challenges, as well as the structure of the system of national security of road transport.

The Strategy is the basic document that defines the concept and guidelines for road traffic safety of Bosnia and Herzegovina, with clearly defined goals. It also defines the measures to deal with issues of road traffic safety, and that are necessary to achieve the intended goals. Baseline strategy should serve as a basis for reform of the security sector of road transport and can be modified and adjusted to the extent of innovation and improve system security. In Bosnia and Herzegovina, as well as in the entities and cantons certain activities are taken but they do not function as an integrated system of traffic safety.

Strategy of road traffic safety defines the development and functioning of the safety of road transport Bosnia and Herzegovina and is an expression of its commitment to be part of regional and global systems of traffic safety. The strategy treats national interest, security objectives, security risks and challenges, possible reactions of the state of Bosnia and Herzegovina to these risks and challenges, as well as the structure of the system of national security of road transport.

Baseline Security Strategy of road transport needs to confirm the commitment of Bosnia and Herzegovina and the entities in Bosnia and Herzegovina to take all necessary actions to meet the conditions for its integration into the European action programs of traffic safety.

Baseline strategy should serve as a basis for reform of the security sector of road transport and can be modified and adjusted to the extent of innovation and improvement of system security. In Bosnia and Herzegovina, as well as entities and cantons certain activities were made, but they do not function as an integrated system of traffic safety (program) with established content, methods (method and means of realization), deadlines, stakeholders and monitoring the effects, which points to the need to coordinate and monitor all programs at the state level. The main disadvantage of the very small individual programs in the current period is failing to follow and grade the results achieved, therefore it is difficult to evaluate the benefits of the measures taken in relation to other measures or actions, rational use of funds etc.

The experiences of some developed countries in the traffic sense with programs (Japan, Canada, Sweden, Finland, France, the US and others.) are very positive. Programmes must, in addition to professional, get the public and political support. Traffic security management (risk management in traffic, or traffic accidents) is a major challenge for every country because of the complex and diverse content of activities and specificity in preventing accidents. States resolve these challenges in different ways. Some countries have in recent years successfully developed and coordinated national strategy for reducing these phenomena. Such policies and programs of traffic safety that resulted from it, has yielded good results in the reduction of traffic accidents and the total damage caused. Traffic security management, among other things, involves institutions qualified to carry out systematic monitoring, identify problems and respond effectively to create a safe environment for all road users.

Basic requirements to be implemented in order to be able to manage the security of traffic, among others, are:

- a comprehensive, stable system of social organization, with the general level of engagement of the community (wider basis, ie the inclusion of a large number of institutions)
- improving the structure of the measures of social intervention by taking a large number of primarily preventative measures,
- giving appropriate place to traffic safety among the generally recognized needs of society,
- defining objectives and strategic activities that will achieve these objectives on a base of skilled forms and causes of accidents,
- programmed reduce in the number of traffic accidents, which implies the existence of high-quality, professionally-based, designed, practical, economically viable, practical conductive programs and plans for traffic safety,
- Reliable information systems, with data that are professionally elaborated and available in a large number of institutions,
- a systematic application of expert verified policies, practices and rational use of resources, traffic safety,
- the existence of a state body for traffic safety, as well as coordinating bodies for traffic safety at all levels of the administration,
- serious and qualified scientific institutions that are in a multidisciplinary way of dealing with the research on traffic safety and the application of appropriate measures,
- definition of the role of institutions in the system of traffic safety, in particular the relationship between administrative bodies and other institutions,
- defining the responsibilities of the institutions of the state in this area,
- constant monitoring, reviewing and developing institutions,
- continuous monitoring and evaluation of the role, impact, effects, scope and limits of the measures of social intervention that is undertaken.

The most rational step in order to enable social structures that can successfully manage the security of traffic at this point is the adoption of the Programme of Action of traffic safety at the level of Bosnia and Herzegovina, with which a strategy of security in this area is specifically defined and implemented. The Action Programme of traffic safety which would define goals, strategic actions for the realization of these goals, set priorities based on the principle of relevance and install other necessary instruments, would, among other things, present a kind of scenario to take, first of all, measures and activities that do not require a large investment of social activities. Its contents and objectives of the programs and plans for traffic safety should be socially desirable, high-quality, professionally justified, designed, practical, cost-effective and practically enforceable.

### 3. European strategy of road transport safety

In the framework of the EU in the last ten years (1996-2006) a series of documents aimed at raising the level of road traffic safety were passed. There are two basic documents of the EU, which include elements related to the safety of road transport:

- The White Book
- Action program of road / road safety.

The Action program of road safety contains statistics of accidents, levels of member countries, review of EU legislation of road safety, the selection of projects by the Commission and some commitments made by citizens in the framework of the European Charter for road safety. The Action Programme consists of sixty measures that together make up the activities necessary to increase traffic safety. In the framework of the Programme of Action of traffic safety EU, three distinct groups of traffic safety can be identified:

- Users of road infrastructure,
- Technology vehicles and
- Road infrastructure.

The document, aimed at reducing the number of traffic accidents, especially processed categories of road users who have difficulty in movement and participation in traffic as follows:

- Children and young people (representing a number of measures relating to improvement of the level of safety of children in cars, trucks and buses)
- Young people (education and prevention for accidents that occur on weekends and late in the evening)
- The elderly (education of the elderly about their ability / inability of movement and participation in traffic)
- Pedestrians and cyclists (regulation of the front surface of all new vehicles to be less dangerous for pedestrians, as well as the application of other devices for indirect vision to eliminate blind spots)
- Motorcyclists and moped drivers (application of new technical achievements with a moped and motorcycle, as well as shaping the legislation so that it introduces gradual access to the most powerful motorcycles).

In April 2007 the new EU regulations on road transport came into force, which should raise the level of safety and improve the working conditions of drivers of commercial vehicles.

#### 4. Previous experience in Bosnia and Herzegovina in the treatment of road transport

The Master Plan for Development of Transportation in Bosnia and Herzegovina provides for the further study of all potential roads in Bosnia and Herzegovina. Planned transport needs by 2020 indicate that, in certain sections, especially near large cities, it is necessary to carry out structural interventions that will enable a higher level of service and traffic safety. Transport Master Plan represents the basic concept of network development of the main corridor, and are considered the main longitudinal and transverse directions through Bosnia and Herzegovina. Under the proposed, 4,073 (km) of the main road network in Bosnia and Herzegovina are international corridors, the first primary routes (1,908 km) and the second primary routes (1,170 km). The goals and interests of long-term socio-economic and spatial development.

Bosnia and Herzegovina in the area of the planned transport infrastructure is reduced to the following:

- creating a legal and institutional basis in Bosnia and Herzegovina, compatible with the EU regulations that future transport network is the basis for the realization of the planned overall development,

- Restoration, reconstruction and upgrading legacy networks and building new networks these align with the needs and requirements arising from new state-territorial division,
- through the implementation of specific projects of reconstruction and construction of modern road infrastructure, generating overall economic development,
- providing cost-effective road transport,
- reducing accidents and
- reducing the negative impacts on the environment, while respecting the national and European standards.

On the other hand, the World Bank has recently implemented a project in the sub-sector of roads in Bosnia and Herzegovina, called "Project of security and management of roads". This project began in 2003 and ended in 2007. A part of this project concerns the rehabilitation of the existing network of main roads in Bosnia and Herzegovina, and within a given program is the study of 'Studies priority reconstruction and rehabilitation of black spots on the main roads in both entities of Bosnia and Herzegovina ". In the context of this project for the following activities were provided:

- establishment of a database of road safety,
- conducting public campaigns, and
- a database of roads and bridges and recording traffic.

These activities were to improve the technical basis for the management of roads, animating the process of increasing awareness of the need for improved safety on the roads and the establishment of operational systems necessary for the implementation of the program of road safety. What characterized this project, which was very modestly realised, was the following:

- a large variety of statistical data related to traffic accidents and the lack of systematic data collection and processing them at all levels of the State of BiH,
- unavailability of all required data on traffic accidents from the police as the main source of information necessary for quality production,
- absence of systematic counting of traffic on the roads and
- unavailability of data on basic technical elements major roads.

## 5. The aim of the strategy of road transport safety in Bosnia and Herzegovina

Traffic safety system is very complex, because of the problem, which vary according to the type, nature and mode of influence. It is therefore difficult to manage this system, because it can never fully capture all the elements. To effectively undertake the objectives and activities that will lead to a reduction of the causes of traffic accidents, it is necessary to have reliable analysis results and proven knowledge that will contribute to a safer environment for all users of road transport. The plan and objectives of activities in the field of security should make strategic, operational and additional activities will include the following items:

- Clearly defined program of activities,
- The scope and quality of precise objectives activities,
- Clearly defined stakeholders,
- Defining the implementation of activities and
- Monitoring and evaluating the results of programs and activities.

Reducing the number of traffic accidents as well as reducing the number of deaths by around 5% per annum, or 30% for a period of six years, would constitute a realistic framework. This reduction to the total number of casualties and the total number of traffic accidents can be implemented by taking clearly defined measures and activities in all fields of security and in all organizational forms of the state of Bosnia and Herzegovina.

Also, it is necessary to point out that without taking adequate measures in the field of road traffic safety in the coming period there will be an increase to the total number of traffic accidents and the number of casualties. According to the forecasted development of the number of traffic accidents in the territory of Bosnia and Herzegovina in 2013, we had approximately 49,731 traffic accidents that killed 572 people, which certainly should not be allowed.

The above-mentioned data to improve the level of safety in road traffic of Bosnia and Herzegovina by 2016 would also imply that BiH was classified as a countries with a medium number of accidents and number of fatalities in Europe.

## 6. Conclusion

Baseline Strategy of road transport safety needs to confirm the commitment of Bosnia and Herzegovina and the entities in Bosnia and Herzegovina to take all necessary action for Bosnia and Herzegovina to meet the conditions for its integration into the European action programs of traffic safety. Baseline Security Strategy of road transport for the period 2008-2016 treated the security system that Bosnia and Herzegovina or the entities want to achieve, using elements of the existing system and developing some new ones. Keeping this approach in mind, the strategy is to ensure the political and legal basis for a fundamental reform of the security sector of road transport, as well as for legislative adaptation and further development of the system of road traffic safety.

On the basis of detailed analysis, objectives and measures to baseline strategy safety road traffic can be summarized as follows:

- the overall level of traffic safety in Bosnia and Herzegovina and both entities is not adequately monitored and correlates with the development of other activities in the field of transport, which indicates the necessity of the response of society to rescue the lives of all road users as well as significant material damage resulting from events accidents;
- Based on the characteristics and evaluation of the current state of all the factors of traffic safety (human, roads, vehicles and the environment), as well as supporting activities in transport safety
- efficient response of society to the negative phenomena in traffic with an adequate system of protecting people and property, requires the implementation of a deliberate, comprehensive, planned and synchronized system of various and interrelated organizational, educational, technical, economic and other measures and activities in order to bring traffic safety to a socially acceptable level.

Problems that have occurred in recent years in the field of traffic safety emerged, largely from the lack of legislation on the level of Bosnia and Herzegovina. The adoption of the basics of traffic safety on the roads in Bosnia and Herzegovina and its implementation in all aspects of the organization of the state and its institutions stimulate the processes in the field of road transport.

Therefore, the need for its further modernization and response in areas where the law in so far implementation has shown incomplete or ineffective.

In Bosnia and Herzegovina, as well as on Entity and cantonal level, certain activities were taken, but they do not function as an integrated system of traffic safety (program) with established content, methods (method and means of realization), deadlines, stakeholders and monitoring the effects, which points to the need for coordination and monitoring of all programs from the state level. The main disadvantage of very small individual programs in the current period is failing to follow and evaluate results achieved is difficult to evaluate the benefits of the measures taken in relation to other measures or actions, rational utilization of funds and so on. The program security should be a synthesis of scientific, practical and professional work of state institutions, with the responsibility and duty to create the safety of all road users. In developing the program, Bosnia should take positive experiences and practices of European countries whose integration it seeks. The final program of traffic safety should eliminate the causes of traffic accidents to lower the number of accidents, because dealing with the consequences and the analysis does not eliminate the causes that its progression from day to day increasing the number of consequences.

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Source: Department of Statistics FBiH, Department of Statistics RS and the Statistical Office of the Brcko District for 2016.

For the population of 3,864,255 inhabitants

On the basis of international definitions, gives a 30% greater value

**VII. MEĐUNARODNI SIMPOZIJ  
INTERDISCIPLINARNOST SAOBRAĆAJA I LOGISTIKE  
Skopje, Republika Makedonija,  
29. i 30. rujna 2016.**

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**AGRESIVNO PONAŠANJE MLADIH VOZAČA  
U CESTOVNOM PROMETU**

**Sažetak rada:**

*mr.sc. Nenad Zuber*

Agresiju karakterizira neprijateljski osjećaj ili neprijateljsko ponašanje prema drugim sudionicima prometa. Agresivni vozači svoje ponašanje nameću drugima, ne obraćajući pažnju na njihova prava u prometu i njihovu volju. Kao reakcija na takvo ponašanje, počesto se javlja uzvraćanje sličnim ponašanjem kao nužda za preživljavanje na cestama. Žrtva agresivnog ponašanja često podliježe odmazdi protiv postupka agresivnog vozača, što dodatno pogoršava i usložnjava opasne situacije. Agresivno ponašanje nije specifično niti se isključivo veže za jednu određenu dob, grupu ili spol vozača. Njemu je uzrokom kada vozači prijeđu svoje granice. Kada se to dogodi, neprijateljstvo usmjereno prema drugima u pravilu nije osobno, već je najčešće posljedica prethodne frustracije i stresa.

Posebno, skupina mladih vozača u pravilu čini veće pogreške u vožnji zbog ponašanja nego zbog neznanja ili manjkavosti u tehnici vožnje! Oni su općenito i učestalije izloženi riziku, ne samo zbog manjeg vozačkog iskustva već i zato što su manje sposobni kontrolirati svoje osjećaje.

Pomoću internetske ankete, koju su N. Zuber, Z. Bočkal, i V. Benceković postavili na web-stranicu ([www.sigurno-voziti.net](http://www.sigurno-voziti.net)), dobivene su samoprocjeneviše od 12.000 ispitanika o agresivnom ponašanju u prometu(*ovu je stranicu i danas moguće posjetiti*). Rezultati istraživanja pokazuju da postoje razlike među spolovima, razlike po dobi kao i prema vozačkom stažu (iskustvu).

**Ključne riječi:**

AGRESIVNOST, SIGURNOST, MLADI VOZAČI, SAMOPROCJENA, PONAŠANJE



## 1. UVOD

Zbog vrlo ozbiljnih, često i katastrofalnih posljedica, pogrešaka i poremećaja u sustavu sigurnosti, zaštita sudionika prometa danas nadilazi granice pojedinih zemalja, postaje internacionalni problem, prerasta u univerzalnu odgovornost, a ne ostaje samo na razini ustavnog prava pojedinca da ga se zaštiti od onih koji ugrožavaju druge u prometu na cestama.

Sigurnost prometa na cestama je kompleksno, interdisciplinarno pitanje u kojem različiti čimbenici igraju važnu ulogu i međusobno značajno djeluju jedni na druge. Velika većina nesreća vjerojatno bi se izbjegla da su se poduzeli odgovarajući postupci u pravom trenutku, dok se same posljedice potpuno neočekivanih i nepredviđenih pogrešaka i kvarova unutar infrastrukture ili vozila ionako ne mogu izbjeći. Dakle, dobar i siguran vozač ključnije čimbenik sustava cestovne prometne sigurnosti, na koji izravno utječe svojim ponašanjem, iskustvom, psihofizičkim sposobnostima, znanjima o prometu i vještinama upravljanja vozilom.

Problemom agresivne vožnje i agresivnih vozača (poglavito mladih) stručnjaci i znanstvenici u svijetu bave se od davnih šezdesetih godina prošloga stoljeća. Bez obzira na tu činjenicu do danas nema opće prihvaćene, jedinstvene, univerzalne definicije agresivne vožnje. Vrlo je slično s utvrđivanjem relevantnih varijabli koje generiraju agresivnu vožnju i agresivna ponašanja.

Uzroci agresivne vožnje su složeni i nitko nema sve prave i potpune odgovore. Psiholozi često ukazuju na duboko ukorijenjene osobne uzroke kao što su stres i emocionalni poremećaji koji dovode do umanjenja vrijednosti prosudbe. Sociolozi su skloni vidjeti vezu između društvenih problema, nekulturnih, neodgojenih ili nasilnih oblika ponašanja u vožnji. Biološke teorije smatraju da je agresivno ponašanje urođeno iako iskustvo govori da postoje iznimke.

Frustrirajuće situacije koje ometaju ili sprječavaju neki oblik ostvarenja cilja, uvjetuju ponašanja za koja se vjeruje da djeluju kao okidač za agresivno ponašanje. Sva ta promišljanja se razlikuju, ali činjenica jest da agresivno ponašanje najčešće pretpostavlja rezultat kombinacije niza varijabli i ovih teorija.

U našoj zemlji, nažalost, stvari se do dana današnjeg ne nazivaju pravim imenom. Naši pozitivni propisi koji uređuju sustav sigurnosti ne poznaju termine „Agresivna vožnja“ (Aggressive Driving) ili znatno za sigurnost opasniju inačicu „Divljanje na cesti“ (Road rage). Kao da se oduvijek „pazilo i mazilo“ one koji divljaju na cestama, pa se njihovo ponašanje nazivalo bezobzirnom vožnjom, neodgovornim ponašanjem u prometu ili slično. Zakonom<sup>5</sup> iz 2004. godine uvode se izrazi: ometanje prometa i ugrožavanje prometa, a tek 2011. godine Kazneni zakon<sup>6</sup> uvodi termin obijesne vožnje.

No, bez obzira kojim se imenom nazove divljanje na cesti ili agresivno ponašanje, materijalizacija takvog ponašanja gotovo je svakodnevna pojava i percepcija sudionika prometa, a posljedice takvog ponašanja „hrane“ rubrike crnih kronika i predstavljaju društveno neprihvatljive crne statistike.

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<sup>5</sup> Zakon o sigurnosti prometa na cestama RH, NN 105/04. srpanj 2004., članak 2., točka 72. i 73.

<sup>6</sup> Kazneni zakon RH, NN 125/11. listopad 2011., članak 226.

## **2. PROBLEM AGRESIJE U PROMETU**

Vozač svojim sposobnostima, osobinama ličnosti, ponašanjem, iskustvom, znanjima o prometu i vještinama upravljanja vozilom utječe na sustav cestovne prometne sigurnosti. Osobine vozača (crte ličnosti i temperament) određuju njegovo ponašanje u prometu. Jedna od crta ličnosti je agresivnost, osobina čovjeka da napada nekog drugog u svojoj okolini. Agresivnost je u populaciji (pa tako i populaciji vozača), normalno distribuirana, što znači da ima malo ljudi koji rijetko ili nikako ne napadaju druge, kao i da ima malo ljudi koji su skloni u svakoj situaciji napasti drugoga.

Vožnja automobilom zbog utjecaja niza čimbenika može postati stresna aktivnost. Žurba, nestrpljivost, gužva, natjecanje s drugim vozačima, samodokazivanje, nadoknađivanje osjećaja inferiornosti i nedoraslost, pogrešni postupci drugih vozača samo su neki od čimbenika koji uzrokuju frustracije i stres u prometu, koje pak za posljedicu imaju neprijateljsko, destruktivno ponašanje i agresiju. Greške u percepciji i pogreške u procjeni i u ponašanju te iznenadne, netočne ili nedovoljno brze odluke u stanju stresa mogu biti fatalne.

Posebna skupina mladih vozača - čini veće pogreške u vožnji zbog ponašanja nego zbog neznanja ili tehnike vožnje! Oni su općenito i više izloženi riziku, ne samo zbog manjeg vozačkog iskustva već i zato što su manje sposobni kontrolirati svoje osjećaje. Inače, agresivno ponašanje u pravilu nije specifično niti za jednu određenu dob, grupu ili spol. Njemu je uzrokom kada vozači prijeđu svoje granice. Kada se to dogodi, neprijateljstvo usmjereno prema drugima u pravilu nije osobno, već je posljedica prethodne frustracije i stresa.

No, temeljno je pitanje mogu li se agresivne tendencije u prometu na cesti posve obuzdati? Agresija, kao oblik, nikako ne bi smjela postati dominantni repertoar ponašanja vozača, pogotovo mladih. Svjedoci smo kako se agresivna vožnja pre-lako usvaja i postaje naučeno ponašanje. Ono što je najgore, djeca uče agresivnu vožnju od svojih roditelja, a onda – sutra, takva vožnja postaje paradigma njihova ponašanja u prometu. Ovi „uzori“ iskrikljuju stavove o tome što je opasno, i postižu kod djece da se agresivnost prihvaća kao nešto normalno, a to povećava u bližoj i li daljnjoj budućnosti rizik u prometu za svakoga.

Agresivna vožnja predstavlja po svemu sudeći sveopći problem, a nažalost je i u porastu. Agresivna vožnja postaje paradigma ponašanja u prometu. Svijest javnosti o opasnostima i rizicima koji su posljedica takve vožnje i takvog ponašanja u prometu valja podići na bitno višu razinu kako bismo izbjegli da postanemo društvo koje prešutno prihvaća takvo ponašanje na cesti.

### **2.1. AGRESIVNA PONAŠANJA I AGRESIVNA VOŽNJA**

„Nove norme“, načini i stil vožnje, pogotovo u urbanim sredinama, posljedice su socio-kulturnih promjena i bivaju spontano usvojene od strane sadašnje generacije, poglavito mlađih, ali ne baš i tako mladih vozača. Individualizam i konkurencija među vozačima doveo je do toga da su vozači postati agresivni i neprijateljski raspoloženi prema ostalim korisnicima cesta.

Agresivna društva, agresivne situacije u društvu, krizna vremena i slično, mogu generirati kod ljudi interaktivne događaje kao što su agresija na radnom mjestu, u obitelji, a možda najviše u prometu na cesti, stvarajući još veći stres koji generira još veće sukobe. Danas agresivni vozači markantno pridonose problemima i nesigurnosti u prometu na cestama i predstavljaju ozbiljnu opasnost za sebe i druge sudionike prometa. Upravo to pokazuju i podaci praćenja stanja sigurnosti na našim cestama, prometnih nesreća, stradanja, ozljeđivanja i šteta koje nastaju kao posljedica tih pojava.

Problem agresivnosti kao društveno neprihvatljiva pojava ne egzistira na našim cestama „od jučer“. Svatko je u vozačkoj praksi susreo primjere agresivne vožnje, i mnogi su od nas, u proteklom razdoblju osjetili nemilo iskustvo agresivnog ponašanja na vlastitoj koži. Agresivna vožnja je nedvojbeno u usponu, postaje stečena navika koja se prenosi s jedne generacije na drugu, a pojačava se neadekvatnim odnosom medija i društva prema tom problemu. Opravdano je za očekivati da će u takvim uvjetima nastaviti rasti intenzitet, učestalost i težina agresivne vožnje i bijesa u prometu.

### **2.1.1. Agresivna ponašanja u prometu**

Agresivna ponašanja često su uzrokom agresivnoj vožnji. Vrlo širok „repertoar“ agresivnih ponašanja koja mogu provocirati agresivnu vožnju mogu se svesti na sljedeća:

- Prebrza vožnja, vožnja na premalom razmaku iza vozila, neustupanje prednosti prolaska, vožnja slaloma, pretjecanje s desne strane, nepropisno i nesigurno mijenjanje prometne trake, u žurbi prolazak prije crvenog svjetla ili ne zaustavljanje prije znaka stop, nervozno trubljenje, „blicanje“ svjetlima, ... i slično.
- U anonimnosti svog automobila iskaljivanje frustracija na drugim sudionicima prometa - gestikuliranje i davanje neprimjerenih, opscenih znakova rukama, vikanje na druge sudionike prometa, psovanje, ...
- Visoke razine frustracija, borba za prevlast na cesti i neobaziranje na potrebe drugih vozača...
- Vožnja pod utjecajem alkohola ili droge, nevezivanje sigurnosnih pojaseva ili poduzimanje drugih nesigurnih radnji vozilom...

Agresivno ponašanje je prije svega potencijalno opasno ili stvarno opasno ponašanje, koje za posljedicu ima učestalo ometanje ili ugrožavanje, a vrlo često i ozljeđivanje sudionika prometa i njihove imovine. Ponašanje u prometu smatra se agresivnim ako je namjerno i ako je motivirano ometanjem drugih sudionika, nestrpljivošću, neprijateljstvom, i/ili pokušajem da se uštedi vrijeme. Vrlo često su to „simptomi“ ponašanja mladih vozača, ali ne isključivo.

Velika većina ljudi će agresivno reagirati, ali ne na iste podražaje iz okoline i ne istim intenzitetom reakcije. No, o agresiji možemo govoriti kao jednom od najčešćih oblika reagiranja u frustrirajućoj situaciji. Ovdje govorimo o agresiji kao aktivnoj obrani koja je usmjerena najčešće prema prepreci što je izazvala frustraciju. Kažemo najčešće, jer osim izravne agresije pojavljuje se posredna i zamijenjena agresija.

### **2.1.2. Agresivna vožnja**

Jedinstvene, opće prihvaćene definicije agresivne vožnje nema. U razvijenim zemljama svijeta definirana je kao način vožnje koji prelazi norme sigurne vožnje i sigurnog ponašanja, koji dovodi do nepotrebne opasnosti, izravno utječe i ugrožava druge sudionike u prometu ili imovinu. Agresivna vožnja definira se kao sebična, opasna, nesigurna ili nestrpljiva vožnja vozilom, koja ima izravan utjecaj na druge vozače.

Agresivna vožnja uključuje širok spektar ponašanja u vožnji, u rasponu od rizične vožnje do eskalacije nasilja u „dvobojima“ na cesti. Agresivna vožnja ovisi o vozačevom psihološkom stanju i čimbenicima iz okruženja, a predstavlja kontekstualno kršenje valjanih prometnih propisa, sigurnosnih pravila i elementarnog etičkog ponašanja.

Vozači koji pokušavaju prijetiti ili druge vozače kazniti za njihov način vožnje ili njihova ponašanja u vožnji, zato što im jednostavno idu na živce (vozači koji voze brzinom koja je ispod ograničene brzine, stariji vozači, vozačice, vozači registarskih pločica drugih, u pravilu, manjih gradova i drugi) ozbiljna su prijetnja sigurnosti u prometu. Ovakav stav prema određenim skupinama vozača u prometu na cesti predstavlja "osvetnički stav" i rezultira točno određenim načinima agresivne vožnje: vožnjom na premalom razmaku od vozila ispred, iznenadnim kočenjem kao upozorenjem za vozila iza, namjernim blokiranjem prolaska vozila sa bočne ceste, učestalim „blicanjem“ pomoću svjetla kao kaznom drugome vozaču, bučnim i prebrzim pretjecanjem ili prolaskom pored vozila, glasnim „turiranjem“ mašine, vikom ili pokazivanjem opscenih gesti prema drugim vozačima (vozačicama) ili drugim.

### **2.1.3. Agresivna vožnja – sveopći problem**

Agresivna vožnja i agresivno ponašanje u prometu, ne samo kod nas već i u svijetu, već dulji niz godina predstavlja sveopći problem. Vrlo je interesantno spomenuti rezultate istraživanja Galupovog instituta koje je provedeno u 23 zemlje i upravo je propitalo javno mnijenje o agresivnoj vožnji – 13.673 imatelja vozačke dozvole.

Temeljni zaključak provedene ankete jest da je agresivna vožnja sveopći problem, a velika većina ispitanika diljem svijeta je ustvrdila kako ih drugi vozači ponekad iritiraju u vožnji. Ono što je u istraživanju upozoravajuće jest da neki rezultati pokazuju kako raste razina tolerancije na agresivno ponašanje vozača u prometu. U mnogim je zemljama veliki postotak vozača bio žrtvom agresivnog ponašanja: U Sjedinjenim Državama (66%), a u Europskoj Uniji (48%) znatan dio ispitanika tvrdi da su bili izloženi agresivnom ponašanju u vožnji. S druge strane, vidimo da 51% ispitanika u Europskoj Uniji i 68% ispitanika u Sjedinjenim Državama Amerike priznaju da se i sami agresivno ponašaju. Postoji čvrsta veza između pokazivanja agresivnog ponašanja i toga da je netko žrtva takvog ponašanja: 70% vozača u Europskoj Uniji koji priznaju da se agresivno ponašaju, u nekoliko su slučajeva i sami bili izloženi agresivnom ponašanju drugih vozača u protekloj godini.

Kako je istraživanje provedeno na nekoliko kontinenata i oblik agresivnog ponašanja u vožnji razlikuje se od kontinenta do kontinenta i od zemlje do zemlje. To se djelomice može objasniti razlikama u kulturi pojedine zemlje i poimanju prihvatljivog ponašanja u vožnji. U Australiji je 77% ispitanika bilo izvrgnuto agresivnim ili nepristojnim gestama, nasuprot svega 9% u Japanu. S druge strane, agresivnim ponašanjem u Japanu smatra se preblizom vožnjom, gdje je 70% ispitanika izjavilo da su ih drugi vozači agresivno slijedili. Nasuprot tome, u Argentini je verbalno zlostavljanje najuobičajeniji oblik agresije, što je osobno iskusilo sedam od deset ispitanika.

Istraživanje je pokazalo da postoji veza između nesreća na cesti i agresivne vožnje. Kod vozača koji su u protekle tri godine imali barem jednu prometnu nesreću, postoji vjerojatnost da su se agresivno ponašali u usporedbi s onima koji nisu imali nesreće u tom razdoblju. Isto tako, postoji veza između evidencije onih ispitanika koji su imali nesreću i činjenice da su bili žrtva agresivnog ponašanja. 56% onih koji su nedavno imali bar jednu nesreću potvrdili su da su bili izloženi agresivnom ponašanju u posljednjih godinu dana, u usporedbi s 45% onih koji nisu imali niti jednu nesreću.

#### **2.1.4. Uzroci agresivne vožnje**

Vrlo je teško pobrojati sve varijable koje utječu ili u danim uvjetima i okružju mogu utjecati na to hoće li netko reagirati agresivno u prometu te kojim intenzitetom ili mjerom. Ono što je izvjesno, to su četiri čimbenika koji su posebno povezani s agresivnom vožnjom:

1. nedostatak odgovornog ponašanja u prometu,
2. nepoštivanje ili ignoriranje propisa koji uređuju odvijanje prometa,
3. povećanje zagušenja i produljenje vremena putovanja u urbanim područjima,
4. agresivno ponašanje drugih vozača.

1. Vožnja je privilegij koja zahtijeva odgovornost! Na cesti, često kao i u životu, ali i izvan ceste, fokus je na individualnim pravima i slobodama - "ja prvi" filozofija je koja isključuje osobnu odgovornost prema drugima s kojima se dijeli cesta.

Svaki vozač mora prihvatiti odgovornost za svoje postupke na cesti. Rješenje problema smanjenja agresivnog ponašanja počinje od svakog vozača ponaosob. Pojedinaac, vozač je taj koji mora podići razinu odgovornog ponašanja u prometu, a veću pozornost treba posvetiti činjenici da su svi vozači dio sustava sigurnosti koji uključuje druge vozače, putnike i pješake. Kao dio tog sustava, moraju se slijediti temeljna pravila kako bi sustav učinkovito funkcionirao.

Vožnja je timski pothvat – odlikuje se suradnjom i tolerancijom, a nije natjecateljski sport. Suradnja jest uistinu glavni način za postizanje sigurnosti za sve. Bez suradnje na cesti vraćamo se na zakone džungle. Svi vozači, amladi vozači posebno, već od početka svog osposobljavanja, trebaju biti svjesni svoje odgovornosti i uloge u prometu. Oni moraju biti poučavani kako posljedice agresivne vožnje najčešće dovode do tragedije i da agresivni vozač često može vrlo lako postati kriminalac.

2. Svakodnevno sudjelovanje u prometu pruža niz eklatantnih primjera kršenja pozitivnih propisa, nepoštivanja ili ignoriranja pisanih ili nepisanih normi, kulturnog ponašanja, suradnje i međusobnog uvažavanja. Mogućnost da agresivni vozači budu uhvaćeni u kršenju prometnih propisa i za to

neizostavno snose primjerene posljedice nije velika. Očito da je potrebna snažna, učestala, neodgodiva i učinkovita kontrola provođenja propisa o sigurnosti prometa na cestama, iako predstavlja trošak za državu.

Da bi sustav učinkovito funkcionirao, potreban je dobar Zakon koji se bez odlaganja provodi. Beskompromisni Zakon ne samo da koristi sigurnosti vožnje i neposrednim izvršiteljima koji ga provode, već on predstavlja i produženu ruku pravosudnog sustava. Agresivna vožnja je ozbiljan prekršaj, čak kazneno djelo. No, ona neće biti tako tretirana dok se u propisima ne definira i ako, potom, naši sudovi ne djeluju učinkovito i ne primjenjuju dosljedno odgovarajuće kazne. Visoke kazne šalju snažnu poruku da se ovaj oblik ponašanja u društvu neće tolerirati.

3. Zagušenja prometa, veliki broj vozila, žurba, znatno produljenje vremena putovanja ne samo u prometnim špicama, činjenično su najčešće povezani s agresivnom vožnjom. Porast broja vozača i vozila, kao i broja prevaljenih kilometara u odnosu na povećanje cestovne mreže (poglavito u gradovima) u nesrazmjeru su. Posljedica su različite gradacije nervoze, ljutnje, stresa, bijesa, emotivno poremećena vožnja, pritisak zbog kašnjenja, žurbe ili gubitka vremena što sve bez sumnje generira agresivno ponašanje. Sudjelovanje u takvim surovim i konkurentnim, čak i neprijateljskim uvjetima na cesti je emotivno vrlo zahtjevno i predstavlja teško iskustvo suočavanja s njima.
4. Agresiju karakterizira neprijateljski osjećaj ili neprijateljsko ponašanje prema drugim sudionicima prometa. Agresivni vozači svoje ponašanje nameću drugima, ne obraćajući pažnju na njihova prava u prometu i njihovu volju. Kao reakcija na takvo ponašanje, počesto se javlja uzvratanje sličnim ponašanjem kao nužda za preživljavanje na cestama. Odmazda protiv agresivnog ponašanja drugih vozača dodatno pogoršava i usložnjava opasnu situaciju. Gdje su tu granice društveno prihvatljivog, veliko je pitanje.

### **3. REZULTATI ISTRAŽIVANJA O AGRESIVNOJ VOŽNJI**

Anketa pod nazivom „Jesam li agresivan vozač“ objavljena je na web-stranici [www.sigurno-voziti.net](http://www.sigurno-voziti.net). Tijekom 28 mjeseci postojanja ankete na web-stranici od 05. travnja 2005. do 13. srpnja 2007. godine, anketu je ispunilo 10.238 osoba. Od ukupnog broja ispunjenih anketa, za analizu rezultata uzeto je 10.000 anketa.

#### **3.1. SVRHA I CILJ ANKETE**

Ovom se anketom te dobivenim i prezentiranim rezultatima željelo pomoći u sagledavanju jednoga segmenta sigurnog odvijanja prometa – ponašanja vozača u prometu na cesti. Naime, uvjetno rečeno, prometna nesreća kao neočekivani događaj uzrokovan pogrešnom percepcijom, nepažnjom ili neiskustvom, može se tolerirati, no posve je nedopustivo tolerirati prometne nesreće uzrokovane neprimjernim ponašanjem sudionika prometa. Dakle, prometne nesreće ne događaju se samo zbog neznanja ili nedovoljnih vještina već upravo zbog, za promet, neprihvatljivog ponašanja. Svakodnevno smo svjedoci prometne nekulture, krajnje nepažnje i nedostatka tolerancije prema drugim sudionicima

prometa, bespotrebnog živciranja i neprihvatljivih reakcija vozača i drugih sudionika, prikrivene i otvorene agresije pa čak i divljanja vozača na cestama.

Namjera autora stranice [www.sigurno-voziti.net](http://www.sigurno-voziti.net) bila je upravo potencirati utjecaj ponašanja i pozitivnih stavova o prometu te na impozantnom uzorku od deset tisuća anketiranih vozača svih dobnih skupina i spolova utvrditi razinu njihova društveno prihvatljivog ili neprihvatljivog ponašanja. Cilj nije bio ispitati opću agresivnost, već razinu agresivnosti kao društveno neprihvatljivog ponašanja u prometu.

### 3.1.1. Opis ankete

Anketa prije svega sadrži podatke ispitanika o spolu, životnoj dobi i vozačkom iskustvu. Anketirani, prema životnoj dobi dijele se u tri dobne skupine, i to: prvu od 18. do 24. godine života, drugu od 25. do 35. godine života i treću 35 i više godina života. Prema vozačkom iskustvu ispitanici su svrstani u jednu od tri skupine: prvu, do jedne godine vozačkog iskustva, drugu, od dvije do četiri godine vozačkog iskustva i treću, preko pet godina vozačkog iskustva (tablica 1.).

**Tablica 1. Udio vozačica i vozača u uzorku**

Traženi podaci u anketi			
Spol	ženski		muški
Starosna dob	18 do 24 godine	25 do 35 godina	preko 35 godina
Vozačko iskustvo	1 godina	2 do 4 godine	5 i više godina

Upitnik je sugerirao svakome ponaosob da anketu ispuni iskreno i sebi samom odgovori na pitanje (samoprocjena) koliko je agresivan vozač, odnosno da napiše učestalost svojih ponašanja i postupaka u prometu te čini li određenu radnju ili se ponaša u prometu na određen način. Anketom su bila ponuđena sljedeća pitanja o ponašanju i postupcima u prometu:

1. Žurim i vozim slalom
2. Ismijavam i kritiziram druge vozače pred suputnicima

3. Izlazim iz automobila i udaram drugi automobil ili bacim na njega nešto
4. Pokušavam doći ispred svih, jer drugi vozači su smetnja na cesti
5. U vožnji radim više stvari: telefoniram, podešavam radio, jedem, pričam sa suputnicima..., jer to nije opasno
6. U autu imam polugu, oružje ili nešto slično kako bih mogao reagirati u svakoj situaciji
7. Ubrzavam naglo, kočim naglo
8. Vozim na malom razmaku u koloni i ne dozvoljavam ubacivanje drugih vozila u moju traku
9. Vozim bar 20 km na sat brže nego je ograničenje brzine na cesti
10. Spreman sam nasrnuti na drugog vozača i potući se
11. Polukružno se okrećem tamo gdje to nije dopušteno
12. Vozim umoran, nepažljivo, nedovoljno oprezno
13. Ubrzavam na žuto, da ne moram stati na crveno
14. Pokušavam izgurati drugo vozilo s ceste kako bih kaznio vozača
15. Brzo i na malom razmaku prolazim pored sporih vozača uz „turiranje“ motorom u znak protesta
16. Sprečavam prolazak drugim vozačima
17. Vozim na repu drugim vozačima kako bih ih prisilio da se maknu ili ubrzaju
18. Mijenjam prometne trake bez davanja pokazivača smjera
19. Smeta me nazočnost policije na cesti
20. Dajem znakove svjetlima vozačima koji griješe a najradije bih ih istukao
21. „Blicam“ drugim vozačima u znak osвете
22. Trubim i vičem na druge vozače kroz otvoren prozor automobila
23. Nasrćem vozilom na osobu čiji me postupak iznervirao
24. Pokazujem vidljivim gestama rukama negodovanje prema drugim vozačima
25. Loše sam raspoložen zbog nesposobnih vozača i psujem ih
26. Spreman sam pucati u drugog vozača



27. Dajem znakove pokazivačima smjera prilikom obilaženja, pretjecanja i skretanja
28. Vozilom izvodim nagle pokrete kako bih zastrašio drugog vozača
29. Izlazim iz automobila i upuštam se u glasnu prepirku
30. Prođem i kroz crveno svjetlo na semaforu
31. Ustupam prednost prolaska drugim vozačima
32. Propuštam pješake koji prelaze kolnik izvan pješačkog prijelaza

Svako postavljeno pitanje baždareno je određenim brojem bodova, kako bi se odgovori raspodijelili u skupine za analizu. Po popunjenoj anketi, anketirani je, prema prikupljenom broju bodova, dobio šaljiv (ili možda ne tako šaljiv) odgovor. Bodovi su podijeljeni u pet skupina, stupnjevani su sa zajedničkim osobinama na skali agresivnosti i to od prihvatljivog ponašanja, preko agresivnog ponašanja pa do ponašanja koje ima karakteristike ratničkog ponašanja (tablica 2).

**Tablica 2. Grupiranje rezultata ankete**

Bodovi	Ponašanje
0	Prihvatljivo ponašanje
1 do 13	Prihvatljivo agresivno ponašanje
14 do 39	Agresivno ponašanje
40 do 69	Izrazito neprijateljsko ponašanje
70 i više	Ratno ponašanje

Odgovori iz predočenih pet skupina, prema prikupljenom broju bodova, koje je ispitanik mogao pročitati na ekranu po završenoj anketi:

### **0 bodova = PRIHVATLJIVO PONAŠANJE**

*Skupili ste nula bodova? Ma jeli to moguće? Procijenite se ponovo. Što opet nula? Vi zaslužujete da Vas Sveti otac proglasi svecem. Ne samo da niste agresivni, Vi ste pravo janje, što ponekad može zasmetati ostale sudionike u prometu.*

### **od 1 do 13 bodova = PRIHVATLJIVO AGRESIVNO PONAŠANJE**

*Imate taman toliko agresivnosti u vožnji koliko je potrebno za normalno uklapanje u prometne tokove. Nastojte se i dalje tako ponašati i ne dozvolite da vam neki oblici ponašanja koji su do sad bili rijetki postanu navika.*

### **od 14 do 39 bodova = AGRESIVNO PONAŠANJE**

*U prometu ste ponekad janje, a ponekad tigar. Nemojte vašu frustraciju rješavati napadanjem nedužnih sudionika u prometu. Budite hrabri i kada niste zaštićeni vašim limenim miljenikom i riješite probleme tamo gdje nastaju, sa suradnicima na poslu ili s obitelji.*

### **od 40 do 69 bodova = IZRAZITO NEPRIJATELJSKO PONAŠANJE**

*Izrazito ste neprijateljski raspoloženi prema ostalim sudionicima u prometu. Morate promijeniti svoje ponašanje i početi cijeniti i ostale sudionike u prometu. Malo više osmijeha na vašem licu ne bi škodilo. Trebate samo shvatiti da svi ljudi griješe, a vama ne daje nitko pravo da u prometu budete sudac, jer ne zaboravite da batina ima dva kraja pa od suca možete postati žrtva.*

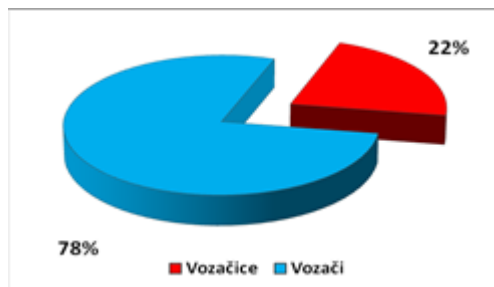
### **70 i više bodova = RATNO PONAŠANJE**

*Ratničkog ste raspoloženja. Vi mislite da je cesta bojno polje. Nije važno tko preživi, jer vi ćete ionako jednom stradati u prometu. Savjetujem Vam da se prevozite javnim prijevoznim sredstvima: vlakom, autobusom ili tramvajem i to po mogućnosti na zadnjim sjedalima, jer vi ste opasni i kao suvozač. Ne promijenite li brzo svoje ponašanje i ne shvatite li da se upravo vi pogrešno ponašate u prometu, mogli biste završiti na groblju s natpisom na spomeniku: "Ovdje počiva vozač koji je mislio da je uvijek u pravu".*

#### **3.1.2. Skupni pokazatelji**

U uzorku od 10.000 obrađenih anketa udio vozačica je 22,1% ili 2210, a vozača je 77,9% ili 7790 anketiranih (grafikon 1. i tablica 3.).

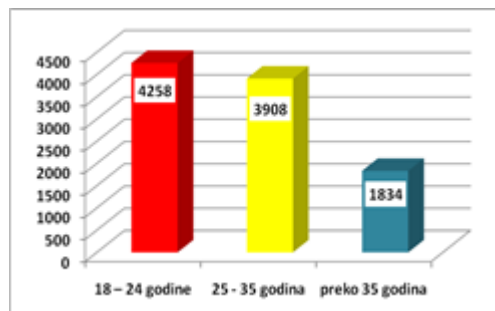
**Grafikon 1. Udio vozačica i vozača u uzorku** Tablica 3. Udio vozačica i vozača u uzorku



Ukupni broj anketiranih osoba		
Vozačice	2210	22,10 %
Vozači	7790	77,90 %
<b>Ukupno</b>	<b>10000</b>	<b>100,00 %</b>

Od ukupnog broja anketiranih, a prema starosnoj dobi: 4258 ispitanika ili 42,58 % anketiranih je mladih vozača između 18. i 24. godine života, 3908 ispitanika između 25. i 35. godine života ili 39,08 % anketiranih, a 1834 ispitanika preko 35 godina života ili 18,34 % anketiranih (grafikon 2. i tablica 4.).

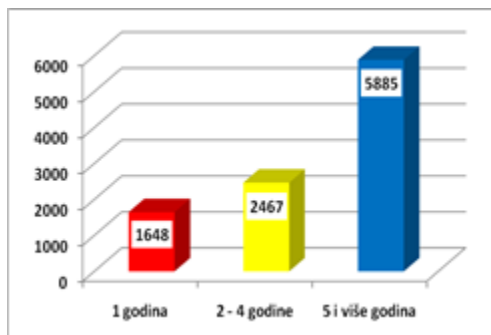
**Grafikon 2. Anketirani prema starosnoj dobi** Tablica 4. Udio anketiranih prema starosnoj dobi



Broj anketiranih prema starosnoj dobi		
18 – 24 godine	4258	42,58 %
25 - 35 godina	3908	39,08 %
preko 35 godina	1834	18,34 %
<b>Ukupno</b>	<b>10000</b>	<b>100,00 %</b>

Od ukupnog broja anketiranih, a prema vozačkom iskustvu: 1648 ispitanika ili 16,48 % anketiranih je s jednom godinom vozačkog iskustva, 2467 ispitanika između dvije i četiri godine vozačkog iskustva ili 24,67 % anketiranih, a 5885 ispitanika s preko pet godina vozačkog iskustva ili 58,85 % anketiranih (grafikon 3. i tablica 5.).

**Grafikon 3. Anketiranih prema vozačkom iskustvu** **Tablica 5. Udio anketiranih prema vozačkom iskustvu**



### 3.2. METODOLOGIJA OBRADJE PODATAKA

Obradom rezultata željelo se utvrditi što ispitanici misle o svom ponašanju u prometu, ima li povezanosti između stupnja agresivnosti i životne dobi, odnosno stupnja agresivnosti i vozačkog iskustva te postoje li razlike između ispitanika prema spolu.

Izvorni rezultati u analizi prikazani su u apsolutnim brojkama i relativnim odnosima (postotcima), a povezanosti su izračunavane korištenjem hi-kvadrat testa i koeficijenta kontingencije.

### 3.3. ANALIZA REZULTATA

#### 3.3.1. Odgovori na pojedina pitanja iz ankete

Na svako postavljeno pitanje u anketi ispitanici su mogli kvantificirati svoja ponašanja i postupke u prometu, odnosno činjenje određene radnje ili ponašanja u prometu kao: često, rijetko ili da takvu radnju nikada u prometu na čine, to jest da se tako nikada ne ponašaju. U tablici broj 6. prikazana je učestalost odgovora po svakom postavljenom pitanju u anketi za sve ispitanike.

Broj anketiranih prema vozačkom iskustvu		
<b>1 godina</b>	<b>1648</b>	<b>16,09 %</b>
<b>2 - 4 godine</b>	<b>2467</b>	<b>24,67 %</b>
<b>5 i više godina</b>	<b>5885</b>	<b>58,85 %</b>
<b>Ukupno</b>	<b>10000</b>	<b>100,00 %</b>

**Tablica 6. Odgovori ispitanika po pojedinom pitanju u anketi**

Broj	Pitanje	Često	Rijetko	Nikada
1.	Žurim i vozim slalom	2958	4687	2355
2.	Ismijavam i kritiziram druge vozače pred suputnicima	4001	4172	1827
3.	Izlazim iz automobila i udaram drugi automobil ili bacim na njega nešto	843	583	8574
4.	Pokušavam doći ispred svih, jer drugi vozači su smetnja na cesti	2700	3585	3715
5.	U vožnji radim više stvari: telefoniram, podešavam radio, jedem, pričam sa suputnicima.... jer to nije opasno	4037	3840	2123
6.	U autu imam polugu, oružje ili nešto slično kako bih mogao reagirati u svakoj situaciji	1835	943	7222
7.	Ubrzavam naglo, kočim naglo	2998	4203	2799
8.	Vozim na malom razmaku u koloni i ne dozvoljavam ubacivanje drugih vozila u moju traku	2759	3683	3558
9.	Vozim bar 20 km na sat brže nego je ograničenje brzine na cesti	5381	3229	1390
10.	Spreman sam nasrnuti na drugog vozača i potući se	1411	2191	6398
11.	Polukružno se okrećem tamo gdje to nije dopušteno	1660	4029	4311
12.	Vozim umoran, nepažljivo, nedovoljno oprezno	1390	3872	4738
13.	Ubrzavam na žuto, da ne moram stati na crveno	4399	4010	1591
14.	Pokušavam izgurati drugo vozilo s ceste kako bih kaznio vozača	958	803	8239
15.	Brzo i na malom razmaku prolazim pored sporih vozača uz „turirane“ motorom u znak protesta	1576	1870	6554
16.	Sprečavam prolazak drugim vozačima	1123	2263	6614
17.	Vozim na repu drugim vozačima kako bih ih prisilio da se maknu ili ubrzaju	2101	2947	4952

Broj	Pitanje	Često	Rijetko	Nikada
18.	Mijenjam prometne trake bez davanja pokazivača smjera	2282	3255	4463
19.	Smeta me nazočnost policije na cesti	4120	2891	2989
20.	Dajem znakove svjetlima vozačima koji griješe a najradije bih ih istukao	2325	3173	4502
21.	„Blicam“ drugim vozačima u znak osvete	1788	2470	5742
22.	Trubim i vičem na druge vozače kroz otvoren prozor automobila	1432	2191	6377
23.	Nasrćem vozilom na osobu čiji me postupak iznervirao	1023	835	8142
24.	Pokazujem vidljivim gestama rukama negodovanje prema drugim vozačima	1944	3957	4099
25.	Loše sam raspoložen zbog nesposobnih vozača i psujem ih	3313	4062	2625
26.	Spreman sam pucati u drugog vozača	1128	644	8228
27.	Dajem znakove pokazivačima smjera prilikom obilaženja, pretjecanja i skretanja	7418	1326	1256
28.	Vozilom izvodim nagle pokrete kako bih zastrašio drugog vozača	1133	1403	7464
29.	Izlazim iz automobila i upuštam se u glasnu prepirku	1039	1077	7884
30.	Prođem i kroz crveno svjetlo na semaforu	1201	2853	5946
31.	Ustupam prednost prolaska drugim vozačima	5857	2809	1334
32.	Propuštam pješake koji prelaze kolnik izvan pješačkog prijelaza	3947	4010	2043

### 3.3.2. Ukupni rezultati

Tablica 7. Rezultati ankete – varijabla starosna dob i vozačko iskustvo

Bodovi	Svi anketirani	Starosna dob			Vozačko iskustvo		
		18 - 24	25 - 35	preko 35	1	2 - 4	5 i više
0	135	58	53	24	29	35	71
1 do 13	1745	622	667	465	405	363	986
14 do 39	4830	1905	2068	857	634	1233	2963
40 do 69	1789	961	694	134	276	523	990
70 i više	1492	712	426	354	304	313	875

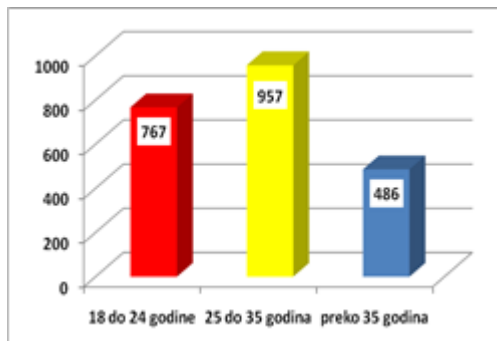
Tablica 8. Rezultati ankete - varijabla vozačko iskustvo i starosna dob

Bodovi	18 do 24 godine			25 do 35 godina			preko 35 godina		
	1	2 do 4	5 i više	1	2 do 4	5 i više	1	2 do 4	5 i više
0	22	27	9	5	6	42	2	2	20
1 do 13	289	232	101	87	102	478	29	29	407
14 do 39	522	965	418	94	244	1730	18	24	815
40 do 69	253	478	230	21	42	631	2	3	129
70 i više	278	281	153	12	30	384	14	2	338

### 3.3.3. Rezultati vozačice

Anketa je provedena s 2210 osoba ženskog spola ili 22,10 % svih ispitanih.

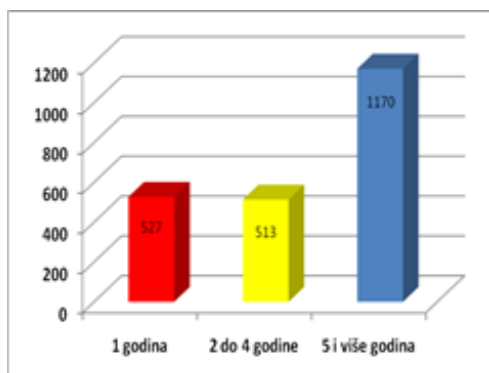
**Grafikon 4. Vozačice prema vozačkom iskustvu**



**Tablica 9. Broj anketiranih vozačica po starosnoj dobi**

Broj anketiranih prema starosnoj dobi	
18 do 24 godine	767
25 do 35 godina	957
preko 35 godina	486

**Grafikon 5. Vozačice prema vozačkom iskustvu**



**Tablica 10. Broj anketiranih vozačica po starosnoj dobi**

Broj anketiranih prema vozačkom iskustvu	
1 godina	527
2 do 4 godine	513
5 i više godina	1170



**Tablica 11. Rezultati anketiranih vozačica – varijabla starosna dob, vozačko iskustvo**

Bodovi	Svi anketirani	Starosna dob			Vozačko iskustvo		
		18 - 24	25 - 35	preko 35	1	2 - 4	5 i više
0	17	6	7	4	6	3	8
1 do 13	576	199	234	143	195	141	240
14 do 39	1237	404	559	274	221	305	711
40 do 69	215	86	104	25	45	49	121
70 i više	165	72	53	40	60	15	90

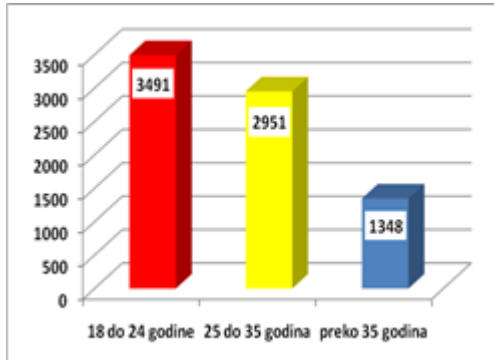
**Tablica 12. Rezultati anketirane vozačice**

Bodovi	18 do 24 godine			25 do 35 godina			preko 35 godina		
	1	2 do 4	5 i više	1	2 do 4	5 i više	1	2 do 4	5 i više
0	3	2	1	2	-	5	1	1	2
1 do 13	106	69	24	66	49	119	23	23	97
14 do 39	146	190	68	63	101	395	12	14	248
40 do 69	35	37	14	10	9	85	-	3	22
70 i više	46	12	14	6	3	44	8	-	32

### 3.3.4. Rezultati vozači

Anketa provedena s 7790 osoba muškog spola, što predstavlja 77,90 % ukupno anketiranih.

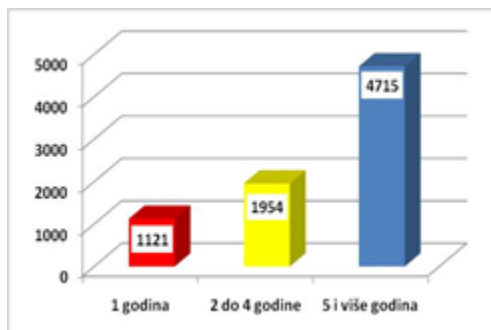
**Grafikon 6. Vozači prema vozačkom iskustvu**



**Tablica 13. Anketirani vozači prema starosnoj dobi**

Broj anketiranih prema starosnoj dobi	
18 do 24 godine	3491
25 do 35 godina	2951
preko 35 godina	1348

**Grafikon 7. Vozači prema vozačkom iskustvu**



**Tablica 14. Anketirani vozači prema vozačkom iskustvu**

Broj anketiranih prema vozačkom iskustvu	
1 godina	1121
2 do 4 godine	1954
5 i više godina	4715

**Tablica 15. Rezultati anketevozači – varijabla starosna dob, vozačko iskustvo**

Bodovi	Svi anketirani	Starosna dob			Vozačko iskustvo		
		18 - 24	25 - 35	preko 35	1	2 - 4	5 i više
<b>0</b>	118	52	46	20	23	32	63
<b>1 – 13</b>	1178	423	433	322	210	222	746
<b>14 – 39</b>	3593	1501	1509	583	413	928	2252
<b>40 – 69</b>	1574	875	590	109	231	474	869
<b>70 i više</b>	1327	640	373	314	244	298	785

**Tablica 16. Rezultati ankete vozači**

Bodovi	18 -24 godina			25 – 35 godina			preko 35 godina		
	1	2 - 4	5 i više	1	2 - 4	5 i više	1	2 - 4	5 i više
<b>0</b>	19	25	8	3	6	37	1	1	18
<b>1 – 13</b>	183	163	77	21	53	359	6	6	310
<b>14 – 39</b>	376	775	350	31	143	1335	6	10	567
<b>40 – 69</b>	218	441	216	11	33	546	2	-	107
<b>70 i više</b>	232	269	139	6	27	340	6	2	306

### 3.4. REZULTATI ISTRAŽIVANJA

- Ukupni rezultati pokazuju na relativno simetričnu raspodjelu agresivnosti s pomakom prema višem stupnju agresivnosti.
- Ispitano je postoji li povezanost između starosti ispitanika i sklonosti agresivnom ponašanju. Dobiveni hi-kvadrat je 356,77 i pokazuje kako postoji negativna povezanost između dobi i agresivnog ponašanja u prometu. Koeficijent kontingencije  $C = 0,19$  pokazuje da je ta povezanost značajna, ali mala.
- Provjerena je i hipoteza postoji li povezanost između vozačkog iskustva i sklonosti agresivnom ponašanju. Dobiveni hi-kvadrat 144,40 pokazuje da postoji negativna povezanost između vozačkog iskustva i agresivnog ponašanja u prometu. Koeficijent kontingencije  $C = 0,12$  pokazuje da je ta povezanost značajna i mala.

#### 3.4.1. Rezultati vozačice

*Tablica 17. Stupanj agresivnosti anketiranih vozačica*

STUPANJ AGRESIVNOSTI			
Neagresivno i prihvatljivo agresivno ponašanje	Agresivno ponašanje	Neprijateljsko i ratničko ponašanje	UKUPNO
27 %	56 %	17 %	100 %

- Rezultati vozačica su pomaknuti prema manje agresivnom ponašanju.
- Ispitivanjem povezanosti starosti vozačica i sklonosti agresivnom ponašanju dobiven je hi-kvadrat 28,07 i  $C = 0,11$  moralo se odbaciti nul-hipotezu i ustvrditi kako postoji mala negativna povezanost između dobi vozačica i sklonosti agresivnom ponašanju.
- Provjerena je i hipoteza postoji li povezanost između vozačkog iskustva vozačica i sklonosti agresivnom ponašanju. Dobili smo hi-kvadrat 90,50 koji pokazuje da postoji negativna povezanost između vozačkog iskustva i agresivnog ponašanja u prometu. Koeficijent kontingencije  $C = 0,20$  pokazuje da je ta povezanost značajna i mala.
- Provjeren je također odnos između vozačkog iskustva i starosti vozačica uspoređujući obje varijable u tri, po starosti, formirane grupe ispitanika. Dobiveni rezultati su sljedeći:
  - grupa od 18. do 24. godine života  
Dobiveni hi-kvadrat 35,28 i koeficijent kontingencije  $C = 0,28$  pokazuju da postoji mala značajna negativna povezanost između vozačkog iskustva i agresivnog ponašanja u prometu.
  - grupa od 25. do 35.godina života

Dobiveni hi-kvadrat 62,24 i koeficijent kontingencije  $C = 0,25$  pokazuju da postoji mala značajna pozitivna povezanost između iskustva i agresivnog ponašanja u prometu.

- grupa više od 35 godina

Dobiveni hi-kvadrat 64,25 i koeficijent kontingencije  $C = 0,34$  pokazuju da postoji mala značajna pozitivna povezanost između iskustva i agresivnog ponašanja u prometu.

### 3.4.2. Rezultati vozači

*Tablica 18. Stupanj agresivnosti anketiranih vozača*

STUPANJ AGRESIVNOSTI			
Neagresivno i prihvatljivo agresivno ponašanje	Agresivno ponašanje	Neprijateljsko i ratničko ponašanje	UKUPNO
17 %	46 %	37 %	100 %

- Rezultati vozača pomaknuti su prema agresivnijem ponašanju.
- Ispitivanjem povezanosti starosti vozača i sklonosti agresivnom ponašanju dobili smo hi-kvadrat 322,44 i  $C = 0,20$  moralo se odbaciti nul-hipotezu i ustvrditi kako postoji mala negativna povezanost između dobi vozača i sklonosti agresivnom ponašanju.
- Provjerena je i hipoteza postoji li povezanost između vozačkog iskustva vozača i sklonosti agresivnom ponašanju. Dobili smo hi-kvadrat 99,39 koji pokazuje da postoji pozitivna povezanost između vozačkog iskustva i agresivnog ponašanja u prometu. Koeficijent kontingencije  $C = 0,11$  pokazuje da je ta povezanost značajna i mala.
- Provjeren je također odnos između vozačkog iskustva i starosti vozača uspoređujući obje varijable u tri, po starosti, formirane grupe ispitanika. Dobiveni rezultati su sljedeći:
  - grupa od 18. do 24. godine života  
Dobiveni hi-kvadrat 79,22 i koeficijent kontingencije  $C = 0,15$  pokazuju da postoji mala značajna pozitivna povezanost između vozačkog iskustva i agresivnog ponašanja u prometu.
  - grupa od 25. do 35. godine života  
Dobiveni hi-kvadrat 34,78 i koeficijent kontingencije  $C = 0,11$  pokazuju da postoji mala značajna pozitivna povezanost između iskustva i agresivnog ponašanja u prometu.
  - grupa više od 35 godina života  
Dobiveni hi-kvadrat 8,76 i koeficijent kontingencije  $C = 0,08$  pokazuju da nema povezanosti između iskustva i agresivnog ponašanja u prometu.

Predmetom ispitivanja bio je i odnos spolova prema agresivnom ponašanju u prometu i ima li kakvih razlika u tome ponašanju.

Postavljena je nul-hipoteza kako nema razlike u sklonosti agresivnom ponašanju u prometu između vozačica i vozača. Dobiveni hi-kvadrat 308,13 je značajan na razini rizika od 1%, te možemo odbaciti nul-hipotezu i ustvrditi da postoji značajna razlika u stupnju agresivnosti u prometu između muškaraca i žena.

#### **4. ZAKLJUČAK**

Na temelju dobivenih i obrađenih rezultata ankete može se zaključiti:

- Sklonost agresivnom ponašanju opada s dobi: Što je netko stariji manje je u prometu agresivan!
- Sklonost agresivnom ponašanju opada i s vozačkim iskustvom!
- Detaljnija analiza pokazala je da između dobnih skupina i spolova postoje razlike. Vozači u dobi od 18. do 24.godine života i između 25. i 35.godine života postaju agresivniji s povećanjem vozačkog iskustva. Kod vozačica pak najagresivnije su vozačice od 18 godina života i agresivnost se smanjuje s iskustvom do 25. godina života. U skupinama vozačica poslije 25.godine života agresivnost se povećava s iskustvom. Izgleda da se u promet uključuju mlade agresivne vozačice. Također bi se moglo zaključiti da agresivno okruženje izaziva sve više primjenu agresivnih oblika ponašanja, odnosno da bi se preživjelo u prometu, da se stigne do cilja, moraju se prihvatiti negativni, agresivni oblici ponašanja.

Očito je kako bi se agresivnom ponašanju i agresivnim vozačima trebalo posvetiti mnogo više vremena i pažnje ukoliko se želi povećati razina sigurnosti u prometu. Kako bi se postiglo značajno smanjenje broja poginulih i ozlijeđenih u nesrećama, fokusiranje na pojedince-vozače mora biti primarni cilj. Povećanje broja ozljeđivanja i trošak prometnih nesreća teško se može izbjeći, ali se može ublažiti, no to zahtijeva uključivanje, timski rad i zajednički angažman niza akcija i aktivnosti od strane vlade, socijalnih agencija, organizacija građana, i posebno, pojedinaca. Provedba zakona, metode i mjere koje se primjenjuju same po sebi neće biti u potpunosti prihvaćene, jer će se ljudi vratiti agresivnim stilovima vožnje, ukoliko postanu svjesni da se njihovo otkrivanje može izbjeći. Provedba je ovisna o stalnom i učinkovitom nadzoru.

S druge strane, da bi čovjek mogao sigurno sudjelovati u cestovnom prometu mora prije svega prepoznati i razumjeti svoje ponašanje te ga znati kontrolirati. Mnogi psihološki faktori su u igri oko agresivne vožnje, a mnogi mogu dokazati kako se takva ponašanja teško kontroliraju. Ljudska bića su prirodno sklona braniti svoj integritet i imaju osobinu smatrati svoje vozilo kao produžetak njihova osobnog integriteta. Oni se često osjećaju ugroženi od drugih vozila i agresivno odgovaraju iz instinkta samozaštite. Čovjek ima prirodno natjecateljski instinkt, što također može biti čimbenik za agresivnu vožnju. Neki vozači reagiraju na pojavu drugog vozača kao na izazov.

Bez obzira na poduzeto, na svjetskoj, europskoj, državnoj ili lokalnoj razini, ali najviši standardi sigurnosti na cestama mogu se postići jedino ako **pojedina sam sebe stavi u središte akcije – preuzme osobnu istinsku odgovornost za svoju i sigurnost drugih**. Uvijek će ostati jedino i ključno pitanje: Kako stvoriti društveno prihvatljiv vrijednosni sustav, odnosno socijalno prihvatljivo ponašanje kod sudionika prometa (prije svega kod vozača)?

Osim specijalističkih kompetencija (temeljnih znanja i vještina) koje se podrazumijevaju, vozač bi trebao imati i psihološke kompetencije – vještinu komunikacije (komunikacijski odgoj), motivaciju za sigurnom vožnjom, te vještinu kontroliranja stresa, kao i smirenost neophodnu za defenzivnu vožnju. Osim toga, poželjne su i etičke kompetencije vozača, što podrazumijeva odgovornu i vožnju po propisima, neometanje i ne ugrožavanje drugih sudionika prometa.

Prihvatljiv vrijednosni sustav vozača uključuje i poželjne osobine kod vozača, kao što su:

- Strpljivost, tolerantnost prema drugima, smirenost u ispravljanju svojih i tuđih pogrešaka, izbjegavanje brzih, naglih i nepromišljenih odluka u zadnji čas, svjesno izbjegavanje rizičnih situacija, izbjegavanje ili neupuštanje u situacije koje prekoračuju razinu i mogućnosti vozačkih vještina i dosega;
- Koncentracija na vožnju i bitne elemente za sigurnu vožnju iz svog okružja, svijest da trenutak nepažnje može dovesti do neželjenih posljedica, obavještavanje drugih o svojim namjerama (davanje znakova, stalno inzistiranje na vidnom kontaktu, siguran položaj vozila i dr.);
- Usredotočenost na vlastitu i tuđu sigurnost – svojim primjerom sigurne i odgovorne vožnje i postupcima u prometu stalno poučavati druge vozače.

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Naslov rada:

## **USAVRŠAVANJE ZA INSTRUKTORA VOŽNJE U REPUBLICI HRVATSKOJI USPOREDBA SA ZEMLJAMA EUROPSKE UNIJE**

Sažetak:

U svim zemljama svijeta kada se govori o prometnoj politici najvažniji aspekt je sigurnost cestovnog prometa te se teži što manjem broju prometnih nesreća, što manjem broju ozlijeđenih u prometnim nesrećama i naravno želi se broj žrtava u prometu svesti na najmanji mogući broj. Osim individualnih tragedija i društvo u cjelini trpi velike gubitke zbog prometnih nesreća. Jedan od bitnih segmenata sigurnosti cestovnog prometa je i obrazovanje odnosno usavršavanje novih instruktora vožnje koji trebaju steći sve potrebne kompetencije kako bi uspješno osposobili nove mlade vozače u autoškolama. Sustavi obrazovanja za instruktore vožnje se razlikuju u zemljama Europske unije sa manjim ili većim razlikama. Zemlje Europske unije imaju različite načine stjecanja zanimanja instruktora vožnje od potpuno liberalnih bez velikog utjecaja vladinih agencija i ureda do zemalja u kojima je sustav obrazovanja pod nadzorom vladinih agencija.

Ključne riječi:

- instruktor vožnje
- sigurnost cestovnog prometa
- osposobljavanje vozača

## 1. SUSTAV OBRAZOVANJA U REPUBLICI HRVATSKOJ

Počeci obrazovanja u Hrvatskoj pojavili su se već u 10. stoljeću, a ono je sve do danas ostalojednom od najvažnijih vertikala hrvatskog društva. Prema podacima posljednjeg popisa stanovništva, koje je objavio Državni zavod za statistiku, u Hrvatskoj raste broj visokoobrazovanih osoba. Završeno samo osnovno obrazovanje u 2011. godini imalo je 30,8% stanovništva, dok je sa završenom samo srednjom školom 2011. godine bilo 52,6% posto stanovništva.

Sustav obrazovanja u Republici Hrvatskoj danas započinje u predškolskim ustanovama, odnosno dječjim vrtićima i ustanovama u kojima se provode predškolski programi. Osnovno obrazovanje počinje upisom u prvi razred osnovne škole i traje od šeste do petnaeste godine života. Osnovna škola traje osam godina i tim obrazovanjem učenik stječe znanje i sposobnost za nastavak obrazovanja.

Nakon završetka osnovnog obrazovanja, učenici imaju mogućnost nastaviti svoje obrazovanje u srednjoškolskim ustanovama koje nisu obveznog karaktera. U gimnazijama se izvodi nastavni plan i program u trajanju od četiri godine, a obrazovanje učenika završava polaganjem državne mature. Obrazovanje učenika u strukovnim i umjetničkim školama može trajati od jedne do pet godina, a završava izradom i obranom završnog rada. Učenici koji su završili strukovne programe mogu polagati i ispite državne mature, kao i steći višu razinu kvalifikacije nastavljanjem obrazovanja.

Gimnazije pripremaju svoje učenike za nastavak obrazovanja, strukovne škole ih osposobljavaju za uključivanje na tržište rada, a ujedno i pružaju mogućnost nastavka obrazovanja. Nakon završetka srednje strukovne škole, ovisno o završenome programu, moguće se uključiti na tržište rada ili, uz ispunjenje određenih uvjeta, nastaviti obrazovanje na srednjoškolskoj ili visokoškolskoj razini. Strukovnim obrazovanjem stječu se znanja, vještine i kompetencije potrebne tržištu rada s ciljem stručnog priznavanja kvalifikacija koje također pružaju mogućnost napretka u budućem obrazovanju.

U Republici Hrvatskoj danas imamo 14 obrazovnih sektora u području srednjoškolskog obrazovanja koji su utvrđeni Odlukom o uspostavi obrazovnih sektora u strukovnom obrazovanju, a jedan od njih je i Promet i logistika u koji spada i Instruktor vožnje.

## 2. STANJE U DJELATNOSTI AUTOŠKOLA I POLOŽAJ INSTRUKTORA VOŽNJE U AUTOŠKOLAMA U REPUBLICI HRVATSKOJ

Po podacima Hrvatskog autokluba kao ovlaštene stručne organizacije za djelatnost autoškola u Republici Hrvatskoj na dan 31.05.2016. u Republici Hrvatskoj trenutno postoji 348 autoškola sa ukupno (računajući instruktore vožnje, predavače i stručne voditelje) 1.627 zaposlenih djelatnika, a od toga je zaposleno 1.554 instruktora vožnje, dakle 4.46 instruktora vožnje po autoškoli.

Broj instruktora vožnje zaposlenih u pojedinim autoškolama je od 1 do 21 instruktora vožnje i to:

- 1 zaposlen instruktora vožnje - 13 autoškola ili 3,7%
- 2 zaposlenih instruktora vožnje - 44 autoškola ili 12,6%
- 3 zaposlenih instruktora vožnje - 83 autoškola ili 23,9%
- 4 zaposlenih instruktora vožnje - 74 autoškola ili 21,3%
- 5 zaposlenih instruktora vožnje - 48 autoškola ili 13,8%
- 6 zaposlenih instruktora vožnje - 31 autoškola ili 8,9%
- .....
- 20 zaposlenih instruktora vožnje – 1 autoškola ili 0,3%
- 21 zaposlen instruktora vožnje – 1 autoškola ili 0,3%

Iz ovih podataka je vidljivo da 262 autoškole ili 75,28 % autoškola ima do 5 zaposlenih instruktora vožnje ili 293 autoškole ili 84,19% autoškola ima zaposlenih do 6 instruktora vožnje.

Životna dob instruktora vožnje u autoškolama u Republici Hrvatskoj je :

- 24 - 30 godina starosti – 200 instruktora vožnje ili 12,87%
- 31-40 godina starosti – 627 instruktora vožnje ili 40,34%
- 41-50 godina starosti – 398 instruktora vožnje ili 25,61%
- 51-60 godina starosti – 252 instruktora vožnje ili 16,21%
- preko 61 godine starosti – 77 instruktora vožnje ili 4,95%

dakle više od 52% instruktora vožnje je u dobi do 40 godina starosti.

Instruktori vožnje imaju obvezu stručnog usavršavanja na način da u ciklusu od svake 4 godine trebaju sakupiti određeni broj bodova koje je moguće sakupiti na različitim aktivnostima

stručnog usavršavanja, uz obvezno prisustvovanje seminarima koje organizira Hrvatski autoklub. Oni koji ne sakupe dovoljan broj bodova pristupaju provjeri stručne osposobljenosti rješavanjem testa znanja pri Hrvatskom autoklubu koji je ovlaštena stručna organizacija za djelatnost osposobljavanja vozača. Prosječna prolaznost instruktora na provjeri stručne osposobljenosti je 65-70%.

### 3. USAVRŠAVANJE ZA INSTRUKTORA VOŽNJE U REPUBLICI HRVATSKOJ

#### 3.1. Usavršavanja u Republici Hrvatskoj

Programne usavršavanja u Republici Hrvatskoj donosi ustanova za obrazovanje odraslih. Programi usavršavanja trebaju biti prilagođeni dobi, prethodnom obrazovanju, znanju, vještinama i sposobnostima polaznika koji stječu, dopunjuju i proširuju svoja znanja, vještine i sposobnosti za rad u struci. Sa programima usavršavanja polaznici sa završenom srednjom školom dopunjuju i proširuju stečeno stručno znanje zbog zahtjeva tržišta rada i radi stjecanja znanja o novim tehnikama i tehnologijama i njihovoj primjeni.

Način izvođenja programa usavršavanja ovisi o kadrovskim, tehnološkim, organizacijskim i drugim mogućnostima ustanove. Prema dosadašnjoj praksi, najzastupljeniji su načini izvođenja programa osposobljavanja i usavršavanja su redoviti i konzultativno-instruktivni, a moguće je izvođenje i dopisno-konzultativnom nastavom.

#### 3.2. Usavršavanje za instruktora vožnje u Republici Hrvatskoj

Programne usavršavanja u Republici Hrvatskoj donosi ustanova za obrazovanje odraslih što u praksi znači da u Republici Hrvatskoj postoji nekoliko programa usavršavanja za instruktora vožnje sa različitim uvjetima upisa, različitim sadržajima u programima usavršavanja, različitim konačnim kompetencijama po završetku programa, i različitom duljinom trajanja osposobljavanja. Smatram da je dana prevelika sloboda ustanovama za obrazovanje odraslih pri izradi i provođenju programa usavršavanja za instruktora vožnje što se može i uočiti sa različitim (nedovoljnim) kompetencijama koje instruktori vožnje stječu prilikom završetka programa odnosno pri prvom zapošljavanju. Zbog te raznolikosti uzeti će za usporedbu samo jedan od programa usavršavanja za instruktora vožnju u Republici Hrvatskoj u trajanju programa od 500 sati usavršavanja za instruktora vožnje B kategorije.

Uvjeti upisa u program usavršavanja za instruktora vožnje B kategorije u Republici Hrvatskoj nisu standardizirani za sva učilišta. Potrebne godine starosti za upis i uključivanje u program usavršavanja se kreću od 18 godina, odnosno stečene vozačke dozvole B kategorije do 23 godine i 6 mjeseci starosti. Potrebne godine starosti za izdavanje licence za instruktora vožnje pri HAK-u i MUP-u koja je neophodna za početak rada kao instruktor vožnje je sukladno zakonskim propisima 24 godine, tako da ako polaznik i ranije završi program usavršavanja za instruktora vožnje nije u mogućnosti prije 24. godine početi s radom. Posjedovanje vozačke dozvole B kategorije je u rasponu od samog posjedovanja odnosno tek stečene vozačke dozvole do tri godine posjedovanja vozačke dozvole. Za upis je potrebno prethodno završiti srednjoškolsko obrazovanje sektoru promet i logistika odnosno određene ustanove su suzile mogućnost upisa samo za polaznike sa završenim srednjoškolskim obrazovanjem u trajanju od minimalno tri ili četiri godine u području cestovnog prometa ili preddiplomski studij cestovnog prometa. Također potrebno je priložiti liječničko uvjerenje o zdravstvenoj sposobnosti za instruktora vožnje vozila B kategorije.

Nastavni plan i program usavršavanja za instruktora vožnje B kategorije

Rb.	Nastavna cjelina	Broj sati			Ukupno
		T	VJ	PN	
	Zajednički dio				
1.	Psihologija poučavanja vožnje	50			50
2.	Prometna tehnika	50			50
3.	Didaktika	50	20		70
4.	Prometni propisi	50			50
5.	Poznavanje vozila	40	15		55
6.	Metodika nastave upravljanja vozilom	60	35		95
7.	Praktična nastava			130	130
UKUPNO		300	70	130	500
T – teorijska nastava skupne konzultacije, V – vježbe (u učionici ustanove ili u vozilu)PN – praktična nastava					

Tablica 1: Nastavni plan i program redovne nastave u programu za stjecanje zvanja instruktor vožnje

Rb.	Nastavna cjelina	Broj sati					Ukupno
		T	SK	IK	VJ	PN	
	Zajednički dio						
1.	Psihologija poučavanja vožnje	50	20	30			50
2.	Prometna tehnika	50	20	30			50
3.	Didaktika	50	20	30	20		70
4.	Prometni propisi	50	33	17			50
5.	Poznavanje vozila	40	13	27	15		55
6.	Metodika nastave upravljanja vozilom	60	27	33	35		95
7.	Praktična nastava					130	130
UKUPNO		300	133	167	70	130	500
T – teorijska nastava, SK-skupne konzultacije, IK-individualne konzultacije, V – vježbe (u učionici ustanove ili u vozilu), PN – praktična nastava							

Tablica 2: Nastavni plan i program konzultativno-instruktivne nastave u programu za stjecanje zvanja instruktor vožnje

Trajanje programa i način izvođenja Program usavršavanja u trajanju od 500 sati realizira se u praksi konzultativno-instruktivnom nastavom. Konzultativno-instruktivna nastava izvodi se skupnim i individualnim konzultacijama. Kroz konzultacije polaznici utvrđuju postojeća i stječu nova znanja, dopunjavaju i kompletiraju znanja potrebna za njihov rad. Teorijski dio programa u trajanju od 300 sati izvodi se u učionici ustanove. Vježbe u trajanju od 70 sati izvode se u učionici ustanove ili u vozilu na prometnom vježbalištu. Praktični dio programa u trajanju od 130 sati realizira se pojedinačno u autoškoli. Realizaciju praktičnog dijela programa osposobljavanja polaznika nadzire mentor, u pravilu instruktor vožnje u autoškoli.

#### 4. USPOREDBA PROGRAMA USAVRŠAVANJE ZA INSTRUKTORA VOŽNJE U REPUBLICI HRVATSKOJ I U ZEMLJAMA EUROPSKE UNIJE

##### 4.1. Minimalni propisani uvjeti za instruktora vožnje

U tablici ispod je navedena potrebna starosna dob za obavljanje poslova instruktora vožnje u zemljama Europske unije. Vidljivo je da je potrebna starosna dob od 18 do 25 godina starosti iz čega se vidi neujednačenost uvjeta upisa u različitim zemljama.

Država	Minimalna starosna dob
Hrvatska	24
Belgija	18
Francuska	18
Portugal	20
Španjolska	20
Italija	21
Švicarska	21
Njemačka	22
Mađarska	22
Češka	24
Slovačka	25

Tablica. 3.: Minimalna starosna dob za upis u program instruktor vožnje

U Republici Hrvatskoj za upis u program usavršavanja za instruktora vožnje potrebna je završena srednja škola u području prometa i logistike. Većina zemalja u Europskoj uniji zahtijeva također završeno srednjoškolsko obrazovanje, dok je u njih nekoliko moguće upisati program za instruktora vožnje s završenom osnovnom školom

Država	Prethodno obrazovanje
Hrvatska	Srednjoškolsko obrazovanje
Austrija	Obvezno obrazovanje
Češka	Obvezno obrazovanje
Njemačka	Obvezno obrazovanje
Mađarska	Obvezno obrazovanje
Francuska	1. Stupanj srednje škole
Španjolska	1. Stupanj srednje škole
Belgija	1. Stupanj srednje škole
Nizozemska	1. Stupanj srednje škole

Tablica. 4.: Potrebno obrazovanje za upis u program instruktor vožnje

Iz navedenih podataka vidljivo da određene zemlje ne zahtijevaju vozačko iskustvo prije upisa u program za instruktora vožnje već je dovoljno samo posjedovanje vozačke dozvole. Kod određenih zemalja potrebno je vozačko iskustvo od 2 do 4 godine.

Država	Vozačko iskustvo
Hrvatska	Ne
Belgija	Ne
Francuska	Ne
Grčka	Ne
Italija	Ne
Mađarska	2
Njemačka	3 u zadnjih 5

Švicarska	3
Velika Britanija	4 u zadnjih 6

Tablica. 5.: Potrebno vozačko iskustvo za upis u program instruktor vožnje

U Republici Hrvatskoj je potrebno nakon završetka programa, prilikom zahtijeva za licencu koja je obvezna priložiti potvrdu o nekažnjavanju dok se ne provjeravaju prijašnji učinjeni prometni prekršaji. Međutim u Republici Hrvatskoj svaka nepravilnost u autoškolama pa makar i administrativna podliježe Zakonu o sigurnosti prometa na cestama i evidentira se kao prekršaj počinjen u prometu. Tu je vidljiva raznolikost kod različitih zemalja.

Država	Prometni prekršaji	Kaznena djela
Hrvatska	Ne	Potvrda o nekažnjavanju
Francuska	Bez prekršaja	Potvrda o nekažnjavanju
Slovačka	Zadnje tri godine	Potvrda o nekažnjavanju
Njemačka	Teži prekršaji	Potvrda o nekažnjavanju
Švicarska	Zadnju godinu	Ne
Grčka	Ne	Potvrda o nekažnjavanju
Italija	Ne	Potvrda o nekažnjavanju
Mađarska	Ne	Ne
Španjolska	Ne	Ne
Švedska	Ne	Ne
Danska	Ne	Ne

Tablica. 6.: Potrebna potvrda o nekažnjavanju i o počinjenju prometnih prekršaja za upis u program instruktor vožnje

#### 4.2. Obrazovanje instruktora vožnje

Trajanje obrazovanja je od 230 do 800 sati koji uključuju i teoretski i praktični dio, odnosno od 4 mjeseca do 2 godine.

Država	Trajanje obrazovanja
Hrvatska	500 sati
Slovačka	230 sati
Mađarska	294 sata
Francuska	600 sati
Austrija	6 mjeseci
Njemačka	10 mjeseci do 2 godine
Poljska	4 mjeseca
Švedska	800 sati ili 1,5 godina

Tablica. 7.: Trajanje obrazovanja u programu za stjecanje zvanja instruktor vožnje

Institucije koje provode obrazovanje (usavršavanje) za instruktora vožnje su u većini zemalja privatna učilišta dok u nekim zemljama to provode državni obrazovni centri, u Republici



Hrvatskoj su to ustanove za obrazovanje odraslih koje mogu biti u privatnom ili u državnom vlasništvu.

Država	Tko obrazuje
Hrvatska	Privatna i javna učilišta
Austrija	Privatna učilišta
Francuska	Privatna učilišta
Njemačka	Privatna učilišta
Španjolska	Privatna učilišta
Danska	Licencirani instruktori
Finska	Državni obrazovni centri
Norveška	Državni obrazovni centri
Švedska	Državni obrazovni centri
Mađarska	Državni obrazovni centri

Tablica. 8.: Institucije koje provode obrazovanje za stjecanje zvanja instruktor vožnje

#### 4.3. Ispit za stjecanje zvanja instruktor vožnje i naknadna provjera stručne osposobljenosti instruktora vožnje

Ispite za instruktora vožnje sve zemlje Europske unije imaju pod nadzorom države odnosno neke od vladinih agencija kao npr. tijelo koje provodi vozačke ispite, vladin ured ili lokalna uprava. U Republici Hrvatskoj ispite provede ustanove za obrazovanje odraslih koje provede programe usavršavanja za instruktora vožnje.

Država	Organizacija koja provodi ispite
Hrvatska	Učilišta
Austrija	Tijelo koje provodi vozačke ispite
Velika Britanija	Tijelo koje provodi vozačke ispite
Mađarska	Tijelo koje provodi vozačke ispite
Španjolska	Tijelo koje provodi vozačke ispite
Belgija	Vladin ured
Danska	Vladin ured
Finska	Vladin ured
Slovačka	Vladin ured
Češka	Lokalna uprava
Italija	Lokalna uprava
Poljska	Lokalna uprava

Tablica. 9.: Institucije koje provode ispite za zvanje instruktor vožnje

Većina zemalja Europske unije nema naknadnih provjera za instruktore vožnje dok određene zemlje imaju i naknadnu provjeru stručne osposobljenosti instruktora vožnje u intervalima od

jedne do 4 godine. U Republici Hrvatskoj postoji provjera stručne osposobljenosti instruktora vožnje svake 4 godine.

Država	Učestalost provjere
Hrvatska	4 godine
Velika Britanija	2 – 4 godine
Sjeverna Irska	4 godine
Nizozemska	jednom godišnje

Tablica. 10.: Intervali periodičke provjere stručne osposobljenosti

## 5. ZAKLJUČAK

Vidljivo da zemlje Europske unije imaju različite načine stjecanja zvanja instruktora vožnje od potpuno liberalnih bez velikog utjecaja vladinih agencija i ureda do zemalja u kojima je sustav obrazovanja odnosno usavršavanja pod nadzorom vladinih agencija. Kod minimalne starosne dobi potrebne za početak rada kao instruktor vožnje vodljivo je da je u nekim državama dovoljna punoljetnost odnosno 18 godina dok je u nekima zemljama potrebna starosna dob 25 godina. Tu je Republika Hrvatska među zemljama s strožim kriterijima jer je potrebna starosna dob 24 godine. Sve zemlje zahtijevaju prethodno završeno obrazovanje od osnovnog do srednjoškolskog ali dopuštaju da se u program uključe sa svim prethodnim zanimanjima, dok je u Republici Hrvatskoj u većini obrazovnih ustanova potrebno završeno srednjoškolsko obrazovanje u području cestovnog prometa. Potrebno prethodno vozačko iskustvo je od samo posjedovanja vozačke dozvole do 4 godine iskustva. U nekim zemljama se traži da nema težih prometnih prekršaja kao i potvrda o nekažnjavanju dok neke zemlje to ne zahtijevaju. U Republici Hrvatskoj nije uvjet da nema počinjenih prometnih prekršaja ali se prilikom izdavanja licence koja ima trajanje od 10 godina traži potvrda o nekažnjavanju. Institucije koje provode obrazovanje odnosno usavršavanje za instruktora vožnje su u većini zemalja privatna učilišta dok u nekim zemljama to provode državni obrazovni centri, u Republici Hrvatskoj su to ustanove za obrazovanje odraslih u privatnom ili u državnom vlasništvu. Trajanje programa je od 230 do 800 sati nastave (teorijske i praktične) odnosno u trajanju od 3 mjeseca do jedne i pol godine.

Kod provođenja ispita za instruktora vožnje sve zemlje Europske unije imaju te ispite pod nadzorom države odnosno neke od vladinih agencija kao npr. tijelo koje provodi vozačke ispite, vladin ured ili lokalna uprava. U Republici Hrvatskoj ispite provedu ustanove za obrazovanje odraslih koje provedu programe usavršavanja za instruktora vožnje te samim time u različitim

ustanovama instruktora vožnje završavaju obrazovanje s različitim stečenim kompetencijama za obavljanje budućeg posla. Većina zemalja Europske unije nema naknadnih provjera za instruktore vožnje dok određene zemlje imaju i naknadnu provjeru stručne osposobljenosti instruktora vožnje u intervalima od jedne do 4 godine. U Republici Hrvatskoj postoji provjera stručne osposobljenosti instruktora vožnje svake 4 godine.

Kako bi se podigle kompetencije instruktora vožnje u Republici Hrvatskoj, te kako bi se ujednačili uvjeti upisa, program i njegovo trajanje a sve u cilju kvalitetnije obuke novih kandidata u autoškolama te samim time i povećanja sigurnosti u prometa na cestama u travnju 2016. godine formirana je radna skupina koja će raditi na novom programu usavršavanja za instruktora vožnje. U radnu skupinu su uključeni predstavnici Agencije za strukovno obrazovanje i obrazovanje odraslih, predstavnici Ministarstva znanosti obrazovanje i sporta, predstavnici Ministarstva unutarnjih poslova, predstavnici Ministarstva pomorstva, prometa i infrastrukture, predstavnici privatnih i državnih ustanova za obrazovanje odraslih koje vrše usavršavanje za instruktora vožnje, predstavnici udruga koje se bave obrazovanjem u cestovnom prometu, predstavnici Hrvatskog autokluba i predstavnici autoškola. Plan je da se do kraja 2016. godine izradi novi nastavni plan i program za instruktora vožnje. Nadamo se da će s novim i kvalitetnijim nastavnim planom i programom za instruktora vožnje doći do podizanja potrebnih kompetencija instruktora vožnje kao i ujednačavanje tih programa u svim ustanovama koje provode usavršavanje za instruktora vožnje s sve u cilju kvalitetnije obuke novih kandidata u autoškolama te samim time i povećanja sigurnosti u prometa na cestama u Republici Hrvatskoj a time i u cijeloj Europskoj uniji.

## 6. LITERATURA I KORIŠTENI MATERIJALI

Ministarstvo znanosti obrazovanja i sporta: Vodič kroz sustav obrazovanjau Republici Hrvatskoj

Hrvatski autoklub: Pravilnici i materijali s stručnih osposobljavanja (Novak: Instruktor vožnje u zemljama EU)

ROAD TRAFFIC SCHOOL  
ZAGREB, TRG J. F. KENNEDYJA 8



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Title of work:

**TRAINING FOR DRIVING INSTRUCTORS IN THE REPUBLIC OF  
CROATIA AND COMPARISON WITH THE EUROPE UNION  
COUNTRIES**

Summary:

When we talk about transport policy in all countries in the world, the most important aspect is the safety of road traffic. The tendencies are: a small number of traffic accidents, a small number of injured in traffic accidents and, of course, to reduce the number of road accident victims to the lowest possible number. Except the individual tragedies, the society as a whole suffers huge losses due to traffic accidents. One of the important segments of road safety is education and training of new driving instructors who need to acquire the necessary competences to successfully enable new young drivers in driving schools. Education systems for driving instructors vary in the EU with greater or smaller differences. EU countries have different ways

of acquiring professional driving instructors: from completely liberal without great influence of government agencies and offices to the countries in which the education system is under the control of government agencies.

Key words:

- Driving instructor
- Road safety
- Trainings for drivers

## 1. THE EDUCATION SYSTEM IN THE REPUBLIC OF CROATIA

The beginnings of education in Croatia appeared already in the 10th century, and it has, to this day, remained one of the most vertical of the Croatian society. According to the last census published by the Central Bureau of Statistics, in Croatia is increasing the number of highly educated people. Completed only primary education in 2011. had 30.8% of the population, while with only a high school education in 2011. was 52.6% of the population.

The education system in Croatia today starts in preschools; in kindergartens and in institutions where the preschool programs are implemented. Primary schools begins by enrolling in the first grade of primary school and lasts from six to fifteen years of age. Elementary school lasts eight years and with this education the student acquires the knowledge and skills for continuing of education.

After completing elementary school, students have the opportunity to continue their education in secondary institutions that are not-mandatory character. In high schools is performed curriculum in duration of four years, and the student's education is completed by passing the state graduation. The students' education in vocational and art schools can take from one to five years and ends with the defense of the final work. The students who have completed vocational programs can take the state graduation exams and acquire higher level qualification by continuing of education.

The high schools prepare their students for further education. The vocational schools enable students to enter the labor market and give the possibility of continuing of education. After the completion of vocational schools, depending on completion of the program, the students may be included in the labor market or, if they fulfill certain conditions, they can continue their education at high school or higher education level. The vocational education provides the knowledge, skills and competences required to the labor market with the aim of professional recognition of qualifications, which also provide the possibility of progress in future education.

Today, in the Republic of Croatia, we have 14 educational sectors in the field of secondary education which are determined by the Decision on establishing educational sectors in vocational education, and one of them is the Transport and Logistics, which includes the Driving Instructor.

## 2. THE SITUATION IN THE DRIVING SCHOOLS SECTOR AND THE POSITION OF DRIVING INSTRUCTORS IN DRIVING SCHOOLS IN THE REPUBLIC OF CROATIA

According to the Hrvatski Autoklub (Croatian Automobile club), as authorized professional organization for business of driving schools in Croatia, on 31st May 2016., in the Republic of Croatia there are 348 driving schools with a total (including driving instructors, lecturers and professional leaders) 1.627 employees, of which are 1.554 driving instructors (4.46 driving instructors per driving school).

The number of driving instructors employed in certain driving schools is from 1 to 21 driving instructors, as follows:

- 1 employed driving instructor – 13 driving schools or 3,7%
- 2 employed driving instructors – 44 driving schools or 12,6%
- 3 employed driving instructors – 83 driving schools or 23,9%
- 4 employed driving instructors – 74 driving schools or 21,3%
- 5 employed driving instructors – 48 driving schools or 13,8%
- 6 employed driving instructors – 31 driving schools or 8,9%
- .....
- 20 employed driving instructors – 1 driving school or 0,3%
- 21 employed driving instructors – 1 driving school or 0,3%

From this data is evidently that 262 driving schools (or 75,28% of driving schools) have up to 5 employees driving instructors; 293 driving schools (or 84,19% of driving schools) have up to 6 employees driving instructors.

The age of driving instructors in driving schools in the Republic of Croatia is:

- 24 – 30 years old – 200 driving instructors or 12,87%

31 – 40 years old – 627 driving instructors or 40,34%

41 – 50 years old – 398 driving instructors or 25,61%

51 – 60 years old – 252 driving instructors or 16,21%

over 61 years of age – 77 driving instructors or 4,95%

So, more than 52% of driving instructors are younger than 40 years.

The driving instructors have obligation of professional training in a way that every 4 years they must collect a certain number of points (that is possible to collect at various activities of professional education and with mandatory attendance at seminars organized by Hrvatski Autoklub). Those who do not collect sufficient number of points approach the control of professional qualifications, solving skills test at Hrvatski Autoklub which is authorized organization for business training of drivers. The average pass rate of instructors on check of the qualification is 65 – 70%.

### 3. TRAINING FOR DRIVING INSTRUCTORS IN THE REPUBLIC OF CROATIA

#### 3.1 Trainings in the Republic of Croatia

The adult education institution brings the training programs in the Republic of Croatia. The training programs should be tailored to the age, the previous education, knowledge, skills and abilities of students who acquire, complement and extend their knowledge, skills and abilities for professional work. Using training programs, the participants with a high school education fulfill and extend this professional knowledge because of the demands of the labor market and to gain the knowledge of new techniques and technologies and their application.

Type of training programs depends on human, technological, organizational and the other possibilities of the institution. According to current practice the most common methods of execution training programs are regular and consultative-instructive; there is a possibility to run a correspondence-consultative teaching.

#### 3.2 Training for driving instructors in the Republic of Croatia

The adult education institution brings the training programs in the Republic of Croatia which in practice means that in Croatia exists several training programs for driving instructors with different conditions of entry, various contents in the training programs, different final competences upon completion of the program, and different duration of the training. I believe that it is given too much freedom to adult education institutions in the preparation and

implementation of training programs for driving instructors which can be seen at different (insufficient) competences that driving instructors gain on completion of the program, and at the first employment. Because of this diversity I will compare only one of the training programs for driving instructors in the Republic of Croatia, in duration of 500 hours of training for driving instructors B category.

Conditions of enrolling to the program of training for driving instructor category B in the Republic of Croatia are not standardized for all colleges. The required age for registration and inclusion in the training program is from 18 years or acquired driver's license category B, up to age of 23 years and 6 months. The required age for issuing a license for driving instructor at Hrvatski Autoklub and at Ministry of Interior Affairs, which is necessary to start work as driving instructor is in accordance with legal regulations, 24 years. So, if the student previously finished training program for driving instructor, he is not able to start work before 24 years. Owning a driver's license category B is in the range of the possession – newly acquired driver's license to 3 years of possessing a driver's license.

For registration is required prior to complete secondary education in the sector of transport and logistics – certain institutions have served the opportunity to enroll only for students who have completed secondary education for a period of minimum 3 or 4 years in road traffic sector or undergraduate road transport. Also, it is necessary to attach a medical certificate for driving instructor B category.

Curriculum training for driving instructor B category:

No.	Teaching unit	Hours			Total
		T	VJ	PN	
	Common part				
1.	Psychology of teaching driving	50			50
2.	Transport technology	50			50
3.	Didactics	50	20		70
4.	Traffic regulations	50			50
5.	Knowledge of vehicles	40	15		55
6.	Methodology of teaching driving	60	35		95
7.	Practical classes			130	130
TOTAL		300	70	130	500
T – lectures, joint consultation					
V - exercises (in the classroom or in the vehicle)PN – practical classes					

Table 1: Curriculum of regular classes in the program for the acquisition of the title: driving instructor



No.	Teaching unit	Hours					Total
		T	SK	IK	VJ	PN	
	Common part						
1.	Psychology of teaching driving	50	20	30			50
2.	Transport technology	50	20	30			50
3.	Didactics	50	20	30	20		70
4.	Traffic regulations	50	33	17			50
5.	Knowledge of vehicles	40	13	27	15		55
6.	Methodology of teaching driving	60	27	33	35		95
7.	Practical classes					130	130
<b>TOTAL</b>		<b>300</b>	<b>133</b>	<b>167</b>	<b>70</b>	<b>130</b>	<b>500</b>
T – lectures, JC – joint consultations, IC – individual consultations E – exercises (in the classroom or in the vehicle), PC – practical classes							

Table 2: Curriculum of consultative-instructional classes in the program for the acquisition of the title: driving instructor

The duration of program and the manner of execution of educational program – 500 hours – is realized in practice using consultative-instructional classes. The consultative-instructional classes is realized through group and individual consultations. Through the consultations, students determine the existing and acquire new knowledge, complement and complete knowledge necessary for their work. Theoretical part of program, for a period of 300 hours, is performed in an institution's classroom. Exercises for a period of 70 hours carried out in the institution's classroom or in the vehicle at the traffic training area. Practical part of the program, for a period of 130 hours, is implemented individually in a driving school. Mentor, typically a driving instructor in a driving school, supervises the implementation of the practical part of the training program of participants.

#### 4. THE COMPARISON OF PROGRAMS: TRAINING FOR DRIVING INSTRUCTORS IN THE REPUBLIC OF CROATIA AND IN THE EUROPEAN UNION COUNTRIES

##### 4.1. The minimum prescribed requirements for driving instructors

In the Table 3 is given the necessary age for working as driving instructor in European Union. It is obviously that the necessary age is between 18 and 25 years, from which we can see diversity of the conditions of registration in different countries.

Country	The minimum age
Croatia	24
Belgium	18
France	18

Portugal	20
Spain	20
Italy	21
Switzerland	21
Germany	22
Hungary	22
Czech Republic	24
Slovakia	25

Table 3: The minimum age for enrollment in the program driving instructor

In the Republic of Croatia, for entry into the training program for driving instructors, is required a high school diploma in the field of transport and logistics. The most countries in EU also requires secondary education, while in a few of them is possible to enter the program for driving instructors with finished primary school.

Country	Prior learning
Croatia	Secondary education
Austria	Compulsory education
Czech Republic	Compulsory education
Germany	Compulsory education
Hungary	Compulsory education
France	Stage 1 high school
Spain	Stage 1 high school
Belgium	Stage 1 high school
Netherlands	Stage 1 high school

Table 4: Necessary education for enrollment in the program driving instructor

These data show that certain countries do not require a driving experience before enrolling in the program for driving instructors, already is enough just to have valid driving license. In some countries it is necessary to have driving experience 2 – 4 years.

Country	Driving experience
Croatia	No
Belgium	No
France	No
Greece	No
Italy	No
Hungary	2 years
Germany	3 in last 5 years
Switzerland	3 years
Great Britain	4 in last 6 years

Table 5: Driving experience necessary for entry into the program driving instructor

In the Republic of Croatia is required, after completion of the program, when is given the application for the license- which is mandatory, to attach a certificate of good conduct while there are not checked earlier maden traffic offenses. But, in the Republic of Croatia, any irregularity in driving schools, even administrative, is subjected to the Road Traffic Safety and it is recorded as an offense in traffic. There are visible diversities in EU countries.

Country	Traffic violation	Offenses
Croatia	No	Certificate of good conduct
France	No offense	Certificate of good conduct
Slovakia	Last 3 years	Certificate of good conduct
Germany	Serious offenses	Certificate of good conduct
Switzerland	Last year	No
Greece	No	Certificate of good conduct
Italy	No	Certificate of good conduct
Hungary	No	No
Spain	No	No
Sweden	No	No
Denmark	No	No

Table 6: Necessary a certificate of good conduct for entry into the program driving instructor

#### 4.2 Education for driving instructor

The duration of education is from 230 to 800 hours, involving theory and practice, or from 4 months to 2 years.

Country	Duration of education
Croatia	500 hours
Slovakia	230 hours
Hungary	294 hours
France	600 hours
Austria	6 months
Germany	10 months to 2 years
Poland	4 months
Sweden	800 hours or 1,5 year

Table 7: Duration of education in the program for the acquisition of titles: driving instructor

In the most of countries, the institutions that implement training for driving instructors are private schools. In some countries national training centers do it. In the Republic of Croatia, adult education institutions (private or national) implement it.

Country	Who educates?
Croatia	Private and public colleges
Austria	Private colleges
France	Private colleges
Germany	Private colleges

Spain	Private colleges
Denmark	Licensed instructors
Finland	State education centers
Norvegen	State education centers
Sweden	State education centers
Hungary	State education centers

Table 8: Institutions that implement education for acquiring titles: driving instructor

#### 4.3. The examination for the position driving instructor and the subsequent verification of professional skills of driving instructor

Exams for driving instructors in all EU countries are regulated by the government or some government agencies such as the authority carrying out driving tests, a government office or a local government. In the Republic of Croatia, the exams are conducted by adult education institutions that implement training programs for driving instructors.

Country	Organization that conducts examinations
Croatia	Colleges
Austria	Authority carrying out driving tests
Great Britain	Authority carrying out driving tests
Hungary	Authority carryinh out driving tests
Spain	Authority carrying out driving tests
Belgium	Government office
Denmark	Government office
Finland	Government office
Slovakia	Government office
Czech Republic	Local government
Italy	Local government
Poland	Local government

Table 9: Institutions that conduct examinations for acquiring titles: driving instructor

Most EU countries do not have subsequent checks for driving instructors, while some countries have subsequent verification of qualification of driving instructors at intervals of 1 to 4 years. In the Republic of Croatia exist skill tests for driving instructors every 4 years.

Country	The frequency of checks
Croatia	4 years
Great Britain	2 – 4 years
North Ireland	4 years
Netherlands	1 time in a year

Table 10: Intervals of periodic verification of qualification

## 5. CONCLUSION

It is obviously that the EU countries have different ways of acquiring the title of driving instructors; from completely liberal without great influence of government agencies and offices, to the countries in which the education system is under the control of government agencies. It is clear that in some countries the minimum age for beginning work as a driving instructor is 18 years while in the others necessary age is 25 years. The Republic of Croatia is between the countries with strict criteria because necessary age here is 24 years. All the countries require previously completed education (primary and secondary) or allow that in the program engage with all previous occupations. In Croatia, in the most educational institutions, is necessary to complete secondary education in the field of road transport.

Needed driver's experience is: from only possession of driver's license to 4 years of experience. In some countries are asking no serious traffic offenses and a certificate of good conduct while the others do not require it.

In the Republic of Croatia does not exist a condition that there are no traffic violation but issuing the license which has duration of 10 years, it is seeking confirmation of no criminal record. The institutions that conduct education for driving instructors in the most of countries are private colleges. In some of them state education centers implement it while in the Republic of Croatia institutions for adult education (private or national) conduct it. Duration of the program is from 230 to 800 hours of instructions (theoretical and practical), from 3 months to 1.5 year.

In conducting of the exam for driving instructors, all EU countries have exams under the state control or some of government agencies such as an authority carrying out driving tests, government department or local government.

In the Republic of Croatia the exams are implemented by the institutions for adult education that conduct the training programs for driving instructors and therefore in different institutions the driving instructors end this education with different acquired competences to perform future work.

The most of EU countries do not have any subsequent verification for driving instructors. Some of them have subsequent verification of qualification for driving instructors in intervals from 1 to 4 years. In the Republic of Croatia exists verification of qualification for driving instructors every 4 years.

To make better the competences for driving instructors in the Republic of Croatia and to equalize the conditions of entry, program and its duration to have more quality education of new candidates in driving schools and to increase the safety in road traffic, in April 2016. is formed working group which will work at new educational program for driving instructors. In this group are involved the representatives of the Agency for Vocational and Adult Education, the representatives of Ministry of Science, Education and Sport, representatives of Ministry of

Internal Affairs and of Ministry of Maritime Affairs, Transport and Infrastructure, representatives of private and state adult education institutions which carry out training for driving instructors, representatives of associations that are dealing with education in road traffic, representatives of Hrvatski Autoklub and driving schools.

The plan is that, by the end of 2016., the development of a new curriculum for driving instructor must be finished. We hope that new and more quality curriculum for driving instructors will help to increase necessary competences and equalization of programs in all institutions that conduct education for driving instructors with the goal: more quality education in driving schools and increasing of safety in road traffic in the Republic of Croatia and in the whole EU.

## 6. LITERATURE AND USED MATERIALS:

Ministry of Science, Education and Sport: Guide to the education system in the Republic of Croatia

Hrvatski Autoklub: Regulations and materials from professional trainings (Novak: Driving instructor in EU countries)

S. O. U. Riste Risteski Ričko – Prilep

dipl. soobr. ing. Sekuloska Violeta



Međunaroden simpozium  
na soobraќajni inženeri

Skopje – R. Makedonija  
29. 30. Septemvri 2016

## **Apstrakt:**

Sekoje grad, sekoje država, sekoje zemja ima svoj soobračeen sistem so koj gi zadovoluva potrebite za prevoz, prenos i transport na svoje žiteli.

Paralelno so potrebite na lugeto, koi se sekojdnevni, neminovni i so tendencija na zgolemuvanje, se zgolemuvaat i potrebite za prevoz, prenos i transport. So toa se optovaruva i samiot soobračeen sistem, koj pak od svoja strana povlekuva sozdavanje na niza od soobračejni problemi.

Sekoje soobračeen sistem vo edna zemja pa i kaj nas, e sostaven od tri komponenti:

1. Soobračejna infrastruktura;
2. Soobračejna suprastruktura;
3. Soobračejni pravila i propisi.

Ovie komponenti mora da formiraat homogeni celini, kako bi funkcionirale soodvetno. Prvičnata homogenost vo celinata na soobračejniot sistem t.e. vo negovite osnovni komponenti, so nizata na promeni koi mora da gi primenat, se raznišuva t.e. se destabilizira. Toa znači deka novonastanatata sostojba na soobračejniot sistem veke ne e homogena i deka ke mora da se izvršat nekoji promeni kako bi se vratila ramnotežata vo sistemot. So toa soobračejniot sistem ke prodolži da ja opravduva svojata uloga – zadovoluvanje na čevkovite potrebi, vo sekoje segment na čevkovoto živeenje. Za da se ovozmōži toa, mora da se napravat promeni vo delovite t.e. komponentite na sistemot, koi veke ne možat da se vkopat i go deformiraat istiot. So iznaoĝanje na soodvetni rešenija bi se vospostavila povtorno ramnotežata vo soobračejniot sistem. Ovaa postapka potrebno e da se vrši sekoje pat koga ke se pojavi neuramnoteženost vo komponentite. Ovie promeni se tekovni i baraat postojano sledenje, detektiranje, analiza i iznaoĝanje na soodvetni rešenija. Za taa cel potrebno e da napomeneme deka osnovata na trite osnovni komponenti e čevkot; kako vozač, kako patnik, kako graditel, organizator, planer... no i destabilizator. Zatoa site problemi koi se javuvaat vo soobračejniot sistem, treba da se baraat vo samata baza na ovoj sistem – čevkot.

### **Ključni zborovi:**

- **Soobračej**
- **Soobračeen sistem**
- **Čevok**
- **Soobračejni problem**
- **Soobračejni rešenija.**
-



## Glaven del:

Pričinata za edna od najgolemite maki na gradskite žiteli e soobraќajot. Osobeno gustiot soobraќaj što gi blokira ulicite i go true vozduhot. Sekoja opština vo Makedonija pokraj ovoj globalen soobraќaen problem ima i svoi lokalni problemi. Sekoj učesnik vo soobraќajot može da gi vooči ovie problem no se pak najmnogu može da gi voočat onie najaktivnite učesnici vo soobraќajot – **vozačite**. Za taa cel učenicite od soobraќajnata struka, od III godina sledeni i mentorirani od predmetniot professor i so asistencija na soobraќajnata policija, izvršija “snimanje” na centralnoto podračje vo gradot Prilep. Akcijata beše registrirana pod mototo “detektiranje na soobraќajnite problem vo Prilep” i se odvivaše vo dve fazi.

Vo prvata faza se anketiraa vozačite na vozilata koi se vo dviženje, a vtorata faza anketata se odvivaše na vozači čii vozila se vo miruvanje. Odgovorite od prvata faza bea kratki i koncizni bez mnogu razmislivanje. So toa se dobivaa onie soobraќajni problemi koi se najvoočlivi. Odgovorite od vtorata faza bea podolgi so poveќе razmislivanje i možeše da se dobijat i odgovori za soobraќajnite problem koi se pomalku voočivi, a po važnost se isto tolku bitni.

Na toj način sobranite odgovori bea staveni na analiza i se dobi lista na prioriteti. Odgovorite od prvata faza se postavuvaa pogore na listata, dodeka od vtorata faza podolu na listata.

Hierarhiskiot raspored na soobraќajnite problemi na gradot Prilep soglasno izvršenata anketa se sledni:

- Soobraќaen metež;
- Aerozagaduvanje;
- Soobraќajna nekultura;
- Pogrešnoto parkiranje;
- Soobraќajnata signalizacija;
- Kružnite tekovi;
- Soobraќajni jazli;
- Gradskiot prevoz.

Zaradi ograničeniot prostor ќе se vrši analiza na prvite tri problem, dodeka drugite ќе bidat kratko opfateni.

Spored napravenite istražuvanja prvite tri problemi se vsušnost globalni, dodeka ostanatite se pomalku ili poveќе lokalni.



*Sl. 1 Učenicite vo akcija*

Gradskite ulici se blokirani od gustiot soobračaj zatoa što gradovite rastaat bez prestant i sega reči 3/4 od svetskoto naselenie živee vo niv. So rastot na gradovite raste i brojot na vozila. “Premnogu luže poseduvaat premnogu vozila koi sakaat da gi vozat na istiot tesen proctor”.

Bidejki lužeto se čustvuvaat zavisni od svoite avtomobili, gradovite moraat da se spravt so se pogolemiot broj na vozila. Postojat gradovi vo svetot koi imaat poveќе vozila otkolku žiteli – Los Angeles na primer.

Iako kaj nas vo Makedonija, sostojbata možebi ušte ne e dojdna do toj stepen, sepa mal e brojot na gradovi koi uspevaat da izlezat na kraj so se pogolemiot priliv na vozila i problemite koi pri toa se sozdavaat. Najteška e sostojbata so starite gradovi, no i so gradovite koi imaat delovi od istorisko značenje.

Do metež vodi i nedostigot na soodvetni parkirališta. Vo sekoe vreme golem broj na vozila kružat po ulicite za iznaoѓanje na parking mesto. Se procenuva deka kako rezultat na soobračajniot metež se zgolemuva i aerzagaduvanje. Cenata na gustiot soobračaj može da se meri i so izgubenite časovi i so stresot koj go trpat vozačite. Emocionalniot danok ne može da se meri so brojki, no so sigurnost može da se kaže deka e enormno visok. Koga kon ova ќе se dodade i soobračajnata nekultura, stresot i soobračajniot metež dopolnitelno se zgolemuvaat.

Od ova možeme da zaklučime deka site predhodno nabroeni soobračajni problemi nemožat da se razgleduvaat i rešavaat zasebno zatoa što eden soobračeen problem povlekuva drug, tret.... i se do nedogled.

Mnogu gratski centri nudat različni rešenija; vo Singapur, koj e eden od gradovite so najgolema koncentracija na vozila vo svetot, e donesen zakon so koj se ograničuva brojot na avtomobili što edno lice može da gi kupi. Vo gradovite so istorisko značenje kako što se mnogu gradovi vo Italija, zabraneto e dviženjeto so avtomobili niz centarot vo pogolemiot del od denot. Drugi gradovi dale predlog da se vovede “danok na soobračaj”, pri što vozačite mora da platat za da vlezat vo centarot na gradot. Vo Meksiko so avtomobil vo centarot može da se vleze samo vo odredeni denovi vo zavisnost od registarskiot broj na voziloto. Ovie merki vo Republika Makedonija ne se prifatlive, no postojat merki koj možat dolgoročno da go ublažt ovoj problem koj doprva kaj nas pristignuva. Konkretni rešenija za nadminuvanje na ovie problemi povtorno se dobivaat od istite onie koi i gi navedoa problemite – vozačite. Del od tie rešenija se sledni:

- Pogolemo vložuvanje na gratskite vlasti za osovremenuvanje na javnata soobračajna mreža;
  - Zgolemen broj na soobračajni lenti;
  - Distanciranje na miruvačkiot soobračaj od aktivniot;
  - Izgradba na sovremeni kružni tekovi;
  - Kompjuterski sistemi za kontrola na semaforškata signalizacija;
- Podobra organizacija na gratskiot prevoz;
  - Posebno izgradeni stojališta za vlez – izlez na patnici;
  - Soodvetna informacija za gratskiot prevoz;
  - Voveduvanje na novi linii;
  - Osovremenuvanje na vozniot park na gratskiot prevoz;
- Pogolemo prisustvo na soobračajnata policija na teren;
  - Prezemanje na preventivni i represivni merki;
  - Sproveduvanje na zakonskite obvrski vo celost i bez isklučoci.

Podatocite koi se dobieni od centarot za javno zdravje okolu procentot na zagaduvanjeto se sledni:



Table 3. Correlation coefficients\* between spatial and spatiotemporal exposure estimates of air pollutants (1994–2006 for NO<sub>2</sub>, NO<sub>x</sub>, and PM<sub>2.5</sub> absorbance; 2000–2006 for PM<sub>10</sub>, PM<sub>coarse</sub>, and PM<sub>2.5</sub>).

Pollutant	NO <sub>2</sub>	NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>coarse</sub>	PM <sub>2.5</sub>	PM <sub>2.5</sub> absorbance
Spatial exposure (n = 5,238)						
NO <sub>2</sub>	0.92					
PM <sub>10</sub>	0.66	0.69				
PM <sub>coarse</sub>	0.17	0.16	0.34			
PM <sub>2.5</sub>	0.67	0.67	0.64	0.32		
PM <sub>2.5</sub> absorbance	0.93	0.92	0.68	0.17	0.70	
Spatiotemporal exposure, 1994–2006 (n = 5,238)						
NO <sub>2</sub>	0.53 <sup>a</sup>					
NO <sub>x</sub>	0.86	0.55 <sup>a</sup>				
PM <sub>2.5</sub> absorbance	0.85	0.97				0.46 <sup>a</sup>
Spatiotemporal exposure, 2000–2006 (n = 1,665)						
PM <sub>10</sub>			0.26 <sup>b</sup>			
PM <sub>coarse</sub>			0.89	0.41 <sup>a</sup>		
PM <sub>2.5</sub>			0.91	0.86	0.47 <sup>b</sup>	

\*Correlation between spatial and spatiotemporal exposure for each pollutant. <sup>a</sup>Spearman, significant at  $\alpha = 0.05$ .

## Sl. 2 Aerozagaduvanje

Namaluvanjeto na aerozagaduvanjeto e prioritet na sekoja zemja. Koristenjeto na alternativniot prevoz e odgovorot na skoro site ispitanici od anketata koga stanuva zbor za rešavanje na ovoj problem. Tuka napojveke se misli na masovniot prevoz no i velosipedskiot prevoz isto taka. Javnata svest bi odigrala golema uloga pri rešavanje na ovoj problem koga bi stanalo zbor za brojot na patnici koi bi trebalo da se vozat so eden patnički avtomobil



Sl.3 Vozači i patnici



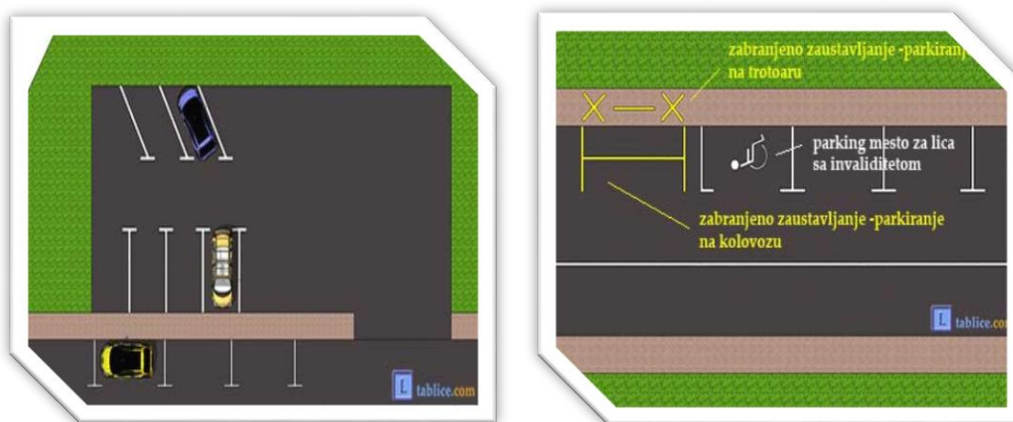
*Sl. 4 Velosipedski prevoz*

Soobraќajната kultura e seušte na mnogu nisko nivo i pokraj vložuvanjeto na napor i golemiot broj na kampanji sprovedeni od strana na Republičkiot Sovet za Bezbednost na Patištata na Republika Makedonija. Site izgubeni sredstva i vložena energija do sega ne uspeaa da go podignat stepenot na soobraќajната kultura na nivo koe bi gi zadovoljuvalo standardite na edno urbano živeenje. Seto toa povlekuva i sozdavanje na eden od najsuštinskite problemi – gubenje na čovečki životi.

Anketiranite bea decidni koga stanuvaše zbor za soobraќajната kultura. Skoro site se složija deka za zgolemuvanje na istata zaslužna bi bila soobraќajната policija so nezina zasilena kontrola i sproveduvanje na zakonskite regulativi bez pristrasnosti.

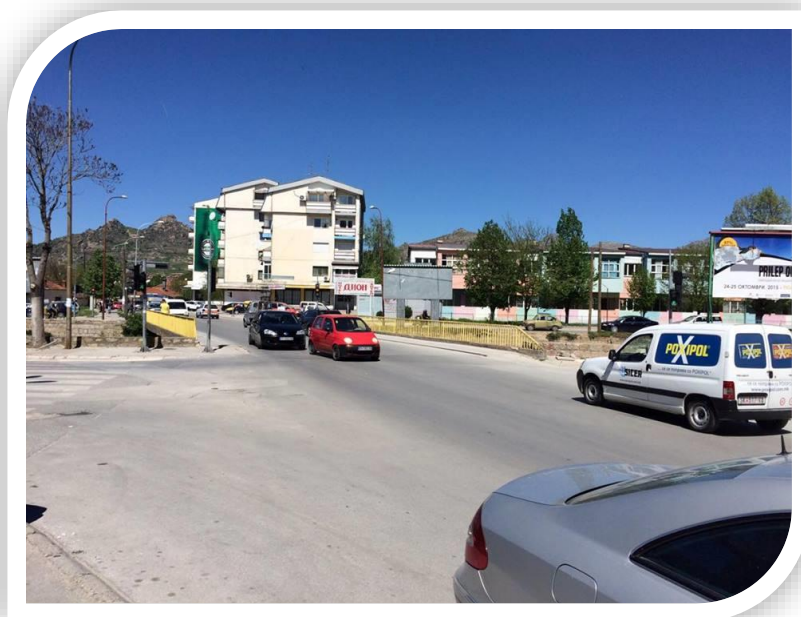
Parkiranjeto kako problem, veќе go navedovme pri analizata na soobraќajniot metež, meğtoa, ne beše konkretizirano isklučivo za gradot Prilep. Vo Prilep iako postojat, golem broj na parking mesta, koi se vo soglasnost so brojot na vozila koi sekojdnevno učestvuvaat vo soobraќajot vo Prilep, sepa ne ja zadovoljuvaat svojata suštinska uloga. Kade e tuka problemot? Pred se problemot go gledame vo nedovolnata soobraќajna kultura kaj vozačite koi pobrzo bi se složile da parkiraat na nesoodvetno mesto odkolku da platat simbolična cena za parking mesto. Kako problem so parkiranjeto vo našiot grad ќе go posočam i bulevarskoto parkiranje. Mislam deka so ovoj način na parkiranje se namaluva možnosta za normalen protok na vozila na edna od najfrekventnite ulici vo gradot – Bulevarot Goce Delčev. Imeno sekoe vozilo koi ima namera da se parkira ili da go napušti svoeto parking mesto, vo izvesna mera go poprečuva normalnoto odvivanje na soobraќajot. Pokraj toa vozilata određen vremenski interval, iako možebi kratok, ja uzurpiraat desnata soobraќajna lenta pri momentot na parkiranje. Isto taka so enormnoto

zgolemovanje na brojot na vozila vo gradot vo dogledno vreme ke bide neophodno potrebno od prošruvanje na gradskite soobračajnici so ušte po edna soobračajna lenta za sekoj pravec.



Sl. 5 Parkiranje

Soobračajnata signalizacija vo gradot Prilep samo delummnno gi zadovoluva potrebite na učesnicite vo soobračajot. Često pati sme svedoci na uništeni soobračajni znaci ili nevoočliva horizontalna signalizacija. Za taa cel, lokalnata samouprava na gradot Prilep veke nekolku godini sproveduva akcija pod naslov “prijavi problem” kade što graĝanite imaat moĝost so javuvanje na besplatnite telefonski broevi ili na soodvetna web strana da gi prijavat i problemite povrzani so soobračajnata signalizacija. Ovoj problem so pomoš na ovaa akcija do nekade e ublažen no anketiranite, a toa e i moe misljenje, mislat deka soobračajnata signalizacija posebno horizontalnata signalizacija, seušte ne gi zadovoluva visokite standardi. Vo ovoj kontekst ke kaĝeme deka vo našot grad preteĝno na visoko frekventnite ulici postojat golem broj na pešački premimi postaveni na relativno kratko rastojanie so što go oteĝnuvaat normalnoto odvivanje na motorniot soobračaj. Isto taka del od pešačkite premimi se mnogu blisku do priklučok na sporeden so glaven pat kade ima poprečen naklon i seto toa vsušnost se kosi so zakonot za bezbednost na soobračajot na patištata. Vozačot koj se naoĝa na sporedniot pat ima namalena vidlivost, a isto taka mora da upotrebi i pogolema brzina za sovladuvanje na naklonot pri priklučuvanje na glavniot pat. Vozačite se iritirani i od samiot odnos na pešacite koi često znaat da gi zloupotrebuvaat svoite prava. So postavuvanje na ovoj problem se dade i odgovorot za samoto rešavanje. Neobeležanite poprečni izdignuvanja t.n. “legnati policajci” isto taka se golem problem koi go posočija anketiranite vozači. Vo kontekst na signalizacijata ke go spomneme i nesoodvetnoto faziranje na semaforškata signalizacija na edna od nafrekventnite ulici vo gradot ulicata “11-ti Oktomvri” na krstosnicata kaj mostot Tabaana. Zeleniot signal na prviot del od krstosnicata e so različno vremetraenje na istiut toj signal na vtoriot del od krstosnicata. So ovoj nedostatok, vozilata koi se naoĝaat pomeĝu dvata dela od krstosnicata, ostanuvaat “zaglaveni” na mostot za vremetraenje na crveniot signal. Ovoj problem ušte poveke se usloĝnuva za vreme na pogolema frekfencija na vozila.



*Sl. 6 Krstosnica kaj mostot Tabaana*

Vo gradot Prilep, za mnogu kratko vreme se napraveni 4 kružni tekovi no ne site gi zadovoluvaat tehničkite i soobraќajni normi. Ispitanite vozači go posočija ovoj problem i toa spored nivnite odgovori dojdovme do zaključok deka istite ne gi zadoboluvaat potrebite za normalno odvijanje na soobraќajot vo smisla na nivnata širina i načnot na vitopenenje.



*Sl. 7 Kružen tek kaj poštata-Prilep*

Del od soobraќajnite jazli vo gradot Prilep isto taka ne gi zadovoluvaat osnovnite tehnički karakteristiki i spored istražuvanjata koi bea sprovedeni detektirani se slednite soobraќajni jazli koi ne gi ispolnuvaat soobraќajnite normi:

- Vlezot vo gradot Prilep od Skopje – “Kaj benziskata Luk Oil”
- Jazolot kaj OU. “Kliment Ohridski”

- Jazolot kaj novata avtobuska stanica
- Jazolot koj vodi kon železničkata stanica



*Sl. 8 Soobraќajni jazli*



*Sl. 9 Soobraќajni jazli*

Sekoj od ovie nesoodvetni jazli bara samostojno rešavanje zatoa što sekoj e slučaj sam za sebe.

Gradskiot prevoz vo gradot Prilep e isto taka eden od soobraќajnite problemi koji go posočija graѓanite i toa pred se vo smisla na popratnata infrastruktura kako na primer stojalištata za vlez i izlez na patnici kako i nemanje na soodvetni vlezno ilezni lenti za samite vozila od gradskiot prevoz. Postojat delovi od gradot koji voopšto ne gi čuvstvuvaat pridobivkite od gradskiot prevoz zaradi nemanje na linii na tie delovi od gradot:

- Naselba Trizla
- Naselba Aličair
- Naselba Pod Kuli



## Zaključok

Doblest na eden čovek e negovata čovečnost, a čevečno e da se greši. Starata pogovorka veli: “Koj priznava – pola mu se prostuva”. I nie trebe da priznaeme deka sme napravile odredeni greški ili možebi propusti koi treba da se posočat bez da se ima gordost za da se priznaat, kako bi možele istite da se rešat i eliminiraat kako problem. Opština Prilep ednaš do dva pati vo godinata organizira otvoren den so svoite gražani na koj prisustvuvaat golem broj na žiteli od gradot no i od okolinata na gradot, gradonačalnikot i golem broj na subjekti odgovorni za dobrosostojbata na gražanite. Na tie otvoreni denovi taka narečeni **denovi na idej** sekoj gražanin može da dade svoje misljenje, sugestija ili da prezentira proekt so koj bi doprinesol vo sozdavanjeto na podobra idnina kako za sebe taka i za drugite gražani na opština Prilep i poširoko.

Ovoj moj trud vo koj gi vklučiv i učenicite od soobračajnata struka od III godina, kako najpodobni spored vozrasta, ja ima istata gorenavedena cel – da doprinese za podobruvanje na urbanoto žveenje vo našiot grad. Na toj den del od učenicite koi učestvuva vo ovoj proekt ќе možat da go prezentiraat ova naše zalaganje do lokalnite vlasti so nadež deka neкои od ovie problemi ќе možat i da se nadminat. So toa ќе dademe ne samo naš mal pridones za bezbednoto živeenje vo gradot tuku i pottik do site učenici za davanje na svoi razmislivanja i sugestii pri formiranje na opštinskata programa vo idnina, so toa na učenicite ќе im se ovozmoži da stanat aktivni kreatori na svojata idnina, a ne samo pasivni žiteli na svojot grad.

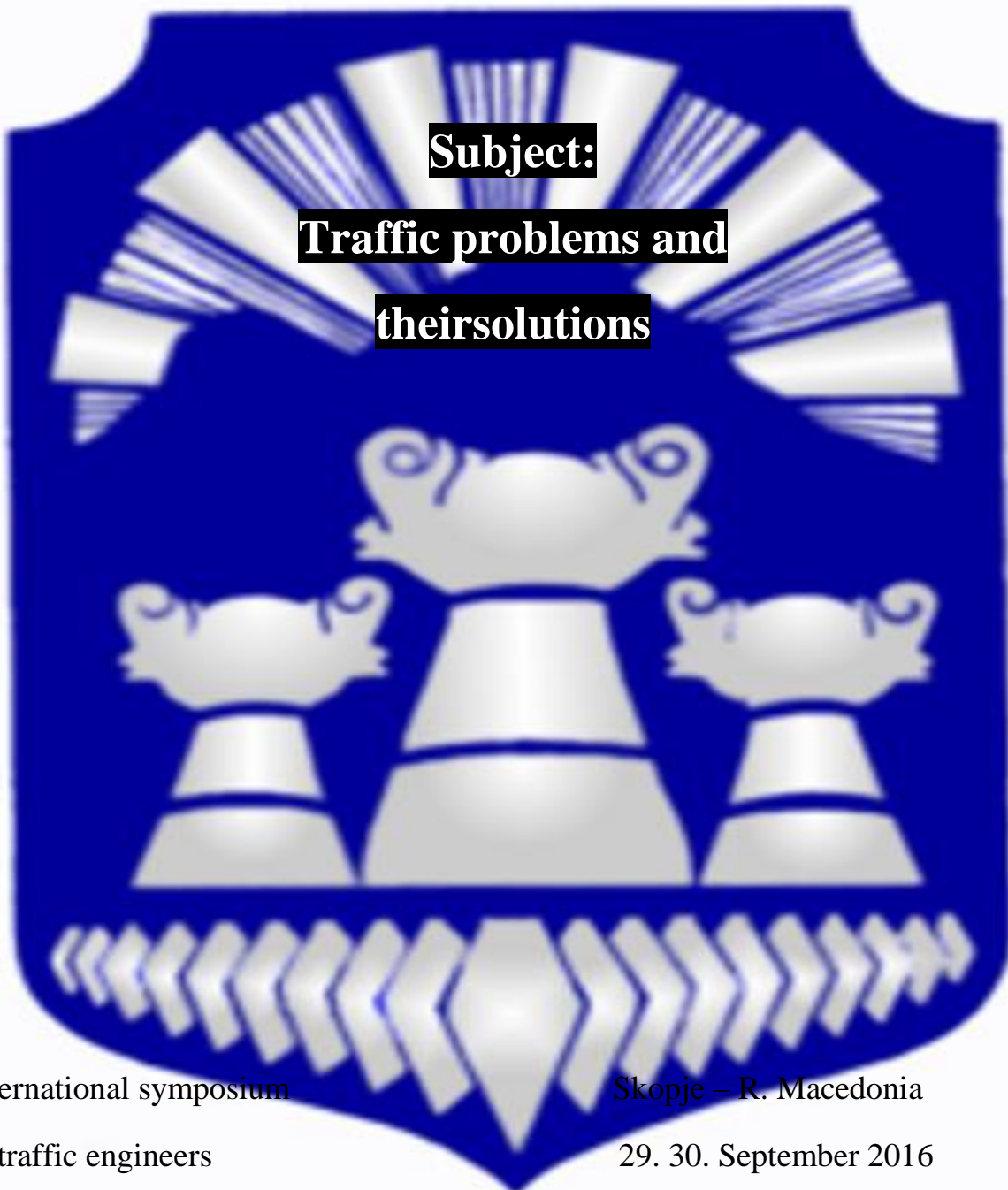
Nerešeni problemi se samo problemite koi ne se posočeni kako problem; tie tleat kako žarčina vo pepelta i samo čekaat pogodan moment da se razgorat i da napravat nepopravlivii šteti.



*Sl. 10 Soobračajna edinica*

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## **Abstract:**

Every town, every country, every state has its own traffic system that is fulfilling the need for transportation, transfer and transport of its citizens.

Parallel to the need of the people that are daily, inevitable and tending to grow, requirements for transportation, transfer and transport are also growing. This is overloading the traffic system itself and indicates creation of the series of traffic problems.

Every traffic system of every country, including ours, is consisted of three components:

4. Traffic infrastructure;
5. Traffic superstructure;
6. Traffic rules and regulations.

These components must form homogenous structures, in order to work properly. The first homogeneity into the structure of the traffic system; into its basic components, affected by the series of changes that has to be implemented, is seriously shaken; is destabilized. This means that the new condition of the traffic system is no longer homogenous and some changes must be implemented in order to bring back the balance into the system. With these changes the traffic system will continue to justify its role – satisfying human needs, in every segment of human life. To make it possible, some changes must be made into components (parts) of the system, those that can no longer be part of it and are deforming the system. Finding appropriate solutions will establish new balance into traffic system. This procedure needs to be implemented every time when misbalance of the components appears. These changes are permanent and need to be monitored constantly, detected, analyzed and finding appropriate solutions. For that goal we need to mention that the base of the three basic components is human; as driver, as passenger, as builder, organizer, planner.... also as destabiliser. Therefore every problem that occurs into traffic system has to find its roots into the base of this system – **human.**

### **Key words:**

- **Traffic**
- **Traffic system**
- **Human**
- **Traffic problem**
- **Traffic solutions.**

## Main part:

The reason for one of the greatest problems of the town citizens is traffic, especially heavy traffic that blocks the streets and pollutes the air. Every municipality in Macedonia besides this global traffic problem has its own local problems. Every participant into traffic can see these problems, but yet they can be mostly detected by the most active participants into traffic – **the drivers**. For this goal students from the traffic branch, III year of studies followed and monitored by the subject professors and assistance of the traffic police, completed “monitoring” of the central area of Prilep city. This action was registered under motto “Detection of the traffic problems in Prilep” and was conducted in two phases.

During the first phase the drivers of the moving vehicles were surveyed, and second phase of the survey was with drivers whose vehicles were parked. Answers from the first phase were short and clear with very little thinking. This shown to us the traffic problems that are most obvious. The answers from the second phase were longer with more thinking and this shown to us traffic problems that are less visible, but also very important.

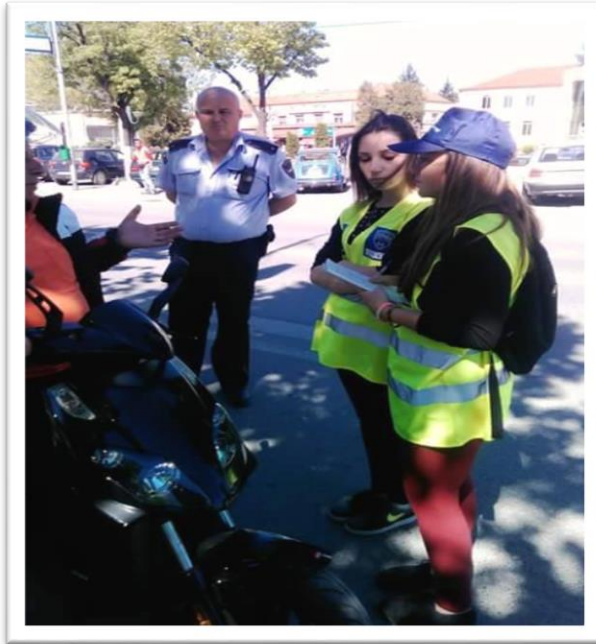
Answers gathered this way were analyzed and led to a list of priorities. Answers from the first phase are placed higher on the list, from the second phase lower on the list.

Hierarchical priorities of the traffic problems in the city of Prilep according to the survey is next:

- Traffic jam;
- Pollution of the air;
- Lack of traffic culture;
- Wrong parking;
- Traffic signalization;
- Roundabouts;
- Trafficnodes;
- Public transport.

Because of the limited space we will analyze the first three problems, and others will be shortly mentioned.

According to the research the first three problems are global, while the rest are more or less local.



*Sl. 1 Students in akcion*

The streets of the city are blocked by the heavy traffic because the cities are now growing fast and almost  $\frac{3}{4}$  from world population lives in it. By growth of the cities also grows the number of the vehicles. “Too many people posses too many vehicles and they want to drive them on the same narrow space”.

Because people are feeling dependent of their vehicles, the cities have to deal with larger and larger number of vehicles. There are cities in the world that have larger number of vehicles than population – Los Angeles for example.

In Macedonia we are not yet that far, however small number of cities has solutions for constant increasing of the vehicles number and problems that come with it. The most difficult situation is in the old cities, but also in the cities that have historical significance.

Lack of the parking places also leads to a jam. Any time large number of vehicles are circling the street to find parking place. It is estimated that as result of the traffic jam the pollution of the air is also increased. The price of the heavy traffic can be measured with lost hours and stress at the drivers. Emotional tax cannot be measured in numbers, but it certainly is enormously high. When you add lack of traffic culture, stress and traffic jam are additionally increased.

This is leading us to a conclusion that every previously mentioned problem cannot be analyzed and solved individually because one problem is leading to second, third ...indefinitely.

Many city centers are offering different solutions; in Singapore, one of the cities with highest concentration of vehicles in the world, there is law that is limiting number of the vehicles that one person can by. In the cities that are historically significant, as many cities in Italy, vehicles cannot move through the central part of the city most of the day. Other cities suggested a “traffic tax” – the drivers have to pay for entering the city center. In Mexico a vehicle can enter the center during certain days depending on the registration number of the vehicle. These measures in Republic of Macedonia are unacceptable, but there are measures that can, on long term, reduce this problem that is yet to come. Specific solutions to overcome these problems are again offered by the same people that pointed to them – drivers. Parts of these solutions are:

- Greater investment of the city authorities for modernization of the public traffic net;
  - Increased number of the traffic lines;
  - Distance between static and active traffic;
  - Building modern roundabouts;
  - Computer system to control semaphore signalization;
- Better organization of the public transport;
  - Special places for bus-stops for passengers entrance and exit;
  - Appropriate information about public transport;
  - Introducing new lines;
  - Modernization of the bus fleet;
- Increasing the presence of the traffic police on the streets;
  - Taking preventive and repressive measures;
  - Implementation of the law fully and no exceptions.

The data gathered from the center for public health about percentage of the pollution are these:



**Table 3.** Correlation coefficients\* between spatial and spatiotemporal exposure estimates of air pollutants (1994–2006 for NO<sub>2</sub>, NO<sub>x</sub>, and PM<sub>2.5</sub> absorbance; 2000–2006 for PM<sub>10</sub>, PM<sub>coarse</sub>, and PM<sub>2.5</sub>).

Pollutant	NO <sub>2</sub>	NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>coarse</sub>	PM <sub>2.5</sub>	PM <sub>2.5</sub> absorbance
Spatial exposure (n = 5,238)						
NO <sub>x</sub>	0.92					
PM <sub>10</sub>	0.66	0.69				
PM <sub>coarse</sub>	0.17	0.16	0.34			
PM <sub>2.5</sub>	0.67	0.67	0.64	0.32		
PM <sub>2.5</sub> absorbance	0.93	0.92	0.68	0.17	0.70	
Spatiotemporal exposure, 1994–2006 (n = 5,238)						
NO <sub>2</sub>	0.53 <sup>a</sup>					
NO <sub>x</sub>	0.86	0.55 <sup>a</sup>				
PM <sub>2.5</sub> absorbance	0.85	0.97				0.46 <sup>a</sup>
Spatiotemporal exposure, 2000–2006 (n = 1,665)						
PM <sub>10</sub>			0.26 <sup>b</sup>			
PM <sub>coarse</sub>			0.89	0.41 <sup>a</sup>		
PM <sub>2.5</sub>			0.91	0.86	0.47 <sup>b</sup>	

\*Correlation between spatial and spatiotemporal exposure for each pollutant. <sup>a</sup>Spearman, significant at  $\alpha = 0.05$ .

Figure. 2 Air pollution

Reduction of the air pollution is priority of every country. Using the alternative transport is the answer of almost every interviewee during survey asked about solution for this problem. They mostly mean about mass transportation but also bicycles. Public awareness can play a great roll during solving this problem meaning larger number of passengers transported by one vehicle.



Figure. 3 Drivers and passengers



*Figure. 4 Bicycle transport*

Traffic culture is still on a very low level no matter the efforts and large number of campaigns conducted by the Republic Council for Traffic Safety in Republic of Macedonia. Every financial lost and energy wasted until now could not increase the level of the traffic culture, the level that will satisfy standards of an urban life. The consequence is creation of the most essential problem – lost of human lives.

Interviewees were like-minded about the traffic culture. Almost all agree that in order to increase the culture we need stronger control from the traffic police and implementing the law regulations indiscriminately.

Parking as problem was already mentioned during analyzes of the traffic jam, but was not mentioned specifically for the city of Prilep. In Prilep there are many parking places according to the number of vehicles every day in Prilep's traffic, seems they are not fulfilling their role. Where is the problem? First we see the problem in the lack of traffic culture of the drivers who will park inappropriate that to pay symbolic price for the parking lot. As parking problem in our city I will point at the boulevard parking. It is my opinion that with this way of parking is decreasing ability for normal flow of the vehicles on one of the most frequent street in the city – Goce Delcev Boulevard. Every vehicle that attends to park, or to leave its parking lot obstructs the normal traffic. Another thing, vehicles for a certain period of time, maybe short, are holding the right line during parking. Also, according to the enormous rise of the number of the vehicles in the city soon it will be necessary an extension of the roads in the city with at least one more line for every direction.



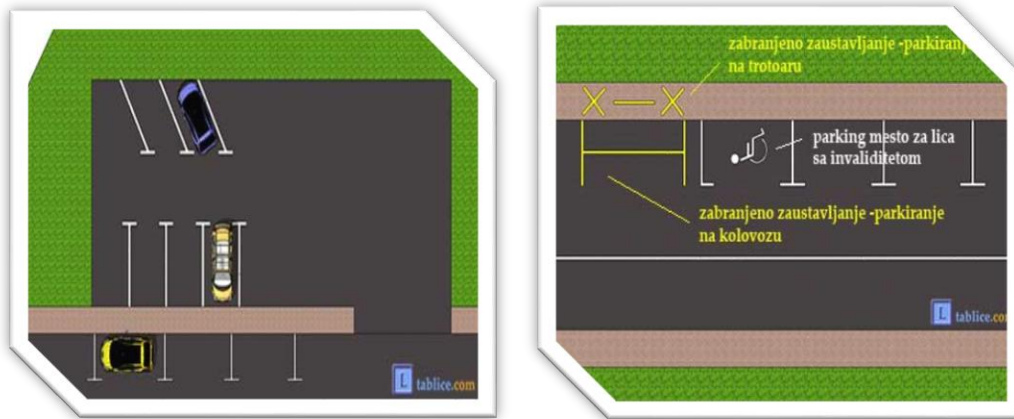


Figure. 5 Parking

The traffic signalization in the city of Prilep is satisfying the demands of traffic participants only partial. We are often witnesses of demolition of the traffic signs of hidden horizontal signalization. Therefore local authorities of the city of Prilep are implementing an action named “report a problem” where the citizens can call free telephone numbers or adequate web page to report problems connected to the traffic signalization. Thanks to this action a problem is partly decreased but the interviewees, and I share their opinion, think that the traffic signalization, especially horizontal signalization, is far from the high standards. According to this we can say that in our city mostly on the high frequent roads there are many pedestrian crossings placed very close to each other and disrupting normal flow of the traffic. Also part of these pedestrian crossings is very close to a connection of an auxiliary and main road where there is cross slope and all of it is not adequate to the law for safety into traffic. The driver from the auxiliary road has lower visibility, also needs to use higher speed for the slope for entering the main road. The drivers are irritated from the pedestrian’s behavior which often knows to abuse their rights. When the problem was detected, solution appears itself. Unmarked cross mounds so-called “lying policeman” are also big problem pointed by the interviewees. In this context with signalization we will mention and inadequate fazes of the semaphore signalization on the one of the most frequent streets in town “11<sup>th</sup> October” on the crossroad at the Tabaana Bridge. The green line at the first part of the crossroad has different duration than the green light on the second part of the crossroad. This leads to the trapping of the vehicles between two parts of the crossroad during the red light; they are blocked on the bridge. This problem is very obvious and complicated during higher frequency of the vehicles.



*Figure. 6 Crossroad at Tabaana Bridge*

In the city of Prilep, in a short period of time 4 roundabouts are built, but not all of them according to the technical and traffic norms. Interviewees pointed to this problem and according to their answers we get to a conclusion that they are not satisfying the needs for normal flow of the traffic, meaning they are not wide enough and the way of twisting.



*Figure. 7 Roundabout at the post office – Prilep*

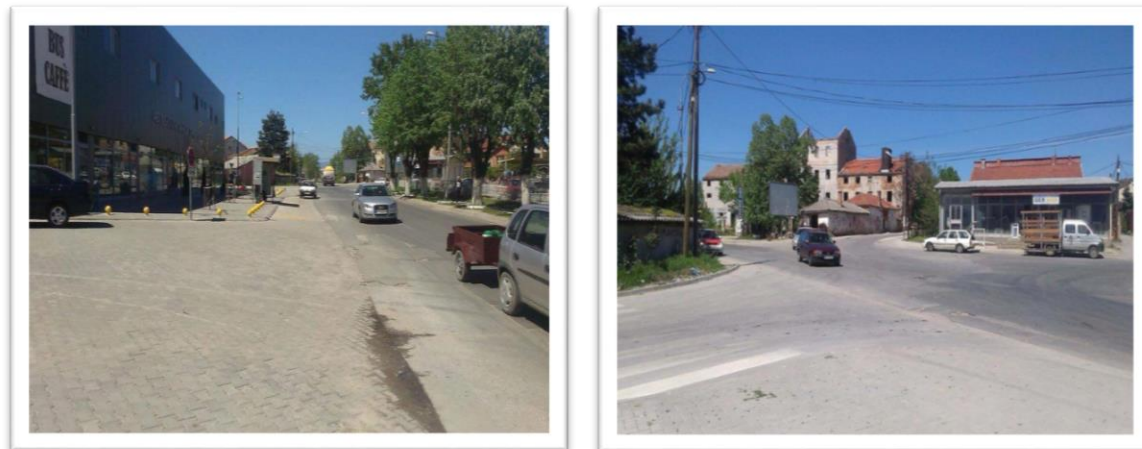
Parts of the traffic nodes in the city of Prilep also have technical characteristics that are not satisfying the basic norms and according to the research these nodes are detected as inadequate to the traffic norms:

- Entrance in the city of Prilep from Skopje – “At the Luk Oil gas station”
- Node at O.U. “Kliment Ohridski”

- Node at the new bus station
- Node leading to the train station.



*Figure. 8 Traffic nodes*



*Figure. 9 Traffic nodes*

Every one of these inappropriate nodes requires independently solving because everyone is a case of its own.

Public transport in the city of Prilep is also one of the traffic problems that was pointed by the citizens meaning mainly about the supportive infrastructure for example standing places for entrance and exit of the passengers, also lack of the appropriate lanes for the vehicles of the public transport. There are parts of the city that don't have any benefit from the public transport because there are no lines for these parts of the city:

- Area Trizla
- Area Aličair
- Area Pod Kuli

## Conclusion:

Positive for a human is his humanity and it is human to make mistakes. An old proverb says: “Who confesses – half is forgiven”. We should also confess that we made certain mistakes or maybe omissions that need to be pointed, without pride to confess, so they can be solved and eliminated as problem. Municipality of Prilep once or twice a year organizes open day for all people with large number of citizens and people from near villages, mayor and many subjects responsible for the people wellbeing. On this opened days so-called **days for ideas every** citizen can share his opinion, suggestion or present a project that will contribute into creation of the better future for himself as well as for anyone else in Prilep and surroundings.

My work that includes the students from the traffic branch, III year of studying, as most adequate in their age, has same goal – to contribute for improving the urban life in our city. On this day some of the students involved in this study will be able to present our efforts to the local authorities hoping that some of these problems will be able to be overcome. With this we will give a small contribution for safe life in the city, but also we will support every student to give his ideas and suggestions to form municipality’s program for the future. This will allow the students to become active creators of their future, not only passive citizens.

Unsolved problems are only the problems that haven’t been pointed as problem; they stay in the shadow and wait for the moment to burst into flames and make incorrigible damage.



*Figure. 10 Traffic unit*

Nataša PRAŠNIKAR prof .mat. in fiz.



## **ANALIZA VOZNEGA PARKA**

Povzetek

V članku sem se odločila predstaviti nadzor nad skupino prevoznih sredstev. Analiza voznega parka predstavlja ključni element za nadzor in uspeh nad delom in finančnimi izidi skupine vozil, ki opravljajo prevoze blaga. Za uspeh podjetja in rast poslovne dejavnosti je v prvi vrsti pomemben izkoristek prevoznih sredstev in s tem povezani finančni izid poslovanja. Pri nadzoru prevoznih sredstev poznamo klasične metode, ki pa so z rastjo novih tehnologij izgubile boj. Nove sodobne tehnologije in pristopi nam omogočajo nadzor in reakcije v realnem času. Te tehnologije omogočajo sodobnim prevoznim podjetjem trenutno – dnevno analizo nad opravljenim delom in izkoristkom delovnega parka.

Ključne besede:

Analiza dela voznega – delovnega parka vozil in voznikov. Sodobne metode nadzora in trenutno spremljanje dela prevoznih sredstev, kontrola izkoriščenosti prevoznih kapacitet.

## 1. UVOD

Za določanje učinkovitosti transportnega dela cestnih vozil obstajajo številni tehnično – tehnološki in uporabnostni kazalniki, med katerimi imajo posebni pomen kazalniki izkoristka nosilnosti. V prispevku je analiziran način ugotavljanja koeficientov statičnega in dinamičnega izkoristka nosilnosti cestnih vozil ter njihove medsebojne primerjave.

Načrtovanje, raziskovanje in ocenjevanje učinkovitosti dela cestnih vozil v potniškem in tovornem prometu niso mogoči brez analize določenih kazalnikov za vrednotenje ustvarjenih rezultatov dela. Obstajajo številni tehnološko- uporabnostni kazalniki dela cestnih vozil npr., kazalniki časovne bilance dela vozil, kazalniki izkoristka prevožene poti., kazalniki pogojev pri opravljanju transportnega dela, kazalniki izkoristka zmogljivosti cestnih vozil ter prevozne zmoglosti cestnega voznega parka idr.

Med vsemi temi kazalniki, posebej v skupini kazalnikov izkoristka zmogljivosti cestnih vozil so najpomembnejši tisti, ki se nanašajo na nosilnost. Slab izkoristek cestnih vozil zmanjšuje njihov transportni učinek, izražen v tonskih kilometrih (tkm), potniških kilometrih (pkm), ali prostorninskih kilometrih (m<sup>3</sup>km), kar je še posebno pomembno na večjih razdaljah.

## 2. RAČUNSKE METODE

Model statičnega izkoristka nosilnosti cestnih vozil predstavlja način ugotavljanja koeficienta statičnega izkoristka kot razmerja količine prepeljanega tovora in količine tovora, ki bi lahko bila prepeljana pri popolnoma izkoriščeni nosilnosti.

Koeficient statičnega izkoristka cestnih vozil ( $y$ ) dobimo z naslednjimi enačbami.

- Za eno vozilo v eni vožnji s tovorom:

$$y = \frac{q_x}{q}$$

kjer sta:

$q$  - dejanska količina tovora, ki je prepeljana v eni vožnji s tovorom,

$q_x$  - koristna nosilnost vozila.

- Za eno vozilo v določenem časovnem obdobju :

$$y = \frac{Q_1}{qZ_x}$$

kjer sta:

$Q_1$ - količina tovora, ki je prepeljana z enim vozilom v določenem časovnem obdobju,

$Z_x$ - □število voženj s tovorom v določenem časovnem obdobju

$q_x$  - koristna nosilnost vozila.

- Za homogeni vozni park ali skupino vozil iste koristne nosilnosti v določenem časovnem obdobju:

$$y = \frac{Q}{qAZ_x}$$

kjer sta:

Q- količina dejansko prepeljanega tovora,

AZ<sub>x</sub>- število voženj s tovorom v določenem časovnem obdobju

q<sub>x</sub> - koristna nosilnost vozila.

Predhodno sta prikazani dve iz množice enačb za analizo voznega parka, ki nam prikazujeta zapletenost in dolgotrajno pridobivanje informacij.

Te informacije so ključnega pomena za načrtovanje in prikaz izrabe – izkoristka prevoznih sredstev. Za analizo voznega parka po klasični računski metodi je potrebno veliko dela in človeških resursov. Metoda je zanesljiva, ni pa dinamična in se ne odvija v realnem času, pač pa po opravljeni transportni storitvi, če želimo prikazati realno stanje. Iz tega razloga je na trgu več orodij, ki v povezavi s sledenjem vozil, ter merjenjem več podatkov iz samega vozila, dajejo hitre in zanesljive podatke, ki jih lahko spremljamo v realnem času. Podatke lahko nadziramo preko računalnika ali pa prenosnega telefona, kar je precej pogosto.

Iz omenjenih razlogov se poslužujemo orodij za upravljanje z voznim parkom.



Slika: ITelematski sistemi (vir: <http://www.cvs-mobile.si/>)

### 3. TELEMATSKI SISTEMI

Telematski sistem je poslovna rešitev, ki zagotavlja brezhibno upravljanje voznih parkov, delovnih procesov ter mobilnih zaposlenih. Primeren je za uporabo na številnih področjih, predvsem v transportu, logistiki, gradbeništvu, potniškem prometu ter v številnih storitveno orientiranih zasebnih ali javnih organizacijah. Prednosti so na dlani – poleg očitnih stroškovnih in

časovnih prihrankov ter prihrankov pri porabi goriva podjetje pridobi tudi boljši vpogled v delo zaposlenih in učinkovitejšo izrabo virov.

### *3.1 Vozni park pod nadzorom*

Telematski sistem podjetju omogoča preprosto upravljanje in natančen nadzor voznega parka. Z njegovo pomočjo ima lahko vaše podjetje v vsakem trenutku na voljo podatke o lokaciji in stanju vozil ter nalogah, ki jih opravljajo vozniki. Uporaba inteligentnih terminalov omogoča natančno, pregledno in cenovno učinkovito komunikacijo med upravljavcem voznega parka, dispečerjem nalog ter vozniki.

### *3.2 Povezani in informirani*

Telematski sistemi ponujajo še dodatne aplikativne razširitve telematskih rešitev na spletne ali mobilne portale. S tem je omogočeno sledenje tovora/vozila/voznika z različnih naprav. Telematske rešitve omogočajo vrsto optimizacij poslovanja, prednjačijo pa optimizacija delovnega časa in voženj voznika ter optimizacija porabe goriva. Kopica zbranih podatkov o vozilih in načinu vožnje pa upravljavcu voznega parka omogoča natančno načrtovanje obremenitev vozil ter servisnih intervalov.

Telematski sistemi za upravljanje voznega parka poskrbijo za:

- Sledenje vozilom in tovoru
- Popoln nadzor nad voznim parkom
- Navigacijo voznika in optimizacijo poti
- Popolno telemetrijo voznega parka
- Optimizacijo porabe goriva
- Optimizacijo delovnega časa in voženj voznika



*Slika: 2 Telematski sistemi (vir: [www.pacificcontrols.net](http://www.pacificcontrols.net))*



### *3.3 Nadzor dogajanja na delovnem mestu*

Telematski sistemi poleg stalne komunikacije med voznikom in upravljavcem voznega parka ali dispečerjem omogočajo tudi pregledno in enostavno upravljanje delovnih procesov. Sistemska rešitev poskrbi tako za funkcijo prijave voznika na delovno mesto kot tudi za vodenje prisotnosti voznika v vozilu ali za nadzor delovnih mest, pri katerih se vozniki menjajo.

### *3.4 Visoka učinkovitost in delo brez napak*

Vnos dogodkov in njihovih stanj še dviguje uporabno vrednost telematskega sistema in s tem pripomore k urejenosti in vodenju osnovnih delovnih enot naročnika, obenem pa ima upravljalec boljši vpogled v dejansko stanje. Zagotovljena dvosmerna komunikacija omogoča visoko učinkovitost dela brez napak, telematski sistem pa skrbi za optimizacijo delovnih postopkov pri posamezni nalogi.

### *3.5 Informacije, ki pomagajo računovodstvu, kadrovski službi ...*

Integracija telematskega sistema z osrednjim informacijskim sistemom podjetja omogoča izmenjavo podatkov med različnimi aplikacijami, kar vašemu podjetju poenostavi vodenje ter upravljanje dokumentacije. Sistemske rešitve, ki skrbijo za samodejni zajem in prenos podatkov, so tudi bistveno bolj natančne od ročnih vnosov, posledično pa je v poslovanju manj napak in zlorab.

### *3.6 Odkrivanje ozkih grl v poslovanju*

Povezava z osrednjim informacijskim sistemom vašemu podjetju omogoča tudi natančne analize delovnih procesov in njihovo optimizacijo, saj z različnimi poizvedbami hitro odkrijete ozka grla v poslovanju.

Telematski sistemi za upravljanje delovnih procesov poskrbijo za:

- Učinkovito delovanje delovnih procesov
- Učinkovito upravljanje zaposlenih in nalog
- Optimizacijo delovnih postopkov
- Neomejeno komunikacijo med uporabniki sistema
- Integracijo z osrednjim informacijskim sistemom ter razširitev njegove funkcionalnosti

### *3.7 Upravljamo lahko le vire, ki jih poznamo in obvladujemo*

Popoln pregled nad viri podjetja ob ustreznem upravljanju zagotavlja njihovo učinkovito porabo ter podjetju v vsakem trenutku postreže z informacijami o virih, ki so mu na voljo, katera področja so kritična in kje se zaloge še nahajajo. Sistemska rešitev podrobno spremlja tudi vse stroške, povezane z viri podjetja in lahko ustrezno odreagira (obvesti odgovorne), če stroški presežejo postavljene omejitve.

### *3.8 Spremljanje stroškov po stroškovnih mestih*

Sledenje vozil služi za podroben pregled nad nalogami, ki jih opravljajo zaposleni, lokacijski in telemetrični podatki pa skupaj z vnosom stanja s strani zaposlenih omogočajo zelo dobro spremljanje stroškov po vozilih, zaposlenih, nalogah in/ali stroškovnih mestih.

### *3.9 Natančnost pri planiranju poslovanja*

Vpeljani telematski sistemi pripomorejo k natančnejšemu planiranju, saj vaše podjetje na osnovi popolne zgodovine preteklih dogodkov lažje napoveduje prihodnje poslovanje.

Telematski sistemi za upravljanje virov v podjetju poskrbijo za:

- Sledenje vozil/voznikov ter nalog, ki jih opravljajo
- Spremljanje stroškov po vozilih, zaposlenih, nalogah in/ali stroškovnih mestih
- Učinkovito porabo virov podjetja
- Izdelavo naprednih analiz in poročil
- Ugotavljanje ozkih grl v poslovanju podjetja
- Integracijo z osrednjim informacijskim sistemom ter razširitev njegove funkcionalnosti

Programska oprema v navezi s telematskimi rešitvami omogoča vrsto funkcionalnosti, ki koristijo vsem vpletenim v dogajanje okoli voznega parka podjetja. Z rešitvami pridobijo tako lastniki, upravljavci voznih parkov in vozniki kot tudi naročniki storitev.

#### **PREDNOSTI ZA VOZNIKE**

- stalna pisna komunikacija med vozniki in dispečerskim centrom
- preprosta navigacija v vozilu z glasovnim vodenjem v različnih jezikih
- večja varnost voznikov (opozorila na zapore cest, kontrole prometa, radarje, ovire ...)

#### **PREDNOSTI ZA DISPEČERJE**

- upravljanje z voznim parkom prek spletne aplikacije
- načrtovanje prevozov
- načrtovanje poti
- prikaz trenutne lokacije vsakega vozila
- prikaz trenutnih položajev za vsako vozilo
- prikaz prevožene poti za vsako vozilo
- ustvarjanje delovnih nalogov
- vnos interesnih točk
- potrjevanje stanj vozila/voznika
- stalna pisna komunikacija z voznikom
- spremljanje vseh telemetrijskih podatkov iz vozila (vmesnik CAN-Bus) in iz dodatnih senzorjev (hitrost, količina goriva, temperature, tovora ...)
- spremljanje in odzivanje na alarme iz vozila

#### PREDNOSTI ZA PODJETJA

- spremljanje potovanja svojega tovora na spletu
- izračun predvidenega časa dostave (ETA)

#### PREDNOSTI ZA UPRAVLJAVCE VOZNEGA PARKA

- stalno spremljanje stroškov
- načrtovanje in upravljanje vzdrževanja voznega parka
- spletna poročila, razvrščena po različnih parametrih (po vozilu, vozniku, stranki, državi)
- analize po različnih parametrih (po vozilu, vozniku, stranki, državi)
- povezovanje in integracija z obstoječimi informacijskimi sistemi in drugimi programskimi rešitvami

#### PREDNOSTI ZA LASTNIKE

- možnost nakupa ali najema opreme
- fiksni mesečni stroški uporabe
- hitra povrnitev naložbe
- konkurenčna prednost podjetja

## 4. ZAKLJUČEK

V prispevku so prikazani sistemi za nadzor voznega parka, opravljanje analiz v realnem času in dinamično delo z vozili, vozniki. Sistemi za analiziranje podatkov se stalno nadgrajujejo in se prilagajajo posameznim uporabnikom. Smotnejša izraba voznega parka, osebja nam prinese boljše finančne rezultate, kvalitetnejše opravljanje storitev, kar cenijo uporabniki in z boljšo izkoriščenostjo voznega parka tudi manjši ogljični odtis in bolj ekološki odnos do naše življenjske sredine

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## AN ANALYSIS OF A MOTOR POOL

### Summary

I decided to introduce the control of a motor pool in this article. An analysis of the motor pool is key for successful control over the work and the financial outcome of a group of vehicles carrying out cargo transport. The efficiency of transportation and the financial outcome of commerce connected to it are crucial for the success and business growth of a company. The classical methods used to control transportations have lost the fight with the growth of new technologies. New, modern technologies and approaches enable us to control and react in real time. These technologies enable the contemporary haulage companies the current – daily analysis of the work done and the efficiency of the motor pool.

### Key words:

The analysis of the motor pool and drivers. Contemporary methods of control and the current monitoring of a vehicle's work, the control of the full use of transport capacities.

## 5. INTRODUCTION

There are numerous technical, technological and exploitation parameters for determining the transportation work efficiency of road vehicles, among the most important are the capacity-exploitation parameters. In this paper, the determination of static and dynamic coefficients of the capacity-exploitation parameters of road vehicles and their mutual comparison is analysed.

Planning, researching and grading the work efficiency of road vehicles in public and cargo traffic is not possible without an analysis of the determined parameters for grading the acquired results of work. There are numerous technological and exploitation parameters for road-vehicle work, for example: time parameters of vehicle-work balance, exploitation parameters of the transportation route, condition parameters in realising transportation work, capacity exploitation parameters of road vehicles and the transportation capability of a road motor pool etc.

Among all these parameters, especially in the group of capacity-exploitation parameters of the road vehicle, the most important are the parameters that refer to capacity. Under exploitation of road vehicles decreases their transportation effect in ton kilometres (tkm), volume kilometres ( $m^3km$ ) or passenger kilometres (pkm), which is especially important over longer distances.

## 6. NUMERICAL METHODS

The model of static-capacity exploitation for road vehicles represents the way of establishing the coefficient of static exploitation compared to the quantity of transportation goods and the quantity of goods that could be transported by complete capacity exploitation.

The coefficient of static exploitation for road vehicles ( $g$ ) is determined with the following equations.

- For one vehicle in one drive with cargo:

$$y = \frac{q_x}{q}$$

where:

$q$  - is the real quantity of cargo that is transported in one drive with cargo,

$q_x$  - is the benefit capacity of road vehicles.

- For one vehicle in a determined time period:

$$y = \frac{Q_1}{qZ_x}$$

where:

$Q_1$ - is the cargo quantity that is transported with one vehicle in a determined time period,

$Z_x$ - is the number of drives with cargo in a determined time period.

$q_x$  - is the benefit capacity of road vehicles.

- For a homogenous motor pool or a group of vehicles with the same benefit capacity in a determined time period:

$$y = \frac{Q}{qAZ_x}$$

where:

$Q$ - is the cargo quantity which is actually transported,

$AZ_x$ - is the number of drives in a motor pool with cargo in a determined time period

$q_x$  - is the benefit capacity of road vehicles.

Two equations out of the set for motor pool analysis demonstrate the complexity and long-term data production.

This information is key for planning and display of usage – exploitation of vehicles. A lot of work and human resources are needed for an analysis of a motor pool with a classical calculation method. The method is reliable, but not dynamic and real-time, but done after a finished transport service, if we wish to show the realistic situation. For that reason there are many tools on the market, that in connection to vehicle tracking and measuring different data from the vehicle itself, give fast and reliable information, that can be tracked in real-time. The

data can be supervised via a computer or a smartphone, which happens often.

For the beforementioned reasons we use tools for motor pool management.



Picture: 3Telematicsystems (source: <http://www.cvs-mobile.si/>)

## 7. TELEMATICS SYSTEMS

A telematic system is a business solution that provides seamless management of fleets, work processes and mobile workers. It is designed to be used in a number of industries, including transportation, logistics, construction, passenger transport and numerous other service-oriented private or public organizations. The benefits are clear – in addition to saving money and time and reducing fuel costs, companies also improve their insight into the work of their employees and ensure improved utilization of resources.

### *3.1 Your fleet under control*

A telematics system enables companies to streamline management operations and accurately control their fleet. The solution gives your company access to real-time information about vehicle location and status data as well as insight into the current activity performed by drivers. The solution uses intelligent terminals to provide accurate, transparent and cost-efficient communication between fleet managers, dispatchers and drivers.

### *3.2 Connected and informed*

Telematics systems offer additional applications that extend telematics solutions to online and mobile portals. This enables our customers to use different devices to track cargo/vehicles/drivers. Telematics solutions provide the basis for different approaches to business optimization, with the focus on work hours and route optimization as well as fuel consumption optimization. Vehicle and driving behavior data enables fleet managers to accurately plan vehicle workloads and service schedules.

Fleet management telematics systems provide the following functionalities:

- Cargo and vehicle tracking
- Complete fleet control
- Driver navigation and route optimization
- Complete fleet telematics
- Fuel consumption optimization
- Optimization of driver work hours and routes



Picture: 4 Telematicssystems (source: [www.pacificcontrols.net](http://www.pacificcontrols.net))

### *3.3 Control over the workplace*

In addition to providing always-on communication between drivers and fleet managers or dispatchers, telematics systems also provide streamlined and transparent features for managing business processes. The solution enables you to track, when your drivers report to their workplace, and helps you monitor drivers' presence in the workplace as well as manage workplaces where several drivers use the same vehicle.

### *3.4 Efficiency and error-free operations*

Input of events and their statuses further increases the value of the telematics system and contributes to improving our customer's management of basic work units. At the same time, it gives managers improved insight into the status of their fleet. Two-way communication improves the efficiency of operations and minimizes errors, while the telematics system ensures the optimization of business processes for individual tasks.

### *3.5 Information that aids accounting, human resources, and others*

By integrating the telematics system with their line-of-business applications, companies can implement data exchange between different applications to streamline documentation management. System solutions for automated data capture and transfer also provide improved accuracy compared to manual entries and reduce risk of errors or fraud.

### *3.6 Identifying bottlenecks in your business*

Integration with the central information system also provides your company with detailed business process analyses and optimization opportunities. By running different queries, you can easily identify the bottlenecks in your company.

Telematics systems for business process management ensure:

- Efficient operations
- Efficient people and task management
- Business process optimization
- Unlimited communication between users
- Integration with the central information system to extend its functionalities

### *3.7 You can only manage the resources you know and control*

Complete overview of company resources coupled with management features enables the appropriate utilization of resources and ensures that you always have the right information about resource availability, critical areas and available inventory. The solution also tracks costs of company resources and can respond by alerting the responsible persons, if costs exceed the predefined limits.

### *3.8 Tracking costs by cost centres*

Vehicle tracking provides a detailed overview of tasks performed by your employees, while location and telematics data coupled with the input of status updates by your employees enable you to accurately track costs by vehicles, employees, tasks and/or cost centers.

### *3.9 Accuracy of business planning*

Telematics systems improve the accuracy of your planning process. By utilizing the complete history of past events, your company can more easily forecast future business.

### **Resource management telematics systems provide the following functionalities:**

- Tracking vehicles/drivers and their activities
- Tracking costs by vehicles, employees, tasks and/or costs centers.
- Efficient resource utilization
- Advanced analyses and reporting
- Identifying bottlenecks in operations
- Integration with the central information system to extend its functionalities

Software combined with telematics solutions provides a number of functionalities that benefit everyone involved with the company fleet. The solutions benefit owners, fleet managers and drivers as well as service customers.



#### DRIVER BENEFITS

- Continuous written communication between drivers and dispatchers
- Simple multilingual turn-by-turn navigation
- Improved driver safety (closed roads alerts, speed measurements, traffic control, road works, etc.)

#### DISPATCHER BENEFITS

- Web-based application for fleet management
- Transportation planning
- Route planning
- Current location for individual vehicles
- Current position for individual vehicles
- Distance travelled for individual vehicles
- Work order preparation
- Ability to input points of interest
- Confirming vehicle and driver status
- Continuous written communication with drivers
- Ability to track all vehicle telematics data (CAN-Bus interface) and data from additional sensors (speed, remaining fuel, temperature, cargo)
- Ability to track and respond to vehicle alerts

#### COMPANIES' BENEFITS

- Ability to track their cargo online
- Estimated time of arrival calculation

#### FLEET MANAGER BENEFITS

- Continuous tracking of costs
- Planning and managing fleet maintenance
- Online reports using various parameters (by vehicle, driver, customer, country)
- Analysis using various parameters (by vehicle, driver, customer, country)
- Interoperability and integration with existing information systems and other software solutions

#### OWNER BENEFITS

- Ability to buy or lease the equipment
- Fixed monthly costs
- Quick ROI
- Competitive advantage

## 8. CONCLUSION

The article shows systems for fleet control, performing real-time analysis and dynamic work with vehicles and drivers. Data analysing systems are constantly being upgraded and adjusted to individual users. A more sensible use of a motor pool and staff brings better financial results, a higher quality service performed, which is more appreciated by users, and with a better exploitation comes a smaller carbon footprint and a more ecological relationship to our life core.

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## VPLIV ELEKTRIČNIH VOZIL NA OKOLJE

### **Povzetek:**

V prispevku se bom dotaknila aktualne teme vpliva električnih vozil na življenjsko okolje. Osnovna tematika obravnava proizvodnjo baterij, kot ekološko najtežavnejšega elementa električnih vozil, vpliv pridobivanja in proizvodnje, ter reciklaže baterij za pogon električnih vozil. Na koncu prispevka sledi še vprašanje dejanskega izkoristka električnih vozil in ekološki vidik le tega. Ključno vprašanje, ki kot rdeča nit spremlja tematiko je: na katere ekološke vidike, bi bilo potrebno polagati več pozornosti v novi prihajajoči električni prihodnosti prevoznih sredstev. Članek je povzetek kritičnih mnenj o električnih vozilih, ki vedno bolj nezadržno vstopajo v našo življenjsko sredino. Namen ni zaviranje te tehnologije in prepričevanje o nesmiselnosti, ampak opozorila strokovne javnosti na nekatere neresnice in zmotne poglede o čistosti teh vozil.

### **Ključne besede:**

Baterije, težke kovine, ekologija, izkoristek električnega vozila, vpliv električnih vozil na okolje.

## 1. POVZETKI ČLANKOV NA TEMO ELEKTRIČNIH VOZIL

# ELEKTRIČNI AVTOMOBILI NOVA GROŽNJA ZA OKOLJE

**Električni avtomobili - nova 'grožnja' za okolje (5.10.2012, Oslo - MMC RTV SLO)**

Znanstveniki so upoštevali celoten proces proizvodnje.

**Na norveški univerzi za znanost in tehnične študije so objavili raziskavo, v kateri ugotavljajo, da sam proces izdelave električnih avtomobilov bolj onesnažuje okolje kot izdelava vozil na fosilna goriva.**

Če sicer pogledamo električni avtomobil kot avtomobil sam po sebi, je ta seveda učinkovitejši in tudi do okolja prijaznejši kot avtomobili, ki imajo motor z notranjim izgorevanjem. Električna vozila tudi oddajajo manj izpustov od tistih, ki imajo motor z notranjim izgorevanjem. Toda v omenjeni raziskavi je skupina raziskovalcev upoštevala celotni življenjski krog avtomobila na električni pogon: od njegove proizvodnje do same uporabe in seveda konca njegove življenjske dobe.

### **Okolju nevarna je električna energija iz premoga**

Količina toplogrednih plinov v ozračju bi se naglo povečala, če bi se povečalo število električnih avtomobilov, so zapisali v poročilu. Raziskovalci so pri analizi upoštevali možnost nastanka kislega dežja in smoga, nastanek trdih delcev v zraku ter zasičenost človeškega telesa in narave z onesnaženimi delci - trenutno so primarni viri električne energije nafta, premog in plin. Pri upoštevanju vseh teh dejavnikov so se električni avtomobili izkazali za slabše ali vsaj enako močne onesnaževalce okolja kot tradicionalna vozila. Še posebej vznemirljiv pa je podatek, da med večje onesnaževalke okolja sodijo tovarne, ki proizvajajo električne avtomobile. Pri izdelavi baterij in električnih motorjev namreč uporabljajo strupene minerale, kot so nikelj, baker in aluminij.

"Že sama proizvodnja električnih avtomobilov je tako škodljiva za okolje, da ti avtomobili okolje onesnažijo, še preden se vozila sploh vozijo po cesti," so zapisali v poročilu.

### **Alternativa: sončna in vetrna energija**

Ni skrivnost, da poskušajo za nadaljnji razvoj električnega avtomobila znanstveniki najti načine, kako pridobiti elektriko na najbolj čist način, kot jerecimo sončna ali vetrna energija, in hkrati zagotoviti njihovo optimalno izrabo. "Kontraproduktivna pa je promocija električnih avtomobilov v regijah, kjer elektriko večinoma pridobivajo iz lignita ali premoga," so še zapisali v poročilu.

# NOVI TESLA S KOT ONESNAŽEVALEC

**Singapurske oblasti pravijo, da električna tesla S onesnažuje preveč**

(4.4.2016, Singapur - MMC RTV SLO )

**Električni avtomobili naj bi rešili svet pred onesnaženjem. Električna vozila so brez-emisijska, zaradi česar vlade po svetu pri nakupu ponujajo ugodnosti, kot so denarne subvencije, s tem pa spodbujajo prodajo EV-vozil. V Singapurju je drugače.**

Kupec električne tesle S iz Singapurja je bil šokiran, ko je želel uvoziti električno vozilo v državo. Namesto pričakovanega popusta mu je država izstavila račun za skoraj 10.000 evrov, ker naj bi bilo električno vozilo onesnaževalec okolja. Tesla model S je 100-odstotno električno športno vozilo, to pomeni, da je brez izpustov. Kaj se je torej zgodilo?



Slika 6: Tesla S (vir: <https://www.teslamotors.com> )

## Neobnovljivi viri elektrike so onesnaževalci

Oblasti v Singapurju, kjer vlagajo veliko denarja v gradnjo energijskih mrež za pridobivanje elektrike s pomočjo obnovljivih virov sončne energije in vetra, obdavčujejo vozila glede na stopnjo onesnaževanja okolja. Pri električnih vozilih vključijo tudi onesnaženje, ki nastane s pridobivanjem elektrike, ki jo potem uporablja vozilo za pogon. Oblasti v Singapurju so tako izračunale, da Tesla S porabi 444 Wh/km, kar je veliko odstopanje od 181 Wh/km, ki jih v tehničnih specifikacijah vozila navajajo pri Tesla Motorsu.

Presenečeni so bili tudi pri Tesli, kjer so za spletno stran BBC Autos izjavili: "Električni avtomobili kot je Tesla S, ustvarijo trikrat manj ogljikovega dioksida kot ekvivalent avtomobila na bencinski pogon. S tem se Tesla S vključuje v skupino najčistejših avtomobilov v Singapurju." Pri Tesli trdijo, da pri 181 Wh/km Tesla S v zrak izpusti 90 gramov ogljikovega dioksida na kilometer, medtem ko podoben avtomobil, mercedes razreda S, v zrak na kilometer poti izpusti 200 gramov ogljikovega dioksida.

# ELEKTRIČNI ALI Z NOTRANJIM ZGOREVANJEM

## Kateri je bolj škodljiv električen ali bencinski?

Mislím, da bi na zgornje vprašanje vsak povprečen človek brez razmišljanja odgovoril, da bencinski oziroma dizelski, vendar vse kaže, da (vedno) ni tako.

Razmišljati o elektromobilih v času, ko je nafta na svetovnih trgih (pa tudi v nekaterih evropskih državah na bencinskih črpalkah) dosegla izjemno nizko ceno, se zdi nesmiselno, a industrija pač deluje dolgoročno, kar je edino prav. Drugače, zaradi dolgega razvoja, niti ne more.

Problem je, še enkrat na kratko, v 'nesporazumu' med ljudmi in industrijo. Vsega kar je starejše od 14 dni, naveličani potrošniki s(m)o tokrat pograbili elektromobile kot suho zlato, čeprav vemo, ni prvič, da jih je industrija ponudila. In ker smo pograbili premočno, skuša industrija prodati nov željen in aktualen produkt. In ker je še prezgodaj, prodajajo serijske koncepte, ki po logiki potrošništva še niso nared, zato so pregrešno dragi, potrošniki pa smo zato nejevoljni. Vse gre preveč na silo.

A kaj hočemo, tako pač je in tu so dva- in večkrat dražji od približno primerljivega bencinskega ali dizelskega, poleg tega pa še vedno z veliko premajhnim dometom, s predolgim časom polnjenja, s premalo polnilnicami in še s kakšno pomanjkljivostjo, ki jo je težko prebaviti.

Seveda sta skrajna tabora dva, eden je za, drugi proti, vmes pa so številni, ki se še ne znajo opredeliti. Med drugim je vzrok nihanja med 'za' in 'proti' tudi v tem, da še ne vemo, koliko elektromobili v resnici onesnažujejo. Avtomobilski proizvajalci se izvijajo in ne dajejo podatkov za čisto sliko o škodljivosti velikih baterij; koliko onesnažujejo okolje med gradnjo tovarne, koliko med proizvodnjo in koliko, ko odslužijo. Že baterije mobilnih telefonov in drugih naprav(ic), ki brez njih ne morejo delovati, majhne in lahke, že predstavljajo velik ekološki problem. Kaj bo šele, ko bo elektromobilov veliko?

Tesla, kot trenutno največji posamezni proizvajalec električnih vozil, postavlja mega tovarno baterij v Nevadi v sodelovanju s podjetjem Panasonic. LG je že postavil ogromno tovarno za proizvodnjo baterij za General Motors, Hyundai in še osem drugih večjih proizvajalcev vozil. Tudi VW namerava graditi svojo tovarno baterij, mediji ugibajo, da bo verjetno stala na Kitajskem. S tem se želi osvoboditi trenutne japonske prevlade na tem področju. To so le nekateri od velikih proizvajalcev, o katerih so znani podatki o namerah za gradnjo spornih tovarn. Predvidoma se tudi drugi proizvajalci vozil pripravljajo na gradnjo in vlaganja v tovarne baterij za električna vozila.



Slika 7 : Kako čista je električna iz vtičnice (vir: <http://www.cablex.ch/eng/Sectors/Energy/eMobility>)

## **Električna iz vtičnice je lahko kriva za več onesnaževanja kot bencinski avtomobil med delovanjem**

Toda tokrat gre za drugačen problem. Ljudje smo namreč trdno prepričani, da je električna vtičnica že sama po sebi čista in okolju prijazna. Pa ni tako, daleč od tega. Gledano skozi oči države je namreč pomembno, kako ta električna nastane: iz hidroelektrarn, iz termoelektrarn, iz plinskih elektrarn, iz jedrskih elektrarn, iz vetrnih elektrarn ... Prav vsaka predstavlja poseg v okolje, v prostor in v (živo) naravo že sama po sebi, potem je tu še njeno delovanje. Termoelektrarne so med delovanjem daleč najbolj umazane in tudi med njimi so velike razlike, od filtrnih naprav pa do goriva (vrste premoga), ki ga uporabljajo.

Nedavna študija britanske Akademije znanosti, ki je zajela celoten okoljski vpliv življenjskega cikla avtomobila, vključno z virom nastanka električne energije in okoljskega vpliva pri proizvodnji baterij, pravi, da če elektromobil črpa elektriko, ki je nastala iz premoga, ta posredno 'proizvede' do 3,6-krat več smrti zaradi sajev in smoga kot bencinski avtomobil. Poleg tega pravijo, da so termoelektrarne tudi opazno bolj škodljive, ko gre za proizvodnjo toplogrednega ogljikovega dioksida. Podobno trdijo tudi nekateri ameriški znanstveniki, ki niso sodelovali pri tej raziskavi.

Še nekaj objavljenih dejstev: električna iz plinskih elektrarn je za polovico, veter in voda pa za tri četrtine, čistejša od bencina, etanol kot pogonsko gorivo je skoraj enako strupeno kot bencin, hibridi in dizli pa so – z obravnavanega zornega kota – čistejši od bencinarjev.

V dobi interneta so številni prepričani, da so na voljo vse informacije, a je resnica daleč od tega. Prvič, nobena skrivnost ni več, da denar vrti svet, in resnica je, hoteli ali nena strani denarja. In drugič, tudi če bi hoteli, čisto v vseh točkah prave resnice ne pozna nihče. Zadeva je preveč kompleksna, da bi jo lahko ovrednotili, ne da bi pri tem uporabili slabe približke.

Zagotovo pa drži: še preden je elektromobil postal splošna dobrina, je že obsojen zaradi okoljske izdaje. In dejstva renomiranih virov so pri tem zelo verjetna.

## 2. ZAKLJUČEK

Iz predhodnih člankov, ki kritično gledajo na električna vozila, njihovo proizvodnjo in domnevno čistost, ki je v mikro okolju in trenutnem delovanju nesporno čist in zelo primeren za okolje lahko razberemo, da v širšem pogledu in po mnenju strokovnjakov, le ni vse tako enostavno in preprosto, kot je predstavljeno javnosti in uporabniku. Dejstva, da obstajajo pomisleki in zakonske omejitve, kažejo, da je tematiko potrebno predstaviti bolj natančno. Sporno pridobivanje težkih kovin, kjer že pridobivanje povzroča veliko onesnaževanja, prav tako reciklaža in odstranjevanje izrabljenih baterij, bo v bodočnosti predstavljale grožnjo našemu življenjskemu okolju. Naslednje poglavje, ki je predstavljeno, je čistost električne energije na naši vtičnici. Razlika je ali jo pridobimo iz termoelektrarne (fosilna goriva) od koder izvira približno tri četrtine električne energije, in lahko ugotovimo, da je izkoristek celotne poti skupaj s porabnikom slabši od izkoristka novejših vozil z dizelskimi motorji. Nasprotno pa velja za električno energijo, ki je pridobljena iz obnovljivih virov (hidro, solarna, biomasa, vetrna, geotermalna). Omenjena energija nima boljših ampak prej slabše izkoristke na celotni poti do uporabnika. Ima pa zelo veliko prednost pri pridobivanju, saj bistveno manj onesnažuje glede izpustov. V prispevku sem ugotovila, da je tematika mnogo preširoka za kratek prispevek, zato verjamem, da bo moje razmišljanje skupaj z povzetki prispevalo k podrobnejšem analiziranju našega zelenega transporta in ekološke ozaveščenosti pri uvajanju električnih vozil, ki prihajajo oziroma so že tu.

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## **Impact of electric vehicles (EV) on the environment**

### Abstract

The basic theme of the article is production of batteries, ecologically the hardest element of electric vehicles, the impact of production and battery recycling for electric vehicles. The conclusion of the article is followed by a question of actual utilization of electric vehicles and ecological aspect of it. The key question is: which ecological aspects should have more emphasis in the new upcoming future of electric transport. This article is a summary of critical opinions/reviews of electric vehicles, which increasingly cross our life paths. My intention is not to hold back the technology but to warn professional public about untruths and views of eco friendliness of these vehicles.

### Key words:

Batteries, heavy metals, ecology, electric vehicle efficiency, impact of electric vehicles on the environment.

## 1. REVIEW OF ARTICLES ON EV

### Electric cars NEW THREAT TO THE ENVIRONMENT

Electric cars - the new 'threat' to the environment (10/05/2012, Oslo - AP)

Scientists have taken into account the entire production process.

Norwegian University of Science and Technical Studies published a survey, which determined that the very process of making electric cars causes more pollution than making vehicles using fossil fuels.

Moreover, if we look at electric car as the car itself, it is obviously more efficient and more environmentally friendly than cars with internal combustion engine. Electric vehicles also emit less emissions than those having an internal combustion engine. However, in the study, a group of researchers took into account the entire life cycle of electric cars from their production, use to their longevity.

#### Environmentally hazardous electrical energy from coal

The amount of greenhouse gases in the atmosphere would rapidly increase with the rise of electric cars. Researchers have taken into account the possibility of acid rain and smog, formation of particulate matter in the air, saturation of human body and nature with contaminated particles - currently the primary sources of power are oil, coal and gas.

In view of these factors, electric cars (EC) proved to be worse or at least as strong pollutants as traditional vehicles. Especially worrying is the fact that major pollutants of the environment include factories producing electric cars. The production of batteries and electric motors uses toxic minerals, such as nickel, copper and aluminium.

"The mere production of electric cars is harmful to environment so these cars pollute the environment, even before the vehicle is driven on the road," the report stated.

#### Alternative: solar and wind energy

It is no secret that in trying to further develop EC, scientists are pursuing ways to obtain electricity in the cleanest way possible: solar or wind energy and ensure their optimal use at the same time. "Promotion of electric cars in regions where electricity is mainly derived from lignite or coal may prove counterproductive," they wrote in the report.

### NEW TESLA S as a pollutant

Singaporean authorities say Tesla S EC pollute too much  
(04/04/2016, Singapore - AP)

Electric cars will save the world from pollution. Electric vehicles have zero emission, resulting in governments around the world offering benefits such as cash grants, thereby promoting sales of EV. It's different in Singapore.

A buyer of electric Tesla S from Singapore was shocked when he wanted to import the vehicle. Instead of the expected discount, the government invoiced him for almost €10,000, since an electric vehicle is a pollutant. Tesla model S is a 100 percent electric sports vehicle meaning zero emissions. So what happened?



Figure 1: Tesla S (source: <https://www.teslamotors.com>)

### **Non-renewable sources of electricity are pollutants**

Authorities in Singapore, where a lot of money is invested in construction of energy networks to generate electricity using renewable solar and wind energy, vehicles are taxed according to the degree of pollution. In case of electric vehicles pollution, resulting from the acquisition of electricity, which is then used to drive the vehicle is included. Authorities in Singapore have also calculated that Tesla S consumes 444 Wh/km, which is significantly more than 181 Wh/km, which are technical specifications of the vehicle at Tesla Motors.

They were even surprised at Tesla stating for BBC Autos: "Electric cars such as Tesla S, generate three times less carbon dioxide than the equivalent of a car running on petrol. This makes Tesla S one of the cleanest cars in Singapore." Tesla argued that at 181 Wh/km Tesla S emissions are 90 grams of carbon dioxide/km, while emission similar car emissions, a Mercedes S-Class, are 200 grams of carbon dioxide.

### Electric or Internal Combustion

#### **Which is more damaging electric or gasoline?**

I think that the above question would be answered by an average person, without thinking, gasoline or diesel, but it is not always so.

Thinking about EC at a time when oil on world markets (as well as in some European countries and petrol stations) hit an extremely low price, seems absurd, yet the industry works in the long term, which is only right. Due to long development it cannot operate differently.

The problem is, briefly, the 'misunderstanding' between people and the industry. Consumers get fed up with everything older than 14 days thus they grabbed electro cars as if they struck gold, even though we know it was not the first time the industry offered them. And since we got overexcited, the industry is trying to sell the new and desired product. And because it is still too early, they sell serial concepts, which according to consumerism are not ready yet sinfully expensive, and consumers are therefore frustrated. Everything is forced.

But that's the way it is. They cost twice as much or are several times more expensive than roughly comparable gasoline or diesel, in addition, still with marginal outreach, excessive charging time, lack of bottlers and even with some deficiency, which can be difficult to digest.

Of course, there are two extreme camps, pro and contra, and a number of indecisive among them. Among other things, the cause of fluctuations between pro and contra is that we do not know how EC pollute the environment. Car manufacturers do not provide data for a clear picture of harm sized batteries; how much they pollute while factories are being built, how much during production and EC longevity. Even batteries of mobile phones and other devices, without which they cannot be operated, small and light, already represent a major ecological problem. What will happen when there are too many EC?

Tesla, currently the largest single producer of electric vehicles, is building a mega battery factory in Nevada in collaboration with Panasonic. LG has already set up a huge factory to produce batteries for General Motors, Hyundai and eight other major vehicle manufacturers as well. VW also intends to build its battery factory, the media speculates that it is likely to be in China. The aim is to liberate the current Japanese dominance in this field. These are just some of the big manufacturers, whose intentions of controversial construction of factories. It's estimated that other vehicle manufacturers are preparing for the construction of and investment in batteries factories for electric vehicles.



Figure 2: How to clean the electricity from the socket  
(source: <http://www.cablex.ch/eng/Sectors/Energy/eMobility>)

## **Electricity from sockets may be to blame for more pollution than gasoline cars during operation**

But this time it is a different problem. In fact, people strongly believe that electrical outlet itself is clean and environmentally friendly. It's not so, far from it. Seen through the eyes of the country, it's important how electricity is generated: hydro/thermal power plants, gas power plants, nuclear power plants, wind ... Each represents an interference with the environment, space and nature then there is its performance. Thermal power plants in operation are by far the dirtiest and there are huge differences between them, from filter devices to fuel (coal types).

A recent study by The British Academy of Sciences, covering overall environmental impact of car longevity, including the source of emergence of electricity and environmental impact in the production of batteries, says that if EC draws electricity created from coal this indirectly 'produces' up to 3.6 times more deaths from soot and smog than gasoline cars. In addition, they say that thermal power plants are also significantly more damaging when it comes to production of greenhouse gas carbon dioxide. Similarly, the problem is argued by some American scientists who were not involved in this study.

A few published facts: electricity from gas power plants is by half, wind and water by three quarters cleaner than gasoline, ethanol as a motor fuel is almost as toxic as gasoline, hybrids and diesel are - from the present angle - cleaner than gasoline.

In the Internet age, many are convinced that all the information is available, but the truth is far from it. First of all, it's no secret money makes the world go round, and the truth is, sadly, on the money side. And secondly, even if they wanted to, nobody really knows the truth on all counts. The matter is too complex to be evaluated, without the use of poor approximations.

Certainly, it is true: before EC has become general commodity, it has already been accused of environmental issue. Facts of reputable sources are very likely.

## **2. CONCLUSION**

From the above mentioned critical articles on electric vehicles, production and alleged purity, which are in the micro-environment and current operation undeniably clean and very suitable for the environment, it can be seen in a wider context and, according to experts, that all is not as simple as presented to the public and user. The fact that there are concerns and legal restrictions implies that the topic should be presented in more detail. Controversial extraction of heavy metals, which already cause pollution, as well as recycling and disposal of batteries will pose a threat to our environment in the future. The next chapter, which is presented, is the purity of electricity in our outlets. The difference is whether electricity is obtained from thermal power plants (fossil fuel), where approximately three quarters of electricity derives from, and we can deduce that the efficiency of entire route, customer included, is worse than efficiency of newer vehicles with diesel engines. The opposite goes for electricity generated from renewable sources (hydro, solar, biomass, wind, geothermal). The latter has no better but rather worse effects on its way to the consumer. Its advantage is in obtaining as it pollutes less.

I found the topic far too broad for a short contribution, so I believe my points of view, together with summaries, contributes to detailed analysis of our green transport and environmental awareness when introducing present and future electric vehicles.

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**INTERDISCIPLINARNOST NA LOGISTIKA,TRANSPORT  
SKOPJE 2016**



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**TEMA : Vlijanie na nepovolni vremenski uslovi pri  
soobrakajni nezgodi**

## *Skopje, 2016*

Ključni zborovi: pat, klima, promet, vozilo

### **Voved**

Patot kako faktor vo bezbednosta na soobrakajot e edna od alkite na sindzirot za bezbednosta vo soobrakajot.

Klima kako faktor za razvoj na transportnite sistemi vklucuvaat prirodni i geografski faktori. Vlijanieto na klimata na promet se odnesuva na klimata i vremenskite uslovi, i e prisutna vo faza na izgradba i operativnata faza na patot, ili vo tekot na soobrakaj. Klimatski uslovi, kako rezultat na mnogu godini na nabljuduvanje, se poznati i transportna mreza mora da se prilagodi. Aerodromi, na primer, izgradena vo oblasti kade najpovolni uslovi za vozdusen soobrakaj, avtopat vo planinskite oblasti na gradot kade snezni vrnezi ne se golemi i kade ne postoji moznost na lavina. Vremenskite uslovi samo delumno se predvidlivi. Osobeno znacajni se odlicni vremenski uslovi koi moze da ima katastrofalni posledici za soobrakaj. Toa e ocigledno vo gradskite oblasti kade poradi golemite kolicini na dozd ili sneg doagja do teskotii vo soobrakajot. Sepak, negativnite efekti od klimatskite faktori mozat da bidat ublazeni.

Obvraska na vozacot e da ja proveriti tehnickata ispravnost za da moze da se vkluci vo soobrakajot i da se dvizi po patistata i ne smee da upravuva so vehicle dokolku toa e neispravno ili ne gi ispolnuva uslovite propisani za soobrakaj na patistata .

Na vozilata sto se proizvedeni seriski ili poedinecno mora da ima se izvrsi soodvetno ispituvanje a potoa se izdava odobrenie – atest za pistanje vo promet na vakvi motorni ili priklucni vozila.

Voziloto ne smee da se preoptovaruva poveke odkolku sto mu e dozvolena nosivosta odnosno propisana vo soobrakajnata dozvola. Tovarot na voziloto treba da bide smesten i pricvrsten za vehicle taka da ne mu precu na vozacot na i da ne gi zagrozuva licata koi se prevezuvaat ili da ne gi zagrozuva ucesnivate vo soobrakajot i da ne ja namaluva stabilnosta na vehicle i da ne gi zaskriva svetlosnite uredi i oznakite na voziloto. Tovarot sto ja preminuva dolzinata, sirinata i visinata na vehicle mora da bide obelezano na nacin so koj ke bidat predupredeni drugite ucesnici vo soobrakajot.

Dokolku voziloto poradi odredena neispravnost ili soobrakajna nezgoda e onesposobeno za ponatamosna rabota i e ostaveno na patot togas vozacot e dolzen vednas da go trgne voziloto od patot so cel da ne gi zagrozi drugite ucesnici vo soobrakajot.



# PATOT KAKO FAKTOR ZA BEZBEDNOST VO SOBRKAJOT

Koga stanuva zbor za patot kako faktor za bezbednost vo soobrakajot se misli i na ulicite, mostovite, tunelite, nadvoznicite, podvoznicite i dr. Procentot na soobrakajni nezgodi koi nastanale kako posledica od nedostatoci i ostetuvanje na kolovoznata konstrukcija se dvizi vo odredeni granici zaradi koi ne treba da se zaobikoli pri analiza na pricinite koi doveduvaat do soobrakajni nezgodi.

Patistata ne mozat da se zamislat bez soodvetna signalizacija. Signalizacijata e sostaven del od patistata i ima zadaca da gi izvesti i stiti koristinicite i ucesnicite na patot. Soodvetni i dobro obelezan pat pretstavuva pogolema sigurnost za site onie koi se pridruvaat kon vremenskite i namenski izvestuvanja so pomos na postavenata signalizacija koja ima za cel da gi zastiti i izvesti navremeno korisnicite na patot i da im ovozmozi maksimalna iskoristenost na patot pod odredeni uslovi.



Sl.1 Ostetuvanje na patot poradi lizganje na zemjiste

Normalna e i pojavata najgolem broj na vozila da se dvizati vo gradovite pa zatoa i problemite od soobrakajot vo gradovite znatitelno se pokomplicirani sto e od posebno znacenje vo denesnite uslovi na razvoj na soobrakajot kaj nas.

Dokolku gi imame vo predvid i faktot deka nasite gradovi kako i vo mnogu drugi zemji ne se izgradeni po sovremeni urbanisticki planovi se nametnuva potrebata da se donesat Generalni soobrakajno-urbanisticki planovi koi ke odgovorat na vistinskite potrebi i uslovi na patniot soobrakaj vo nasite gradovi i ke imame vistinska slika za realniot soobrakaj so koj nie denes se spravuvame.

Poslednive nekolku godini se poveke se posvetuva na izgradba na patistata zatoa sto se pogolemi soznanija imame deka patot iako e skapa investicija e nesto sto ponatamu vo narednite godini povekekratno ke ni se isplati. Isto taka vredi da se spomeni deka statistickite podatoci pokazuvaat deka brojot na zrtvi na avtopatistata e mnogu pomal vo odnos na drugite patista.

Patot i patnata okolina kako faktor za bezbednost vo soobrakajot ne bi bil celosen dokolku ne se istaknat i drugite elementi: obezbeduvanje soodvetna vidljivost, osvetluvanje na opasni mesta na patot, ozelenuvanje na okolinata na patot, posebni merki za bezbednost vo tekot na zimata i drugi.



Sl.2 Sprečuvanje na soobrakajot poradi vremenski nepogodi

Vremenski uslovi ne vlijaat mnogu na golemi avioni, brodovi i avtobusi kako mali avioni, brodovi i vozila za licna upotreba ili sport. Za takvi korisnici na patistata e neophoden pristap do meteoroloski informaciji koja im ovozmozuva bezbeden transport. Vo SAD, nevremeto predizvika edna tretina od nesreki, a vremenski uslovi se losi (1964.-1969.) predizvikuvaaat okolu 35% od site nesreki. Vo Hrvatska, losite vremenski uslovi vo pomorskiot soobrakaj smetki za okolu 20% od nesreki pogolemi brodovi, a okolu 40% od nesreki pomali sadovi i vnatresnite plovni okolu 50% od site.



Sl.3 Narusuvanje na soobrakajot poradi silen vetar

Vlijaniето na klimatskite faktori se gleda vo vlijaniето deka vremeto ima vrz lugjeto. Mnogu toplo ili mnogu studeno vreme negativno moze da vlijae na lugjeto kako ovie uslovi ne se idealni. Ova e osobeno vidljivo pri vozenje na dolgi rastojanija.

## Vlijanieto na Voziloto faktor za bezbednost vo soobrakajot

Edna od karakteristikite na modernata avto industrija e postojanoto usovrsuvanje na motornite vozila.

Vozilata stanuvaaat se poudobni, poprijatni i pobrzy, sto znaci i poopasni, zatoa prasanjata sto se odnesuvaat na konstruktivnite karakteristiki na sovremenite vozila na tehnicki pregled imaat vazna uloga od koja zavisi pogolemata bezbednost na patistata. Na toa prasanje mora da mu se posveti posebno vnanianie, kako vo industrijata za avtomobili, taka i pri odrzuvanjeto i pravilnoto koristenje na motornite vozila. Tehnickata ispravnost na vozilata e sigurna garancija deka nivnoto pojavuvanje so soobrakajot ke pretstavuva pomala opasnost, odkolku sto e toa slucaj na tehnicki neispravnite vozila.

Statisticckite podatoci kazuvaat deka vozilata so pogolema moknost imaat pomal broj soobrakajni nezgodi, a ovoj broj e ponizok za vozilata do 3 godini starosta, odnosno za relativno novi vozila. ako se ima predvid deka vo soobrakajot se pojavuvaat razlicni kategorii vozila, koi se razlikuvaat po konstrukcija, dimenzija, moknost i ne ednakvi brzini, razlicni manevarski sposobnosti, a osobeno koga tuka ke se vklucati i vozilata od javniot gradski patnicki soobrakaj, togas jasno proizleguva zaklucokot deka pri proucuvanjeto na soobrakajot, mora da se imaat predvid site kategorii vozila so ogled na nivnite svojstva, i vrz osnova na toa da se donesat zaklucoci za merkite za nivnoto adaptirano ucestvo vo soobrakajo. Vo nasata zemja postoi golemo sarenilo na vozila od razlicni tipovi i marki (ima okulu 300 tipovi i marki) od sto mozeme da zaklucime deka stanuva zbor za slabosti na voznite parkovi mozna tehnicka neispravnost, kako i opsnostite koi proizleguvaat od ova sarenilo. Posebno vnanianie treba da posvetat nadleznite vo sluzbite za tehnicki pregled koj mozat, vo izvesna merka, sovesno vrsejki ja svojata dolznost, da gi ublazat navedenite nedostatoci.



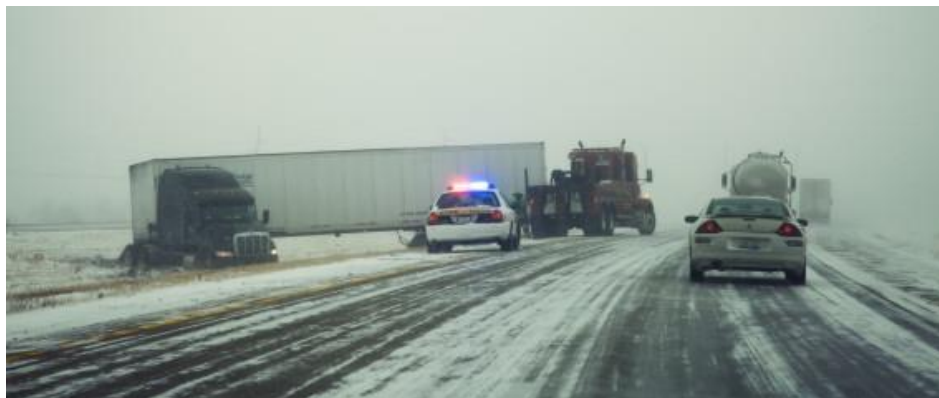
Sl.4 Zapren soobrakaj poradi podmrznat kolovoz

Isto taka od golemo vaznost za bezbednosta vo soobrakajot e i vekot na traenje na vozilata, odnosno nivnoto ucestvo vo soobrakajot.

Postoji i tendencija,poradi niskiot standard na zitelite,vozilata da se koristat 10 pa i poveke godini,sto ja vlosuva i onaka losata situacija vo odnos na tehnickata ispravnost na vozilata

## Vlijanieto na klimata za kopnen transport

Dozdovite isto taka, vlijae na transportnata mreza. Dozd, intenzitet karakteristika na određen prostor, vo princip, da ima pogolemo vlijanie na patistata. Svetlinata dozd ili preliv za patista moze da se sozdade tenok sloj lizgava. Dozdovite na visok intenzitet moze da predizvika bujce sto ja osiromasuvaat izgradbata na patista i zeleznicki prugi; isto taka, moze da predizvika lizganje na zemjisteto, zatnuvanjeto kanalizacija, ostetuvanje na nasipite i mostovi. Ova e osobeno problem vo pomalku razvienite zemji kade sto slabiot kvalitetot na transportnata mreza poplavi i poplavi moze da unisti delovi od patot i go uspori ili da se spreči protokot na soobrakaj. Ako oblata pogodeni od obilnite dozdovi, pogodeni za formiranje na lizganje na zemjisteto, posledicite za soobrakaj moze da bide golem. Poplavite vo recnite dolini, koi minuvaat vazni transportni ruti, moze da go paralizira soobrakajot i imaat mnogu steta na ekonomijata na prostorot, sto zavisi od prekinatite patni pravci. Opsto zemeno, dozd ja namaluva vidlivosta i da se zgolemi neizvesnosta, so sto se zabavuva soobrakajot.



Sl.5 Podmrznat kolovoz

Sneg, vo oblastite vo koi se pojavuva, sozdavajki problemi so rakuvanje na soobrakaj. Snegot se javuva relativno pogresno i deka samo vo eden del od godinata, cesto pagjaat na golemi površini. Vo Hrvatska, sneg moze da vlijae na celiot kontinentalna oblast. Poradi e nevozmožno da se rascisti snegot od patistata vo kratok rok, pa cesto se doagja do zastoj vo soobrakajot, a toa moze da potrae nekolku dena, dodeka situacijata se normalizira. Poseben problem e zgolemeni soobrakajki pri sneznite vrnezi vo oblastima vo koi ne e voobicaeno, na pr. Vo hrvatskite primorski oblasti. Poradi nedovolniot broj na vozila za sneg odstranuvanje, tolku podolgo zadrzuvanje sozdava seriozni teskotii. Duri i vo oblastite kade sto snegot redovno vrnezi od dozd, sneg sozdava problemi. Imeno, kako sneg se slucuva samo vo studenata sezona, ne e profitabilen za da se zadrži golem broj na vozila za cistenje. Zatoa, vo prvite denovi do nekolku golemi kolicini na sneg pagja redovno imaat teskotii vo soobrakajot vo site delovi na svetot. Vo planinskite podracja toa e uste poizrazena. Silen veter moze da sozdade sneg i deka gi blokiraat patista, i

pretstavuva opasnost i lavini. Zatoa, vo planinskite oblasti se gradat snegobrani ogradi i tuneli, so cel da se zgolemi bezbednosta vo soobrakajot. Brzoto isceznuvanje na sneg moze da predizvika golemi poplavi, koi isto taka imaat negativno vlijanie vrz soobrakajot.

Vo soobrakajot vo zimskite meseci vlijae i mrazot. Na kopno, nejzinoto vlijanie e raznovidna. Na pat taa se pojavuva kako crn mraz, sto go sprecura normalniot protok na soobrakajot. Led kanalizacija na patot. Ova moze da bide opasno, vo slucaj na zeleznickiot soobrakaj, koga temperaturite moze da predizvika pukanje osteteni zeleznicki lenti. Mrazot sto se drzi do sredstva za transport, isto taka, ima negativan efekt.

Vlijanie vrz suvozenen soobrakaj ima veter. Silen vetar moze da turka i izlizga vozila. Vo krajbrezniot del na hrvatskiot silen veter sozdava golemi problemi vo soobrakajot na patistata. So cel da gi predupredat vozacite na silen veter, mestoto so silni sokovi se

specijalno oznaceni, a vo nekoi mesta se izgradeni zidovi za zastita od silna naletite.



Sl.6 Vnematelno vozenje poradi silen vetar

## Zaklucok

Posebno vnanie treba da posvetat nadleznite vo sluzbite za tehnicki pregled koj mozat,vo izvesna merka,sovesno vrsejki ja svojata dolznost,da gi ublazat navedenite nedostatoci.

Isto taka od golema vaznost za bezbednosta vo soobrakajot e i vekot na traenje na vozilata,odnosno nivnoto ucestvo vo soobrakajot.

Postoi i tendencija,poradi niskiot standard na zitelite,vozilata da se koristat 10 pa i poveke godini,sto ja vlosuva i onaka losata situacija vo odnos na tehnickata ispravnost na vozilata

I pokraj razvojot na naukata i tehnologijata treba da se zeme predvid prirodnite uslovi koi se osnova na prostor vo koj transportnata mreza se razviva.

Vozilata stanuvaaat se poudobni, poprijatni i pobrzy, sto znaci i poопасni, zatoa konstruktivnite karakteristiki na sovremenite vozila na tehnicki pregled imaat vazna uloga od koja zavisi pogolemata bezbednost na patistata.

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Interdisciplinary Logistics, transports

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TOPIC: Effects of adverse weather conditions in accidents

Keywords: time, climate, trade, vehicle

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## Introduction

As a factor in road traffic safety is a link chain for traffic safety.

Climate as a factor for the development of transport systems include natural and geographical factors. Climate Impact of operations relates to climate and weather, and is present in the phase of construction and operation of the road, or during transport. Climatic conditions, the result of many years of observation, are known and transport network must be adjusted. Airports, for example, built in the areas where the most favorable conditions for air traffic highway in mountainous areas of the city where snowfalls are not high and where there is no possibility of an avalanche. Weather conditions only partly predictable. Especially remarkable is the excellent weather conditions that could have disastrous consequences for traffic. This is obvious in urban areas due to large amounts of rain or snow comes to difficulties in traffic. However, negative effects of climate factors can be mitigated.

The obligation of the driver to check the roadworthiness to be able to engage in traffic and moving along the roads and must not drive the vehicle if it is faulty or does not meet the conditions required for the road traffic.

The vehicles are manufactured serial or individual must have to perform appropriate testing and then be granted - attest to pishtanje authorization of such motor vehicles or trailers.

The vehicle must not overburdening more than what is permissible payload that is prescribed in the traffic dozvola. Tovarot vehicle should be placed and fixed to the vehicle so it does not interfere with the driver and not to endanger the persons transported or not uchesnivate endangering traffic and does not diminish the stability of the vehicle and not hides the light devices and markings vehicle. Tovarot it passes the length, width and height of the vehicle must be labeled in a way that would be alerted other road traffic.

If the vehicle due to some malfunction or accident is disabled and further work is left on the road, then the driver is obliged to remove the vehicle from the road in order not to endanger other road users.

## ROAD AS A FACTOR FOR TRAFFIC SAFETY

When it comes to the road as a factor in traffic safety thought the streets, bridges, tunnels, overpass, underpasses and others. The percentage of accidents that have occurred as a consequence of defects and damage to the road structure move within certain limits because that should not circumvent the analysis of the causes that lead to accidents.

Roads can not be imagined without proper signaling. Signaling is part of the road and is tasked to inform and protect koristinicite and participants of the road. Adequate and well-marked path is greater security for all those who adhere to the weather reports and earmarked by the set



signaling that seeks to protect and inform road users time and allow maximum utilization of the road under certain conditions.



Fig.1 Damage to the road due to landslides

Normal appearance is the highest number of vehicles to move to the cities and therefore the problems of traffic in cities significantly more complicated it is of particular importance in the present situation of the development of traffic here.

If we consider the fact that our cities as well as in many other countries are not built according to modern urban planning is a need to bring in general traffic and urban plans that respond to the real needs and requirements of road transport in our cities and we have a true picture of the actual traffic that today we are dealing with.

Recent years have increasingly been paid to the construction of roads because they have greater knowledge that the road although it is an expensive investment is something further in the coming years will be multiple payments. It is also worth mentioning that statistics show that the number of deaths on highways is much smaller than other roads.

Road and road environment as a factor for traffic safety would not be complete without highlighting other elements: ensuring adequate visibility, lighting the dangerous places on the road, greening the environment on the road, special safety measures during the winter and others.



Fig.2 Preventing traffic due to weather

Weather conditions do not affect very large aircraft, ships and buses, small aircraft, ships and vehicles for personal use or sports. For such road users it is necessary to access weather information that enables safe transport. In the US, the storm caused a third of accidents and the weather is bad (1964th-1969th) cause about 35% of all accidents. In Croatia, the bad weather conditions in maritime transport accounts for about 20% of accidents larger ships and about 40% of accidents smaller vessels and inland about 50% of all.



Fig 3 The disruption of traffic due to strong wind

The influence of climatic factors is looking at the impact that weather has on people. Very hot or very cold weather can adversely affect people as these conditions are not ideal. This is especially evident when driving long distances.

The impact factor of the vehicle for traffic safety

One of the features of modern auto industry is the continued development of motor vehicles.

Vehicles are becoming more comfortable, more pleasant and faster, meaning more dangerous, because issues relating to the design features of modern vehicles technical inspection have an important role from which depends safer patishtata. On that question must be given special attention, as industry car, and in the maintenance and proper use of motor vozila. Tehnichkata

roadworthiness of vehicles is a reliable guarantee that their matching traffic will pose less danger than in the case of technically defective vehicles.

Statistics show that vehicles with higher power have fewer accidents, and this number is lower for vehicles up to 3 years of age, that is relatively new vozila.ako Given that sobrkjajot appear different categories of vehicles, which differ in construction , dimension, power and not equal speeds, different maneuverability, especially when there will include vehicles of public urban passenger transport, the clear conclusion is that in studying the traffic must be taken into account all categories of vehicles with regard to their properties, and on this basis to draw conclusions on measures for their participation in adapted soobrakjajo.In our country there is a great variety of vehicles of different types and brands (there are about 300 types and brands) from which we can conclude that it is weaknesses fleet possible technical failure, as well as hazards arising from this sharenilo.Esspecily should pay attention to the relevant departments for technical examination which may, to some extent, consciously do job its duty to mitigate these shortcomings.



Pic.4 Stopped traffic due to frozen track

Also of great importance for road safety and the lifetime of the vehicles or level participation in traffic.

There is a tendency, because of the low standard of the inhabitants, the vehicles use 10 or more years, which exacerbates an already bad situation regarding roadworthiness of vehicles

The impact of climate on land transport

Rains also affected the transport network. Rain intensity characteristic of a space, in principle, have a greater impact on the roads. Light rain or drizzle road can create a thin layer slippery. The rains of high intensity can cause bujce depleting less build roads and railways; It can also cause landslides, clogging drains, damage to embankments and bridges. This is particularly a problem in less developed countries where the poor quality of the transport network floods and floods can destroy parts of the road and slow down or prevent the flow of traffic. If the area affected by heavy rains, suitable for the formation of landslides, the consequences for traffic can be large.

Floods in river valleys that cut major transport routes, can paralyze traffic and have a lot of damage to the economy of the area, which depends on the broken roads. Generally, rain reduce visibility and increase uncertainty, which slows traffic.



Fig.5 frozen track

Snow in areas that are emerging, creating problems with the handling of traffic. Snow falls relatively wrong and that only one part of the year, and often fall over large areas. In Croatia, snow can affect the entire metropolitan area. Because of this incidence it is impossible to clear snow from roads in the short term, so often comes to a standstill in traffic, and it may take a few days until the situation normalizes. A particular problem is the increased incidence of snowfall in areas in which it is common, eg. In the Croatian coastal areas. Due to insufficient number of vehicles for snow removal, the longer retention creates serious difficulties. Even in areas where snow regularly rainfall, snow creates problems. Namely, snow occurs only in the cold season, it is not profitable to keep a large number of vehicles for cleaning. Therefore, in the early days to a few large amounts of snow falls regularly have difficulties in traffic in all parts of the world. In the mountain areas it is even more pronounced. A strong wind could create snow loads that block the roads, threatening and avalanches. Therefore, in the mountainous areas are built of snow fences and tunnels in order to increase traffic safety. Rapidly disappearing snow could cause severe flooding, which also have a negative impact on traffic.

Traffic in the winter months and affects the ice. On land, its impact is varied. The way it appears as black ice, which prevents the normal flow of traffic. Ice drains the road. This can be dangerous in the case of rail, when temperatures can cause cracking damaged rail tracks. Ice that sticks to the means of transport, also have a negative effect.

Impact on Land Transport has wind. Strong crosswinds can become pregnant and tumble vehicles. In the coastal part of Croatian strong wind creates major traffic problems on the roads. In order to warn drivers of the strong wind, the place with strong shocks are specially marked and in some places have built walls to protect against strong gusts. The best example of how much attention should be paid to the wind in the planning of the road is Maslenica Bridge.



#### SI.6 Careful driving because of strong wind

##### Conclusion

Special attention should pay to competent agencies for technical examination which may, to some extent, conscientiously doing their duty to mitigate these shortcomings.

Also of great importance for road safety and the lifetime of the vehicles or their participation in traffic.

There is a tendency, because of the low standard of the inhabitants, the vehicles use 10 or more years, which exacerbates an already bad situation regarding roadworthiness of vehicles

Despite the development of science and technology should take into account the natural conditions on the space in which the transport network develops.

Vehicles are becoming more comfortable, more pleasant and faster, making signs and dangerous, because the structural features of modern vehicles technical inspection have an important role from which depends safer roads.

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