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**XIV Međunarodni simpozij „Interdisciplinarnost
logistike i saobraćaja“**

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UOČLJIVOST BIKIKLISTA

Sažetak:

Projekt Uočljivost biciklista nastavak je uspješno provedenog projekta financiranog iz Nacionalnog programa sigurnosti cestovnog prometa Republike Hrvatske (NPSCP) "Uoči me!!!" vezan uz uočljivost pješaka kojim se već 4. godinu nakon završetka projekta provode edukacijske, preventivne i promidžbene aktivnosti. Također, kao rezultat provedenog projekta kreiran je te se uspješno provodi i fakultativni predmet "Sigurnost pješaka u cestovnom prometu" u sklopu kojeg učenici Škole za cestovni promet educiraju učenike u osnovnim školama o važnosti vidljivosti pješaka u svrhu povećavanja njihove sigurnosti u prometu.

Za razliku od projekt „Uoči me“ u kojem je naglasak dan na pješake kao jednu od najugroženijih skupine sudionika u cestovnom prometu u projektu „Uočljivost biciklista“ kao i što sam naziv projekta govori naglasak je dan na bicikliste, odnosno na potrebu primjene različitih preventivnih mjera koje će rezultirati boljom uočljivošću biciklista, a samim tim i većom sigurnošću ove skupine sudionika u cestovnog prometa. Ukupni proračun projekta iznosi 27.871,79 eura, od čega se 70 % ili 19.510,25 eura financira iz NPSCP RH 2021. - 2030. Projekt je u potpunosti usklađen s Nacionalnim planom sigurnosti cestovnog prometa za razdoblje od 2021. do 2030. godine koji se odnosi na sigurnost aktivnih oblika prometovanja, a definirano je područjem djelovanja PD7.

Uključivanjem direktnih i indirektnih korisnika projekta osigurat će se veća sigurnost biciklista. Također promijenit će se i svijest, odnosno spoznaju o potencijalnim opasnostima prilikom kretanja kolnikom.

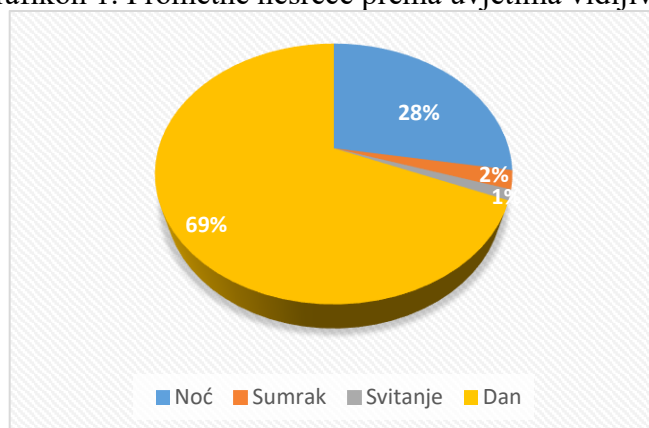
Ključne riječi: sigurnost biciklista, uočljivost biciklista, prometne nesreće

1. Uvod

Biciklisti kao sudionici u prometu izloženi su nizu opasnosti koje se javljaju prilikom kretanja do željenog odredišta. Obzirom na otpornost, brzinu i masu automobila uz pješake, najugroženija su skupina sudionika u cestovnom prometu. Veliki broj opasnosti skriva se u nedovoljno osvijetljenoj biciklističkoj infrastrukturi, nedovoljno uočljivoj odjeći biciklista, lošim i nedovoljnim infrastrukturnim rješenjima, prometnoj signalizaciji i karakteristikama prometnog toka.

Prema statističkim podacima u 2020. godini dogodile su se 1193 prometne nesreće u kojima su sudjelovali biciklisti što čini 2,7 % prometnih nesreća od ukupnog broja. U prometnim nesrećama sa sudjelovanjem biciklista poginulo je 12 osoba, a ozlijeđeno je 996 osoba. Prema statističkim podacima 31 %, odnosno svaka treća prometna nesreća dogodi se noću ili u uvjetima smanjene vidljivosti (sumrak, svitanje, magla, ...)

Grafikon 1. Prometne nesreće prema uvjetima vidljivosti



U projektu „Uočljivost biciklista“ sve pripremne aktivnosti koje su se odnosile na istraživanje, edukaciju, prevenciju i promidžbu provodile su se u Gradu Zagrebu, na lokacijama najrizičnijim za bicikliste, na reprezentativnom uzorku od minimalno 700 biciklista s ciljem da se ukaže na važnost problematike uočljivosti biciklista kao jednog od većih uzroka stradavanja biciklista u prometu na cestama. Rezultati istraživanja, edukacije, prevencije i promidžbe prezentirani su učenicima srednjih škola u Gradu Zagrebu i u ostalim većim gradovima Republike Hrvatske (Split, Rijeka, Zadar, Šibenik, Gospić, Metković, Osijek, Beli Manastir, Varaždin i Čakovec) Kako bi problematiku uočljivosti biciklista usmjerili na veći broj trenutnih i budućih biciklista kao i na veći broj sudionika prometa koji se s biciklistima susreću u prometu na cestama. Glavni cilj projekta je povećanje sigurnosti biciklista na cestama na području Republike Hrvatske za 10% u dvije godine, što je u

skladu s Nacionalnim planom sigurnosti cestovnog prometa RH 2021. - 2030. (50 % u 10 godina.), a definirano je područjem djelovanja PD7 (Aktivni oblici prometovanja).



Slika 1. Gradovi u kojima su provedene edukacije

Korisnici projekta su učenici srednjih i osnovnih škola koji su bili uključeni direktno ili indirektno sudjelujući na edukacijama o uočljivosti i sigurnosti biciklista. Broj direktnih korisnika je veći od 800, a indirektnih veći od 5000. Također, za održivost projekta direktni i indirektni korisnici će se svakako povećati jer će se edukacije nastaviti održavati u osnovnim i srednjim školama.

2. PRVA FAZA PROJEKTA

Početak projekta započeo je izradom detaljnog plana projektnih aktivnosti i prikupljanjem potrebne dokumentacije za odrađivanje projektnih aktivnosti. Pribavljeni su prikladni promotivni materijali kojima je svrha dodatno utjecati na svijest biciklista, ali i drugih sudionika o potrebi bolje uočljivosti tijekom sudjelovanja u prometu na cestama. Osim promotivnih materijala projektni tim izradio je edukativnu prezentaciju kojoj je uz edukativne video materijala svrha dodatno utjecati na svijest biciklista o boljoj uočljivosti tijekom sudjelovanja u prometu na cesti.

Važnost projekta „Uočljivost biciklista“ prepoznala je i PU Požeško – slavonska koja je ovom projektu dala podršku na način da je organizirana preventivna akcija u gradu Požegi koja je bila usmjerena na uočljivost biciklista. U suradnji s PU požeško - slavonskom organizirana su predavanja o uočljivosti biciklista za najmlađe sudionike u prometu, učenike 4. razreda osnovne škole ali i za iskusne vozače motornih vozila koje su educirali učenici trećih razreda Škole za cestovni promet koji se obrazuju u programu za zanimanje tehničar cestovnog prometa.

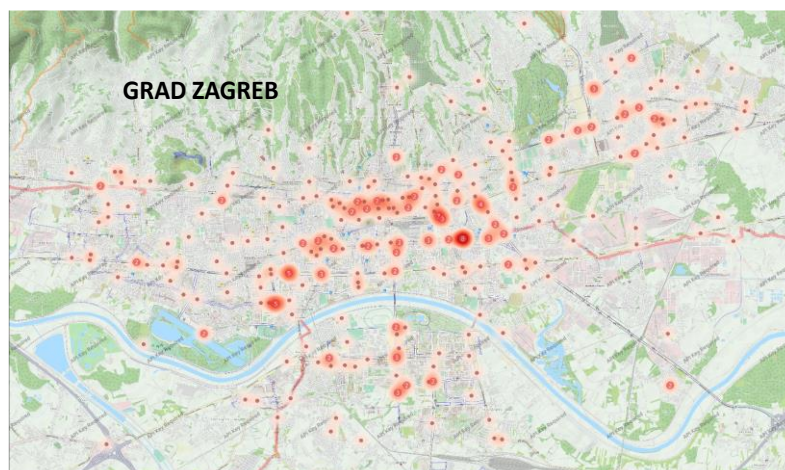
Kako bi projekt dobio na vjerodostojnosti provedeno je anketno istraživanje u kojem su ciljana populacija bili učenici srednjih škola. U anketnom istraživanju istraživanja su bila usmjerena na:

- poznavanje zakona i propisa u cestovnom prometu,

- spoznaju o potencijalnim opasnostima u prometu,
- sigurnosnu opremu za bicikliste.

Istraživanje se odvijalo putem unaprijed uređenog obrasca koji se nakon ispunjavanja analizirao. Anketnom istraživanju pristupilo je 284 učenika srednjih škola. Rezultati su pokazali da 77,8 % ispitanika smatra kako se biciklisti trebaju pridržavati istih pravila kao i vozači automobila. Na pitanje o korištenju sigurnosne opreme za vrijeme vožnje 88,7 % ispitanika odgovorilo je da istu koristi tijekom vožnje, međutim samo 9,5 % ispitanika koristi reflektirajuću odjeću tijekom upravljanja biciklom. Sigurnosnu kacigu koja nije zakonom propisana kao obavezna oprema koristi samo 9,9 % ispitanika. Tijekom upravljanja biciklom 50 % ispitanika koristi mobitel ili slušalice, 52,5 % ispitanika nikad ili rijetko pregledava tehničku ispravnost bicikla.

U cilju opsežnijeg istraživanja, čiji rezultati su se obrađivali metodama koje su zahtijevale znanstveni pristup angažirani su stručnjaci s Fakulteta prometnih znanosti koji su analizom Pravilnika o biciklističkoj infrastrukturi, te upitnikom o prometnim nesrećama (UPN) kako i programom Q-GIS detektirali i vizualizirali potencijalno opasna mjesta za bicikliste u Gradu Zagrebu i u još 13 većih gradova u Republici Hrvatskoj. Stručnjaci s Fakulteta prometnih znanosti za potrebe projekta „Uočljivost biciklista“ izradili su službeni dokument s toplinskim kartama koji vrlo jasno analitički i grafički prikazuju „crne točke“ za bicikliste u Gradu Zagrebu i još 13 veći gradova u RH koja su obuhvaćena preventivnim projektnim aktivnostima. Podaci dobiveni kroz istraživanja u sklopu projekta „Uočljivost biciklista“ korišteni su s ciljem ukazivanja mjerodavnim na opasna mjesta na kojima se događa značaj broj prometnih nesreća u kojima sudjeluju biciklisti ali i kako bi sudionici u prometu jasnije akceptirali ta opasna mjesta. Nakon obrade podataka o prometnim nesrećama s poginulim i ozlijeđenim biciklistima iste su mapirane te označene točne lokacije svih prometnih nesreća na području Grada Zagreb i gradova prema kojima su bile usmjerene edukacije, prevencije i promidžbe s ciljem utvrđivanja "crnih točaka" za bicikliste. Svaka toplinska karta za pojedini Grad prikazana je u prezentaciji tijekom edukacije.



Slika 2. Toplinska karta Grada Zagreba s prometnim nesrećama u kojima su sudjelovali biciklisti

3. DRUGA FAZA PROJEKTA

Drugi dio projekta usmjeren je na održavanje preventivnih edukacija koje predstavljaju ključnu aktivnost projekta u gradovima koji su obuhvaćeni projektom. Za potrebe edukacija projektni tim i učenici Škole za cestovni promet kao volonteri, napravili su edukativni video materijal koji je sastavni dio prezentacije na edukacijama/radionicama, ali i video materijal s istinitim ispovijedima bicikliste sudionika prometne nesreće koja nastala kao posljedica slabe ili loše uočljivosti u prometu na cesti.

Prve edukacije započele su u Gradu Metkoviću, Imotskom i Splitu dok su se usporedno odvijale i u razrednim odjeljenjima Škole za cestovni promet. Nakon uspješno provedenih prvih edukacija iste su nastavljene u Gradu Belom Manastiru, Osijeku, Rijeci, Gospiću, Zadru i Šibeniku, a tijekom koji su učenici srednjih škola bili su upoznati sa statističkim podacima, potencijalnim opasnostima prilikom kretanja biciklista kolnikom, te utjecajem reflektirajućeg materijala na uočljivost u prometu. Nakon svake održane prezentacije učenici su rješavali evaluacijski kviz znanja. Sudionici edukacija, odnosno učenici srednjih škola u navedenim gradovima edukacije su pratili s velikim interesom te su bili izrazito motivirani za rješavanje kviza znanja ali iz obrađenih ishoda testiranja vidljiv je nedostatak znanja iz područja prometnih propisa koji se odnose na bicikliste te korištenja reflektirajuće opreme, što u potpunosti opravdava potrebu za ovakvim edukacijama te predstavlja jedan od izrazito važnih čimbenika u unaprijeđenju sigurnosti cestovnog prometa u RH.

Završetak projektnih aktivnosti na projektu „Uočljivost biciklista“ obilježen je završnom konferencijom na kojoj su svi sudionici imali mogućnost vidjeti rezultate vrlo intenzivnog i dobro isplaniranog rada na projektu. Uz sudionike iz Republike Hrvatske koji su predstavljali Ministarstvo unutarnjih poslova, Fakultet prometnih znanosti, Grad Zagreb, školske ustanove na završnoj konferenciji sudjelovali su i predstavnici Škola iz Republike Slovenije, Republike Srbije i Sjeverne

Makedonije što je ovoj konferenciji dalo međunarodnu razinu, a rezultate projekta predstavilo i kolegama iz regije te otvorilo mogućnost suradnje na unaprijeđenu sigurnosti biciklističkog prometa i među Školama u regiji. Za potrebe završne konferencije osim sadržaja koji su usmjereni na teorijska saznanja svi sudionici imali su mogućnost isprobati i svoje vještine u upravljanju biciklom na poligonu koji je za te potrebe uređen u školskom dvorištu, a na kojem su sudionici imali mogućnost naučiti kako kao biciklist na siguran i uočljiv način sudjelovati u prometu na cesti.



Slika 3. Poligon sigurne vožnje za bicikliste u Školi za cestovni promet

Sve aktivnosti projekta „Uočljivost biciklista“ dostupne su na stranicama:

1. <https://www.scp.hr/uocljivost-biciklista-270.html>
2. <https://www.facebook.com/profile.php?id=61553790763812>
3. http://ss-rboskovic-sinj.skole.hr/?news_hk=1&news_id=791&mshow=290&fbclid=IwAR02PhzhTnWuTdHa9zKUkkJxojJa9LYENJ0PLVgBY6b5JEe2h-0i1RqZDZQ#mod_news
4. <https://elpros.net/2023/projekt-uocljivost-biciklista/>
5. <https://www.24sata.hr/news/radionice-za-700-ucenika-u-cetrnaest-gradova-ucit-cemo-mlade-kako-sigurno-voziti-bicikl-937287>
6. Javljanje uživo – TV emisija na HRT1, Dobro Jutro Hrvatska – 10.4.2024.
https://www.facebook.com/djh.hrt/videos/265113853343298?locale=hr_HR

4. ODRŽIVOST PROJEKTA

Nakon financijske potpore Ministarstva dio projektnih aktivnosti (edukacija i promidžba) projektni tim Škole za cestovni promet će provoditi u sklopu izvannastavne aktivnosti. Kao i s prethodnim projektom iz NPSCP Uoči me!!!, provodit će se edukacije na području Grada Zagreba, a prema

potrebi i u drugim gradovima RH. Financijsku potporu Škola za cestovni promet će tražiti od Ministarstva koje dodjeljuje financijska sredstva za izvannastavne aktivnosti i fakultativne predmete.

Direktnim korisnicima prezentirani su prijedlozi i smjernice koje će biti primjenjive na bicikliste kao jednu od najranjivijih sudionika u prometu, s aspekta dobre i jasne uočljivosti kao što je korištenje adekvatne opreme, korištenje kacige te kretanje u prometu prema prometnim pravilima i propisima. Aktivnost se provodila u Gradu Zagrebu i u navedenim gradovima RH tijekom edukacija.

Aktivnosti projekta koje su vidljive svim indirektnim korisnicima doprinijele su novoj aktivnosti kao što je preventivna akcija u Požegi, odnosno gradu koji nije bio definiran ovim projektom. Realizacija projekta uklapa se u predviđene aktivnosti Nacionalnog plana sigurnosti cestovnog prometa koji ima cilj smanjenje broja prometnih nesreća u kojima su sudjelovali biciklisti za 10% u dvije godine. S obzirom na nastavak održavanja edukacija u Školi za cestovni promet i izvan nje projekt će imati utjecaj na povećanje sigurnosti biciklističkog prometa na području Republike Hrvatske.

5. ZAKLJUČAK

U projektu „Uočljivost biciklista“ koji je financiran sredstvima iz Nacionalnog programa sigurnosti prometa na cestama provedene su edukacije o uočljivosti i sigurnosti biciklističkog prometa u ukupno 14 gradova u Republici hrvatskoj, direktno je educirano više od 800 sudionika u cestovnom, a indirektno kroz različite oblike preko 5000 korisnika i za potrebe prikupljanja podataka anketirano je ukupno 258 ispitanika. U edukacijama se kroz osobni kontakt došlo do sudionika u prometu koji vrlo često koriste bicikl kao prijevozno sredstvo u prometu na cestama ali ujedno predstavljaju populaciju sudionika u prometu koja uskoro postaju i vozači motornog vozila u prometu na cesti.

Projekt „Uočljivost biciklista“ jedan je od projekata čiji rezultati će se i dalje nastaviti koristiti za potrebe provođenja fakultativnog predmeta koji se provodi u Školi za cestovni promet, a koji za cilj ima promicanje i unapređenje sigurnosti cestovnog prometa kod najmlađih sudionika u prometu - učenika nižih razreda osnovnih škola na području Grada Zagreba.

Ulaganjem u sigurnost biciklističkog prometa gradi se snažnija i veća biciklistička zajednica, potiče se zdrav načina življenja, te smanjuje utjecaj motornog prometa na zagađenje zraka i okoliša. Ovakvim preventivnim aktivnostima kroz duži i intenzivniji vremenski period uvelike se može doprinijeti povećanju sigurnosti biciklističkog ali i cestovnog prometa općenito, a upravo smo mi Škole koje obrazuju učenike u programima za zanimanja iz područja cestovnog prometa najpozvanije na sudjelovanje u ovakvim projektima i ovakvim preventivnim aktivnostima.

Literatura:

1. Slavulj, M., Jurak, J., Šimunović, Lj., Čosić, M., Šojat, D., Sikirić, M.: Rješavanje problema uočljivosti biciklista, Fakultet prometnih znanosti 2024.
2. Jelić, I., Čurković, T., Kovač, S., Stanić, M., Ozimec, N., Kučina, T.: Uočljivost biciklista, brošura, Škola za cestovni promet 2024.



Škola za
cestovni
promet

ŠKOLA ZA CESTOVNI PROMET, ZAGREB

Igor Jelić, mag. ing. traff.
Tomislav Čurković, dipl. ing. prometa

VISIBILITY OF CYCLISTS

Abstract:

The project „Visibility of cyclists“ is a continuation of the successfully implemented project financed by the National road traffic safety program of the Republic Croatia (NPSCP) "Uoči me!!!" related to the visibility of pedestrians, with which educational, preventive and promotional activities have been carried out for the 4th year after the end of the project. Also, as a result of the implemented project, the optional course "Pedestrian Safety in Road Traffic" was created and successfully implemented, as part of which students of the Road Traffic School educate students in primary schools about the importance of pedestrian visibility in order to increase their safety in traffic.

In contrast to the "Uoči me!!!" project, in which the emphasis is placed on pedestrians as one of the most vulnerable groups of road traffic participants, in the "Bicyclist Perception" project, as the name of the project suggests, the emphasis is on cyclists, that is, on the need to apply various preventive measures which will result in better visibility of cyclists, and thus greater safety of this group of participants in road traffic. The total project budget is EUR 27,871.79, of which 70% or EUR 19,510.25 is financed from the NPSCP of the Republic Croatia 2021 - 2030. The project is fully aligned with the National Road Traffic Safety Plan for the period from 2021 to 2030, which refers to the safety of active forms of transportation, and is defined by the field of action of PD7. The inclusion of direct and indirect users of the project will ensure greater safety for cyclists. Consciousness, that is, awareness of potential dangers when moving on the road, will also change.

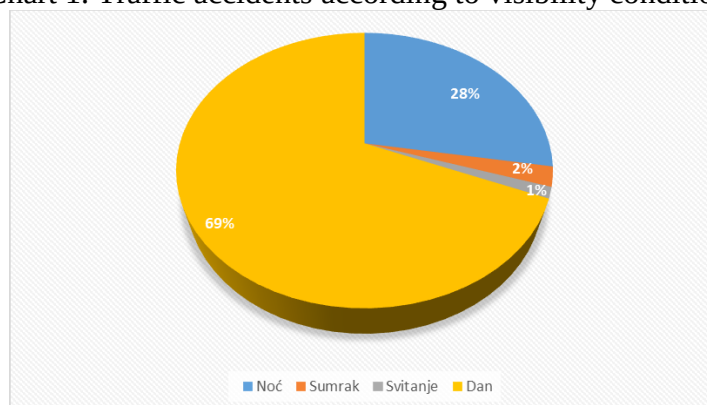
Keywords: *safety of cyclists, visibility of cyclists, traffic accidents*

1. INTRODUCTION

Cyclists as road users are exposed to a series of dangers that occur when moving to their desired destination. Considering the resistance, speed and mass of cars, pedestrians are the most vulnerable group of road users. Many dangers are hidden in insufficiently lit cycling infrastructure, insufficiently visible clothing of cyclists, poor and insufficient infrastructure solutions, traffic signals and traffic flow characteristics.

According to statistical data, in 2020 there were 1,193 road accidents involving cyclists, which is 2.7% of the total number of road accidents. 12 people died and 996 people were injured in traffic accidents involving cyclists. According to statistics, 31%, that is, every third traffic accident occurs at night or in conditions of reduced visibility (dusk, dawn, fog, ...)

Chart 1. Traffic accidents according to visibility conditions



In the "Visibility of cyclists" project, all preparatory activities related to research, education, prevention and promotion were carried out in the City of Zagreb, at the most risky locations for cyclists, on a representative sample of at least 700 cyclists with the aim of pointing out the importance of the problem of conspicuity cyclists as one of the major causes of injuries to cyclists in road traffic. The results of research, education, prevention and promotion were presented to secondary school students in the City of Zagreb and in other major cities of the Republic of Croatia (Split, Rijeka, Zadar, Šibenik, Gospić, Metković, Osijek, Beli Manastir, Varaždin and Čakovec) in order to address the problem of visibility of cyclists to a greater number of current and future cyclists as well as to a greater number of road users who encounter cyclists in road traffic. The main goal of the project is to increase the safety of cyclists on the roads in the Republic of Croatia by 10% in two years, which is in accordance with the National Road Traffic Safety Plan of the Republic of Croatia 2021 - 2030 (50% in 10 years), and is defined by the area of operation PD7 (Active forms of transportation).

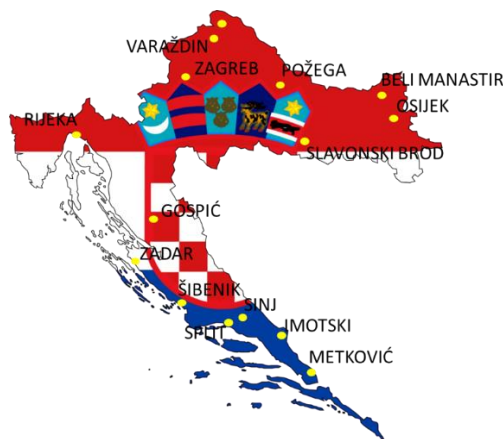


Figure 1. Cities where education was conducted

The beneficiaries of the project are high school and elementary school students who were involved directly or indirectly by participating in training sessions on the visibility and safety of cyclists. The number of direct beneficiaries is greater than 800, and indirect beneficiaries are greater than 5000. Also, for the sustainability of the project, direct and indirect beneficiaries will certainly increase, as education will continue to be held in primary and secondary schools.

2. THE FIRST PHASE OF THE PROJECT

The beginning of the project began with the creation of a detailed plan of project activities and the collection of the necessary documentation for carrying out the project activities. Adequate promotional materials have been acquired, the purpose of which is to further influence the awareness of cyclists and other participants about the need for better visibility while participating in road traffic. In addition to the promotional materials, the project team created an educational presentation, the purpose of which, along with educational video materials, is to further influence cyclists' awareness of better visibility while participating in road traffic.

The importance of the project "Visibility of cyclists" was also recognized by the PU Požeško - Slavonia, which supported this project by organizing a preventive action in the city of Požega that focused on the visibility of cyclists. In cooperation with the PU of Požega - Slavonia, lectures on the visibility of cyclists were organized for the youngest participants in the sweep, students of the 4th grade of elementary school, but also for experienced drivers of motor vehicles, which were educated by the students of the third grade of the School for Road Traffic who are educated in the program for the profession of technician road traffic.

In order for the project to gain credibility, a survey was conducted in which the target population was high school students. In the survey research, the research was focused on:

- knowledge of laws and regulations in road traffic,

- knowledge about potential dangers in traffic,
- safety equipment for cyclists.

The research was carried out using a prearranged form, which was analyzed after filling it out. 284 high school students took part in the survey. The results showed that 77.8% of respondents believe that cyclists should follow the same rules as car drivers. When asked about the use of safety equipment while driving, 88.7% of respondents answered that they use it while driving, however, only 9.5% of respondents use reflective clothing while operating a bicycle. A safety helmet, which is not prescribed by law as mandatory equipment, is used by only 9.9% of respondents. While driving a bicycle, 50% of respondents use a mobile phone or headphones, 52.5% of respondents never or rarely check the technical condition of the bicycle.

In order to carry out more extensive research, the results of which were processed using methods that required a scientific approach, experts from the Faculty of Transport Sciences were engaged, who analyzed and visualized potentially dangerous traffic accidents using the questionnaire on traffic accidents (UPN) and the Q-GIS program. places for cyclists in the City of Zagreb and in 13 other major cities in the Republic of Croatia. Experts from the Faculty of Traffic Sciences for the needs of the project "Visibility of cyclists" created an official document with heat maps that very clearly analytically and graphically show "black spots" for cyclists in the City of Zagreb and 13 other larger cities in the Republic of Croatia that are covered by preventive project activities. The data obtained through research as part of the "Cyclist Perceptibility" project were used with the aim of pointing out dangerous places where a significant number of traffic accidents involving cyclists occur, but also to make road users more clearly accept these dangerous places. After processing the data on traffic accidents with dead and injured cyclists, they were mapped and marked with the exact locations of all traffic accidents in the area of the City of Zagreb and the cities towards which education, prevention and publicity were directed with the aim of determining "black spots" for cyclists. Each heat map for a particular city is shown in a presentation during the education.

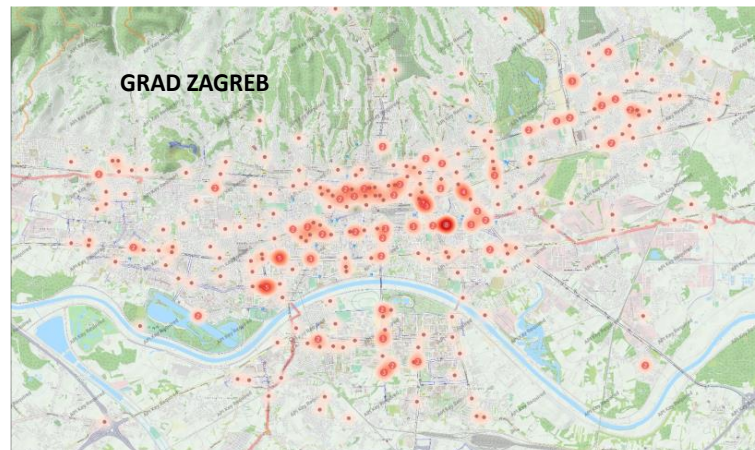


Figure 2. Heat map of the City of Zagreb with traffic accidents involving cyclists

3. THE SECOND PHASE OF THE PROJECT

The second part of the project is aimed at holding preventive educations, which represent the key activity of the project in the cities covered by the project. For the purposes of education, the project team and students of the Road Traffic School, as volunteers, made an educational video material that is an integral part of the presentation at educations/workshops, as well as video material with the true confessions of a cyclist involved in a traffic accident that occurred as a result of poor or poor visibility in traffic on the road.

The first educations began in the cities of Metković, Imotski and Split, while they also took place in the classrooms of the Road Traffic School. After the successful completion of the first training sessions, they were continued in the cities of Beli Manastir, Osijek, Rijeka, Gospić, Zadar and Šibenik, during which secondary school students were introduced to statistical data, potential dangers when cycling on the road, and the impact of reflective material on visibility in traffic. After each presentation, students solved a knowledge evaluation quiz. The participants of the trainings, i.e. students of secondary schools in the mentioned cities, followed the trainings with great interest and were highly motivated to solve the knowledge quiz, but from the processed results of the tests, a lack of knowledge in the field of traffic regulations related to cyclists and the use of reflective equipment is visible, which in fully justifies the need for such trainings and represents one of the extremely important factors in improved road traffic safety in the Republic of Croatia.

The end of the project activities on the "Bicyclist's Perceptibility" project was marked by a final conference where all participants had the opportunity to see the results of very intensive and well-planned work on the project. In addition to participants from the Republic of Croatia representing the Ministry of the Interior, the Faculty of Transport Sciences, the City of Zagreb, school institutions, the final conference was also attended by representatives of schools from the Republic of Slovenia, the

Republic of Serbia and North Macedonia, which gave this conference an international level, and presented the results of the project and colleagues from the region and opened up the possibility of cooperation on improved bicycle traffic safety among schools in the region as well. For the purposes of the final conference, in addition to the contents focused on theoretical knowledge, all participants had the opportunity to try out their skills in managing a bicycle on the training ground set up for these purposes in the school yard, where the participants had the opportunity to learn how to be a cyclist safely and noticeable way to participate in road traffic.



Figure 3. Safe driving range for cyclists at the Road Traffic School

All activities of the project "Visibility of cyclists" are available on the following pages:

7. <https://www.scp.hr/uocljivost-biciklista-270.html>
8. <https://www.facebook.com/profile.php?id=61553790763812>
9. http://ss-rboskovic-sinj.skole.hr/?news_hk=1&news_id=791&mshow=290&fbclid=IwAR02PhzhTnWuTdHa9zKUkkJxojJa9LYENJ0PLVgBY6b5JEe2h-0i1RqZDZQ#mod_news
10. <https://elpros.net/2023/projekt-uocljivost-biciklista/>
11. <https://www.24sata.hr/news/radionice-za-700-ucenika-u-cetrnaest-gradova-ucit-cemo-mlade-kako-sigurno-voziti-bicikl-937287>
12. Javljanje uživo – TV emisija na HRT1, Dobro Jutro Hrvatska – 10.4.2024.
https://www.facebook.com/djh.hrt/videos/265113853343298?locale=hr_HR

4. SUSTAINABILITY OF THE PROJECT

After the financial support of the Ministry, part of the project activities (education and promotion) will be carried out by the project team of the Road Traffic School as part of extracurricular activities. As with the previous project from NPSCP Uoči me!!!, education will be conducted in the area of the City of Zagreb and, if necessary, in other cities of the Republic of Croatia. The Road Traffic School

will seek financial support from the Ministry, which allocates financial resources for extracurricular activities and optional subjects.

Proposals and guidelines were presented to direct users that will be applicable to cyclists as one of the most vulnerable road users, from the aspect of good and clear visibility such as the use of adequate equipment, the use of a helmet and movement in traffic according to traffic rules and regulations. The activity was carried out in the City of Zagreb and in the mentioned cities of the Republic of Croatia during the training sessions.

The project's activities, which are visible to all indirect users, contributed to a new activity, such as a preventive action in Požega, that is, a city that was not defined by this project. The implementation of the project fits into the planned activities of the National Road Traffic Safety Plan, which aims to reduce the number of traffic accidents involving cyclists by 10% in two years. With regard to the continuation of education in the Road Traffic School and outside it, the project will have an impact on increasing the safety of bicycle traffic in the territory of the Republic of Croatia.

5. CONCLUSION

In the project "Visibility of cyclists", which was financed with funds from the National Road Traffic Safety Program, training on the visibility and safety of bicycle traffic was carried out in a total of 14 cities in the Republic of Croatia, directly educating more than 800 participants in road traffic, and indirectly through various forms 5,000 users and a total of 258 respondents were surveyed for data collection purposes. In the educations, through personal contact, we reached traffic participants who very often use bicycles as a means of transportation in road traffic, but at the same time represent the population of traffic participants who soon become drivers of motor vehicles in road traffic.

The project "Cyclists' visibility" is one of the projects whose results will continue to be used for the purposes of conducting an optional course conducted at the School of Road Traffic, which aims to promote and improve road traffic safety among the youngest road users - students below classes of elementary schools in the area of the City of Zagreb.

By investing in the safety of bicycle traffic, a stronger and larger cycling community is built, a healthy lifestyle is encouraged, and the impact of motorized traffic on air and environmental pollution is reduced. Such preventive activities over a longer and more intensive period of time can greatly contribute to increasing the safety of cycling and road traffic in general, and we, the Schools that educate students in programs for occupations in the field of road traffic, are the most invited to participate in such projects and such preventive activities.

Literature:

3. Slavulj, M., Jurak, J., Šimunović, Lj., Čosić, M., Šojat, D., Sikirić, M.: Rješavanje problema uočljivosti biciklista, Fakultet prometnih znanosti 2024.
4. Jelić, I., Čurković, T., Kovač, S., Stanić, M., Ozimec, N., Kučina, T.: Uočljivost biciklista, brošura, Škola za cestovni promet 2024.



Implementacija izobraževanja viličaristov v redni izobraževalni program logistični tehnik

Avtor: Haris Čordić, mag. inž. prom.

Povzetek

V članku je na kratko predstavljena struktura usposabljanja viličaristov v Sloveniji, v nadaljevanju pa obširneje predstavljeno usposabljanje dijakov na izobraževalnem programu logistični tehnik za vožnjo viličarja. Ključni del predstavlja poglavje 3, kjer so navedeni doprinosi in predvsem izzivi, s katerimi se soočamo pri izvedbi praktičnega usposabljanja viličaristov v rednem izobraževalnem programu.

Ključne besede

Viličarist, varnost, logistični tehnik

1 Uvod

Viličarji spadajo pod motorna industrijska vozila, ki se uporabljajo za manipulacije s tovorom na kratke razdalje. Najbolj pogosta izvedba so čelni viličarji. Manipulacije s tovorom v oskrbovalni verigi so neizogibne, saj je tovor potrebno razložiti, naložiti in uskladiščiti v skladišče, zato je pogostost uporabe viličarja v procesu premeščanja tovora velika. Samo v letu 2013 je 20 največjih proizvajalcev viličarjev prodalo 944 405 enot viličarjev (Bond, 2013).

Kljub svoji majhnosti, gre za izjemno rigidno industrijsko vozilo, ki večinoma presega maso avtomobila, zato je potrebno z viličarjem ravnati previdno, saj lahko hitro pride po poškodb tovara oz. ljudi. Nirav Chauhan (2023) v svoji objavi na omrežju LinkedIn navaja podatke Eurostat-a, da se je v letu 2021 zgodilo 3347 delovnih nesreč s smrtnim izidom, od tega 10 % delež predstavljajo delovne nesreče z viličarjem.

Nadalje navaja študijo UK's Health and Safety Laboratory, ki pravi:

- 90 % viličaristov doživi vsaj eno delovno nesrečo v svoji karieri
- 11% viličaristov doživi vsaj eno delovno nesrečo vsako leto

Iz zgornjih podatkov lahko sklepamo, da gre za nevarno vozilo in da so vsi predpisi s področja varnosti pri delu še kako potrebni, prav tako pa tudi izobraževanje, teoretično in praktično, katerega namen je operaterja viličarja (tj. viličarista) teoretično in praktično usposobiti za varno delo z viličarjem.

Pristop k izobraževanju viličaristov se po Evropi razlikuje: v nekaterih državah je potrebno opraviti t.i. »hitre tečaje«, v nekaterih državah pa so izobraževanja bolj obsežna in zahtevna. V Sloveniji Pravilnik o varnosti in zdravju pri uporabi delovne opreme v 12. členu določa, da mora delodajalec delavca usposobiti za pravilno in varno uporabo delovne opreme s teoretičnim in praktičnim usposabljanjem ter seznanjanjem z nevarnostmi, ki se lahko pojavijo pri uporabi takšne opreme. V zadnjem odstavku je še zapisano, da je potrebno za take primere (kot je npr. viličar) zagotoviti posebno usposabljanje. Ta usposabljanja se lahko različno dolga, saj dolžina teoretičnih in praktičnih usposabljanj ni predpisana. Ker je izvedba vseh usposabljanj za delavce, tako stroškovno kot izvedbeno, na strani delodajalca, se delodajalci odločajo za »hitra« usposabljanja, saj želijo prihraniti tako denar kot tudi čas, ko je delavec na usposabljanju, saj v času usposabljanja delavec ne opravlja svojega primarnega dela.

2 Izobraževanje viličaristov na SIC Ljubljana

2. 1 Izobraževanje NPK viličaristov - odrasli

Strokovni izobraževalni center Ljubljana, v sklopu Medpodjetniškega izobraževalnega centra (MIC), izvaja usposabljanje NPK (nacionalna poklicna kvalifikacija) viličaristov za odrasle osebe. Izobraževanja potekajo v popoldanskih urah, tako teoretični kot praktični del. Izobraževanja izvajamo v sodelovanju z Zavodom Republike Slovenije za zaposlovanje (ZRSZ) ter v sodelovanju z različnimi podjetji, ki pošiljajo kandidate na zunanje usposabljanje. Taka podjetja so sicer redka, saj usposabljanje poteka v obsegu 50 ur, kar je za podjetja prevelik obseg in se raje odločajo za hitrejši tečaj znotraj podjetja. Prednost opravljanja NPK je sicer tudi v tem, da je NPK certifikat veljaven po celi Sloveniji, v katerem koli podjetju, za razliko od t.i. »internih« usposabljanj, kjer je kandidat usposobljen izključno za delo z viličarjem v dotičnem podjetju, kjer je usposabljanje opravljal. Ker pa je ta prednost izključno na strani delavca, se tako podjetju »ne splača« plačevati dražji in dolgotrajnejši tečaj usposabljanja za delavca, kljub temu, da bi delavec s tem pridobil znatno boljše usposabljanje ter bi posledično bolj varno upravljal z viličarjem.

Izobraževanje izvajajo usposobljeni viličaristi z izobrazbo s področja strojništva ali varstva pri delu.

Praktični preizkus se izvaja pred tri člansko komisijo Republiškega izpitnega centra (RIC).

Pogoj za pristop k opravljanju NPK viličarist je izobrazba na ravni SOK 2 ter vozniški izpit B kategorije.

2. 2 Izobraževanje viličaristov v rednem programu logistični tehnik

V letih 2018-2020 smo na šoli sodelovali v projektu International Forklift Training, v sklopu Erasmus+ KA2 projektov. Na projektu smo sodelovali s hrvaško srednjo šolo »Gospodarska škola Čakovec« in francosko srednjo šolo »Lycée professionnel Ramiro Arrue« ter slovenskim podjetjem Kobal transporti d.o.o..

Namen projekta je bil pripraviti mednarodno usklajen program za izobraževanje viličaristov – tako odraslih kot dijakov v srednješolskem izobraževanju. Poleg programa za izobraževanje smo izvedli tudi usposabljanje učiteljev mentorjev na področju varnega dela z viličarjem.

V času izvajanja projekta se nam je porodila ideja, da bi v Sloveniji pričeli z izvajanjem usposabljanja viličaristov v rednem programu logistični tehnik, tako kot izvajajo v Franciji in poskusno tudi na Hrvaškem.

Programi srednješolskega strokovnega izobraževanja dovoljujejo šolam, da 20% kurikuluma razporedi sama, gre za t.i. »odprti kurikulum«, ki ga vsaka šola v sodelovanju s podjetji pripravi v skladu s smernicami trga dela.

Implementacija usposabljanja viličaristov bi tako lahko postavili v redno izobraževanje preko odprtega kurikuluma. V šolskem letu 21/22 smo pričeli z izvedbo predmeta »upravljanje skladišč«, ki je tako vnesel program usposabljanja viličaristov v redno izobraževanje na programu logistični tehnik.

Osnovno opremo za usposabljanje viličaristov (čelni viličar, zaščitna oprema, palete, IBC, ipd.) smo pridobili že v času izvajanja usposabljanja viličaristov za NPK (od leta 2013-) v sklopu MIC.

2. 3 Način in potek izvedbe izobraževanja viličaristov v rednem programu logistični tehnik

Usposabljanje obsega 34 ur teorije ter 34 ur praktičnega pouka. Praktični pouk se zaradi lažje izvedbe deli v skupine do maksimalno 17 dijakov, kot zahteva Pravilnik o normativih in standardih za izvajanje izobraževalnih programov in vzgojnega programa na področju srednjega šolstva (UL RS št. 74/23).

Teoretični pouk se izvaja v splošnih učilnicah in obsega znanja s področja varnosti pri delu in prve pomoči, zgradbe viličarja ter ravnanja z viličarjem. Dijaki uspešno povezujejo teorijo s prakso, na koncu teoretičnega usposabljanja imajo dijaki tudi izpit za oceno, s katerim dokazujejo popolno razumevanje zgoraj omenjenih teoretičnih sklopov.

Praktični del se izvaja na poligonu na lokaciji Avtošole Ježica, kjer imamo vso potrebno opremo za izvajanje (čelni viličar, električni paletni viličar, ročni viličar, tovarne enote, stožci, zaščitna oprema, regali) ter obsega predvsem:

- pregled viličarja – dijak opravi vizualni pregled viličarja ter zavaruje sebe in okolico
- vožnja brez tovora – dijak brez tovora vozi naravnost, vzvratno in slalom
- ravnanje s paletami – dijak se varno približa paleti, jo dvigne in spusti
- spretnostna vožnja s tovorom – dijak s tovorom vozi naravnost, vzvratno in slalom
- zlaganje na kup – dijak zloži palete eno na drugo in nato razloži
- zlaganje v regal – dijak naloži paleto v regal in jo razloži iz regala
- varno parkiranje viličarja – dijak ustrezno zavaruje viličar pred premikanjem

Praktično usposabljanje pričnemo z uporabo ročnega viličarja, da dijaki pridobijo občutek manevriranja. Izvajajo razne vaje, od slalom vožnje, vožnje »osmic« do nakladanja, dvigovanja in razkladanja raznih tovarnih enot.



(vir: lasten)

Slika 1: Spretnostna vožnja

Dijaki so razdeljeni v dve skupini glede na opravljen vozniški izpit B kategorije. Ker je pogoj za pristop k opravljanju NPK viličarist vozniški izpit B kategorije, smo se tudi mi odločili, da imamo enako pravilo. Razlogov je več, prvi in ključni pa je definitivno varna izvedba usposabljanja, saj so dijaki, ki so opravili vozniški izpit B kategorije, bili zdravniško pregledani za vožnjo motornega vozila ter imajo občutek dela z motornimi vozili (uporaba stopalk, ročne zavore, manevriranje, ipd.). Dijaki, ki so v skupini, ki nimajo vozniškega izpita B kategorije, se učijo na električnem paletnem viličarju. Praktične vaje pa ostajajo enake za obe skupini, ne glede na sredstvo, ki ga uporabljajo.

Ker gre za vožnjo motornih vozil in je pogoj za vožnjo čelnega viličarja vozniški izpit B kategorije, smo predmet umestili v zaključni letnik SSI programa ter v 4. letnik PTI programa, ko dijaki napolnijo 18 let. Za udeležbo na praktičnih vajah je obvezna uporaba zaščitnih delovnih čevljev po standardu EN 20345 S3.

Usposabljanje dijaki zaključijo tudi s pridobitvijo ocene iz praktičnega preverjanja, ki je na nivoju NPK preverjanja. Dijakom izdamo potrdilo o uspešno opravljenem usposabljanju, ki ga lahko nato uporabijo za prijavo na NPK viličarist, kjer jim lahko komisija pridobljena znanja tudi prizna.

3 Zaključek (analiza stanja in izzivi)

Trenutno zaključujemo tretje šolsko leto, odkar usposabljammo dijake za vožnjo viličarja. V teh letih lahko izpostavimo kar nekaj ključnih doprinosov ter izzivov, ki nas še čakajo, da bi lahko usposabljanje kar se da izpopolnili do potankosti.

Ključni doprinosi:

- Imajo praktični pouk, kar vnaša dodatno motivacijo za delo, saj gre za drugačen pristop k izobraževanju in jim nudi nadvse zanimivo izkušnjo,
- Pridobijo zelo uporabno znanje, ki jim lahko koristi tudi izven logistike/prometa,
- Brezplačno se usposabljaajo za vožnjo viličarja,
- Spoznajo varnost pri delu in pomembnost le-te skozi celotno kariero,
- Pri promociji poklica predstavlja praktično usposabljanje v strokovnem izobraževanju privlačno izbiro, kot tudi edino tako na programu logistični tehnik v Sloveniji.

Ključni izzivi:

- **Uskladitev urnika vožnje z vremenom** – praktični pouk se lahko izvaja samo v lepem vremenu, ob močnejših padavinah je zaradi odprtosti poligona izvedba nemogoča ter celo nevarna. Možna rešitev je seveda postavitve montažne hale, vendar se na poligonu za motorna vozila hala ne sme postaviti.
- **Kvalitetno in varno mentorstvo dijakom** – dober inštruktor mora biti poleg, da lahko dijaku daje napotke glede zadolžitve ter ga poskuša usmerjati, da bi storil čim manj napak. Vendar pa je zadrževanje v delovnem območju viličarja prepovedano in **zelo nevarno**. Čelni viličar ima 2500kg ter je brez vzmetenja, s polnimi pnevmatikami. Inštruktor, ki je poleg viličarja tvega, da mu dijak zapelje preko stopala. V tem primeru so tudi zaščitni čevlji ustreznega standarda nesposobni preprečiti hudo poškodbo stopala. Biti v delovnem območju viličarja pa predstavlja tudi ostala tveganja: možnost prevrnitve, možnost, da se dijak zaleti v celotno telo inštruktorja, ipd.. Del napotkov, ki jih dajemo dijakom na viličarju, se lahko varno poda preko radio povezave, podobno kot to delajo inštruktorji pri vožnji motornih koles. Vseeno pa se pojavi vprašanje lokacije inštruktorja: če inštruktor stoji daleč, bo težje opazil napake, ki jih dijak izvaja, kot so npr. sunkovitost pritiskanja stopalk in ročic ter podajal ustrezne napotke. Zaradi same zasnove viličarja pa inštruktor ne more biti prisoten na vozilu, tako kot to počnejo na poligonu s traktorjem.

- **Dijaki s posebnimi potrebami** – predstavljajo poseben izziv. Praviloma dijaki, ki imajo posebne potrebe ne pridobijo voznškega izpita B kategorije – saj ne opravijo zdravniškega pregleda. Vendar pa mi vseeno nudimo možnost dijakom voziti električni paletni viličar brez izpita B kategorije. Kako zagotoviti varno udeležbo vseh: dijaka, ki vozi, inštruktorja ter ostalih dijakov in morebitnih mimoidočih, ki sodelujejo pri praktičnemu pouku? Kot dva primera, s katerimi smo se že soočili, lahko navedemo dijaka z gibalnimi primanjkljaji in visoko stopnjo naglušnosti. Želimo si zagotovimo usposabljanje tudi dijakom s posebnimi potrebami, na drugi strani pa moramo zagotoviti varno izvedbo pouka za vse. Je smiselno takim dijakom oprostiti praktično usposabljanje, kljub njihovi želji, da ga želijo opravljati?
- **Stroški usposabljanja** – pri praktičnem usposabljanju je razumljivo, da bodo nastali tudi stroški. Zaščitne delovne čevlje si morajo dijaki sami kupiti in jih s seboj prinašati na praktično usposabljanje. Ostale stroške, kot so nakup, amortizacija, servisi, plin oz. elektrika, krije šola. Večino opreme smo uspeli kupiti s sredstvi iz raznih nacionalnih oz. mednarodnih projektov. V šolskem letu 23/24 smo od podjetja Kobal transporti d.o.o. prejeli skladiščni regal kot donacijo. Stroške postavitve regala in tekoče stroške sedaj krijemo sami, kupovanje nove opreme bo izziv, saj praktično usposabljanje ni predvideno z izobraževalnim programom »logistični tehnik«.



(vir: lasten)

Slika 2: Zlaganje v regal

- **Velikost skupin** – trenutno izvajamo vaje v skupino po maksimalno 17 dijakov. Večina razredov nima 32 dijakov, zato redko pridemo do take številke, se je pa že zgodilo, da so bile skupine velike tudi po 12, 13 dijakov. Kako v dveh praktičnih urah voženj, v katero je vključena tudi priprava poligona in končno pospravljanje, toliko dijakov kvalitetno usposobiti. Če predpostavimo, da sta dve šolski uri 90 min, in da porabimo za postavitev, pripravo, preobuvanje in pospravljanje 20 minut, nam ostane 70 minut dejanske vožnje. Če to razdelimo na 12 delov, govorimo o manj kot 6 minut na dijaka, kar je bore malo.

Pravilnik o normativih in standardih za izvajanje izobraževalnih programov in vzgojnega programa na področju srednjega šolstva v 94. členu sicer določa, da je odstopanje od normativov dovoljeno pri praktični vožnji z motornim vozilom, pri čemer mora biti s programom po letnikih določen obseg ur praktične vožnje z motornim vozilom. Za naš program to ne velja, saj smo praktično usposabljanje z vožnjo viličarja dodali v odprti del kurikulumu. Četudi bi dijake razdelili v manjše skupine, bi to lahko preseglo dovoljeno dnevno število ur dijakov (npr. 4 skupine po 8, po 4 ure tedensko) oz. postane izdelovanje urnika težavno. Pa četudi bi nam to uspelo, nastane problem, kaj storiti, ko je slabo vreme za določeno skupino, ki bo imela prihodnje vaje šele čez 4 tedne?

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Implementation of forklift operators training in the regular educational program of logistics technicians

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Summary

The article briefly presents the training structure of forklift drivers in Slovenia followed by the forklift training of students enrolled in programme logistics technician in more detail. The key part is chapter 3, where contributions and challenges we face in the implementation of practical training of forklift operators in the regular educational program are listed.

Key words

Forklift, safety, logistics technician

1 Introduction

Forklifts belong to motorized industrial vehicles that are used to manipulate cargo over short distances. The most common version are front-end forklifts. Manipulation of cargo in the supply chain is inevitable, as cargo needs to be unloaded, loaded and stored in the warehouse, so the frequency of use of a forklift in the process of moving cargo is high. In 2013 alone, the top 20 forklift manufacturers sold 944,405 units of forklifts (Bond, 2013).

Despite its small size, it is an extremely rigid industrial vehicle, which mostly exceeds the weight of a car, so it is necessary to handle the forklift carefully, as it can quickly damage the load or people. In his post on LinkedIn, Nirav Chauhan (2023) cites Eurostat data that in 2021 there were 3,347 fatal accidents at work, of which 10% were accidents with forklifts.

He goes on to cite a study by the UK's Health and Safety Laboratory which says:

- 90% of forklift operators experience at least one work accident in their career
- 11% of forklift drivers experience at least one work accident every year

From the above data we can conclude that it is a dangerous vehicle and that all regulations in the field of safety at work are still necessary as well as training, theoretically and practically, the purpose of which is to theoretically and practically train the forklift operator (i.e. the forklift driver) to work safely with forklift.

The approach to the training of forklift operators varies across Europe: in some countries it is necessary to complete the so-called "fast courses", and in some countries the trainings are more extensive and demanding. In Slovenia, »*Pravilnik o varnosti in zdravju pri uporabi delovne opreme*« stipulates in Article 12 that the employer must train the employee in the correct and safe use of work equipment through theoretical and practical training and familiarization with the dangers that may arise when using such equipment. In the last paragraph, it is also written that it is necessary to provide special training for such cases (such as a forklift). These trainings can vary in length, as the length of theoretical and practical trainings is not prescribed. Since the execution of all training for workers, both in terms of cost and implementation, is on the employer's side, employers decide on "quick" training, as they want to save both money and time when the worker is on training, because during the training the worker is not performing his primary job.

2 Forklift operator training at SIC Ljubljana

2. 1 Forklift operator training of adults (NPK)

Technical Educational Center Ljubljana (SIC), precisely Intercompany Training Center (MIC), conducts NPK (stands for national professional qualification) training for adults. The training takes place in the afternoon, both theoretical and practical. We provide training in cooperation with the Employment Agency of the Republic of Slovenia (ZRSZ) and in cooperation with various companies that send candidates for external training. Such companies are rare, as the training takes place in the range of 50 hours, which is too much for companies since they prefer to opt for faster courses within the company. The advantage of completing the NPK is also that the NPK certificate is valid throughout Slovenia in any company unlike the so-called "internal" training where the candidate is trained exclusively to work with a forklift in the company in question where the training took place. However, since this advantage is exclusively on the side of the worker, it is therefore "not worth it" for the company to pay for a more expensive and lengthy training course for the worker despite the fact that the worker would thereby obtain significantly better training and, as a result operate the forklift more safely.

Training is provided by qualified forklift operators with a degree in mechanical engineering or occupational safety. The practical test is conducted before a three-member committee of the Republic Examination Center (RIC).

The prerequisite for enrolling in programme is an education at SOK 2 level and a driving test of B category.

2. 2 Education of forklift operators in the regular programme of logistics technician

In the years 2018-2020 the school participated in the International Forklift Training project as part of the Erasmus+ KA2 projects. We collaborated on the project with the Croatian high school "Gospodarska škola Čakovec" and the French high school "Lycée professionnel Ramiro Arrue" and the Slovenian company Kopal transporti d.o.o..

The purpose of the project was to prepare an internationally coordinated program for the education of forklift operators - both adults and students in secondary education. In addition to the education programme, we also conducted training for teacher mentors in the field of safe handling with forklifts. During the implementation of the project we came up with the idea of starting the training of forklift operators in Slovenia in the regular programme of logistics technicians just as they do in France and on a trial basis also in Croatia.

Secondary vocational education programmes allow schools to allocate 20 % of the curriculum themselves, this is the so-called "open curriculum", which each school prepares in cooperation with companies in accordance with the guidelines of the labor market.

The implementation of the training of forklift operators could thus be included in regular education through an open curriculum. In the 21/22 school year, we started with the implementation of the "warehouse management" course, which thus included the training program for forklift operators in the regular education of the logistics technician programme.

Basic equipment for the training of forklift operators (front forklift, protective equipment, pallets, IBC, etc.) was already acquired during the training of forklift operators for NPK (from 2013-) as part of the MIC.

2. 3 Methods and course of training of forklift operators in the regular logistics technician programme

The training consists of 34 hours of theory and 34 hours of practical lessons. For ease of implementation, practical lessons are divided into groups of up to a maximum of 17 students, as required by the Pravilnik o normativih in standardih za izvajanje izobraževalnih programov in vzgojnega programa na področju srednjega šolstva (UL RS št. 74/23). Theoretical classes are held in general classrooms and include knowledge in the field of safety at work and first aid, forklift construction and forklift handling. The students successfully connect theory with practice at the end of the theoretical training the students also have an assessment exam, which proves their full understanding of the above-mentioned theoretical sections.

The practical part is carried out on the training ground at the location of Driving School Ježica, where we have all the necessary equipment for implementation (front-end forklift, electric pallet truck, manual forklift, cargo units, cones, protective equipment and racks) and mainly includes:

- inspection of the forklift – a student performs a visual inspection of the forklift and protects himself and the surroundings
- driving without a load – a student drives straight, reverse and slalom without a load
- handling pallets - a student safely approaches the pallet, lifts and lowers it
- skillful driving with a load - a student drives straight, backwards and slalom with the load
- stacking – a student stacks the pallets one on top of the other and then unfolds them
- stacking in the rack - a student loads the pallet into the rack and unloads it from the rack
- safe parking of the forklift - a student properly secures the forklift from moving

Practical training begins with the use of a manual forklift so that the students get a feel for maneuvering. They perform various exercises from slalom driving, figure-of-eight driving to loading, lifting and unloading various cargo units.



(source: own)

Photo 3: Skill driving

Students are divided into two groups depending on whether they have obtained driving licence (B category). Since the prerequisite for taking the NPK forklift operators driving test is B category, we also decided to apply the same rule. There are several reasons but the first and most important one is definitely the safe implementation of the training, since the students who passed the B category driving licence have been medically examined for driving a motor vehicle and have the experience of working with motor vehicles (use of pedals, hand brakes, maneuvering, etc.). Students who are in the group without category B driver's licence learn on an electric pallet truck. The practical exercises, however, remain the same for both groups regardless of the means they use.

Condition for driving a front-end forklift is a B category driving licence we placed the subject in the final year of the SSI programme and in the 4th year of the PTI program when the students turn 18. For participation in practical exercises the use of protective work shoes according to the EN 20345 S3 standard is mandatory.

The students also complete the training by obtaining a grade from the practical examination, which is at the level of the NPK examination. Students are issued with a certificate of successfully completed

training which they can then use to apply to the NPK forklift operator certification, where the committee can also recognize the acquired knowledge.

3 Conclusion (situation analysis and challenges)

We are currently completing the third school year since we have been training students to drive a forklift. During these years, we can point out quite a few key contributions and challenges that still await us in order to perfect the training as much as possible.

Key contribution:

- They have practical lessons, which brings additional motivation to work, as it is a different approach to education and offers them an extremely interesting experience,
- they acquire very useful knowledge that can also benefit them outside of logistics/transport,
- they are trained to drive a forklift for free,
- they learn about safety at work and its importance throughout their career,
- when promoting the profession, practical training in technical education is an attractive choice, as well as the only one in the logistics technician program in Slovenia.

Challenges:

- **Coordination of the driving schedule with the weather** - practical lessons can only be carried out in good weather, in case of heavy rainfall due to the openness of the training ground, the execution is impossible and even dangerous. A possible solution is, of course, the construction of an assembly hall, but a hall must not be erected on the test site for motor vehicles.

- **Quality and safe mentoring of students** - a good instructor must be able to give the student instructions regarding assignments and try to guide him to make as few mistakes as possible. However, staying in the working area of the forklift is prohibited and very dangerous. The front forklift has 2500 kg and is without suspension, with solid tires. An instructor who is next to a forklift runs the risk of a student running over his foot. In this case even protective shoes of the appropriate standard are unable to prevent severe foot injury. Being in the working area of the forklift also presents other risks: the possibility of tipping over, the possibility of the student bumping into the entire body of the instructor, etc. Part of the instructions we give to the students on the forklift can be safely given via radio connection, similar to what instructors do when candidates drive motorcycles. However, the question of the location of the instructor arises: if the instructor is standing far away it will be more difficult for him to notice mistakes made by the student, such as jerky pressing of the

pedals and levers and give appropriate instructions. Due to the very design of the forklift, the instructor cannot be present on the vehicle, as they do on the training ground with a tractor.

- Students with special needs - represent a special challenge. Most students with special needs do not obtain a category B driving test - as they do not get positive feedback from medical examination. However, we still offer students the opportunity to drive an electric pallet truck without a category B exam. But how to ensure the safe participation of everyone: the student who drives, the instructor, other students and possible passers-by participating in the practical lessons? As two examples we have already encountered, we can cite a student with motor deficits and a high degree of hearing loss. We want to provide training for students with special needs, but on the other hand, we must ensure that classes are conducted safely for everyone. Does it make sense to exempt such students from practical training, despite their desire to do it?

-Training costs – when dealing with practical training it is understandable that costs will also be incurred. Students must purchase protective work shoes themselves and bring them to practical training. Other costs, such as purchase, depreciation, services, gas or electricity, are covered by the school. We managed to buy most of the equipment with funds from various national or international projects. In the 23/24 school year, we received a donation from the company Kopal transport d.o.o. - a storage rack. We are now covering the costs of setting up the rack and current costs ourselves, buying new equipment will be a challenge, as practical training is not provided for in the "logistics technician" educational program.



(source: own)

Photo 4: Loading onto storage rack

- **Group size** - we currently conduct exercises in a group of a maximum of 17 students. Most classes do not have 32 students, so we rarely reach such a number, but it has already happened that the groups were as large as 12 or 13 students. How to successfully train so many students in two practical hours of driving, which also includes the preparation of the training ground and final cleaning. If we assume that two school hours are 90 minutes and that we spend 20 minutes setting up, preparing, changing shoes and tidying up, we have 70 minutes of actual driving left. If we divide this into 12 parts, we are talking about less than 6 minutes per student, which is quite a bit.

Article 94 of the Pravilnik o normativih in standardih za izvajanje izobraževalnih programov in vzgojnega programa na področju srednjega šolstva (UL RS št. 74/23) stipulates that deviations from the norms are allowed for practical driving with a motor vehicle, and the program must specify the number of hours of practical driving with motor vehicle. This does not apply to our program, as we have added practical training with forklift driving to the open part of the curriculum. Even if the students were divided into smaller groups, this could exceed the permitted daily number of hours for the students (e.g. 4 groups of 8, 4 hours per week) or making a schedule becomes difficult. Even if we were to succeed, the problem arises, what to do when the weather is bad for a certain group that will have the next training in 4 weeks?

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AVTOSOOBRAKAEN UČILIŠEN CENTAR
“Boro Petruševski” - Skopje



XIV Megunaroden simpozium na tema:
INTERDISCIPLINARNOST NA LOGISTIKATA I SOOBRAKAJOT

VOZAC NA MOTORNO VOZILO VO REDOVNO SREDNO OBRAZOVANIE VO
REPUBLIKA SEVERNA MAKEDONIJA

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Skopje, 2024

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1. VOVED

Vo mnogu zemji vo svetot postoi možnost da se stane vozač na 16 - godišna voзраст, dodeka ima i zemji koi dozvoluvaat samo po navršeni 18 godini. No, toa ne znači deka site početnici vozači se podgotveni da počnat da vozat na nekoja točno odredena voзраст.

[1] Na site ni e poznato deka mladite luđe učat polesno otkolku postarite luđe. Kako što stareeme našiot mozok se poteško pamti, pobaven e, osobeno ova e karakteristično koga treba da se usvojuvaat novi znaenja ili veštini. Tokmu toa e pričinata zošto najgolemiot del od našeto obrazovanie se odviva do triesettata godina od našiot život.

Ako gi zaprašame onie koi se direktno vključeni vo podučuvanje na mladite kandidati za idni vozači, a toa se instruktorite, tie će ni kažat deka najgolemata teškoťija vo nivnata profesija e „ne – vozačite“ da gi pretvorat vo vozači. Tie ne možat da gi naučat ovie kandidati odlično da vozat, tuku samo će gi naučat na opštite pravila i propisi za da možat da go položat vozačkiot ispit. A potoa preporečuvaat podolgo vreme da pominat pozadi volanot za da go podobrat svoeto vozačko iskustvo.

Na prašanje kolku dolgo će im treba da ja naučat ovaa veština, odgovorot e deka mnogu zavisi i od prirodnata nadarenost na samite mladi luđe i od nivnata želba.

No isto taka instruktorite so gordost zboruvaat za edna druga kategorija na vozači koi imaat vrodni vozački instinkt – oset za voženje.

Postojat poveќе faktori, zošto nekoji luđe se prirodno dobri vo voženje vo sporedba so drugite, a učenje da se vozi na rana voзраст, definitivno može da igra uloga vo razvivanje na silni vozački veštini.

Eve nekolku pričini za onaa grupa na vozači koi možat da se izdvojat po svojata prirodna darba za voženje:

1. Interes za voženje:

Ušte od najrana voзраст pojavuvaat interes za avtomobili, postojano gi sledat dviženjata na svoje roditeli - vozači. Ušte od najrana voзраст postavuvaat prašanja vo vrska so voženje i so netrpenie čekaat da zastanat pozadi volanot. Kolku poveќе informacii sobiraat, tolku podobno i po samouvereno se čuvstvuvaat. Nivnata želba za da stanat vozači e mnogu silna. Kaj ovaa grupa vozači mnogu važna uloga ima i roditelot vozač koj sekogaš treba na svoeto dete da mu ja razjasni nastanata situacija, da go podučuva, (zošto ja namaluva brzina i na koja pedala pritiska) i t.n. Voženje od rana voзраст može da dađe pobogato vozačko iskustvo, podobri reakcii i pogolema samodoverba kaj mladite luđe koi ja izbralae svojata idna profesija - vozač.

2. Izloženost na različni soobraćajni uslovi:

Vozačite koi započnale so voženje na rana voзраст, bile izloženi na različni uslovi, kako što se različni vremenski uslovi, soobraćajni situacii i različni tipovi na patišta. Ovaa izloženost može da im pomogne da razvijat podobra prilagodljivost i veštini za donesuvanje odluki pri voženje.

3. Prirodna darba:

Vozačite može da imaat prirodna sposobnost ili nadarenost kon zadači što vključuvaat koordinacija, prostorna orientacija i brzo donesuvanje odluki, koi se važni veštini pri voženje. Ovaa vrodna sposobnost može da im go skрати i da im go olesni vremeto za zdobivanje so veštinite za voženje. Ovie mladi vozači brzo se izdvojuvaat od ostanatite.

4. Doverba:

Doverbata igra golema uloga vo vozenjeto. Luĝeto koi veruvaat vo sebe, zad volanot ĉestopati se porelaksirani, fokusirani i podobro se spravuvaat so predizvikuvaĉki situacii vo soobrakajot.

5. Stavot kon vozenjeto:

Zainteresiranite mladi vozaĉi neguvaat pozitiven stav kon vozenjeto, gledaat na ubavata strana. Veruvaat deka so poĉituvanje na pravilata i propisite vo soobrakajot sekoe patuvanje ke bide interesno. Moĝat da posetat mnogu zemji, da doznaat za razliĉnite kulturi i t.n. A potoa se posvetuvaat i na odgovornosta, vnimanieto, trpenieto i pretpazlivsta. Nekoi vozaĉi prirodno gi poseduvaat ovie kvaliteti i polesno gi razvivaat so tekot na vremeto.

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[1] <https://survivalfreedom.com/What-Is-the-Best-Age-to-Start-Driving>

1.1. INICIJATIVA ZA VOVEDUVANJE NA NOV OBRAZOVEN PROFIL VO SOOBRAKAJNATA STRUKA VO SREDNOTO STRUČNO OBRAZOVANIE VOZAČ NA MOTORNO VOZILO

Stručniot soobračen aktiv vo ASUC Boro Petruševski započna so inicijativa za voveduvanje na nov obrazoven profil vo soobračajnata struka vo srednoto stručno obrazovanie VOZAČ NA MOTORNO VOZILO. Za taa cel se obrativme do Asocijacija na združenija na rabotodavačite na prevoznite trgovski društva na Republika Severna Makedonija MAKAM-TRANS.

Vo inicijativata beše navedeno sledново:

Soglasno novo nastanatite trendovi i pobaruvačkata na profesionalen kadar od oblata na prevozot na patnici i tovar, se nametna potrebata za aktiviranje na obrazoven profil „VOZAČ NA MOTORNO VOZILO“. Ovoj profil postoeše vo ASUC „Boro Petruševski“ do 1998 godina.

Poradi usoglasuvanjeto na potrebite na pazarot i soodvetnite kadri koi izleguvaat od učilištata ja započnavme ovaa inicijativa za profilot „VOZAČ NA MOTORNO VOZILO“, so koja sakame da ukažeme na važnosta na ovaa profesija i na možnostite za vrabotuvanje koi ke gi imaat kadrite koi ke proizlezat od obrazovniot proces vo ovoj profil.

Ova dualno obrazovanie ke bide trigodišno so možnost za horizontalna proodnost vo srodnite obrazovni profili.

Dokolku uspešno se sprovede ovaa inicijativa i dokolku ja ostvarime ovaa strateška investicija vo obrazuvanje na kadri od ovoj profil, našeto učilište ke izleze vo presret na potrebite na pazarot. Interesot na učenicite ke se zgolemi za запиšuvanje vo našeto učilište a dolgogodišnoto iskustvo na našiot nastaven kadar ke pridonese za obrazuvanje na kvalitetni kadri koi profesionalno ke si ja izvršuvaat svojata rabota kako vo zemjata taka i vo stranstvo.

Ušte pogolema motivacija ni e naoğanjeto na pogolem broj socijalni partneri koi direktno ke ja podržat našata inicijativa. A ovie kadri što ke proizlezat od obrazovniot proces, vednaš ke bidat na raspolaganje za vrabotuvanje kaj ovie socijalni partneri.

Za ovaa cel potrebno e da se izgotvi:

1. Analiza za potrebite na pazarot na trudot;
2. Pravilnik za obrazovanie na vozači na motorni vozila;
3. Od postoečkite standardi na zanimanje i obrazovni profili da se izraboti nastaven plan;
4. Izrabotka na nastavni programi po predmetnite sodržini;
5. Da se napravi verifikacija na nastavniot plan;
6. Da se napravi verifikacija na ustanovata.

So ovaa inicijativi barame podrška od Asocijacija na združenija na rabotodavačite na prevoznite trgovski društva na Republika Severna Makedonija MAKAM-TRANS kako nosečka institucija i direktno involvirana vo ovaa problematika.

1.2. PODRŠKA ZA VOVEDUVANJE NA OBRAZOVEN PROFIL VOZAČ NA MOTORNO VOZILO VO ASUC BORO PETRUŠEVSKI

Asocijacija na združenja na rabotodavačite na prevoznite trgovski društva na Republika Severna Makedonija MAKAM-TRANS, Asocijacija PREVOZNIK, Asocijacija ISTOK i Združenieto TRANSPORT LEGIS dadea podrška za voveduvanje na obrazovniot profil VOZAČ NA MOTORNO VOZILO. Za taa cel podrškata beše pratena do institucijite vo Republika Severna Makedonija, potočno do Vladata na Republika Severna Makedonija, Ministerstvoto za transport i vrski, Ministerstvoto za vnatrešni raboti i Ministerstvoto za obrazovanie.

Vo podrškata e navedeno:

Asocijacija i raznite oblici na združuvanja na prevoznice na teritorija na našata država, daveat podrška na inicijativata za voveduvanje na obrazovniot profil VOZAČ NA MOTORNO VOZILO, so cel da se nadminat problemite so koi se soočuvaaat prevoznice, no i da se dade podrška za pristapuvanje na aktivnosti koi se sproveduvaaat na nivo na Evropa, a se inicirani od strana na najgolemata transportna zaednica IRU.

Sostojbata vo državata, no i na nivo na Evropa so nedostig na vozači na motorni vozila e alarmanantna i nanazad poveќе godini od strana na IRU se dostavuvaaat analizi i inicijativi za nadminuvanje na akutniot problem, imeno:

Izveštaj na IRU od 15.11.2022 godina:

(<https://trans.info/driver-shortage-in-europe-to-triple-by-2026-313260>)

Spored izveštajot na IRU, jasno se naveduva deka do 2026 godina, na nivo na Evropa ke ima nedostig od nad 2.000.000 vozači poradi odenje vo penzija i nesproveduvanje soodvetni aktivnosti za privlekuvanje na mladi lica i ženi za ovaa profesija, što ke vlijae na polovina od celokupnoto dviženje na stokata i na milioni patuvanja na patnici. Krivata so nedostig na vozači vo Evropa ima nagorna linija, što pretstavuva golema zakana za održuvanje na kontinuitetot vo vršenje na prevozot na stoka i patnici, što bara prezemanje na soodvetni politiki za nadminuvanje na ovaa sostojba.

Izveštajot na IRU utvrduva problemi koi mora da se nadminuvaaat:

Ključ za pristap i privlečnost:

- Minimalna vozrast za kvalifikacija se ušte e 21 godina za vozačite na tovarni motorni vozila vo pet zemji na EU i pomegu 21 i 24 godini za poveketo vozači na avtobus niz EU, što pretstavuva ogromna bariera za onie što go završuvaaat srednoto obrazovanie
- Prečka se i visokite trošoci za obuka za steknuvanje so vozačka dozvola i sertifikat za profesionalna kompetentnost (SPK) na vozač

Rešenija za nadminuvanje na problemot:

- Javniot i privatniot sektor treba da rabotat zaedno za da se spravat so nedostigot na vozači, vo izveštajot na IRU naveduva 20 rešenija koi momentalno se implementirani od strana na združenijata za patniot soobračaj, prevoznice i ispračite.
- Državnite organi, isto taka, treba da prezemat aktivnosti za da sprečat eskalacija na nedostigot, vklučuvajki:
 - Utvrđuvanje na minimalnata vozrast za obuka i polaganje na vozački ispit za tovarni motorni vozila na 17 godini, so dobivanje na privremena vozačka dozvola, i na 18 godini dobivanje trajna vozačka dozvola
 - Subvencioniranje na trošoci za obuka na novi profesionalni vozači
 - Izgradba na poveќе sigurni i bezbedni mesta za parkiranje

Podrškata pred se e baranje za sledenje na aktivnostite koi se sproveduvaat vo državite členki na EU vo odnos na problemot so nedostig na vozači, kreiranje na aktivnosti i politiki za pobrza pristapnost do rabotni veštini na vozač na motorno vozilo preku poveќе zakonski izmeni i dopreciziranja za privlekuvanje na mladi lica za ovaa profesija i nivno stručno osposobuvanje.

Profesionalniot vozač vo meѓunarodniot prevoz pred se treba da e lice koe ima stručno poznavanje od oblasta, koe se steknalo so soodvetno stručno obrazovanje i preku istoto ќе se transformira vo profil so visoka profesionalnost i pristap kon rabotnite zadači, a toa e možno edinstveno preku soodvetno sredno stručno obrazovanje na mladi lica.

Vo našata država odamna e ukinat smerot vozač, so što vo realnosta prevoznice se primorani da primaat polukvalifikuvani vozači koi svoite veštini gi učat preku greškite koi gi pravat na teren, a so toa nanesuvaat i golema šteta na samite trgovski društva. Faktot deka mladite lica treba da čekaat do 21 godina za da se steknat so soodvetni vozački kategorii, gi odvraka da ja rabotat ovaa profesija od edna strana, a od druga strana i ženite isto taka se obeshrabreni da rabotat kako vozač na motorno vozilo, bez razlika što imame golema brojka na nevraboteni lica, a nadomestokot što go dobivaat vozačite e mnogu pogolem od minimalnata plata na nivo na državata.

Zakonski izmeni pod itno treba da se napravat vo Zakonot za bezbednost na soobraќajot na patištata vo odnos na starosnata granica za obuka i polaganje na vozački ispit za tovarni motorni vozila za C kategorija na 17 godini, so dobivanje na privremena vozačka dozvola, i na 18 godini dobivanje trajna vozačka dozvola, za onie koi učat redovno obrazovanje vozač na motorno vozilo.

Vo Zakonot za prevoz vo patniot soobraќaj treba po primerot na državite členki na EU da se doprecizira delot za stručna kompetentnost na vozačite i steknuvanje so SPK na vozač, da se priznava i dobiva po avtomatizam so završeno sredno stručno obrazovanje VOZAČ NA MOTORNO VOZILO.

Zakonskite izmeni pogore navedeni ќе dadat možnost da se otvori smer VOZAČ NA MOTORNO VOZILO vo sredno stručno obrazovanje, a preku principot na dualno obrazovanje ќе se ovozmoži i praktična nastava vo del od prevoznite trgovski društva koi se spremni da investiraat vo mladi lica kako nivni potencijalni rabotnici, odnosno profesionalni vozači na motorni vozila.

Vo odnos na poddrškata se naide na pozitiven odgovor od site institucii kade beše prosledena. Glavniot odgovor beše od Centarot za stručno obrazovanje i obuka, kade dadoa izvestuvanje deka ja prifakaat inicijativata za izrabotka na standard na zanimanje i standard na kvalifikacija za Vozač na motorno vozilo.

2. STANDARD NA ZANIMANJE

Vo mesec februar se započna so izgotvuvanje na standardot na zanimanje VOZAČ NA MOTORNO VOZILO.

Vo rabotnata grupa učestvuvavme:

1. Azra Tutić dipl.soob.inž. – sovetnik za soobraќajna struka od CSOO
2. Nikolče Spasovski dipl.soob.inž. – nastavnik po soobraќajna grupa na predmeti, stručen rakovoditel i predavač po teoretska nastava vo avto školata vo ASUC “Boro Petruševski”-Skopje
3. M-r. Snežana Božinoska-Risteska dipl.soob.inž. - nastavnik po soobraќajna grupa na predmeti vo ASUC “Boro Petruševski”- Skopje
4. Elena Nedelkoska dipl.soob.inž. – pretstavnik od Asocijacija MAKAM-TRANS

Vo prilog e del od Standardot na zanimanje, kade što e daden opisot na zanimanjeto:
Standard na zanimanje

Naziv na SZ	Vozač na motorno vozilo
Kod na SZ	1011.30.01
Sektor	OOBRAKAJ, TRANSPORT I SKLADIRANJE
Nivo na složenost na rabotni zadači	V (peto), podnivo VB
Opis na zanimanjeto	Vozačot na motorno vozilo, posveteno, stručno i bezbedno upravuva so različni vidovi prevozni sredstva nameneti za prevoz na patnici i stoka vo vnatrešniot ili megunarodniot soobračaj. Vo megunarodniot paten soobračaj prevozot go izvršuva soglasno zakonskata materija so koja e regulirana ovaa oblast prilagoden kon Direktiva 2003/59/EZ na Evropskiot parlament a vo vnatrešniot paten soobračaj prilagoden kon domašnite propisi. Zadačite na zanimanjeto vkučuvaat: - podgotovka na dokumentite i voziloto pred početokot na prevozot; - racionalno upravuvanje so vozilata so primena na bezbednosnite propisi i principite za davanje kvalitetna usluga; - primena na regulativi od domenot na patniot soobračaj; - primena na propisite za zdravje i bezbednost pri rabota; - griža za životnata sredina, voziloto, stokata i patnicite; - primena na pravata i obvrskite na mobilnite rabotnici (vozači); - počituvanje na soobračajnata etika i kultura vo soobračajot; - proverka na sistemite za kočenje, greenje, osvetluvanje, signaliziranje i druga oprema na vozilata; - obezbeduvanje na stokata koja što se transportira so cel da se spreči šteta i zaguba; - vodenje na evidencija za patuvanjata soglasno megunarodnite propisi i propisite na Evropskata Unija; - održuvanje na vozilata, čistenje i izveduvanje lesni popravki.

3. STANDARD NA KVALIFIKACIJA SO NASTAVEN PLAN

Po izradotka na Standardot na zanimanje, sleduvaše i izradotka na Standard na kvalifikacija so nastaven plan, koj isto taka beše izradoten od strana na istata rabotna grupa.

Vo prilog nastavniot plan:

Struka/Sektor: Soobračajna/Soobračaj, transport i skladiranje

Obrazoven profil/Kvalifikacija: Vozač na motorno vozilo

Vremetraenje na obrazovanieto: Tri godini

Red. broj	Programski podračja i nastavni predmeti	Godina i fond na časovi						Zast. vo %
		I		II		III		
		ned.	god.	ned.	god.	ned.	god.	
1.	OPŠTO OBRAZOVANIE							40%
1.1.	Makedonski jazik i literatura, a za učenicite od drugite zaednici: albanski jazik i literatura, turski jazik i literatura ili srpski jazik i literatura	3	108	3	108	3	99	
(1.1.)	Makedonski jazik i literatura za učenicite od drugite zaednici	(2)	(72)	(2)	(72)	(2)	(66)	
1.2.	Angliski jazik	2	72	2	72	2	66	
1.3.	Istorija	2	72					
1.4.	Informatika	2	72					
1.5.	Matematika	3	108	2	72	2	66	
1.6.	Fizika	2	72					
1.7.	Sport i sportski aktivnosti	2	72	2	72	2	66	
Vkupno časovi za opšto obrazovanie		16 (18)	576 (648)	9 (11)	324 (396)	9 (11)	297 (363)	
2.	STRUČNOTEORETSKO OBRAZOVANIE							20%
2.1.	Osnovi na soobračaj	3	108					
2.2.	Mehanizacija na pretovar	2	72					
2.3.	Tehnologija na rakuvanje i skladiranje	2	72					
2.4.	Bezbednost vo patniot soobračaj			2	72	2	66	
2.5.	Patišta i ulici			2	72			
2.6.	Vozila vo patniot soobračaj			3	108			
2.7.	Prevoz na patnici					3	108	
2.8.	Prevoz na tovar					3	108	
Vkupno časovi za stručno-teoretsko obrazovanie		7	252	7	252	8	264	
3.	PRAKTIČNA OBUKA							40%
3.1.	Praktična nastava	7	288	14	504	14	462	
3.2.	Ferijalna praktika	Min. 10 дена		Min.10 дена				
Vkupno časovi za praktična obuka		7	288	14	504	31	462	
Vkupno časovi (1+2+3)		30 (32)	1116 (1188)	30 (32)	1188 (1260)	31 (33)	1089 (1155)	3393 100%

Po izgotvuvanje na Standardot na zanimanje i Standardot na kvalifikacija so nastavniot plan, istite bea odobreni od strana na MON, i se dade Soglasnost da se vmetne staro – noviot obrazoven profil VOZAČ NA MOTORNO VOZILO kako dualno obrazovanie vo konkursot za upis na učenici

vo prva godina vo srednoto stručno učilište ASUC “Boro Petruševski” – Skopje, za učebnata 2024/2025 godina.

4. ZAKLUČOK

Vo naredna faza ќе se pristapi kon izgotvuvanje na nastavnite programi po stručno teoretskite predmeti i praktičnata nastava.

Dosta biten segment vo naredniot period od dve godini ќе bidat Zakonskite izmeni koi pod itno treba da se napravat vo Zakonot za bezbednost na soobraќajot na patištata vo odnos na starosnata granica za obuka i polaganje na vozački ispit za tovarni motorni vozila za C kategorija na 17 godini, so dobivanje na privremena vozačka dozvola, i na 18 godini dobivanje trajna vozačka dozvola, za onie koi učit redovno obrazovanie vozač na motorno vozilo i vo **Zakonot za prevoz vo patniot soobraќaj treba po primerot na državite členki na EU da se doprecizira delot za stručna kompetentnost na vozačite i steknuvanje so SPK na vozač, da se priznava i dobiva po avtomatizam so završeno sredno stručno obrazovanie VOZAČ NA MOTORNO VOZILO.**

Nie kako najstaro, najsovremeno, najopremeno učilište koi rabotime i na promoviranje na strukite i profilite vo ova učilište, vo izminatiot period na promocija, naidovme na ogromen interes pomeѓu devvetoodelencite kako i kaj nivnite roditeli za upis vo ova zanimanje, so toa što bi imale možnost ušte so 18 godini da rabotat kako profesionalni vozači so soodvetno stručno obrazovanie.

**TRAFFIC SCHOOL CENTRE
"Boro Petrushevski" - Skopje**



XIV International Symposium

INTERDISCIPLINARITY OF LOGISTICS AND TRAFFIC

**MOTOR VEHICLE DRIVER IN REGULAR SECONDARY EDUCATION IN THE
REPUBLIC OF NORTH MACEDONIA**

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Skopje, 2024

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1. INTRODUCTION

In many countries in the world, it is possible to become a driver at the age of 16, while there are also countries that allow it only after the age of 18. But that doesn't mean that all drivers are ready to start driving at a specific age.

[1] We all know that young people learn more easily than older people. As we age, our brain is harder to remember, it is slower, this is especially characteristic when new knowledge or skills need to be acquired. This is precisely the reason why most of our education takes place until the thirtieth year of our life.

If we ask those who are directly involved in teaching young candidates for future drivers, namely the instructors, they will tell us that the biggest difficulty in their profession is to convert "non-drivers" into drivers. They cannot teach these candidates to drive well, they will only teach them the general rules and regulations so that they can pass the driving test. And then they recommend spending more time behind the wheel to improve their driving experience. When asked how long it will take them to learn this skill, the answer is that it depends a lot on the natural giftedness of the young people themselves and their desire.

But the instructors are also proud to talk about another category of drivers who have an innate driving instinct – a sense of driving. There are a number of factors why some people are naturally good at driving compared to others, and learning to drive at an early age can definitely play a role in developing strong driving skills.

Here are some reasons for that group of drivers who can stand out because of their natural gift for driving:

Interest in driving:

From an early age, they show an interest in cars, they constantly follow the movements of their parents - drivers. From an early age, they ask questions about driving and look forward to getting behind the wheel. The more information they gather, the more comfortable and confident they feel. Their desire to become drivers is very strong. In this group of drivers, the parent driver plays a very important role, who always needs to explain the situation to his child, to teach him (why he reduces the speed and which pedal to press), etc. Driving from an early age can give a richer driving experience, better reactions and more confidence in young people who have chosen their future profession - driver.

Exposure to different traffic conditions:

Drivers who started driving at an early age were exposed to different conditions, such as different weather conditions, traffic situations and different types of roads. This exposure can help them develop better adaptability and decision-making skills while driving.

Natural gift:

Drivers may have a natural aptitude or aptitude for tasks involving coordination, spatial orientation, and quick decision-making, which are important driving skills. This innate ability can shorten and ease the time it takes them to acquire driving skills. These young drivers quickly stand out from the rest.

Confidence:

Confidence plays a big role in driving. People who believe in themselves behind the wheel are often more relaxed, focused and better able to cope with challenging traffic situations.

The attitude towards driving:

Interested young drivers cultivate a positive attitude towards driving, look on the bright side. They believe that by respecting the rules and regulations in traffic, every trip will be interesting. They can visit many countries, learn about different cultures, etc. And then they devote themselves to responsibility, attention, patience and prudence. Some drivers naturally possess these qualities and develop them more easily over time.

It is important to note that inherited or acquired driving skills can always be improved. Young people who want the profession of "DRIVER" should be given the opportunity to prove themselves and progress in the chosen profession through: good education and upbringing, good teaching staff, practice, training and readiness of the institutions for this challenge. Precisely ASUC "Boro Petrushevski", due to its many years of experience in this field, can open its doors to all interested young people who have chosen the profession of "DRIVER" as their future profession.

[1] <https://survivalfreedom.com/What-Is-the-Best-Age-to-Start-Driving>

1.1.INITIATIVE FOR THE INTRODUCTION OF A NEW EDUCATIONAL PROFILE IN THE TRAFFIC PROFESSION IN SECONDARY VOCATIONAL EDUCATION MOTOR VEHICLE DRIVER

The professional traffic asset in ASUC Boro Petrushevski started with an initiative to introduce a new educational profile in the traffic profession in the secondary vocational education DRIVER OF A MOTOR VEHICLE. For this purpose, we turned to the Association of Employers of Transport Trade Companies of the Republic of North Macedonia, MAKAM-TRANS.

The initiative stated the following:

According to the newly emerging trends and the demand for professional staff in the field of passenger and cargo transportation, the need for the activation of an educational profile "MOTOR VEHICLE DRIVER" was imposed. This profile existed in ASUC "Boro Petrushevski" until 1998. Due to the alignment of the needs of the market and the appropriate personnel coming out of the schools, we started this initiative for the profile "MOTOR VEHICLE DRIVER", with which we want to point out the importance of this profession and the employment opportunities that the personnel who will emerge from the educational process in this profile.

This dual education will last for three years with the possibility of horizontal mobility in related educational profiles.

If this initiative is successfully implemented and if we make this strategic investment in the education of personnel of this profile, our school will meet the needs of the market. The interest of the students will increase in enrolling in our school, and the many years of experience of our teaching staff will contribute to the education of quality staff who will professionally perform their work both in the country and abroad.

Finding a larger number of social partners who will directly support our initiative is an even greater motivation for us. And these personnel that will emerge from the educational process will immediately be available for employment with these social partners.

For this purpose, it is necessary to prepare:

1. Analysis of the needs of the labor market;
2. Regulations for the education of drivers of motor vehicles;
3. From the existing standards of occupation and educational profiles to create a teaching plan;
4. Development of curricula according to the subject contents;
5. To verify the curriculum;
6. To verify the institution.

With this initiative, we seek support from the Association of Employers' Associations of Transport Trade Companies of the Republic of North Macedonia, MAKAM-TRANS, as a leading institution and directly involved in this issue.

1.2 SUPPORT FOR THE INTRODUCTION OF A MOTOR VEHICLE DRIVER EDUCATION PROFILE IN ASUC BORO PETRUSHEVSKI

The Association of Employers' Associations of Transport Companies of the Republic of North Macedonia MAKAM-TRANS, the CARRIER Association, the ISTOK Association and the TRANSPORT LEGIS Association supported the introduction of the educational profile DRIVER OF A MOTOR VEHICLE. For this purpose, support was sent to the institutions in the Republic of North Macedonia, specifically to the Government of the Republic of North Macedonia, the Ministry of Transport and Communications, the Ministry of Internal Affairs and the Ministry of Education.

The support states:

The association and various forms of associations of carriers in the territory of our country support the initiative to introduce the educational profile DRIVER OF A MOTOR VEHICLE, in order to overcome the problems faced by carriers, but also to provide support for accessing activities which are implemented at the level of Europe, and were initiated by the largest transport community IRU.

The situation in the country, but also at the level of Europe with a shortage of motor vehicle drivers is alarming and for several years IRU has been submitting analyzes and initiatives to overcome the acute problem, namely:

IRU report from 15.11.2022:

(<https://trans.info/driver-shortage-in-europe-to-triple-by-2026-313260>)

According to the IRU report, it is clearly stated that by 2026, there will be a shortage of over 2,000,000 drivers across Europe due to retirement and lack of adequate activities to attract young men and women to this profession, affecting half from the overall movement of goods and millions of passenger journeys. The curve with the shortage of drivers in Europe has an upward curve, which represents a great threat to maintaining the continuity in carrying out the transportation of goods and passengers, which requires the adoption of appropriate policies to overcome this situation.

The IRU report identifies problems that must be overcome:

Key to access and appeal:

☐ The minimum age for qualification is still 21 for HGV drivers in five EU countries and between 21 and 24 for most bus drivers across the EU, representing a huge barrier to those completing secondary education

☐ The high costs of training for obtaining a driver's license and certificate of professional competence (SPK) of a driver are also an obstacle.

Solutions to overcome the problem:

☐ The public and private sectors need to work together to tackle the driver shortage, the IRU report lists 20 solutions currently being implemented by road transport associations, hauliers and shippers.

☐ State authorities should also take action to prevent shortages from escalating, including:

- Determining the minimum age for training and taking the driver's test for cargo motor vehicles at 17 years old, with obtaining a temporary driver's license, and at 18 years old, obtaining a permanent driver's license

- Subsidizing costs for training new professional drivers

- Construction of more safe and secure parking places

The support is primarily a request for monitoring the activities carried out in the EU member states regarding the problem of driver shortage, creation of activities and policies for faster access to the working skills of a motor vehicle driver through more legal amendments and refinements to attract of young people for this profession and their professional training. The professional driver in international transport should first of all be a person who has professional knowledge of the field, who has acquired an appropriate vocational education and through it will be transformed into a profile with high professionalism and approach to work tasks, and this is possible only through an appropriate secondary school vocational education of young people.

In our country, the direction of the driver was abolished a long time ago, so that in reality the carriers are forced to receive semi-qualified drivers who learn their skills through the mistakes they make in the field, thus causing great damage to the commercial companies themselves. The fact that young people have to wait until the age of 21 to acquire the appropriate driving categories discourages them from working in this profession on the one hand, and on the other hand women are also discouraged from working as a motor vehicle driver, regardless that we have a large number of unemployed people, and the compensation that drivers receive is much higher than the minimum wage at the state level.

Legal amendments urgently need to be made in the Law on Road Traffic Safety regarding the age limit for training and taking the driving test for goods motor vehicles for category C at 17 years, with obtaining a temporary driver's license, and at 18 years obtaining a permanent driver's license, for those who study regular motor vehicle driver education.

In the Law on transportation in road traffic, following the example of the EU member states, the section on professional competence of drivers and acquisition of a driver's license should be specified, to recognize

2. STANDARD OF OCCUPATION

In the month of February, the drafting of the standard for the occupation MOTOR VEHICLE DRIVER began.

We participated in the working group:

1. Azra Tutić B.Sc. Eng. – advisor for traffic profession from CSOO
2. Nikolche Spasovski, B.Sc.Traff.Eng. - teacher of the traffic group of subjects, professional leader and lecturer of theoretical teaching at the driving school in ASUC "Boro Petrushevski"-Skopje
3. Snezhana Bozhinoska-Risteska, M.Sc.Traff.Eng. - teacher of the traffic group of subjects at the ASUC "Boro Petrushevski" - Skopje
4. Elena Nedelkoska, B.Sc.Traff.Eng. - a representative from the MAKAM-TRANS Association

Table.1 shows a part of the Occupation Standard, where the description of the occupation is given:

Table 1.Standard of occupation

Title of SO	MOTOR VEHICLE DRIVER
Code of C3	1011.30.01
Sector	TRAFFIC, TRANSPORT AND STORAGE
Level of complexity of work tasks	V (fifth), sub level VB
Description of occupation	The driver of a motor vehicle, dedicatedly, expertly and safely manages different types of means of transport intended for the transport of passengers and goods in internal or international traffic. In international road traffic, transportation is carried out in accordance with the legal matter that regulates this area adjusted to Directive 2003/59/EC of the European Parliament, and in internal road traffic adjusted to domestic regulations. The tasks of the occupation include: - preparation of the documents and the vehicle before the start of the transportation; - rational management of vehicles with the application of safety regulations and the principles of providing quality service; - application of regulations from the field of road traffic; - application of the regulations for health and safety at work; - care for the environment, the vehicle, goods and passengers; - application of the rights and obligations of mobile workers (drivers); - respect for traffic ethics and culture in traffic; - inspection of the braking, heating, lighting, signaling and other vehicle equipment systems; - securing the goods being transported in order to prevent damage and loss; - keeping records of the trips according to the international regulations and the regulations of the European Union; - vehicle maintenance, cleaning and light repairs.

3. QUALIFICATION STANDARD WITH CURRICULUM

After the preparation of the Occupation Standard, there followed the preparation of the Qualification Standard with a curriculum, which was also prepared by the same working group.

Table 2 is the curriculum:

Profession/Sector: Traffic/Traffic, transport and storage

Educational Profile/Qualification: Motor vehicle driver

Duration of education: Three years

Table.2 Curriculum

No.	Program areas and subjects	Year and class fund						Заст. во %
		I		II		III		
		weekly	annually	w.	a.	w.	a.	
1.	GENERAL EDUCATION							40%
1.1.	Macedonian language and literature, and for students from other communities: Albanian language and literature, Turkish language and literature or Serbian language and literature	3	108	3	108	3	99	
(1.1.)	Macedonian language and literature for students from other communities	(2)	(72)	(2)	(72)	(2)	(66)	
1.2.	English language	2	72	2	72	2	66	
1.3.	History	2	72					
1.4.	Computer science	2	72					
1.5.	Mathematics	3	108	2	72	2	66	
1.6.	Physics	2	72					
1.7.	Sport and sport activities	2	72	2	72	2	66	
Total general education hours		16 (18)	576 (648)	9 (11)	324 (396)	9 (11)	297 (363)	
2.	VOCATIONAL THEORETICAL EDUCATION							20%
2.1.	Basics of traffic	3	108					
2.2.	Mechanization of transshipment	2	72					
2.3.	Handling and storage technology	2	72					
2.4.	Safety in road traffic			2	72	2	66	
2.5.	Roads and streets			2	72			
2.6.	Vehicles in road traffic			3	108			
2.7.	Transportation of passengers					3	108	
2.8.	Cargo transportation					3	108	
Total hours for professional theoretical education		7	252	7	252	8	264	
3.	PRACTICAL TRAINING							40%
3.1.	Practical teaching	7	288	14	504	14	462	
3.2.	Ferial practice	Minimum days 10 дена		Minimum days10 дена				
Total hours of practical training		7	288	14	504	31	462	
Total hours (1+2+3)		30 (32)	1116 (1188)	30 (32)	1188 (1260)	31 (33)	1089 (1155)	3393 100%

After drafting the Occupation Standard and the Qualification Standard with the curriculum, they were approved by the Ministry of Education and Culture, and Consent was given to insert the old - the new educational profile MOTOR VEHICLE DRIVER as a dual education in the competition for the enrollment of students in the first year in the secondary vocational school ASUC "Boro Petrushevski" - Skopje, for the academic year 2024/2025.

4. CONCLUSION

In the next phase, the preparation of the curricula for professional theoretical subjects and practical teaching will be started.

A quite important segment in the next two years will be the legal amendments that urgently need to be made in the Law on Road Traffic Safety in relation to the age limit for training and passing the driver's test for cargo motor vehicles for category C at 17 years old , by obtaining a temporary driver's license, and at the age of 18 obtaining a permanent driver's license, for those who study regular motor vehicle driver education, and in the Law on transportation in road traffic, following the example of the EU member states, the section on professional competence should be refined of drivers and acquisition of a driver's license, to be recognized and obtained in automation with completed secondary vocational education MOTOR VEHICLE DRIVER.

We, as the oldest, most modern, most equipped school, which also works to promote the professions and profiles in this school, in the past period of promotion, encountered a huge interest among ninth graders as well as among their parents for enrollment in this occupation, as they would have the opportunity at the age of 18 to work as professional drivers with appropriate professional education.

STROKOVNI IZOBRAŽEVALNI CENTER LJUBLJANA

Avtorica:

Mateja Vlašić, mag. inž. prom.

Logistične težave sodobnega časa: pomanjkanje delovne sile v transportni panogi in zaposlovanje tujcev iz držav južne Azije

Povzetek

Trenutne razmere na trgu dela v Sloveniji in okoliških deželah predstavljajo niz izzivov, saj povpraševanje po usposobljenih delavcih na področju transporta in logistike znatno presega razpoložljivo ponudbo. Številni Slovenci se zaradi boljših dohodkov in pogojev dela zaposlujejo v tujini, kar pomeni, kot navajajo mediji, da se tukajšnji »bazen« delovne sile čedalje bolj prazni. Delodajalci so delovno silo prisiljeni iskati v tujini, in to ne samo v jugozahodnih državah Evrope, temveč tudi v obljudenih državah južne Azije. V prispevku so predstavljeni vzroki krize na trgu delovne sile za delovno mesto voznik, posledice in možne rešitve za navedeno težavo ter postopki zaposlovanja Azijcev. Ali so Azijci lahko kos evropskim voznikom, kakšne so razlike v prometnih predpisih ter kaj njihovo zaposlovanje pomeni podjetjem, je osrednja tema prispevka.

Ključne besede:

pomanjkanje voznikov, kriza na trgu dela, tuja delovna sila, zaposlovanje Azijcev

UVOD

Delovne sile na trgu transportnih storitev kronično primanjkuje. Trgovinska menjava in povpraševanje za prevozom se viša v povprečju 5–6 % letno, kar posledično pomeni tudi več tovornjakov, ki pa potrebujejo voznike. Javni srednješolski sistem že skoraj desetletje ne zagotavlja več izobraževanja za poklic voznik. To povzroča velike težave prevoznikom, ki si prizadevajo za rast podjetij in dobiček ter predvsem ohranjanje poslovnih stikov z nalogodajalci, s katerimi imajo večletne pogodbe. Pomanjkanje voznikov v Evropi povzroča krizo, trgovinske police bodo ostale prazne, surovine ne bodo pravočasno v podjetjih, ne bo možno preprečiti zamud pri dostavah, posledično se bodo višale cene izdelkov in blaga. Delodajalci so prisiljeni zaposlovati vse, ki se prijavijo na razpis, ne glede na morebitne primanjkljaje. Hkrati morajo delovno silo iskati v tujini, in sicer ne samo v jugozahodnih državah Evrope, saj je tudi tam vedno manj delavcev, ampak tudi v Aziji. Po pisanju revije *Prevozi* v Sloveniji primanjkuje skoraj štiri tisoč voznikov. Zaradi pomanjkanja voznikov naj bi v Evropi po nekaterih ocenah stala vsaj desetina voznega parka.

RAZLOGI KRIZE NA TRGU DELOVNE SILE

Zavod RS za zaposlovanje (v nadaljevanju ZRSZ) v sodelovanju z vozniki tovornih vozil kot razloge pomanjkanja voznikov navaja številne slabosti poklica voznik: nočne izmene, nestalen urnik dela, daljše odsotnosti od doma, zahtevano znanje tujih jezikov ipd. Večkrat navajajo tudi sume kršitev delovnopравne zakonodaje: zaposlovanje na črno, neredno izplačilo plač ali del plače, ki se izplačuje na roke. Pogosta so tudi pričakovanja delodajalcev po nedoslednem upoštevanju obveznih počitkov ali polnjenju vozil nad nosilnostjo vozila. (Štakul, 2022)

Po podatkih ZRSZ je bilo leta 2023 v programe usposabljanja in pridobitve vozniškega izpita kategorije C in kategorije CE vključenih samo 98 udeležencev, 114 manj kot leto pred tem.

Tabela 1: Programi neformalnega izobraževanja in usposabljanja (Krušič, Stanka, 2024)

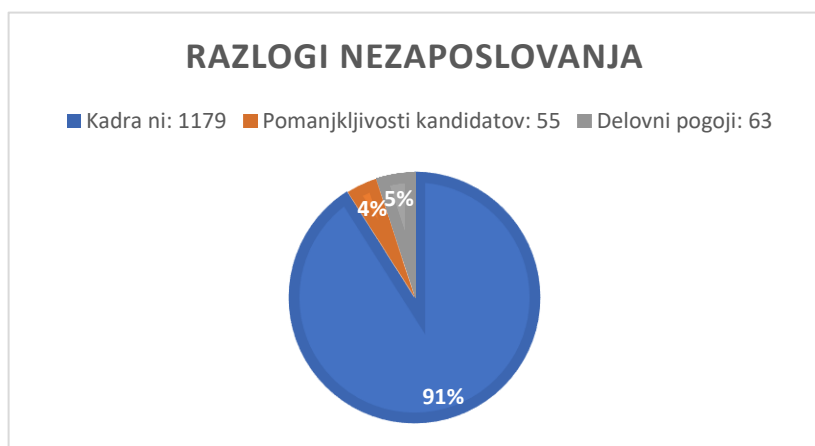
Število vključitev Obdobje	2022	2023	I–V 2024
Usposabljanje in pridobitev vozniškega izpita kategorije C	173	83	70
Usposabljanje in pridobitev vozniškega izpita kategorije CE	39	15	18
SKUPAJ	212	98	88

ZRSZ redno sodeluje tudi z delodajalci. V raziskavi *Napovednik zaposlovanja* so razloge za težave pri iskanju kadrov razvrstili v tri kategorije:

1. na trgu dela izrazito primanjkuje kadra s tem poklicem;
2. kandidati, ki so se javili na razpis, niso bili ustrezni zaradi primanjkljajev;
3. delovni pogoji (npr. plača, urnik dela, fizično ali terensko delo ipd.) odvrčajo kandidate od prijav na prosta delovna mesta.

Pri velikem številu poklicev, pri katerih so imeli delodajalci težave z iskanjem kadra, je ključni razlog, da **kadra v teh poklicih na trgu dela ni**. Omenjena problematika je bila še posebej poudarjena za voznike avtobusov, in sicer v 99 % primerov.

Graf 1: Razlogi za težave delodajalcev pri iskanju kandidatov za voznike težkih tovornih vozil



(ZRSZ, 2024)

Anketirani delodajalci so imeli težave z zaposlitvijo voznikov težkih tovornjakov in vlačilcev pri 1.297 prostih delovnih mestih. V 1.179 primerih so delodajalci menili, da težave izhajajo iz splošnega pomanjkanja kadra na

trgu dela. Za 63 delovnih mest so izpostavili delovne pogoje, za 28 delovnih mest pa pomanjkljivosti kandidatov.

Delodajalci, ki so imeli težave z iskanjem voznikov avtobusa (860 delovnih mest), so za 852 delovnih mest kot glavni razlog težav navedli odsotnost tega kadra na trgu dela, za 8 delovnih mest pa so bili ključni delovni pogoji. (ZRSZ, 2024)

ZAPOSLOVANJE TUJCEV

Azijski šoferji se v vse večjem številu zaposlujejo pri evropskih podjetjih. Enako kot slovenski državljani, ki odhajajo v tujino, tudi tujci iz revnih držav prihajajo v Slovenijo zaradi višjega standarda, boljših pogojev življenja, boljšega zdravstva in šolstva. Na trgu dela v Sloveniji se pojavljajo nove agencije, ki posredujejo pri zaposlovanju tujcev iz držav tretjega sveta oziroma južne Azije, kot so Filipinci, Indijci in Nepalci.

Po neuradnih podatkih, ki mi jih je posredovalo neko transportno podjetje, jih od 400 zaposlenih voznikov tovornih vozil različnih kategorij približno 50 prihaja iz Nepala in Indije, kar je več kot 10 % zaposlenih.

Kakšen je postopek zaposlitve tujca, navajajo v slovenski agenciji Pinoy 385, ki ponujajo svoje storitve in pomoč slovenskim podjetjem pri postopkih zaposlovanja filipinskih delavcev. Da bi Slovenski podjetniki zaposlili Filipince, morajo upoštevati določene pogoje. Delodajalci morajo filipinskemu delavcu zagotoviti ustrezen namestitev v Sloveniji za cel čas zaposlitve, pokriti vse stroške potovanja (dvosmerno letalsko vozovnico), kot tudi stroške vseh potrebnih dovoljenj za prebivanje v Sloveniji, zdravniški pregled in podobno. Delodajalec se mora tudi akreditirati pri manilskem ministrstvu, postopek običajno traja do dveh tednov.

Za zaposlitev filipinskega delavca so med drugim pogoj tudi dvojezična navodila oziroma zapisani procesi na delovnem mestu, dvojezična plačilna lista (torej tudi v angleščini), prav tako morajo njegovi nadrejeni znati govoriti angleško. Plača mora biti enaka kot jo imajo slovenski delavci za isto oziroma primerljivo delovno mesto.

Ko delodajalec izrazi potrebo, kadrovska agencija preveri delodajalca, ali je primeren oziroma pripravljen zaposliti tujega delavca (preveri vse našete pogoje) in mu pomaga pri akreditaciji. Potem se začne proces iskanja in selekcije, po potrebi tudi testiranje, ustreznih kandidatov na Filipinih, kar traja okoli tri tedne. Ko je kandidat izbran, agencija v imenu delodajalca odda vlogo za pridobitev enotnega dovoljenja za prebivanje in delo (na pristojni upravni enoti). Filipinsko ministrstvo ne dovoli da se delavec sam dogovarja o pogojih dela in plači, ampak se je o tem treba uskladiti z njimi. Tako zagotavljajo, da njihovi delavci niso izkoriščani po svetu.

Vse stroške postopka krije delodajalec, saj to zahteva filipinsko ministrstvo za migrantsko delo. Neuradni izračuni pa kažejo, da bi delodajalca vsi stroški (nastanitve, letalskih vozovnic ...) s provizijami in plačo filipinskega delavca stali okoli dve letni bruto plači delavca. (Dakić, 2024)

ZAPOSLOVANJE FILIPINCEV

Po podatkih državnega portala GOV.SI je bilo Filipincem leta 2023 izdanih 94 dovoljenj za začasno ali stalno prebivanje, medtem ko je bilo letos že v prvih petih mesecih izdanih 96 dovoljenj. (Državna uprava Slovenije, 2024)

V novoustanovljeni kadrovski agenciji Pinoy386, ki pomaga Slovenskim podjetjem pri iskanju delavcev navajajo, da so Filipinci znani po svoji prilagodljivosti, marljivosti in tekočem znanju

angleškega jezika, kar menda olajša njihovo integracijo v slovensko delovno okolje. Povprečna starost filipinskih državljanov je 25 let, povprečje v EU pa je 45 let. Iz vidika teh prednosti je Slovenija storila korak naprej s poskusom vzpostavitve bolj sistematičnega pristopa k zaposlovanju filipinskih državljanov, vključno z odprtjem kadrovske agencije in načrtovanim konzulatom na Filipinih.

Grega Bizjak, direktor družinskega prevozniskega podjetja *Sigr* iz Jesenic, bil je eden izmed prvih prevoznikov, ki se je z idejo zaposlovanja filipinske delovne sile prvič srečal leta 2019. Takrat je bil član slovenske gospodarske delegacije, ki je na delovnem obisku na Filipinih spoznavala priložnosti za zaposlovanje teh delavcev v slovenskih podjetjih. Po tistem so v Slovenijo poskušali pripeljati filipinskega delavca, pa je bilo tako zapleteno, da so to idejo za nekaj časa opustili. (Lončar, 2023)

Slovenija je menda januarja v Manili na Filipinih končno odprla konzulat, kar bo olajšalo zaposlovanje filipinskih državljanov v Sloveniji. Po vzpostavitvi generalnega konzulata v Manili filipinskim delavcem, ki se želijo zaposliti v Sloveniji, za ureditev dovoljenj ni več treba potovati v oddaljena Tokio ali New Delhi.

ZAPOSLOVANJE INDIJCEV

Po podatkih indijskega ministrstva za delo in zaposlovanje je minimalna dnevna plača v Indiji decembra 2023 ostala na enaki ravni kot decembra 2022 in je znašala 178 INR ali približno 1,99 EUR. Povprečna plača v Indiji se razlikuje po posameznih regijah in področju delovanja, povprečje pa je okrog 200 EUR. (SPIRIT Izvozno okno, 2024)

Indijcem je bilo leta 2023 izdanih 1370 dovoljenj za začasno ali stalno prebivanje v Sloveniji. Letos je bilo v samo prvih petih mesecih izdanih 718 dovoljenj. (Državna uprava Slovenije, 2024)

Veliko Indijcev v zadnjem času zaposlujejo tudi v slovenskem prevozniskem podjetju Kobal transporti, d. o. o., na delovnem mestu voznik tovornega vozila.

ZAPOSLOVANJE NEPALSKIH DELAVCEV

Po podatkih GOV.SI je bilo leta 2023 Nepalcem izdanih 286 dovoljenj za začasno ali stalno prebivanje, medtem ko je bilo letos v samo prvih petih mesecih izdanih 310 dovoljenj. (Državna uprava Slovenije, 2024)

Svetovalna agencija *Workforce*, specializirana za zagotavljanje kvalificiranih in zanesljivih delavcev iz Nepala, predstavlja Nepalce kot narod, »ki je znan po svoji delavnosti, trdoživosti in prilagodljivosti, ki izvirajo iz njihovega življenja v težkih pogojih Himalaje. Te lastnosti se prenašajo

tudi na delovno mesto, kar jim omogoča, da se hitro in učinkovito prilagajajo novim delovnim okoljem.« (Workforce, 2023) Omenjene lastnosti so prepoznali v podjetju Kobal transporti ter tako poleg Indijcev zaposlujejo tudi Nepalce. Težava je, da nikoli ne vedo, kakšnega delavca bodo v resnici dobili. Nekateri pridejo zelo pridni, delavni in natančni ter skrbni do voznega parka, drugi pa imajo popolnoma drugačne delovne navade in manj spoštljiv odnos do delodajalčeve lastnine.

SLABOSTI ZAPOSLOVANJA TUJCEV IN MOŽNE REŠITVE

Ko tuji vozniki prispejo v Slovenijo, opravijo tečaj pospešene pridobitve temeljne kvalifikacije za voznika, ki traja 140 ur. Po mnenju različnih agencij za zaposlovanje ter upanju delodajalcev so tako pripravljeni za cesto. Več kot očitno je, da izobraževanje brez nujnega praktičnega usposabljanja v spremstvu mentorjev ter podrobnega testiranja pred zaposlitvijo ni dovolj, da bi vozniki s popolnoma drugačno mentaliteto in navadami, iz držav, kjer obstajajo številna nepisana pravila, zmešnjava na cestah in zakon močnejšega, obvladali prometna pravila ter pridobili kompetence, kot so natančnost in spoštljivo vzdrževanje in ohranjanje vozila.

Postopki zaposlitve trajajo od štiri do šest mesecev, v tem času pa agencije pripravljajo delavca na prihod v Slovenijo, kot tudi pomagajo delodajalcu pri integraciji tujca. Kot je pojasnil solastnik agencije Pinoy, je treba delavca pripraviti na delo v Evropi. V Aziji trije ali štirje delavci opravljajo delo enega delavca v Evropi.

Na vprašanje, kako bodo lahko Filipinci delali na zahtevnih delovnih mestih, če pa govorijo zgolj angleško, je solastnik agencije Pinoy pojasnil, da če delovno mesto zahteva znanje slovenščine, je treba na Filipinih organizirati tečaj slovenščine in dodal, da to možnost uporablja kar nekaj nemških podjetij. (Dakić, 2024)

Delodajalci so žal dobesedno prisiljeni delovno silo iskati v tujini, ne moremo pa si zatiskati oči pred dejstvom, da to pri nekaterih domačinih vzbuja nelagodje, strah in jezo. Vozniki in drugi zaposleni v različnih transportnih podjetjih menijo, da vozniki iz azijskih držav nimajo ustreznega znanja ter da s slabim delom in nenehnimi težavami ter uničevanjem vozil poslabšujejo ugled voznikov. Po neuradnih podatkih, pridobljenih od zaposlenih v različnih prevoznih podjetjih, se opažajo očitno slabšanje stanja voznega parka, pospešeno porabo vozil, pnevmatik, neprevidnost in nepremišljenost delavcev. Pogosto se na različnih družabnih omrežjih objavljajo in negativno komentirajo različne fotografije, s katerih je razvidno, da vozniki nimajo ne ustreznega znanja ne kompetenc. Posledično pada ugled podjetja.



Slika 1: Sociokulturne razlike in predsodki do delavcev iz južne Azije (Facebook, 2023)

Kljub številnim pozitivnim lastnostim, ki jih navajajo različne agencije, ki posredujejo pri zaposlovanju, nihče ne omenja težav v komunikaciji, kar posledično povzroča številne nesporazume pri delu. Kot trdi Nepalec, zaposlen v enem od podjetij skupine SIJ Ravne, Nepalci nikoli ne bodo priznali, da česa ne razumejo. Na primer, ko dobijo določena navodila ali jim kdo kaj razloži, ni dovolj, da se jih le vpraša, ali so razumeli, saj bodo v vsakem primeru prikimali. Navodila je treba ponoviti oziroma naj delavec dokaže, da je razumel, kako se nekaj dela oz. naredi. Nalogodajalec se tako prepriča, da delavec ni samo vljudnostno prikimal, ampak je zadolžitev res razumel. Treba jim je prijazno razložiti nove stvari, postopke dela in preveriti, ali razumejo. Tako bo delo hitreje in lažje steklo. Seveda je bolje, da so razporejeni v ekipe z drugimi sodelavci v podjetju. Tako se bodo lažje in hitreje naučili delovnih nalog in se vključili v kolektiv. Podjetja morajo delavcem omogočiti učenje in razvoj na delovnem mestu.



Slika 2: Prometni zamaški in zmešnjava na cestah Indije (SCROLL IN, 2018)



Slika 3: Zastoj na slovenskih cestah (Vozim se, 2024)

ZAKLJUČEK

Zadnji dve leti prihaja v Slovenijo vse več delovne sile iz obljudenih držav južne Azije, od koder delavci prihajajo zaradi slabih delovnih pogojev. To je za slovenske podjetnike zelo vabljivo. Na prvi pogled se zdi, da je to poceni delovna sila, ki jim prinaša večji dobiček. Zastavlja se vprašanje, ali je to zares poceni delovna sila ali pa je to samo pravljičica, ki so jo slovenskim delodajalcem ponudili »prodajalci megle« iz različnih agencij, ki posredujejo pri zaposlovanju tujih državljanov. Delodajalci pravzaprav nimajo druge izbire, saj voznikov dejansko ni. Če želijo nadaljevati delovne procese, se to kaže kot ena redkih rešitev.

Dejstvo je, da je privabljanje delovne sile iz Azije neka rešitev. Seveda pa morajo delodajalci te delavce v samem postopku zaposlitve dodatno ustrezno izobraziti, jim priskrbeti mentorje ter jih nekaj časa uvajati v spremstvu, saj so razlike v kulturi voznikov, prometnih predpisih in pogojih na cestah Indije, Filipinov in Nepala zelo velike. Vozila v Evropi so novejša, sodobnejša, pravila so drugačna, uporablja se tahograf, vozi se po desni in ne po levi strani ceste ...

Pogosto so razlike v kulturi in jeziku tako velike ovire, da je vprašljivo, ali so rezultati zaposlovanja tujcev iz držav Azije pozitivni. Morda v drugih panogah, ampak na področju transporta in logistike se kaže preveč primanjkljajev. Mentaliteta ljudi v Evropi in Aziji se razlikuje. Zagotovo obstajajo številni neutemeljeni predsodki do azijskih delavcev, ampak ne gre prezreti dejstva, da ta sistem za zdaj ne deluje in nujno potrebuje drugačen pristop in bolj temeljito izobraževanje in usposabljanje za delavce iz Azije, ki se želijo zaposliti v Sloveniji.

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Logistics problems of modern times: labor shortage in the road freight transport and the recruitment of foreigners from South Asian countries

Summary:

The current situation on the labour market in Slovenia and the surrounding countries poses a number of challenges, as the demand for qualified workers in the transport and logistics sector significantly exceeds the available supply. Many Slovenians are employed abroad due to better incomes and working conditions, which means, as the media report, that the "pool" of domestic labour is becoming increasingly empty. Employers are forced to look abroad for labour, not only in south-western European countries, but also in populous countries in South Asia. This article presents the causes of the crisis in the driver labour market, the consequences and possible solutions to this problem and the procedures for recruiting Asians. Can Asians keep up with European drivers, what are the differences in traffic regulations and what does their employment mean for companies, is the main idea of the contribution.

Key words:

shortage of drivers, crisis in the labour market, foreign labour, employment of Asians

1. INTRODUCTION

There is a chronic shortage of labour on the market for transport services. Trade and demand for transport services are increasing by an average of 5-6% annually, which means more lorries, which in turn require drivers. For almost a decade, the public school system has no longer offered training for the profession of driver. This poses major problems for hauliers who are striving for growth and profit and, above all, want to maintain business contacts with clients with whom they have multi-year contracts. The shortage of drivers in Europe leads to a crisis, shelves remain empty, raw materials do not reach companies on time, delivery delays cannot be prevented and, as a result, the prices of products and goods rise. Employers are forced to hire anyone who applies for a job, regardless of any shortages. At the same time, they have to look abroad for labour, not only in south-western European countries, as there is less and less labour available there, but also in Asia. According to the magazine *Prevozi*, there is a shortage of almost four thousand drivers in Slovenia. According to some estimates, at least a tenth of the vehicle fleet in Europe is idle due to the shortage of drivers.

2. REASONS FOR THE LABOR MARKET CRISIS

In cooperation with lorry drivers, the Employment Agency of the Republic of Slovenia (hereinafter ZRSZ) cites a number of disadvantages of the driving profession as reasons for the shortage of drivers: Night shifts, irregular working hours, long absences from home, required foreign language skills, etc. In addition, there are repeated suspicions of violations of labour law: illegal employment, irregular wage payments or part of the wage being paid by hand. The expectation of employers not to observe the prescribed rest periods or to load the vehicles beyond their capacity is also widespread. (Štakul, 2022)

According to the ZRSZ, only 98 participants were accepted into the training and acquisition programmes for category C and CE driving tests in 2023, 114 fewer than in the previous year.

Table 1. Non-formal education and training programs (Krušič, 2024)

Number of inclusions Period	2022	2023	I – V 2024
Training and obtaining a category C driving test	173	83	70
Training and obtaining a category CE driving test	39	15	18
SUM	212	98	88

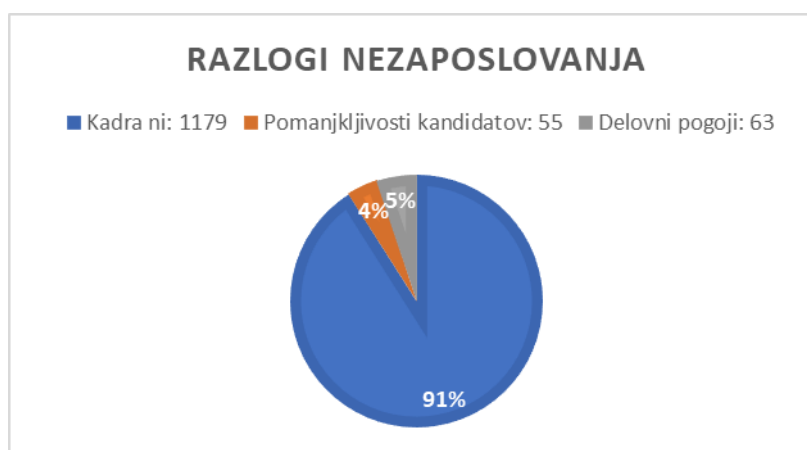
The ZRSZ also works regularly with employers. In the Recruitment Forecaster survey, the reasons for recruitment difficulties were categorised into three categories:

1. there is a significant shortage of staff in this profession on the labour market;

2. the candidates who applied for the vacancy were not suitable due to shortcomings;
3. the working conditions (e.g. salary, working hours, physical labour or field work, etc.) discourage candidates from applying for vacancies.

In a large number of occupations where employers had problems finding staff, the main reason is that there are no staff in these occupations on the labour market. The aforementioned problem was particularly emphasised for bus drivers, namely in 99% of cases.

Graph 1: Reasons for employers' difficulties in finding candidates for drivers of heavy goods vehicles (ZRSZ, 2024)



The employers surveyed had difficulty recruiting heavy goods vehicle and articulated lorry drivers for 1,297 vacancies. In 1,179 cases, employers believed that the problems were due to a general shortage of staff on the labour market. Working conditions were emphasised for 63 jobs and the shortcomings of the applicants for 28 jobs. Employers who had problems finding bus drivers (860 jobs) cited the lack of such staff on the labour market as the main reason for the problems in 852 jobs, and working conditions were the key in 8 jobs. (ZRSZ, 2024)

3. EMPLOYMENT OF FOREIGNERS

Asian drivers are being hired by European companies in increasing numbers. Just like Slovenian citizens who go abroad, foreigners from poor countries are also coming to Slovenia for higher standards, better living conditions, better health care and better education. New agencies are appearing on the Slovenian labour market that mediate in the recruitment of foreigners from third world countries or South Asia, such as Filipinos, Indians and Nepalese.

According to unofficial data provided to me by a transport company, out of 400 employed lorry drivers of various categories, around 50 are from Nepal and India, which is more than 10% of the workforce.

The Slovenian agency Pinoy 385, which offers its services and support to Slovenian companies in hiring Filipino workers, explains how the process of hiring a foreigner works. In order for Slovenian entrepreneurs to hire Filipinos, they must fulfil certain conditions. The employer must provide the Filipino employee with adequate accommodation in Slovenia for the entire duration of the employment, cover all travel expenses (round-trip airfare) and the costs of all necessary permits for the stay in Slovenia, medical examination and the like. The employer must also be accredited by the Ministry in Manila, a process that usually takes up to two weeks.

Bilingual instructions or written procedures in the workplace, a bilingual payroll (i.e. also in English), and his superiors must also be able to speak English are further conditions for the employment of a Filipino worker. The salary must be the same as that received by Slovenian employees for the same or a comparable position.

If the employer expresses a need, the recruitment agency checks whether the employer is suitable or willing to hire a foreign worker (checks all the conditions listed) and helps them with accreditation. Then the search and selection process of suitable candidates in the Philippines begins, which takes about three weeks, including testing if necessary. Once the candidate is selected, the agency applies for a single residence and work permit on behalf of the employer (at the relevant administrative office). The Philippine Ministry does not allow the employee to agree the working and salary conditions themselves, but it is necessary to coordinate with them. In this way, they ensure that their employees are not exploited worldwide.

All costs of the procedure are borne by the employer, as prescribed by the Philippine Department of Migrant Labour. However, unofficial calculations show that all expenses (accommodation, air tickets...) with commissions and the salary of the Filipino employee would cost the employer about two years of the employee's gross salary. (Dakić, 2024)

3.1 EMPLOYMENT OF FILIPINOS

According to the government portal GOV.SI, 94 temporary or permanent residence permits were issued to Filipinos in 2023, while 96 permits were issued in the first five months of this year. (Državna uprava Slovenije, 2024)

The newly established recruitment agency Pinoy386, which helps Slovenian companies find labour, states that Filipinos are known for their adaptability, diligence and fluency in English, which supposedly makes it easier for them to integrate into the Slovenian workforce. The average age of Filipino citizens is 25, while the EU average is 45. Given these advantages, Slovenia has taken a step forward in trying to establish a more systematic approach to the employment of Filipino nationals, including the opening of a recruitment agency and a planned consulate in the Philippines.

Grega Bizjak, director of the family-owned transport company Sigr from Jesenice, was one of the first transport companies to come up with the idea of employing Filipino workers in 2019. At the time, he was part of a Slovenian business delegation on a working visit to the Philippines to find out about employment opportunities for these workers in Slovenian companies. Afterwards, they tried to bring a Filipino worker to Slovenia, but it was so complicated that they gave up the idea for a while. Slovenia reportedly finally opened a consulate in Manila in the Philippines in January, which will facilitate the employment of Filipino citizens in Slovenia. Following the establishment of the Consulate General in Manila, Filipino workers who want to work in Slovenia will no longer have to travel to faraway Tokyo or New Delhi to obtain permits.

3.2 EMPLOYMENT OF INDIANS

According to the Indian Ministry of Labour and Employment, the daily minimum wage in India in December 2023 is at the same level as in December 2022, namely INR 178, which corresponds to approximately EUR 1.99. The average salary in India varies depending on the region and field of work, but averages around EUR 200. (SPIRIT Izvozno okno, 2024)

In 2023, 1,370 permits for temporary or permanent residence in Slovenia were issued to Indians. This year, 718 permits were issued in the first five months alone. (Državna uprava Slovenije, 2024)

Recently, many Indians have also been employed by the Slovenian transport company Kopal transporti, d. o. o., as truck drivers.

3.3 EMPLOYMENT OF NEPALI WORKERS

According to GOV.SI, 286 temporary or permanent residence permits were issued to Nepalese in 2023, while 310 permits were issued in the first five months of this year alone.

Workforce Consultancy, which specialises in the recruitment of skilled and reliable workers from Nepal, presents the Nepalese as a people “known for their hard work, tenacity and adaptability that comes from living in the harsh conditions of the Himalayas. These qualities are also transferred to the workplace, enabling them to adapt quickly and efficiently to new working environments.” (Workforce, 2023) Kobal transporti has recognised these qualities and therefore employs Nepalis as well as Indians. The problem is that they never know what kind of workers they will actually get. Some come very hardworking, diligent and punctual and take care of the fleet, while others have completely different work habits and a less respectful attitude towards the employer's property.

3.4 DISADVANTAGES OF EMPLOYING FOREIGNERS AND POSSIBLE SOLUTIONS

When foreign drivers arrive in Slovenia, they complete a course for the accelerated acquisition of the basic qualification for a driver, which lasts 140 hours. According to various employment agencies and the hopes of employers, this prepares them for road transport. It is more than obvious that training without the necessary practical training accompanied by mentors and extensive pre-employment tests is not enough for drivers with a completely different mentality and habits, from countries where there are many unwritten rules, confusion on the roads and the law of the jungle, to master the traffic. Rules and acquired skills such as accuracy and respectful maintenance and preservation of the vehicle.

The recruitment process takes between four and six months. During this time, the agencies prepare the employee for their arrival in Slovenia and help the employer to integrate the foreigner. As the co-owner of the Pinoy agency explained, the employee must be ready to work in Europe. In Asia, three or four workers do the work of one worker in Europe.

When asked how Filipinos will be able to work in demanding jobs if they only speak English, the Pinoy agency co-owner explained that if the job requires knowledge of the Slovenian language, a Slovenian language course should be organised in the Philippines, adding that some German companies take advantage of this opportunity. (Dakić, 2024)

Unfortunately, employers are literally forced to look abroad for labour, but we cannot turn a blind eye to the discomfort, fear and anger this causes among some locals. Drivers and other employees of

various transport companies feel that drivers from Asian countries do not have sufficient skills and that they bring down the reputation of drivers by doing a poor job and constantly causing problems and destruction to vehicles. According to unofficial information from employees of various transport companies, there is an obvious deterioration in the condition of the fleet, accelerated consumption of vehicles and tyres, negligence and recklessness of workers. Photos are frequently published and negatively commented on various social networks, showing that the drivers have neither sufficient knowledge nor competence. As a result, the company's reputation falls.



Figure 1: Sociocultural differences and prejudices towards workers from South Asia (Facebook, 2023)

Despite the many positive qualities cited by various recruitment agencies, no one mentions communication problems, which in turn leads to many misunderstandings at work. As a Nepali employee in one of the SIJ Ravne Group companies claims, Nepalese will never admit that they do not understand something. For example, when they are given certain instructions or someone explains something to them, it is not enough to ask them if they have understood because they will definitely nod. The instructions must be repeated or the employee must prove that they have understood how something is done. In this way, the employer can make sure that the employee not only nods politely, but has really understood the assignment. You must explain new things and work processes to the employee in a friendly manner and check that they have understood them. This makes work quicker and easier. Of course, it is better if they are assigned to teams with other colleagues in the company. This way, they learn the work tasks more easily and quickly and integrate themselves into the team. Companies need to give their employees the opportunity to learn and develop on the job.



Figure 2: Traffic jams on the roads of India
(SCROLL IN, 2018)



Figure 3: Traffic jam on Slovenian road
(Vozim se, 2024)

4. CONCLUSION

In the last two years, more and more labour has come to Slovenia from the populous countries of South Asia, where workers come because of poor working conditions. This is very inviting for Slovenian entrepreneurs. At first glance, it appears to be cheap labour that brings them more profit. The question is whether it really is cheap labour or whether it is just a fairy tale offered to Slovenian employers by "fog sellers" from various agencies that arrange the employment of foreign citizens. Employers do not really have a choice, as there are practically no drivers. If they want to continue the labour processes, this seems to be one of the few solutions.

The fact is that recruiting labour from Asia is a solution. Of course, employers need to provide these workers with additional adequate training during the employment process itself, provide them with mentors and accompany them for a period of time, because the differences in driver culture, traffic rules and conditions on the roads in India, the Philippines and Nepal are very large. The vehicles in Europe are newer, more modern, the rules are different, a tachograph is used, you drive on the right and not on the left side of the road..

Often the differences in culture and language are such big barriers that it is questionable whether hiring foreigners from Asian countries will bring positive results. Maybe in other industries, but in the transport and logistics sector there are too many deficits. The mentality of people in Europe and Asia is different. Certainly, there are many unfounded prejudices against Asian workers, but we cannot ignore the fact that this system is not working at the moment and that there is an urgent need for a different approach and more thorough education and training for workers from Asia who want to work in Slovenia.

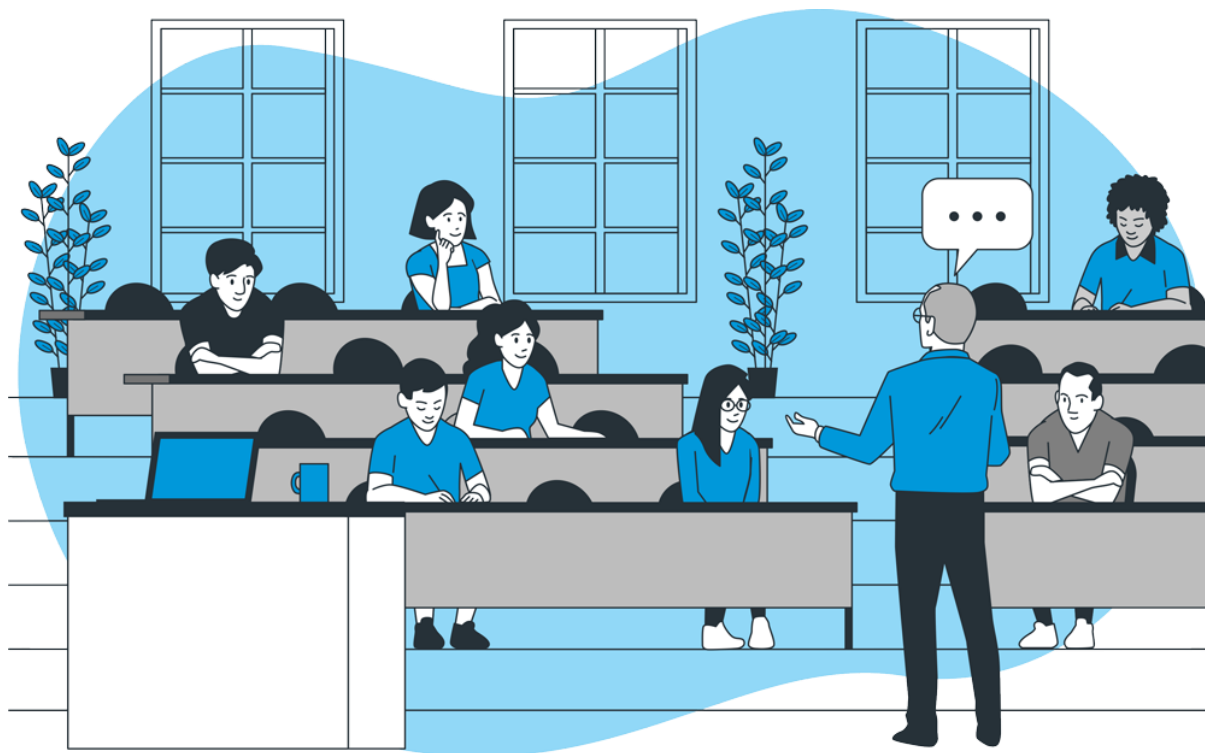
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Tema:

Vključevanje na učenice vo proekti



Međunaroden simpozium
na soobračajni inženieri

Bosna-Sarajevo
Oktomvri 2024

Apstrakt

Človeškiot život sekogaš bil inspiracija na mnogu filozofi, naučnici, mislители, umetnici..., no životot na čovekot isto taka e inspiracija i na običniot čovek. Običniot čovek e obzemen od mislata za „podobro utre”. Vo toj negov život, čovekot raboti, tvori, se rekreira, sportuva.... Čovekot pokraj toa što sozdava za životot, toj saka istiot i da go uživa i toa sekoj na svoj unikaten način.

Često pati čovekot, kako osnovna kletka na opštествoto, pogolemiot del od svojot život go pominuva rabotejki za da sozdade sredstva za život, no, vo trka so vremeto, istiot toj čovek e mnogu dinamičen zatoa što ima mallku vreme za ispolnuvanje na svoje celi. Često pati, čovekot vo svojot životen vek, nema mnogu možnost da gi uživa plodovite na svojot trud i za da ja zgolemi taa možnost, toj povtorno stanuva podinamičen. Za da bide što e možno poprisuten na poveќе mesta istiot gi koristi uslugite koi mu gi nudi soobraќjot. Od druga strana pak sekoj od nas e svesen za ovoj fakt, no sekoj od nas ne pravi skoro ništo za da go promeni istiot. Kako može da se promeni toj fakt i što treba da se smeni za da se ublaži brzoto tempo na živeenje. Odgovorot na ovie dve prašanja leži vo mladite generaciji koi doagaat posle nas, a koi ne se dovolno vključeni vo procesot na sozdavanje na materijalni dobra i uslugi. Mladite ja imaat energijata i potencijalot koj e potreben na sekoe opštество za da može da se razviva i da stani ubavo mesto za živeenje na sekoj člen na toa opštество.

Mladosta e faza vo koja decata izleguvaat od svoje zaštitni obvivki i se podgotveni da gi raširат svoje krilja vo svetot na nadežta i sonišata. Mladosta znači da se neguva nadež. Toa e vreme na razvoj, vreme na rast i promena. Taa promena pokraj lična mladite sakaat da ja pretočat i vo opštествena. Da im go ovozmožime toa za da ne letnat nadvor od našite domovi, često nepovratno i za sekogaš. Tie igraat važna uloga kako vo razvojot na semejstvoto taka i vo razvojot na opštествoto. Nivniot potencijal, entuzijazam i hrabrost, nemože da se sporedi so nitu eden segment vo opštествoto.

Mladosta e sinonim za promena, napredok i razvoj. Mladosta e možnost za soočuvanje so predizvici i sozdavanje proctor za soočuvanje so tie ppredizvici. Toa znači pretvoranje na problemite vo možnosti za iznaoѓanje na rešenija. Na svetsko nivo 1/6 od vkupnata populacija se mladi luѓe. Sепak premnogu često mladite se ostaveni na strana bez glas ili možnost da gi spodelat svoje idej i mislenja. Investiraќi vo mladite investirame vo našata i nivnata idnina.

Mladinata treba da bide dvižečkata sila na sekoja zemja. Dokolku ima sila и se kombinira so mudrosta i znaenјeto na postarite od niv uspehot e zagaraniran.

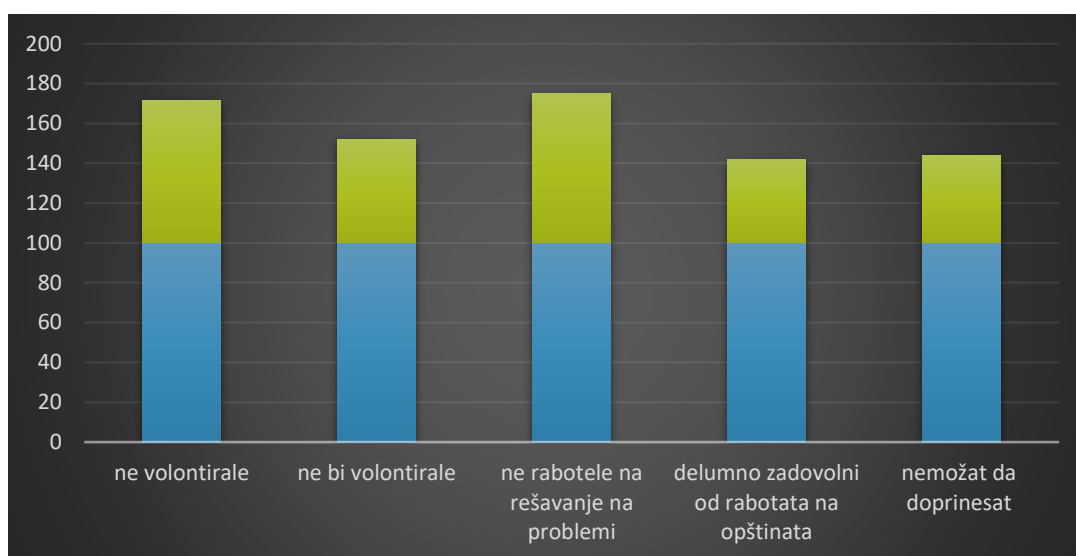
Mojata založba so ovoj moj trud e da se pokaže deka mladite imaat idej za odredeni problem koi gi ima opštествoto i da so praktični primeri dobieme rešenje kako može uspešno da se iskombinira silata i potencijalot so mudrosta, iskustvoto i znaenјeto.

Ključni zborovi: mladost, soobraќaj, proekti, opštество

Glaven del

Vključenosta na mladite vo proektite na lokalnata sredina se mnogu mali ili voopšto ne postojat.

Duri 71.7% od mladite nikogaš ne učestvuvali vo volonterka aktivnost, a 52% od niv velat deka sigurno ne bi volontirale nikogaš ponatamu, 75% nikogaš ne rabotele individualno i vo grupi za da rešat nekakov lokalni problem, 42% delumno se zadovolni od rabotata na nivnata opština, dodeka 44% velat deka ne možat ništa da pridonesta za podobruvanje na nivnoto mesto za živeenje.. Ovie podatoci se del od naodite na istražuvanje nasloveno pod imeto „Potrebata na mladite na lokalno nivo”.



Od druga strana pak, od združenieto „Mladite možat”, velat deka preku soodveten povik, mladite možat da vidat što nedostasuva vo nivnata opština i što im e potrebno ne samo na mladite tuku i na site gražani na toa opštestvo. Osnovna cel e mladite da ja promenat percepcijata za svojata sredina no i sredinata da ja promeni percepcijata kon niv, a so toa da im ovozmoži vključuvanje na mladite pri rabota na nekoj proekti, no i pri donesuvanje na nekoj odluki koi se odnesuvaat na lokalnata sredina vo koja ovie mladi živeat.

Ovie dve kontradiktorni analizi ne doveduvaat do zaključok deka mladite imaat želba vo vključenosta na proekti najprvo vo sklop na opštinata vo koja živeat, a ponatamu i na državno nivo pa i poširoke, no ne im se dalo možnost toa da go napravat.

Mladite luže se neiscrpen izvor na energija. Vo niv ima tolku golem potencijal koj dokolku se aktivira i iskoristi na parvo mesto, vo parvo vreme no i na soodveten način, može da rezultira so golem uspeh na zadovolstvo na site involvirani strani. Od edna strana zaednicata će ima dobar benefit zatoa što toa koe što će se izraboti e za opšto dobro na site členovi na zaednicata, no od druga strana mladiot čovek će ja potroši energijata na nešto koe će mu bide inspiracija za ponatamošniot nagov angažman, a za toa ke bide nagrađen ili pofalen, ke bide viden i slušnat od strana na kreatorite na zaednicata.

Fakt e deka mladite često pati, točno zaradi toa višak na energija se vpuštaa vo sekojdnevni nesoodvetni “aktivnosti” koi nikomu ne mu nosat dobro. Isto taka fakt e i deka mladite se iseluvaa barajki se sebesi i barajki nešto što će go ispolni mladiot čovek so što toj će bide zadovolen. Ovoj problem pomalku ili poveќе go imaat site zemji koi ne se členki na EU. Zaradi ovaa sostojba sekoja godina se smenuva i demografskata slika koja nikako ne e nešto so što može da se menadjira i da se pravat planovi kako za edna firma, institucija pa i za ceala zemja. Nikoj ne može da bide ramnodušen za ovaj podatok i sekoj se prašuva što treba da se napravi. No mnogu malku ili skoro voopšto ne se pravi za da ovaj problem se ublaži i da na nekakov način se zadržat mladite doma vo sopstvenata zemja.

Vo domenot na mojata oblast jas se probav da izvlečam od mladite del od nivnata energijai da im dadam do znaenje deka možat da bidat korisni građani na opštествoto.

Mojata založba možebi ne e idealno rešenje koga stanuva zbor za rasseluvanje na mladite zatoa što toj problem iziskuva angažman na site strukturi na opštествoto no sepa možebi će bide eden čekor nanapred kon rešavanje na ovoj nagolem problem na denešnicata. Dokolku se spoijat vakvite ili slični ideji i se deluva so združeni sili možebi problemot će počne da se razrešuva.

Za što stanuva zbor? Imeno stanuva zbor za vključuvanje na mladite pri izrabotka na proekti koi se realni i koi ne se fikcija. Smetav deka učenicite od završnite godini na srednoto obrazovanie, vo sklop na svojot domen na dejstvuvanje možat da bidat vključeni vo sostav na timot koj izrabotuva proekti bilo toa da se lokalni ili na poširočko nivo. So ta učenicite će go primenat svoeto znaenje koe go steknale izminatite godini vo strukata no i će dadat svoj doprinos pri kreiranje na ekonomijata na edna zemja. Dali e seto ova izvodljivo? Da, izvodljivo e. Eve eden nelatanten primer deka e vozmožno i deka e izvodljivo.

Imeno izminatata učebna godina so učenicite od IV godina od soobraќajната struka izrabotivme dva proekti koi se odnesuvaat na nekoi soobraќajni rešenija za gradot Prilep. Isto taka učenicite organiziraa eden interesen nastan koj beše dosta poseten od građanstvoto na gradot Prilep. Sledejki gi preporskite na organizatorot od minatogodišniot simpozium koj se održa vo Skopje, da probame da na ovie naši sobiri poveќе se zadržime na angažmani so učenicite, jas probav toa da go napravam i da im nametnam na učenicite deka imaat kapacitet i dovolno predznaenje za da izrabotat nešto korisno za našiot grad, koe što ponatamu na sledniot naš simpozium će go prenesam do site členovi na simpoziumot.

Za početak sakav da probam da izrabotam eden projekt zaedno so učenicite, no koga vidov deka dobro ni odi se potrudivme da izrabotime ušte eden. Zaprepastena bev od golemiot interes na učenicite. Od 60 učenici kolku što broi soobraќajната struka od IV godina, duri 48 se vključija vo ovoj predizvik. Za vreme na izrabotkata na ovie proekti, učenicite se podelija vo grupi zatoa što imaa različno razmisluvanje za da donesat konečno rešenje. Učenicite so golem entuzijazam i dosta seriozno gi dovedoa ovie proekti do kraj.

Toa bea slednite aktivnosti:

1. Organiziranje na parking za nov object;
2. Dopolnuvanje i revidiranje na gradskiot prevoz;
3. Aktiviranje na svesta kaj građanite za soobraќajната kultura;
4. Pretstavuvanje na ideji pred biznis sektorot i lokalnata sredina.

Ovie proekti učenice gi rabotea najprvo kako vežbi, a potoa gi dopolnija so site dodatoci koi se neophodno potrebni za da tie vežbi prereasnat vo eden proekt.

Za da se izrabotat ovie vežbi učenice bea podeleni vo grupi. Dobar del od učenice zedoa učestvo vo izrabotkata na site aktivnosti. Ovoj podatok e ušte eden imperative samo kolku učenice sakaat da bidat del od timot za rabota. Sekoja grupa broeše od po desetina člena.

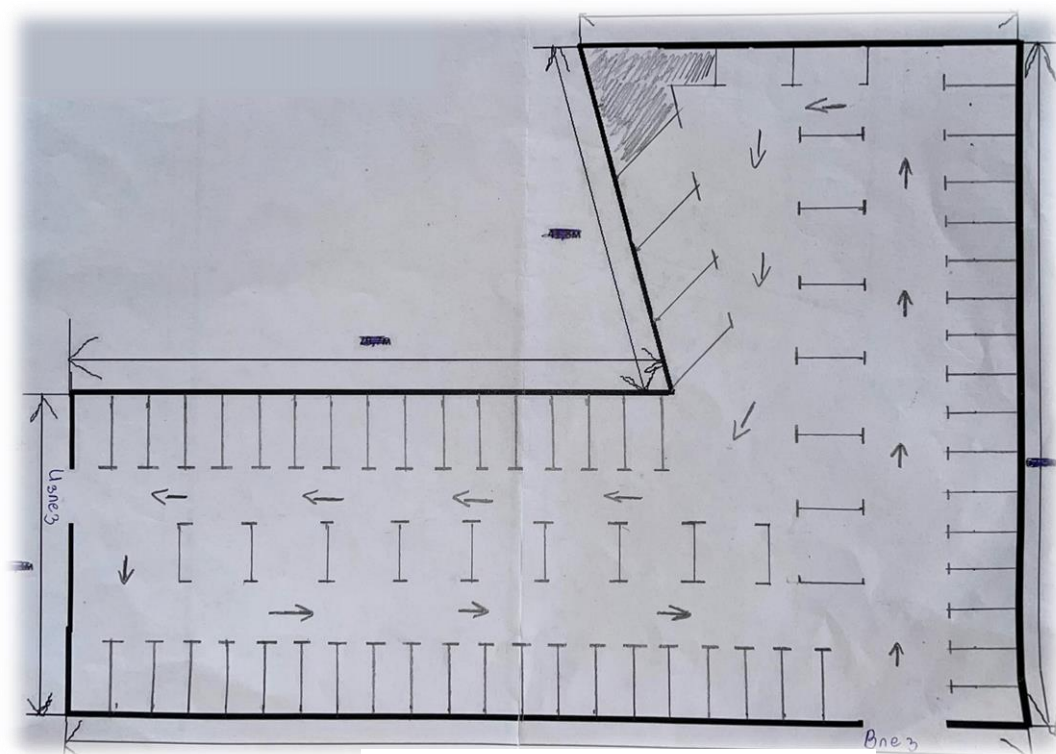


sl.br.1 rabota vo grupi

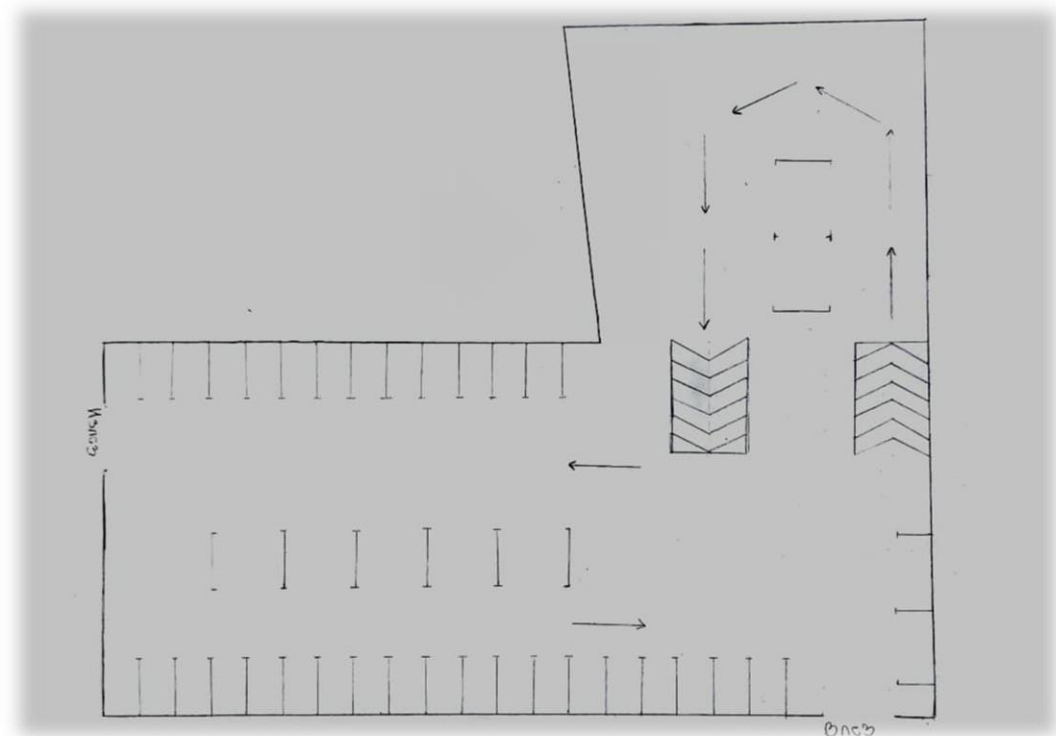
Rabotnite angažmani na členovite na grupata bea jasno postaveni i dosta koncizni. Moram da napomenam deka interesot na sekoj člen na grupata beše ogroman. Posebno me iznenadi no voednoi me izraduva faktot deka i učenice so relativno poslab uspeh sakaa da bidat členovi na nekoj od timovite. Isto taka i onie učenici koi inaku se inertni za vreme na časovite sakaa da rabotat vo timot i se razbira na obostrano zadovolstvo toa im beše ovozmoženo. So ovi fakt se doağa do zaključok deka i učenice so poslab uspeh vo sebe imaat potencijal koj ne treba da se zanemari i koj može da se uspešno da se iskoristi samo e potrebna eksponencijalna kapisla i soodvetno menadjiranje.

Prvot raboten proekt, iako malku na početokot skeptično, sepak dade tolku mnogu pozitivni angažmani što veќе do sredinata na izrabotkata na istiot bev sigurna deka ќе rezultira so uspeh. Imeno stanuva zbor za organiziranje na parking proctor na novoizgraden ojekt, detska gradinaka, vo nasleba Točila. Za taa cel učenice dobijaa za zadača da go organiziraat parking prostorot koj go ima toj object na raspolaganje. Raspoloživiot prostor koj go imaše ovoj object e so nepravilna forma. Učenice najprvo so istražuvanje za kapacitetot na samiot object i so istražuvanje za toa kolku vraboteni ќе ima vo toj object dojdoda do zaključok deka ќе treba da obezbedat parking mesta koi ќе gi prifatat vozilata so koi ќе doaağa vrabotenite vo gradinkata i za koi ќе ima potreba od podolgo vremetraenje na parkiranje kako i parking mestata za roditelite koi ќе gi nosat I zemaat svoje deca vo I od prestoj vo gradinkata. Ovie praking mesta se so kratkovremetraenje no zatoa pak isite ќе treba da se obezbedat za odprilika istovremeno t.e. nautro koga gi nosat decata i potoa se praznat, kako i popladne koga gi zemaat decata i odma se praznat. Prostorot so koj se raspolagaše beše navistina

oskuden, no se pak učenice dādo rešenija koi imaa svoja izdržlivost i toa site tri rešenija imaa interesni zaključoci. Sepak kako najinteresen bi vi go pretstavila spored mene najdobrite rešenija.



Sl.br.2 Rešenje br.1



Sl. hr. 3 Rešenje hr. 2

Vtorata zadača, koja kako proekt ni beše predizvik, e revidiranje na vejke postoečkiot gradski prevoz.

Imeno gradskiot prevoz vo gradot Prilep postoi vejke 10 godini. Istiot e dosta koristen od stran an graѓanite no postojat i nekolku nedostatoci. Pred se kako predizvik na učenicite im beaše податокот дека nekolku naselbi vo gradot ne se opfateni so gradskiot prevoz, a se so golema frekfencija na luѓe. Tuka kako najrelevantni vo odnos na toa se naselba Aličair i naselba Trizla, pa i naselbata Bageska Ograda.



Sl.br.4 rabota na soobrakjaen problem

Učenicite vo pogled na toa imaa različni rešenija. Edno od niv, spored mene e najidealno zaradi toa što ne bara dopolnitelni sredstva i ima realna možnosta da itoto bide sprovedeno vo delo. Organizaciski mnogu dobro se vklopuva vo veќе postoečkiot vozen red, ainfrastrukturno itekako e izvodljivo. Edna od grupite se odlučija za kompletna promena na gradskiot prevoz vo smisla na liite i brojot na linii, no se razbira toa bara dopolnitelni trošoci i vreme. Tretata grupa se odluči da vmetne ušte dve novi linii na veќе postoečkite tri kolku momentalno gi ima gradskiot prevoz vo gradot Prilep, so što bi se imalo vkupno pet zasebni linii. i ova rešenje, iako ne kolku prethodnoto, ima potreba od dopolnitelni investicii i vreme za negovo sproveduvanje i organiziranje, no sepa kako rešenija i dvete se interesni i imaat možnosta za nivna realizacija vo nekoje dogledno vreme.

Vo pogled na ovoj problem učenicite izlegoa so slednite rešenija.



Sl. br. 5 nostoečka sostoiha



Sl.br.6 nova sostojba

Učenicite uspea so minalni sredstva i so minimalni promeni na organizacijata da gi opslužat i ovie dve naselbi so uslugata na gradskiot prevoz.

Bitnata aktivnost koja sakav da vi ja prenesam, a koja proizleze od samite učenici beše po povod denot na soobračajnata kultura 11 maj. Vikendot pred 11 maj potočno na 04 maj pred kamenata bina na gradot Prilep, učenice od soobračajnata struka angažiraa literaturno čitanje na lični tvorbi. Isto taka na 11ti maj vo gradskata biblioteka vo Prilep pred brojna publika se čitaa lični tvorbi so tema „Soobračajnite nezgodi“. Učesnicite koi citaa lični tvorbi bea ocenuvani od soodvetna komisija i se proglasija najdobrite. Za taa cel bea pokaneti site učenici od gradot, bez razlika na vozrasta, polot, verskata pripadnost za da so svoi lični tvorbi vo proza i poezija im dolovat na graĝanite deka vo soobračjani nezgodi site sme podednakvo ranlivi. Golemiot broj na slušатели bra trognati od pišaniot zbor koj dopre dlaboko ne samo vo nivnata svest tuku i vo nivnite duši, zatoa što sekoj na nekaov način se sretnal so vistinata za soobračajnite nezgodi dali direkno ili indirektno.

Učenicite oreku svoje tvorbi upatija apel do slušatelite za počituvanjeto na pravilata i propisite vo soobračajnot bezrezavno sekogaš i sekade.

Bodreni od mene kako mentor na projektot i zadovolni pred se od postignatite rezultati, učenice rešija ovie nivni založbi okolu izrabotkata na rešenija za određen soobračeen problem, da go pretstavat pred određeni strukturi od našiot grad.toa I go napravivme na eden nastan koj se narekuva „Cirkularna Ekonomija“, a se održuva sekoja godina na Ekonomskiot fakultet vo Prilep. Toa e eden renomiran fakultet so dolgogodišno iskustvo.Na denot na održuvanjeto na ovoj nastan, del od učenice gi pretstavija svoje projekti pred pretstavnici na biznis sektoroot od gradot i pred členovi na sovetot na opština Prilep. Ovie trudovi pobudija golem interes i kaj pretstavnice koi gi spomenav no i kaj profesorite I studentite na Ekonomskiot Fakultet. Posle pretstavuvanjeto na projektite sleduvaa niza na prašanja kako i sugestii od strana na prisutnite slušate



Sl.br.7 literaturno čitanie



Zaključok

Sl.br.8 pretstavuvanje na učenice pred biznis sektorot

„Idninata pripaža na mladite”...so ovaa izjava site se složuvame. Za da taa idnina im ja ovozmožime na mladite vo sopstvenata zamja, nie generaciite pred niv morame nešto da napravime za da go slušneme nivniot krik koj e mnogi jak dokolku slušneme ubavo i so vnimanie. Morame da go sogledame porivot na mladite da dadat svoj pridones vo opštestvoto vo koe živeat, da tvorat, da promenat nešto, da opstanat tuka kade što se za da uči ostanat tuka kade što se. Morame da ja sogledame nivnata borba za da go pomestat vremeto čekor napred.

Vo opštestvoto takvo kakvo što e, so sekoj nov den se nametnuva potrebata toa da bide ponapredno,, podemokratsko, pootvoreno za site negovi činiteli. Potrebata nee toa da se streми kon idelnoto, tuku ednostavno samo po sebe da bide soodveteno I realno prilagodeno na potrebite na graѓanite.

Koga stanuva zbor za ulogata na mladite vo nego, možeme so sigurnost da kažeme deka mladata intelektualna sil e onaa koja so svojot revolucioneren duh moze da vlijae mnogu silno, ako ne I odlučuvački, za opštestvenite tekovi, promeni I slučuvanja. Meѓutoa, ne sekogaš svateni dobronamerno, često pati potceneti kako idealisti I nedovno iskusni, mladite bile svesno marginalizirani kako kategorija vo oštestvoto. Sepak, vistinata I česnata namera, porano ili podocna izlegovala na videlina. Toa vpročem go dokažala I istorijata I toa mnogu pati do sega.

Kako nekoj koj e postojano so mladite zaraddi rabotniot amgažman, čuvstvuvam potreba ne samo da go izrazam svoeto mislenje tuku I aktivno da dejstvuvam, zaedno so učenicite so koi rabotam, da go pokažam I dokažam toa.

Smetam deka, neizvalkani, nekorumpirani I neinstrumentalizirani od nikoj, mladite možat da go promenat opštestvoto na podobro. Tie se želni za Pravda, za socijalna ednakvost I demokratizacija vo opštestvoto.

Točno e deka ima I takvi koi mmislat I velat deka mladite ne se dovlno efikasni I produktivni, deka dejstvuvaat nezainteresirano I neodgovorno. Možebi, spored mene, toa e proizvod na „sterilniot” način na živeenje vo opštestvoto. Meѓutoa, smetam deka toa e možno da se pomeni. Ovaj mal trud vo koj go prenesov mojot angažman za da go pokažam učestvoto na mladite vo proektite na opštestvoto, e samo mal dokaz deka deka, sekoj od nas imame možnost da ja ispravime taa nepravda kon mladite. So toa možeme da ja ispolnime našata graѓanska dolžnost I obveska, da se posvetime I borime za podobroto, za prosperitetot I za idninata. Za promeni vo pozitivna nasoka koi ke donesta samo benefit na mladite, nan as, na našeto opštestvo.

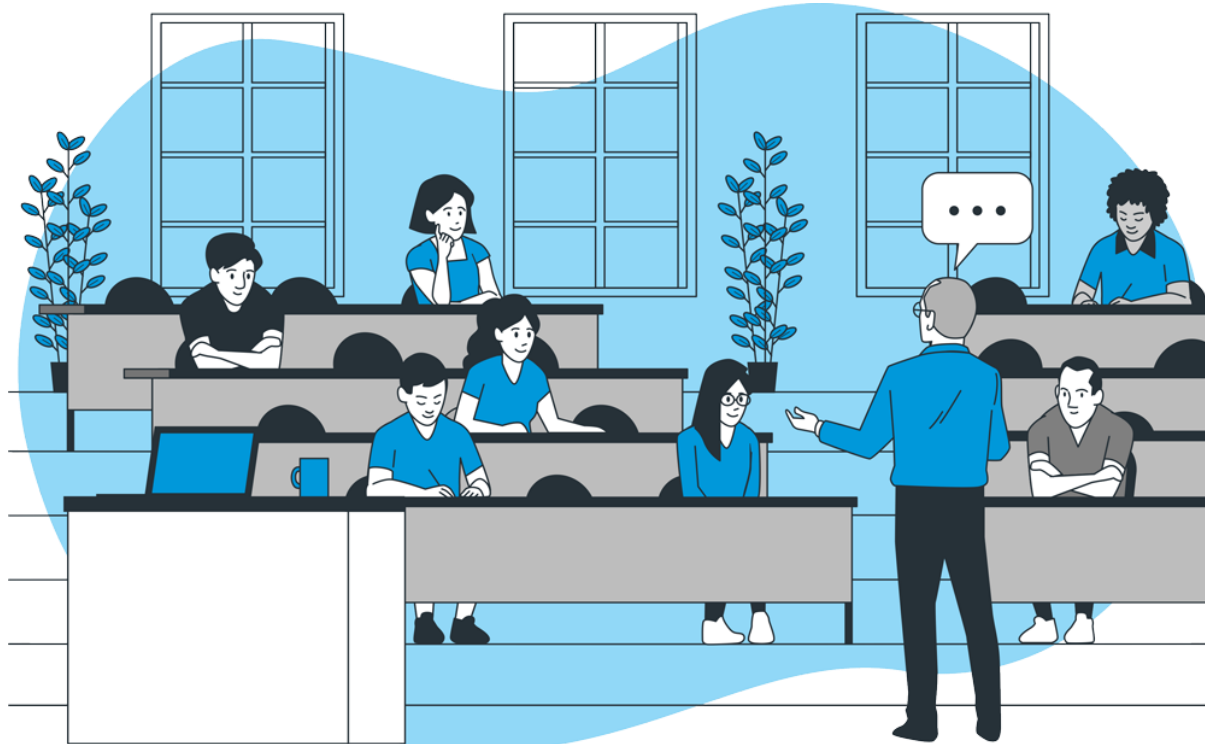
S. O. U. Riste Risteski Ričko – Prilep

dipl. soobr. ing. Sekuloska Violeta



Unit:

Including students in projects



International symposium
of traffic engineers

Bosna-Sarajevo
October 2024

Abstract

The human life was always an inspiration on many philosophers, scientists, thinkers, artists... but the human life is also an inspiration to an ordinary human. An ordinary person is overwhelmed by the thought for a "better tomorrow". In his life, a person, works, creates, recreates, plays sports... Besides creating for his life, a person also wants to enjoy it, each in their own unique way.

Many times, the human as a basic cell of society, a bigger part of his life, passes working to create funds for life, but, in race with time, the same person is also very dynamic because he has little time to fulfill his goals. Many times in his life span, he doesn't have the opportunity to enjoy his effort, and to increase that possibility he becomes more dynamic. To be present in more places, he uses the help of the transport. On the other hand every one of us is conscious of this fact, but no one does anything to change it. How can that fact be changed and what has to be done to soften the fast pace of living. The answer to these two questions lies in the young generations who are coming after us, but are not included in the process of making material goods. The youth have the potential and the energy which is needed in every society for it to develop and to become a better place for living for every member of that society.

The youth is a phase in which kids are leaving their comfort zones and are ready to spread their wings in the world of hope and dreams. Youth means nurturing hope. That is the time for development, time for change and growth. Besides that self change the youth want to convert it into social change. For them to not leave our homes permanently and forever, let's allow them that. They play an important role in the development of the family as the development of the society. Their potential, enthusiasm and bravery can't compare with a single segment in the society.

The youth is a synonym for change, upgrade and development. The youth is a possibility for confrontation with challenges and making space for confronting challenges. That means converting the problems into possibilities for finding solutions. On a world wide level 1/6 from the total population are young people. However the young people are often left without voice or possibility to share their ideas and thoughts. Investing in the young people we are investing in our and their future..

The youth has to be a moving force on every country. If there is strength and it is combined with the wisdom and knowledge of their elders, success is guaranteed.

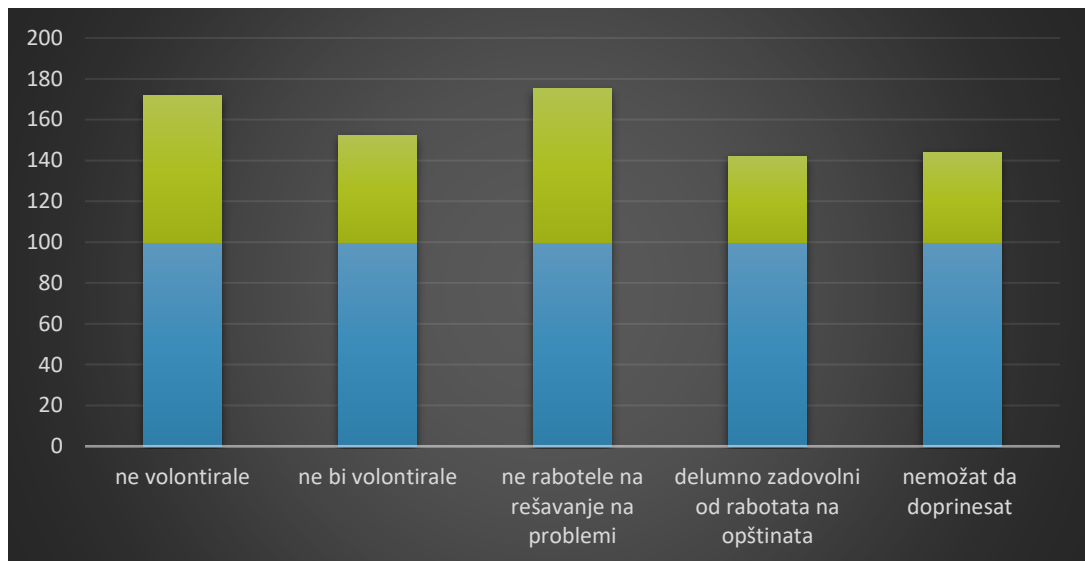
My commitment in this assignment is to show that the young people have ideas for certain problems that the society has and with practical examples receive solutions how successfully we can combine force and potential with intelligence, experience and knowledge.

Key words: youth, traffic, projects, society

Main part

The inclusion of the young people in the project for the local environment are very small or they don't exist at all.

71.7% of the young people were never included in volunteer activities, 52% of them say that they'll never volunteer in the future, 75% have never worked individually or in groups to solve a local problem, 42% are partially satisfied with the work by their society, 44% are saying that they can't contribute for improving their place of living... These statistics are part of the research titled under the name " The needing of the young people on local level"



On the other hand, of the association "The youth can", say that by an appropriate call, the young can see what's missing in their society and what's needed to be changed not only for the young but also for all citizens in that society. The main goal is for the young to change the perception for their surroundings and also the surroundings to change the perception for them, and with that to enable inclusion of the young to work on some projects, but also contribute to some decisions which are involved for the local surroundings where they live.

These two contradictory analysis are bringing us conclusions that the young people desire to be included in projects mainly in assembly in the society where they live, furthermore on country level and wider, but they didn't have the opportunity to do it.

The young are an inexhaustible source of energy. They hold very big potential, if activated and used in the right place and at the right time, also in an appropriate way, it can result in a big success and pleasure for every involved side. From one side the community will have better benefit because what will be worked on is for the general good for all participants in the community, but from the other side a young person will spend his energy on something that will be his inspiration for his further work, and for that he will be awarded or complemented, will be seen and heard from the creators of the community.

The fact is that the young people often let themselves in everyday inappropriate activities because of excess energy, which bring good to noone. Also, the fact is that the young people are going

abroad to find themselves and to find something that will fulfill the young person with what he will be satisfied. This problem more or less will have all countries that that are not participats in EU. Because of this situation every year the democratic picture changes, it can't be managed and we can't make plans like one company, institution, and for the whole country. No one can be careless of this data and everyone asks what has to be done. But very little or almost nothing can be done for this problem to easen up and in some way to keep the young home, in their country.

In the domain of my area i tried to draw the energy of the young people and tell them that they can be useful citizens of the society.

My commitment maybe it's not an ideal solution when it comes to young peoples movement because that problem requires working on all structures on the society, but maybe it will be one step closer to solving this enormous problem. If we combine this or similar ideas and we act with combined forces, maybe the problem with be solvable.

What are we talking about? Namely we talk about including the young in making which are real and not fiction. I thought the students that finished high school, in assembly in their domain on action can be included in the team that works on the project either on local or more broadly level. With that the students will use their knowledge that they acquired in the past years in their profession, also they will give contribution by creating the economy of one contry. Is this all profitable? Yes it is profitable. Here is an example that is possible and profitable.

This past school year with the students of IV year from the traffic profession, we created two projects which relate on some transport solutions for Prilep. Also the students organised one interesting event which was very visited from the people that live in Prilep. Following the recommendation from last years symposium which took place in Skopje, to try to keep our meetings more engaged with the students, I tried to arrange and tell the students that they have potential and foreknowledge to make something useful for our city, which later on the next symposium will transfer it to other members.

To start I wanted to try to make one project with the students, but when i saw that it goes well we tried to make another one. I was stunned from the big interest by the students. From 60 student that counts the traffic profession from IV year, 48 were included in this challenge. While working on this projects the students were divided in groups because they had different ideas for the final solution. The students with big enthusiasm and very seriously finished these projects.

These were the following activities:

1. organising parking for a new project
2. supplementing and revising public transport
3. activating the citizens awareness for the traffic culture
4. presenting ideas in front of the business sector and the local surroundings..

The students worked on these projects first as exercises, and then supplemented them with all the accessories that are necessary for those exercises to grow into a project.

To make this exercise, the stdents were divided in groups. A good part of the students took part in the making for all activities. This data is one more imperative how much the students want to be a part of the work team. Every group included a dozen members.

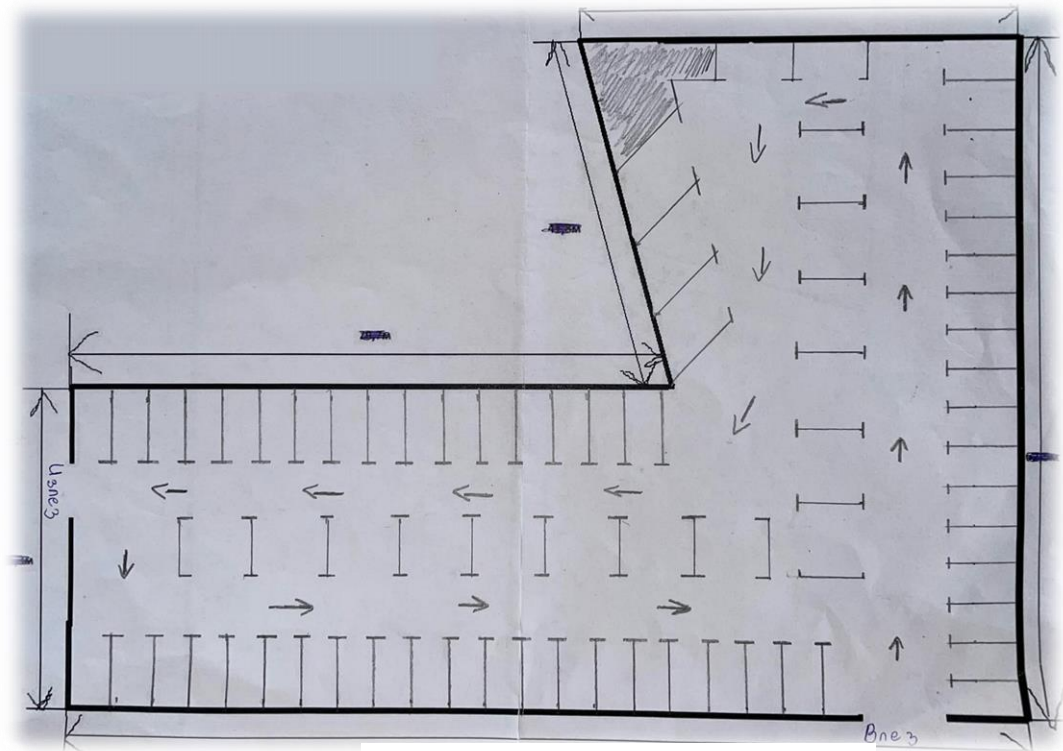


pic.no1 group work

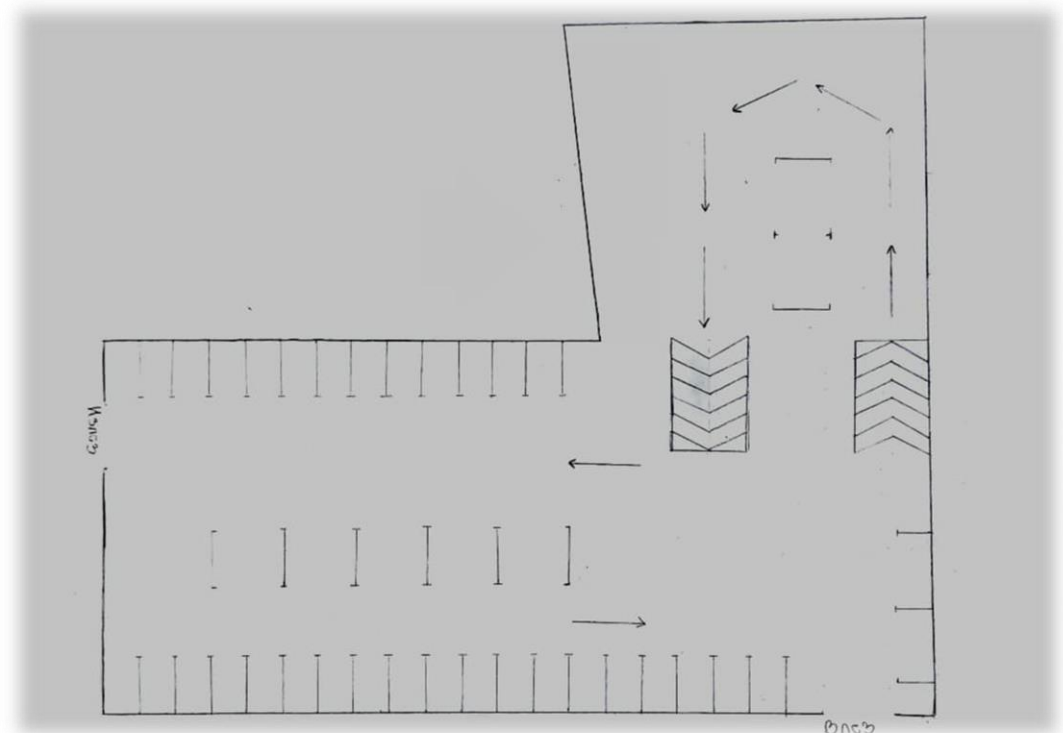
The work for the members of the group were clearly set and quite concise. I must mention that the interest of every member of the group was huge. It especially surprised me, but also made me happy, the fact that the students with lower success wanted to be members in one of the teams. Also, those students that are interns during the lessons wanted to work in the team, and of course to mutual satisfaction it was made possible. With these facts we come to the conclusion that even the students with lower success have potential that should not be overlooked and which can be used successfully, it just needs an exponential and proper management.

In the start we were sceptical about the first work project, however it gave very positive engagements. It is about organizing a parking place newly built in a kindergarten building, in Tocila. The students were given an assignment to organize the parking place that they have available. The place that is available is on incorrect shape. First of all the students studied the capacity of the place and with the research they came to a conclusion that they'll have to arrange parking places for workers of the kindergarten which they'll need more park time also a parking place for the parents who will carry and take their children in the kindergarten. These parking places are with short park time but they'll have to be arranged in the same time, in the morning when they will bring their children, and in the afternoon when they will take their children and then the parking places are empty.

The parking place that we worked on was scarce, but the students managed to find solutions and came up with three solutions with interesting conclusions. However as the most interesting I'd present you these solutions.



Pic no2 solution no1



Pic no3 solution no2

The second task, as a project was very challenging, is revising the already existing city transport.

The city transport in pilep exist for more than 10 years. It is very used by the citizens, but it also has some shortage. First of all as a challenge to students was that not every settlement is covered by

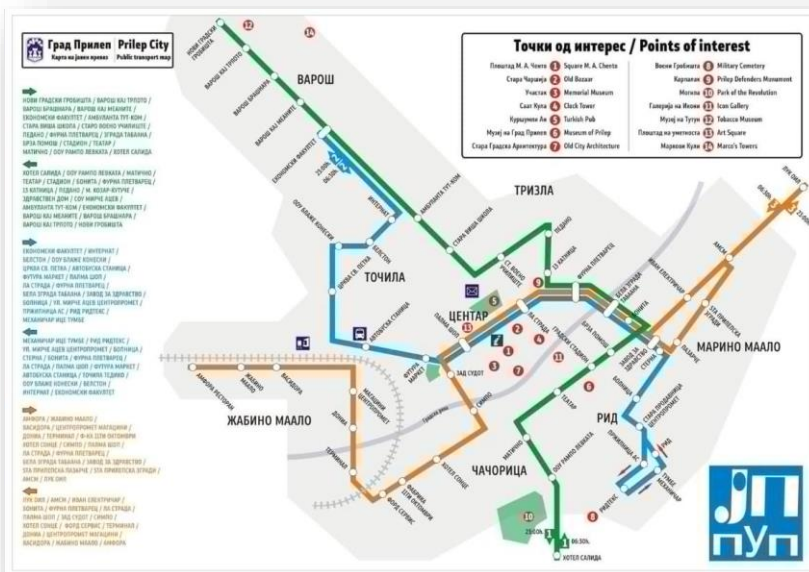
the city transport, but also has a big frequency of people. As the most relevant are the settlement Aličair, Trizla and Bageska Ograda.



Pic no4 work on a traffic problem

The student has very different solutions. In my opinion one of them is the most ideal because it doesn't need additional funds and it's most likely that it will be accomplished. It already fits into the existing timetable, it is also infrastructurally doable. One of the groups came up with a complete change of the city transport, in the lines and the number of lines, but that includes bigger funds and more time. The third group wanted to insert two more lines into the existing three that has the city transport of Prilep, which would've made five in total, this solution though is isn't as the one before, it needs additional investments and time for its implementation and realization, but as solutions both are interesting and have a possibility of their realization in a long time.

Regarding this problem, the students came up with the following solutions:



Pic no5 existina condition



Pic no6 new condition

Učenicite uspea so minalni sredstva i so minimalni promeni na organizacijata da gi opslužat i ovie dve naselbi so uslugata na gradskiot prevoz.

Bitnata aktivnost koja sakav da vi ja prenesam, a koja proizleze od samite učenici beše po povod denot na soobračajnata kultura 11 maj. Vikendot pred 11 maj potočno na 04 maj pred kamenata bina na gradot Prilep, učenicite od soobračajnata struka angažiraa literaturno čitanje na lični tvorbi. Isto taka na 11ti maj vo gradskata biblioteka vo Prilep pred brojna publika se čitaa lični tvorbi so tema „Soobračajnite nezgodi“. Učesnicite koi citaa lični tvorbi bea ocenuvani od soodvetna komisija i se proglasija najdobrite. Za taa cel bea pokaneti site učenici od gradot, bez razlika na vozrasta, polot, verskata pripadnost za da so svoi lični tvorbi vo proza i poezija im dolovat na gražanite deka vo soobračajni nezgodi site sme podednakvo ranlivi. Golemiot broj na slušатели bra trognati od pišaniot zbor koj dopre dlaboko ne samo vo nivnata svest tuku i vo nivnite duši, zatoa što sekoj na nekaov način se sretnal so vistinata za soobračajnite nezgodi dali direkno ili indirektno.

Učenicite oreku svoje tvorbi upatija apel do slušatelite za počituvanje na pravilata i propisite vo soobračajnot bezrezavno sekogaš i sekade.

Bodreni od mene kako mentor na proektot i zadovolni pred se od postignatite rezultati, učenicite rešija ovie nivni založbi okolu izrabotkata na rešenija za određen soobračeen problem, da go pretstavat pred određeni strukturi od našiot grad.toa I go napravivme na eden nastan koj se narekuva „Cirkularna Ekonomija“, a se održuva sekoja godina na Ekonomskiot fakultet vo Prilep. Toa e eden renomiran fakultet so dolgogodišno iskustvo.Na denot na održuvanje na ovoj nastan, del od učenicite gi pretstavija svoje proekti pred pretstavnici na biznis sektoroot od gradot i pred členovi na sovetot na opština Prilep. Ovie trudovi pobudija golem interes i kaj pretstavniciite koi gi spomenav no i kaj profesorite I studentite na Ekonomskiot Fakultet. Posle pretstavuvanje na proektite sleduvaa niza na prašanja kako i sugestii od strana na prisutnite slušate



Pic no7 literature reading



Pic no8 presentation of students in front of the business sector

Conclusion

The future belongs to the young"... everyone agrees with this statement. To make that future possible for the young in their own country, us, generations before them, must do something in order to hear their scream, which is very loud if we hear it with attention. We must see the urge of the young, to give contributions in the society that they live in, to create, to change something, to survive where they are, to learn how to stay where they are. We must see their battle for them to move the time a step forward.

In society as it is, every new day imposes the need for us to be more advanced, more democratic, more open for all its factors. The need isn't always to attempt the ideal, but simply on its own to be appropriate and realistically adapted to the needs of the citizens.

When it comes to the role of the young in it, we can surely say that the young intellectual strength is the one that with its revolutionary spirit can affect very strongly, if not decisive, for the social flows, changes and happenings. However, not always understood with good will, many times underestimated like idealists and not enough experienced, the young were consciously marginalized like a category of the society. However, the truth and the honest intention, sooner or later come to light. That in fact was proven many times in history.

Like someone who is constantly with young people for work, I feel the need to express my thoughts and to actively participate, together with the students I work with, to show and prove it.

I think that is untainted, incorruptible and non-instrumental by anyone, the young can change the society towards better. They are eager for justice, for social equality and democracy in society.

It's true that there are some people who think that the young aren't efficient and productive, that they act non-interested and irresponsible. Maybe, according to me, this is the product of "the sterile" way of living in society. However, I think that it can be changed. This small work in which I assigned my engagement to show the inclusion of the young in projects for the society, it's just a small proof that every one of us has a chance to heat that injustice towards the young. With that we can fulfill our social duty and obligation, to dedicate and fight for the better, for prosperity and the future. For changes in a positive direction who will bring benefit for the young, for us, for our society.

Tomislav Kučina, dipl. ing. prometa
Tomislav Ćurković, dipl. ing. prometa

OSPOSABLJAVANJE VOZAČA MOTORNIH VOZILA U REPUBLICI HRVATSKOJ - USPOREDBA OSPOSABLJAVANJA KANDIDATA U AUTOŠKOLAMA I UČENIKA U SREDNJIM ŠKOLAMA

Sažetak:

Osposobljavanje vozača motorni vozila u Republici Hrvatskoj provodi se kroz programa osposobljavanja u autoškolama za stjecanje vozačkih dozvola za upravljanje vozilom uz obvezu stjecanja početnih kvalifikacija u za to ovlaštenim učilištima za obrazovanje odraslih. U Republici Hrvatskoj postoji srednjoškolski program za redovite učenike u trogodišnjem trajanju koji obuhvaća uz stjecanje srednjoškolskog obrazovanja i sve ostale navedene kvalifikacije odnosno stjecanje vozačke dozvole B i C kategorije i stjecanje početnih kvalifikacije koje su regulirane Zakonom o sigurnosti prometa na cestama i Zakonom o prijevozu u cestovnom prometnu.

U radu je izrađena analiza oba načina stjecanja potrebnih kvalifikacija kroz njihove specifičnosti te uspješnosti u provedbi istih kroz kadrovske i materijalne uvjete za provođenje navedenih programa. Također je napravljena i usporedba sati osposobljavanja i prolaznosti na pojedinim ispitima.

Ključne riječi: vozač motornog vozila, Autoškole, početne kvalifikacije – KOD 95

1. Zakonski okviri osposobljavanja vozača u Republici Hrvatskoj

Osposobljavanje kandidata za vozače je nastavni proces koji se provodi prema propisanom programu koji obuhvaća nastavne predmete: Prometni propisi i sigurnosna pravila, Upravljanje vozilom i Pružanje prve pomoći osobama ozlijeđenim u prometnoj nesreći.

Osposobljavanje kandidata za vozače iz nastavnih predmeta Prometni propisi i sigurnosna pravila i Upravljanje vozilom provode autoškole, a iz predmeta Pružanje prve pomoći osobama ozlijeđenim u prometnoj nesreći zdravstvene ustanove koje za to ovlasti ministar nadležan za zdravstvo.

Za provedbu djelatnosti osposobljavanja kandidata za vozače autoškola mora imati:

- 1) instruktora vožnje te stručnog voditelja autoškole i predavača nastavnog predmeta Prometni propisi i sigurnosna pravila, koji mogu osposobljavati kandidate i kao instruktori vožnje,
- 2) najmanje po jedno tehnički ispravno vozilo one kategorije za koju se obavlja osposobljavanje u vlasništvu, leasingu ili najmu, opremljeno za osposobljavanje kandidata za vozače A1, A2, A, AM i B kategorije vozila do deset godina starosti, priključno vozilo do 20 godina starosti, a za ostale kategorije vozila do 15 godina starosti,

Osposobljavanje kandidata za vozače u autoškoli iz nastavnog predmeta Prometni propisi i sigurnosna pravila izvodi predavač, iz nastavnog predmeta Upravljanje vozilom izvodi instruktor vožnje, a iz nastavnog predmeta Pružanje prve pomoći osobama ozlijeđenim u prometnoj nesreći izvodi predavač, doktor medicine.

Stručni voditelj autoškole može biti osoba koja je završila najmanje preddiplomski studij, u trajanju od tri godine prometnog smjera (cestovnog ili gradskog), s najmanje tri godine radnog iskustva na poslovima obrazovanja ili osposobljavanja u cestovnom prometu, koja ima položen stručni ispit i dozvolu instruktora vožnje onih kategorija vozila za koje se osposobljava kandidate u autoškoli. Predavač u autoškoli može biti osoba koja je završila najmanje preddiplomski studij, u trajanju od tri godine prometnog smjera (cestovnog ili gradskog), najmanje tri godine vozačku dozvolu B kategorije, dozvolu instruktora vožnje i položen stručni ispit. Instruktor vožnje u autoškoli može biti osoba sa zanimanjem instruktora vožnje koja ima najmanje tri godine vozačku dozvolu B kategorije, zdravstveno sposobna za vozača i kojoj je izdana dozvola instruktora vožnje te koja je navršila 24 godine starosti. Instruktori vožnje, predavači, stručni voditelji obvezni su se stručno usavršavati i dužni su pristupiti provjeri stručne osposobljenosti najmanje jedanput u četiri godine.

Vozački ispit se sastoji od nastavnih predmeta Prometni propisi i sigurnosna pravila, Pružanje prve pomoći osobama ozlijeđenim u prometnoj nesreći i Upravljanje vozilom. Ispit iz predmeta Prometni propisi i sigurnosna pravila i Upravljanje vozilom provodi ovlašteni ispitivač koji ima dopuštenje (licenciju) ministarstva nadležnog za unutarnje poslove. Ispit iz predmeta Pružanje prve pomoći provodi ispitivač koji ima dopuštenje (licenciju) ministarstva nadležnog za zdravstvo.

Ovlašteni ispitivač za nastavne predmete Prometni propisi i sigurnosna pravila i Upravljanje vozilom može biti osoba koja je završila najmanje diplomski sveučilišni studij prometnog smjera (cestovnog ili gradskog), sa položenim ispitom za instruktora vožnje i iskustvom od najmanje tri godine na poslovima osposobljavanja kandidata. Ovlašteni ispitivač mora položiti stručni ispit za ovlaštenog ispitivača kod ovlaštene stručne organizacije.

Tijekom provedbe vozačkog ispita iz nastavnog predmeta Upravljanje vozilom koristi se sustav audio snimanja i video snimanja tehničkim uređajem u svrhu ujednačavanja standarda i kriterija

provedbe vozačkih ispita te se video snimanjem bilježe prometne situacije ispred vozila, a audio snimanjem bilježi se komunikacija ovlaštenog ispitivača s kandidatom za vozača unutar ispitnog vozila. Sav audio i video materijal snimljen tijekom provedbe vozačkog ispita čuva se godinu dana.

Osoba može steći pravo na samostalno upravljanje vozilom određene kategorije ako je:

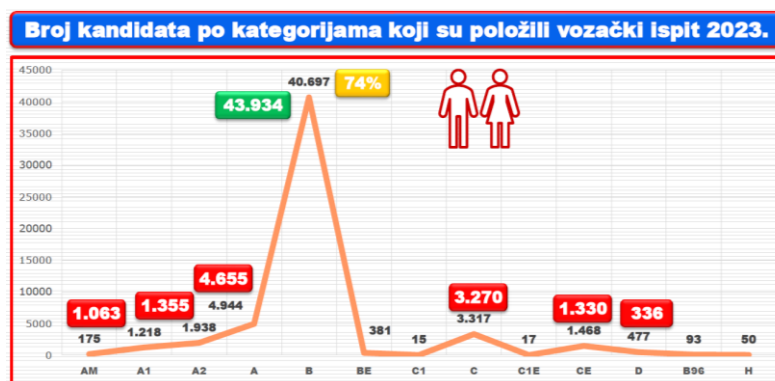
- 1) duševno i tjelesno sposobna upravljati vozilom određene kategorije,
- 2) navršila najnižu dob za upravljanje vozilom određene kategorije,
- 3) položila vozački ispit za upravljanje vozilom određene kategorije.
- 4) nastanjena u Republici Hrvatskoj te ima prebivalište, prijavljeno boravište na razdoblje od najmanje 185 dana, školuje se ili ima odobren privremeni ili stalni boravak.

Vozačka dozvola izdaje se za upravljanje vozilima koja su svrstana u AM, A1, A2, A, B, BE, C1, C1E, C, CE, D1, D1E, D, DE, F, G i H kategorije. Vozačka dozvola za upravljanje vozilima AM, A1, A2, A, B, BE, F i G kategorije izdaje se s rokom važenja od 10 godina. Vozačka dozvola za upravljanje vozilima C1, C1E, C, CE, D1, D1E, D, DE i H kategorije izdaje se s rokom važenja od pet godina. Po isteku roka od pet godina, prilikom produljenja vozačke dozvole vozači su duži podvrgnuti se zdravstvenom pregledu za vozača.

U B kategoriju spadaju motorna vozila čija najveća dopuštena masa ne prelazi 3.500 kg i predviđena su za prijevoz do 9 putnika uključujući i vozača, a mogu biti u kombinaciji s priključnim vozilom čija najveća dopuštena masa ne prelazi 750 kg. Starosna dob za kategoriju B je 18 godina, a upis u autoškolu je moguć sa 17 godina i 6 mjeseci starosti. U C kategoriju spadaju motorna vozila, čija je najveća dopuštena masa veća od 3.500 kg. Starosna dob za kategoriju C je 21 godina, Najniža starosna dob za upravljanje vozilom C i CE kategorije je 18 godina, ukoliko vozač posjeduje početne kvalifikacije dobivene sukladno propisu kojim se uređuje prijevoz u cestovnom prometu.

2. Osposobljavanja kandidata u autoškolama u Republici Hrvatskoj

U tijeku jednog dana iz nastavnog predmeta PPSP smiju se održati najviše tri nastavna sata. Autoškola je dužna obavijestiti ovlaštenu stručnu organizaciju o datumu i vremenu početka izvođenja nastave iz nastavnog predmeta PPSP, najkasnije na dan početka izvođenja nastave, putem jedinstvenog informacijskog sustava. Nastava iz nastavnog predmeta UV može započeti s kandidatom za vozača koji je prethodno položio ispit iz nastavnog predmeta PPSP, i to prvih pet sati po jedan nastavni sat dnevno. S kandidatom ne smijese izvoditi nastavu dulje od dva nastavna sata dnevno, osim provedbe nastave na autocesti ili na cesti izvan naselja.



Slika 1: Broj kandidata u autoškolama u 2023. godini.

Izvor: Hrvatski auto klub - Seminar za stručne djelatnike autoškola – 14.03.2024.

Slika 1. prikazuje broj kandidata u upisanih u autoškole u Republici Hrvatskoj tijekom 2023. godine. U nje je vidljivo da je najzastupljenija B kategorija i to sa 40.697 kandidata što čini 74 % svih kandidata. Također je vidljiv pad kandidata u odnosu na 2022. godinu kada ih je bilo 43.934 i u odnosu na 2021. godinu kada je u B kategoriju bilo upisano 50.631 kandidat. C kategoriju u 2023. godini je upisalo 3.317 kandidata.

Osposobljavanje kandidata za vozače djelatnost je koja se obavlja u općem interesu, a pretpostavlja jedinstveni nastavni proces koji se provodi prema propisanim sadržajima utvrđenim Programom vozačkog ispita.

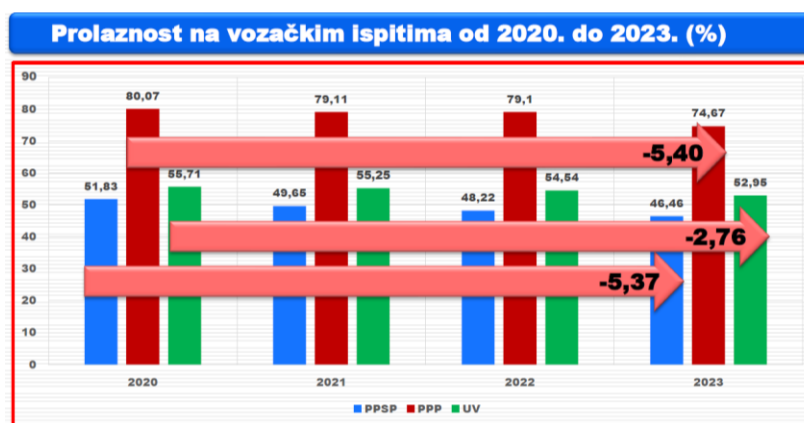
Osposobljavanje za B kategoriju obuhvaća nastavne predmete:

1. Prometni propisi i sigurnosna pravila (PPSP) – 30 sati
2. Pružanje prve pomoći osobama ozlijeđenim u prometnoj nesreći (PPP) – 9 sati
3. Upravljanje vozilom (UV) – 35 sati.

Osposobljavanje za C kategoriju obuhvaća nastavne predmete:

1. Prometni propisi i sigurnosna pravila (PPSP) – 15 sati
2. Upravljanje vozilom (UV) – 15 sati.

Slika 2. prikazuje prolaznost na vozačkim ispitima od 2020. godine do 2023. godine. Tijekom 2023. godine prolaznost iz ispita Prometni propisi i sigurnosna pravila je 46,46 %, iz Pružanje prve pomoći osobama ozlijeđenim u prometnoj nesreći 74,67 % i iz Upravljanja vozilom 52,95 %. Također je vidljiv pad prolaznosti u odnosu na 2020. godinu.



Slika 2: Prolaznost na vozačkim ispitima u autoškolama u 2023. godini.

Izvor: Hrvatski auto klub - Seminar za stručne djelatnike autoškola – 14.03.2024.

3. Osposobljavanje učenika u srednjim školama u Republici Hrvatskoj

Zanimanje Vozač motornog vozila je u redovnom sustavu srednjoškolskog obrazovanja u Republici Hrvatskoj. To je trogodišnje zanimanje koje obuhvaća uz stjecanje srednjoškolskog obrazovanja i stjecanje vozačke dozvole B i C kategorije te stjecanje početnih kvalifikacije koje su regulirane Zakonom o sigurnosti prometa na cestama i Zakonom o prijevozu u cestovnom prometnu a na temelju nastavnog plana i programa pripisanog od Ministarstva znanosti, obrazovanja i mladih.

Slika 3. prikazuje nastavni plan i program za Vozača motornog vozila.

RB.	NASTAVI PREDMET	1. godina	2.godina	3. godina	Ukupno sati
1.	Hrvatski jezik	3/105	3/105	3/96	306
2.	Strani jezik	2/70	2/70	2/64	204
3.	Povijest	2/70	-	-	70

4.	Politika i gospodarstvo	-	-	2/64	64
5.	Tjelesna i zdravstvena kultura	2/70	2/70	2/64	204
6.	Vjeronauk/Etika	1/35	1/35	1/32	102
7.	Geografija	2/70	2/70*		140
8.	Matematika	2/70	2/70	2/64	204
9.	Fizika	2/70	-	-	70
10.	Računalstvo	2/70	-		70
11.	Osnove prijevoza i prijenosa	2/70			70
12.	Goriva i maziva	2/70	-	-	70
13.	Cestovna vozila	3/105	2/70	2/64	239
14.	Prva pomoć	-	1/35	-	35
15.	Prometna kultura	-	2/70	-	70
16.	Propisi u cestovnom prometu	-	2/70	-	70
17.	Prijevoz tereta	-	-	3/96	96
18.	Prijevoz putnika	-	-	2/64	64
19.	Prometna tehnika	-	-	2/64	64
20.	Izborni predmet:	2/70	2/70	2/64	204
21.	Fakultativno - Zaštita okoliša	2/70			70
20.	Praktična nastava	2/70	7/245	7/224***	539
21.	Upravljanje motornim vozilom	-	-	1,5/45**	45

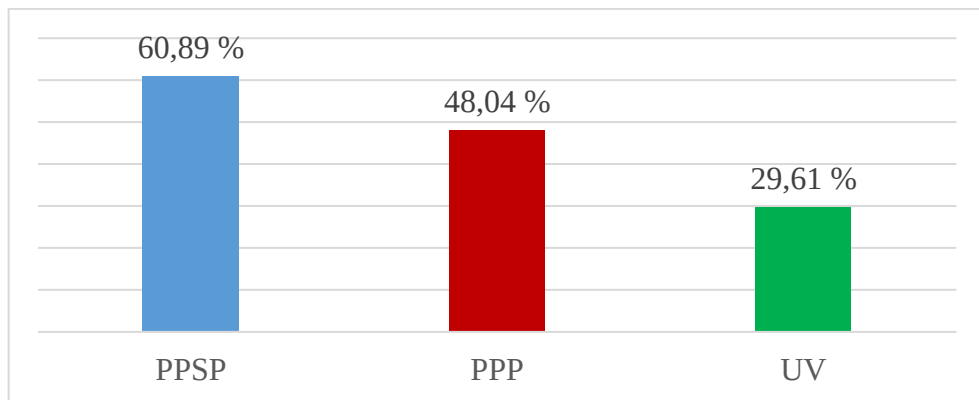
Slika 3: Nastavni plan i program za Vozača motornog vozila

Izvor: Ministarstvo znanosti, obrazovanja i mladih

U srednjim školama koje obrazuju osobe za zanimanje vozač motornog vozila na način organiziranja i provedbe vozačkih ispita primjenjuju se odredbe propisa o načinu obavljanja i organiziranja vozačkih ispita. Učenici mogu s navršених 16 godina života započeti s osposobljavanjem za vozača motornih vozila C kategorije i upravljati vozilom te kategorije tijekom procesa osposobljavanja. Osposobljavanje se obavlja u skladu s odredbama Programa vozačkog ispita i Pravilnika o osposobljavanju kandidata za vozače, a u sklopu Nastavnog plana i programa za zanimanje vozač motornog vozila u redovitom srednjoškolskom obrazovnom programu. Osposobljavanje iz nastavnog predmeta Upravljanje vozilom može započeti nakon što učenik položi ispit iz nastavnih predmeta Prometni propisi i sigurnosna pravila i Pružanje prve pomoći osobama ozlijeđenim u prometnoj nesreći.

Osposobljavanje za C kategoriju u srednjim školama obuhvaća nastavne predmete:

1. Prometni propisi i sigurnosna pravila (PPSP) – 70 sati
2. Pružanje prve pomoći osobama ozlijeđenim u prometnoj nesreći (PPP) – 35 sati
3. Upravljanje vozilom (UV) – 45 sati.



Slika 4: Prolaznost na vozačkim ispitima u srednjim školama u školskoj godini 2023./2024

Izvor: Škola za cestovni promet – školska godina 2023/2024

Slika 4. prikazuje prolaznost na vozačkim ispitima učenika u Školi za cestovni promet u školskoj godini 2023/24. Vidljivo je da je prolaznost iz Prometnih propisa 60,86 % što je bolja prolaznost od prolaznosti u autoškolama koja je 46,46 %. Prolaznost iz Pružanje prve pomoći osobama ozlijeđenim u prometnoj nesreći je 48,04 % i iz Upravljanja vozilom je 29,61 %, što je lošije od prolaznosti u autoškolama

Polaganju vozačkih ispita mogu pristupiti samo učenici koji su se osposobljavali u tim školama, a koji se obrazuju za zanimanje vozač motornog vozila u redovitom srednjoškolskom obrazovnom programu. Škole su dužne za provedbu vozačkog ispita bez naknade staviti na raspolaganje prostorne i ostale materijalne uvjete te motorno vozilo C kategorije, opremljeno sukladno propisima. Učenici imaju pravo na polaganje vozačkog ispita u tri ispitna roka bez naknade. Ako ne polože vozački ispit u propisanom roku, plaćaju naknadu za svaki sljedeći pristup ispitu.

4. Stjecanje početnih kvalifikacija – KOD 95

Stjecanje početnih kvalifikacija za vozače motornih vozila regulirano je regulirano je Zakonom o prijevozu u cestovnom prometu i smatra se stručnim osposobljavanjem vozača. Vozači koji obavljaju cestovni prijevoz javnim cestama u Republici Hrvatskoj moraju steći početnu kvalifikaciju i redovito se osposobljavati kroz obveznu periodičnu izobrazbu ako upravljaju vozilima za koja je potrebna:

- vozačka dozvola kategorije C1, C1E, C ili CE, D1, D1E, D ili DE

Početna kvalifikacija stječe se:

- pohađanjem tečaja i provjerom znanja
- ubrzanim stjecanjem početnih kvalifikacija.
- kroz srednjoškolski program obrazovanja za zanimanje vozač motornog vozila, kao i kroz druge vrste obrazovanja ili osposobljavanja, uz uvjet da program obrazovanja ili osposobljavanja obuhvaća sadržaje propisane u skladu s ovim Zakonom

Pohađanje tečaja i provjera znanja sastoji se od poduke za stjecanje početne kvalifikacije u trajanju od 280 sati te teoretskog i praktičnog dijela ispita. Nakon položena oba dijela ispita izdaje se svjedodžba o stručnoj osposobljenosti o početnim kvalifikacijama.

U slučaju stjecanja početnih kvalifikacija kroz srednjoškolski program obrazovanja za zanimanje vozač motornog vozila nakon završenog obrazovanja, uz redovitu svjedodžbu izdaje se i SSO o početnim kvalifikacijama. Ubrzano stjecanje početnih kvalifikacija obuhvaća pohađanje tečaja u trajanju od 140 sati i provjeru znanja. Nakon položenog ispita izdaje se svjedodžba o stručnoj osposobljenosti o ubrzanim početnim kvalifikacijama (u daljnjem tekstu: SSO o ubrzanim početnim kvalifikacijama).

Za stjecanje početne kvalifikacije nije potrebno prethodno imati odgovarajuću vozačku dozvolu, ali se ona mora steći do početka izvođenja obuke samostalne vožnje, odnosno do početka provođenja praktičnog dijela ispita.

5. Zaključak

Osposobljavanje kandidata za vozače je jedinstveni nastavni proces koji se provodi prema propisanom programu koji obuhvaća nastavne predmete: Prometni propisi i sigurnosna pravila, Upravljanje vozilom i Pružanje prve pomoći osobama ozlijeđenim u prometnoj nesreći.

Osposobljavanje kandidata za vozače djelatnost je koja se obavlja u općem interesu, a pretpostavlja jedinstveni nastavni proces koji se provodi prema propisanim sadržajima utvrđenim Programom vozačkog ispita a za B kategoriju obuhvaća nastavne predmete: Prometni propisi i sigurnosna pravila (PPSP) - 30 sati, Pružanje prve pomoći osobama ozlijeđenim u prometnoj nesreći (PPP) - 9 sati, Upravljanje vozilom (UV) - 35 sati, dok za C kategoriju obuhvaća nastavne predmete: Prometni propisi i sigurnosna pravila (PPSP) - 15 sati, Upravljanje vozilom (UV) - 15 sati.

Srednjoškolski program za redovite učenike u trogodišnjem trajanju obuhvaća uz stjecanje srednjoškolskog obrazovanja i sve ostale navedene kvalifikacije odnosno stjecanje vozačke dozvole B i C kategorije i stjecanje početnih kvalifikacije koje su regulirane Zakonom o sigurnosti prometa na cestama i Zakonom o prijevozu u cestovnom prometu a na temelju nastavnog plana i programa pripisanog od Ministarstva znanosti, obrazovanja i mladih. Ovakvim sustavom srednjoškolskog obrazovanja podiže se kvaliteta zanimanja Vozač motornog vozila koji tijekom 3 godine stječu najkvalitetnija znanja i vještine koje mogu primijeniti u stvarnom prijevoznom procesu, a koja su izrazito bitna za ovo izrazito važno i traženo zanimanje.

Literatura i izvori podataka

1. Zakon o sigurnosti prometa na cestama, "Narodne novine", broj 67/08, 48/10, 74/11, 80/13, 158/13, 92/14, 64/15, 108/17, 70/19, 42/20, 85/22, 114/22 i 133/23
2. Pravilnik o osposobljavanju kandidata za vozače, NN 132/2017, 6/2018, 102/2020
3. Zakon o prijevozu u cestovnom prometu NN 41/2018, 98/2019, 30/2021, 89/2021, 114/2022
4. Pravilnik o početnoj i periodičnoj izobrazbi vozača, NN 14/2022 - 02.02.2022.
5. Nastavni plan i program za Vozača motornog vozila



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MOTOR VEHICLE DRIVER TRAINING IN THE REPUBLIC OF CROATIA - COMPARISON OF THE TRAINING OF CANDIDATES IN DRIVING SCHOOLS AND STUDENTS IN SECONDARY SCHOOLS

Summary:

Motor vehicle driver training in the Republic of Croatia is carried out through a training program in driving schools for obtaining driver's licenses for driving a vehicle with the obligation to acquire initial qualifications at authorized adult education schools. In the Republic of Croatia, there is a three-year high school program for full-time students, which includes, in addition to the acquisition of a high school education, all the other listed qualifications, i.e. the acquisition of category B and C driver's licenses and the acquisition of initial qualifications regulated by the Road Traffic Safety Act and the Road Transport Act traffic.

The paper analyzes both methods of acquiring the necessary qualifications through their specificities and their success in implementing them through personnel and material conditions for the implementation of the mentioned programs. A comparison of hours of training and passing certain exams was also made.

Keywords: *motor vehicle driver, Driving schools, initial qualifications – CODE 95*

6. Legal framework for driver training in the Republic of Croatia

The training of candidates for drivers is an educational process that is carried out according to a prescribed program that includes the following subjects: Traffic regulations and safety rules, Driving a vehicle and Providing first aid to people injured in a traffic accident.

Training of candidates for drivers in the subjects Traffic regulations and safety rules and Vehicle management is carried out by driving schools, and in the subject Providing first aid to persons injured in traffic accidents by health institutions authorized for this by the minister of health.

To carry out the activity of training candidates for drivers, the driving school must have:

1) driving instructor and professional driving school leader and lecturer of the subject Traffic regulations and safety rules, who can also train candidates as driving instructors,

2) at least one technically correct vehicle of the category for which the training is carried out in ownership, leasing or rental, equipped for training candidates for drivers of A1, A2, A, AM and B categories of vehicles up to ten years old, trailer up to 20 years old , and for other categories a vehicle up to 15 years old,

The training of candidates for drivers in the driving school in the subject Traffic regulations and safety rules is carried out by a lecturer, in the subject Vehicle management is carried out by a driving instructor, and in the subject Providing first aid to persons injured in a traffic accident is carried out by a lecturer, doctor of medicine.

The professional leader of the driving school can be a person who has completed at least an undergraduate study, lasting three years in the field of traffic (road or city), with at least three years of work experience in education or training in road traffic, who has passed a professional exam and a driving instructor's license those categories of vehicles for which candidates are trained at the driving school. A teacher in a driving school can be a person who has completed at least an undergraduate course, lasting three years in the field of traffic (road or city), at least three years of driving license category B, a driving instructor's license and passed a professional exam. A driving instructor in a driving school can be a person with the profession of a driving instructor who has had a category B driver's license for at least three years, is medically fit to drive and has been issued a driving instructor's license and has reached the age of 24. Driving instructors, lecturers, professional managers are obliged to undergo professional training and are required to undergo a professional qualification check at least once every four years.

The driving test consists of teaching subjects Traffic regulations and safety rules, Providing first aid to persons injured in a traffic accident and Driving a vehicle. The exam in the subjects Traffic regulations and safety rules and Vehicle management is conducted by an authorized examiner who has permission (license) from the police minister. The examination in the subject Providing first aid is conducted by an examiner who has permission (license) from the minister of health.

An authorized examiner for the subjects Traffic regulations and safety rules and Vehicle management can be a person who has completed at least a bachelor's degree in the field of traffic (road or city), with a passing exam for a driving instructor and at least three years of experience in training candidates. An authorized examiner must pass the professional examination for an authorized examiner at an authorized professional organization.

During the implementation of the driving test in the subject Vehicle management, an audio recording and video recording system is used with a technical device for the purpose of harmonizing the standards and criteria for the implementation of driving tests, and the traffic situation in front of the vehicle is recorded by video recording, and the communication between the authorized examiner and the driver candidate is recorded by audio recording inside the test vehicle. All audio and video material recorded during the driving test are kept for one year.

A person can acquire the right to independently drive a vehicle of a certain category if:

- 1) mentally and physically capable of driving a vehicle of a certain category,
- 2) has reached the minimum age for driving a vehicle of a certain category,
- 3) passed the driving test for driving a vehicle of a certain category.
- 4) resides in the Republic of Croatia and has a residence, registered residence for a period of at least 185 days, is studying or has an approved temporary or permanent residence.

D

Driving license is issued for driving vehicles classified in AM, A1, A2, A, B, BE, C1, C1E, C, CE, D1, D1E, D, DE, F, G and H categories. Driving license for driving AM, A1, A2, A, B, BE, F and G category vehicles is issued with a validity period of 10 years. Driving license for driving C1, C1E, C, CE, D1, D1E, D, DE and H category vehicles is issued with a validity period of five years. At the end of the five-year period, when renewing the driver's license, drivers are required to undergo a driver's medical examination.

Category B includes motor vehicles whose maximum permissible weight does not exceed 3,500 kg and are intended for the transport of up to 9 passengers, including the driver, and can be combined with a trailer whose maximum permissible weight does not exceed 750 kg. The age for category B is 18 years, and enrollment in the driving school is possible at 17 years and 6 months of age. Category C includes motor vehicles with a maximum permissible weight of more than 3,500 kg. The age for category C is 21 years, the minimum age for driving a vehicle of category C and CE is 18 years, if the driver has the initial qualifications obtained in accordance with the regulations governing road transport.

7. Candidate training in driving schools in the Republic of Croatia

In the course of one day, a maximum of three lessons may be held in the PPSP course. The driving school is obliged to inform the authorized professional organization about the date and time of the beginning of classes in the subject PPSP, at the latest on the day of the start of classes, through a unified information system. Lessons in the subject UV can begin with a driver candidate who has previously passed the exam in the subject PPSP, and for the first five hours, one lesson per day. They may not conduct classes with the candidate for more than two hours a day, except for conducting classes on the highway or on a road outside the settlement.

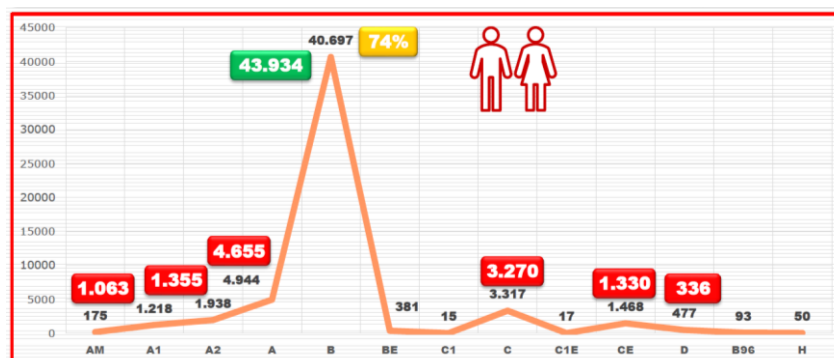


Figure 1: Number of candidates in driving schools in 2023.
Source: Croatian Auto Club - Seminar for driving school professionals - 14 March 2024.

Figure 1 shows the number of candidates enrolled in driving schools in the Republic of Croatia in 2023. It shows that the most represented category is B, with 40,697 candidates, which is 74% of all candidates. There is also a visible drop in the number of candidates compared to 2022, when there were 43,934, and compared to 2021, when 50,631 candidates were enrolled in the B category. 3,317 candidates enrolled in category C in 2023.

The training of candidates for drivers is an activity that is carried out in the general interest, and it assumes a unique teaching process that is carried out according to the prescribed contents determined by the Driver's Test Program.

Training for category B includes the following subjects:

1. Traffic regulations and safety rules (PPSP) – 30 hours
2. Provision of first aid to persons injured in a traffic accident (PPP) – 9 hours
3. Driving a vehicle (UV) – 35 hours.

Training for the C category includes the following subjects:

1. Traffic regulations and safety rules (PPSP) – 15 hours
2. Driving a vehicle (UV) – 15 hours.

Figure 2 shows the passing rate on driving tests from 2020 to 2023. In 2023, the passing rate for the Traffic regulations and safety rules exam is 46.46%, for Providing first aid to persons injured in a traffic accident 74.67% and for Driving a vehicle 52.95%. There is also a visible drop in passing rates compared to 2020.

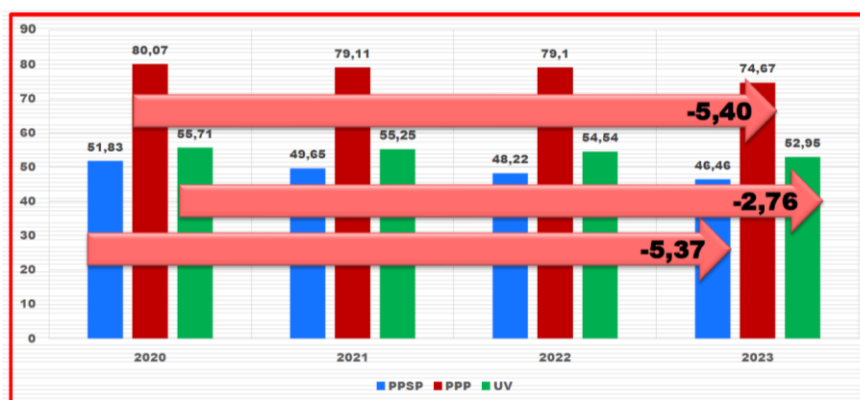


Figure 2: Passing of driving tests in driving schools in 2023.
Source: Croatian Auto Club - Seminar for driving school professionals - 14 March 2024.

8. Training of students in secondary schools in the Republic of Croatia

Occupation Motor vehicle driver is in the regular system of high school education in the Republic of Croatia. It is a three-year occupation that includes, in addition to the acquisition of a high school education and the acquisition of a category B and C driver's license, as well as the acquisition of initial qualifications that are regulated by the Law on Road Traffic Safety and the Law on Road Transport and based on the curriculum assigned by the Ministry of Science, education and youth.

Figure 3 shows the curriculum for Motor Vehicle Driver.

RB.	NASTAVI PREDMET	1. godina	2.godina	3. godina	Ukupno sati

1.	Hrvatski jezik	3/105	3/105	3/96	306
2.	Strani jezik	2/70	2/70	2/64	204
3.	Povijest	2/70	-	-	70
4.	Politika i gospodarstvo	-	-	2/64	64
5.	Tjelesna i zdravstvena kultura	2/70	2/70	2/64	204
6.	Vjeronauk/Etika	1/35	1/35	1/32	102
7.	Geografija	2/70	2/70*		140
8.	Matematika	2/70	2/70	2/64	204
9.	Fizika	2/70	-	-	70
10.	Računalstvo	2/70	-		70
11.	Osnove prijevoza i prijenosa	2/70			70
12.	Goriva i maziva	2/70	-	-	70
13.	Cestovna vozila	3/105	2/70	2/64	239
14.	Prva pomoć	-	1/35	-	35
15.	Prometna kultura	-	2/70	-	70
16.	Propisi u cestovnom prometu	-	2/70	-	70
17.	Prijevoz tereta	-	-	3/96	96
18.	Prijevoz putnika	-	-	2/64	64
19.	Prometna tehnika	-	-	2/64	64
20.	<i>Izborni predmet:</i>	2/70	2/70	2/64	204
21.	<i>Fakultativno - Zaštita okoliša</i>	2/70			70
20.	Praktična nastava	2/70	7/245	7/224***	539
21.	Upravljanje motornim vozilom	-	-	1,5/45**	45

Figure 3: Curriculum for Motor Vehicle Driver
Source: Ministry of Science, Education and Youth

In secondary schools that train people for the profession of motor vehicle driver, the provisions of the regulations on the way of conducting and organizing driving tests are applied. Students who are 16 years old can start training to become drivers of category C motor vehicles and drive a vehicle of that category during the training process. The training is carried out in accordance with the provisions of the driver's test program and the Rulebook on the training of candidates for drivers, and as part of the curriculum for the profession of motor vehicle driver in the regular high school education program. Training in the subject Vehicle driving can begin after the student passes the exam in the subjects Traffic regulations and safety rules and Providing first aid to persons injured in a traffic accident.

Training for category C in secondary schools includes the following subjects:

1. Traffic regulations and safety rules (PPSP) – 70 hours
2. Providing first aid to persons injured in a traffic accident (PPP) – 35 hours
3. Driving a vehicle (UV) – 45 hours.

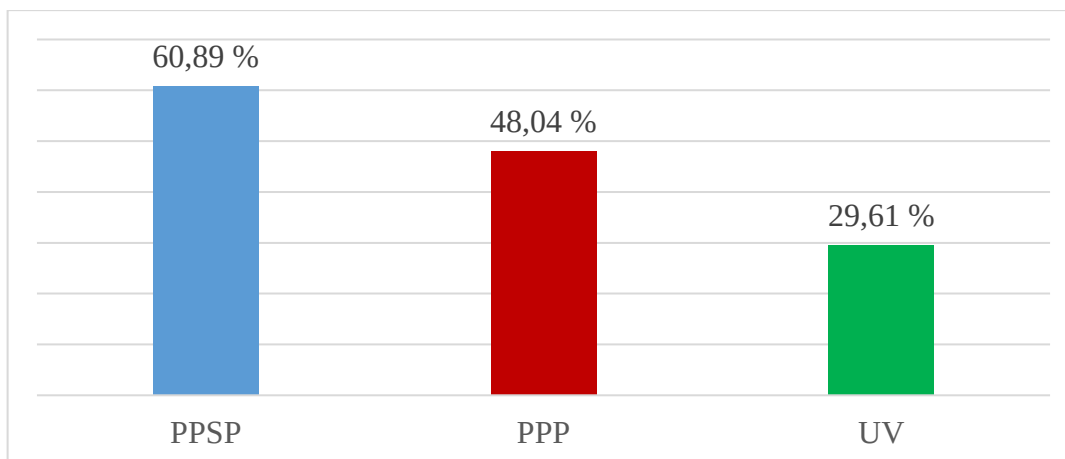


Figure 4: Passing of driving tests in secondary schools in the school year 2023/2024
Source: Road Traffic School - school year 2023/2024

Figure 4 shows the passing rate of students in the School of Road Traffic in the school year 2023/24. It can be seen that the pass rate in Traffic Regulations is 60.86%, which is better than the pass rate in driving schools, which is 46.46%. The pass rate in Providing first aid to persons injured in a traffic accident is 48.04% and in Driving a vehicle is 29.61%, which is worse than the pass rate in driving schools.

Only students who were trained in these schools, and who are being educated for the profession of motor vehicle driver in a regular high school education program, can take the driving test. Schools are obliged to make available space and other material conditions and a motor vehicle of category C, equipped in accordance with the regulations, for conducting the driving test free of charge. Students have the right to take the driving test in three test periods free of charge. If they do not pass the driving test within the prescribed period, they pay a fee for each subsequent attempt to take the test.

9. Acquisition of initial qualifications - CODE 95

The acquisition of initial qualifications for drivers of motor vehicles is regulated by the Road Transport Act and is considered professional driver training. Drivers who perform road transport on public roads in the Republic of Croatia must obtain an initial qualification and undergo regular training through mandatory periodic training if they drive vehicles that require:

- driving license category C1, C1E, C or CE, D1, D1E, D or DE

The initial qualification is acquired:

- attending the course and checking knowledge
- accelerated acquisition of initial qualifications.
- through a high school education program for the profession of motor vehicle driver, as well as through other types of education or training, with the condition that the education or training program includes the contents prescribed in accordance with this Law

Attending the course and checking knowledge consists of 280 hours of instruction for obtaining the initial qualification and the theoretical and practical part of the exam. After passing both parts of the exam, a professional qualification certificate is issued on the initial qualifications.

In the case of acquiring initial qualifications through a high school education program for the profession of motor vehicle driver after completing the education, an SSO on initial qualifications is

issued in addition to the regular certificate. Accelerated acquisition of initial qualifications includes attending a 140-hour course and testing knowledge. After passing the exam, a professional qualification certificate on accelerated initial qualifications (hereinafter: SSO on accelerated initial qualifications) is issued.

In order to acquire the initial qualification, it is not necessary to have a suitable driver's license beforehand, but it must be acquired before the start of the independent driving training, that is, before the practical part of the exam begins.

10. Conclusion

The training of candidates for drivers is a unique educational process that is carried out according to a prescribed program that includes the following subjects: Traffic regulations and safety rules, Driving a vehicle and Providing first aid to people injured in a traffic accident.

The training of candidates for drivers is an activity that is carried out in the general interest, and it assumes a unique teaching process that is carried out according to the prescribed contents determined by the Driver's Test Program, and for category B it includes the following subjects: Traffic regulations and safety rules (PPSP) - 30 hours, Providing the first helping people injured in a traffic accident (PPP) - 9 hours, Driving a vehicle (UV) - 35 hours, while for the C category it includes subjects: Traffic regulations and safety rules (PPSP) - 15 hours, Driving a vehicle (UV) - 15 hours.

The three-year high school program for full-time students includes, in addition to the acquisition of a high school education, all the other listed qualifications, i.e. the acquisition of category B and C driver's licenses and the acquisition of initial qualifications regulated by the Road Traffic Safety Act and the Road Transport Act, based on the curriculum plan and program assigned by the Ministry of Science, Education and Youth. With this system of high school education, the quality of the Motor Vehicle Driver profession is raised, who over the course of 3 years acquire the highest quality knowledge and skills that they can apply in the real transport process, which are extremely important for this extremely important and sought-after profession.

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10. Curriculum for Motor Vehicle Driver

JU SREDNJA ŠKOLA ZA SAOBRAĆAJ I KOMUNIKACIJE

TEMA: INTELEGTENTNI TRANSPORTNI SISTEMI U FUNKCIJI BEZBJEDNOSTI SAOBRAĆAJA

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Uvod

U kontekstu rapidnog rasta urbanizacije i povećanja broja vozila širom svijeta, potreba za rješavanjem problema sigurnosti saobraćaja postala je prioritet za vlade i saobraćajne vlasti. Saobraćajni nesreće i dalje su jedan od vodećih uzroka smrti i povreda u cijelom svijetu, što predstavlja značajan izazov za javno zdravlje i sigurnost. Prema podacima Svjetske zdravstvene organizacije (WHO), saobraćajne povrede uzrokuju procijenjenih 1,3 miliona smrtnih slučajeva svake godine, dok milioni drugih ljudi pretrpe životne povrede. U svjetlu ovih alarmantnih statistika, traže se inovativna rješenja za poboljšanje sigurnosti na cestama, unapređenje protoka saobraćaja i smanjenje negativnog uticaja transporta na okolinu.

Inteligentni transportni sistemi (ITS) pojavljuju se kao ključna tehnološka reakcija na ove izazove. ITS obuhvata širok spektar tehnologija koje imaju za cilj poboljšanje efikasnosti, sigurnosti i održivosti transportnih sistema. Korištenjem naprednih komunikacijskih mreža, senzora, analize podataka u realnom vremenu i automatiziranih sistema, ITS nudi potencijal za revolucioniranje načina na koji upravljamo i interagujemo sa saobraćajem.

Ovaj seminarski rad istražuje utjecaj ITS-a na sigurnost saobraćaja, fokusirajući se na ključne tehnologije, njihove praktične primjene, koristi koje donose sigurnosti saobraćaja, kao i izazove i budući potencijal ITS-a u preoblikovanju saobraćajnog pejzaža.

1. Teorijski okvir: Razumijevanje inteligentnih transportnih sistema

Inteligentni transportni sistemi obuhvataju različite tehnologije koje su dizajnirane za poboljšanje upravljanja transportom i povećanje sigurnosti na cestama. Osnovna svrha ITS-a je pružiti efikasniji i sigurniji transportni sistem integracijom informatičkih tehnologija, komunikacijskih mreža i automatizacije.

Prema definiciji Evropske komisije, ITS se opisuje kao "primjena informatičkih i komunikacijskih tehnologija na transportne sisteme u cilju povećanja njihove efikasnosti, sigurnosti i održivosti". Ovi sistemi koriste kombinaciju senzora, kamera, radara i analize podataka za praćenje, upravljanje i optimizaciju saobraćaja u realnom vremenu.

ITS obično obuhvata četiri ključna komponenta:

- **Sistemi za upravljanje saobraćajem (TMS):** Ovi sistemi prate i kontrolišu protok saobraćaja, osiguravajući optimalne uslove na putevima i autoputevima.
- **Tehnologije pomoći vozačima (ADAS):** Ove tehnologije su dizajnirane da pomognu vozačima kroz pružanje informacija u realnom vremenu i upozorenja o potencijalnim opasnostima ili problemima.
- **Autonomna vozila:** Ova vozila koriste napredne senzore i algoritme za navigaciju bez ljudske intervencije.
- **Komunikacija između vozila i infrastrukture (V2I):** Omogućava vozilima da komuniciraju sa infrastrukturnim elementima poput saobraćajnih signalizacija, saobraćajnih znakova i senzora, dijeleći podatke u realnom vremenu.

2. Ključne tehnologije u ITS-u i njihov utjecaj na sigurnost saobraćaja

Široka primjena ITS-a omogućena je zahvaljujući različitim ključnim tehnologijama koje rade zajedno na poboljšanju protoka saobraćaja, smanjenju nesreća i na kraju spašavanju života. Ove tehnologije transformišu način na koji se upravlja saobraćajem i kako vozači interaguju sa svojim vozilima i okruženjem na cesti.

2.1 Pametni saobraćajni semafori i sistemi za upravljanje saobraćajem (TMS)

Pametni saobraćajni semafori jedan su od najsvjetlijih i najšire primjenjivanih komponenti ITS-a. Ovi sistemi koriste podatke u realnom vremenu prikupljene od senzora i kamera kako bi prilagodili trajanje svjetlosnih signala na osnovu trenutnih saobraćajnih uslova. Time se osigurava optimizacija protoka saobraćaja, smanjuje gužva i smanjuje mogućnost nesreća izazvanih zaustavljanjem i kretanjem u koloni.

U urbanim područjima, gdje je gužva u saobraćaju ozbiljan problem, pametni saobraćajni semafori mogu igrati ključnu ulogu u povećanju sigurnosti. Na primjer, kada semafor detektuje da je raskrsnica jako zauzeta, može automatski produžiti trajanje zelenog svjetla za vozila koja idu u tom pravcu, olakšavajući protok saobraćaja i smanjujući rizik od nesreća. Pored toga, integracija

naprednih algoritama omogućava dinamičko optimizovanje signalizacije na temelju faktora kao što su doba dana, vremenski uvjeti i saobraćajni obrasci.

Sistemi za upravljanje saobraćajem (TMS) koriste podatke prikupljene od raznih senzora, kamera i GPS uređaja za praćenje saobraćajnih uslova na čitavim regionima ili autoputevima. Ovi sistemi mogu pružiti ažuriranja u realnom vremenu vozačima, omogućujući im da izbjegnu zagušene rute i nesreće. Na primjer, TMS može obavijestiti vozače o nesrećama, zatvorenim cestama ili gužvama putem mobilnih aplikacija ili elektronskih poruka na saobraćajnim znakovima. U slučaju nesreće, TMS može također preusmjeriti saobraćaj na alternativne puteve, minimizirajući daljnju gužvu i poboljšavajući sigurnost.

2.2 Sistemi za detekciju nesreća i automatska obavještenja o nesrećama

Sposobnost detekcije nesreća u realnom vremenu i obavještanja hitnih službi još je jedan ključni element ITS-a. Sistemi za detekciju nesreća koriste senzore, kamere i radare za detektovanje anomalija kao što su iznenadni zaustavljanja, sudari ili vozila koja skreću sa puta. Kada se nesreća detektuje, ovi sistemi mogu automatski obavijestiti hitne službe, omogućujući im da brže i efikasnije stignu na mjesto nesreće.

Pored toga, sistemi za detekciju nesreća mogu upozoriti druge vozače u blizini o potencijalnoj opasnosti, omogućavajući im da preduzmu preventivne mjere. Na primjer, u slučaju sudara na autoputu, sistem može aktivirati upozoravajuća svjetla na vozilima u blizini ili postaviti elektronska upozorenja na digitalnim saobraćajnim znakovima kako bi smanjio rizik od sekundarnih nesreća izazvanih nespremnim vozačima.

2.3 Autonomna vozila i tehnologije pomoći vozačima (ADAS)

Autonomna vozila su možda najrevolucionarnija tehnologija u okviru ITS-a. Ova vozila koriste niz senzora, uključujući kamere, LIDAR (svjetlosno prepoznavanje) i radare, kako bi stvorila detaljnu mapu svog okruženja i kretala se bez ljudske intervencije. Eliminiranjem ljudskih grešaka, koje su odgovorne za veliki broj saobraćajnih nesreća, autonomna vozila mogu drastično poboljšati sigurnost saobraćaja.

ADAS (Napredni sistemi pomoći vozačima) su još jedan važan segment ITS-a. Ovi sistemi su dizajnirani da pomognu vozačima u donošenju sigurnijih odluka kroz pružanje informacija u realnom vremenu, upozorenja i automatske intervencije. Neki od najčešćih ADAS sistema uključuju:

- **Automatsko kočenje u nuždi (AEB):** Automatski primjenjuje kočnice kada se sudar neizbježno približava.
- **Pomoć za zadržavanje u traci (LKA):** Pomaže vozaču da ostane u traci kroz asistenciju u upravljanju volanom.
- **Adaptivni tempomat (ACC):** Prilagođava brzinu vozila kako bi održao siguran razmak od drugih vozila.
- **Detekcija mrtvih kutova:** Upozorava vozače na vozila u mrtvim kutovima, smanjujući rizik od nesreća tokom promjena traka.

Ovi sistemi rade zajedno kako bi poboljšali svijest vozača i smanjili vjerovatnoću nesreća, posebno onih uzrokovanih nesmotrenošću ili umorom vozača.

2.4 Pametni parkirni sistemi

Pronalaženje slobodnog parkinga čest je problem u urbanim područjima, što često dovodi do vozača koji kruže oko blokova, čime se doprinosi gužvi i zagađenju. Pametni parkirni sistemi koriste senzore za praćenje dostupnosti parking prostora u realnom vremenu. Vozači mogu pristupiti tim podacima putem mobilnih aplikacija, što im omogućava da brže pronađu slobodna parking mjesta i smanje vrijeme provedeno u traženju.

Pametno parkiranje također smanjuje rizik od nesreća na parkiralištima i u urbanim ulicama, jer vodi vozače do slobodnih mjesta i sprječava sudare uzrokovane neurednim parkiranjem ili nepotrebnim manevriranjem.

3. Utjecaj ITS-a na sigurnost saobraćaja

Široka primjena ITS-a imala je značajan utjecaj na sigurnost saobraćaja, jer se bavi mnogim osnovnim uzrocima nesreća i neefikasnosti. Neki od najvažnijih efekata ITS-a na sigurnost saobraćaja uključuju:

3.1 Smanjenje ljudskih grešaka

Ljudske greške su primarni uzrok saobraćajnih nesreća, uključujući ometanost tokom vožnje, umor, vožnju pod uticajem alkohola i zanemarivanje saobraćajnih znakova ili signalizacije. ITS tehnologije, posebno ADAS i autonomna vozila, dizajnirane su da smanje ljudske greške. Na primjer, automatsko kočenje u nuždi može spriječiti sudar ako vozač ne reaguje na vrijeme, dok adaptivni tempomat osigurava da vozila održavaju siguran razmak.

Automatizacijom ključnih aspekata vožnje, kao što su upravljanje, kočenje i ubrzanje, ITS tehnologije mogu značajno smanjiti broj nesreća uzrokovanih ljudskim faktorima.

3.2 Brža reakcija na nesreće

Sistemi za detekciju nesreća igraju ključnu ulogu u poboljšanju brzine obavještanja hitnih službi. Brže vrijeme reakcije može biti presudno za život ili smrt onih koji su uključeni u nesreću. Automatskim detektovanjem nesreće i obavještanjem hitnih službi, ITS omogućava da pomoć stigne brže, potencijalno spasi živote i minimizira ozbiljnost povreda.

Pored toga, ITS može obavijestiti vozače u okolini da usporavaju ili uzmu alternativne rute, smanjujući rizik od sekundarnih nesreća i osiguravajući sigurniji protok saobraćaja.

3.3 Poboljšanje odgovora nakon nesreće

Pored detekcije nesreća, ITS sistemi mogu također pomoći u upravljanju situacijama nakon nesreće. Na primjer, ako je vozilo uključeno u sudar, njegova lokacija i stanje mogu se automatski prenijeti hitnim službama, koje se bolje mogu pripremiti za mjesto nesreće. Ovi podaci u realnom vremenu omogućavaju hitnoj pomoći da odgovori efikasnije, čime se poboljšavaju rezultati za one uključene.

3.4 Optimizacija saobraćaja i smanjenje gužvi

Optimizacijom saobraćajnih semafora, upravljanjem gužvama u realnom vremenu i pružanjem informacija vozačima u stvarnom vremenu, ITS može smanjiti gužve u saobraćaju. Manje gužve znače manje agresivne vožnje, manje nesreća i manje zagađenja. Optimizacija saobraćaja također sprječava situacije u kojima frustrirani vozači uključuju opasno ponašanje, poput prebrze vožnje ili prolaska kroz crveno svjetlo.

4. Izazovi i ograničenja ITS-a

Unatoč brojnim prednostima, implementacija ITS-a suočava se s nekoliko izazova. Glavni izazovi uključuju:

- **Visoki početni troškovi:** Instalacija i održavanje ITS infrastrukture, uključujući senzore, kamere i komunikacijske mreže, mogu biti skupi, posebno za zemlje u razvoju ili manje općine.
- **Problemi privatnosti:** Široka primjena senzora, kamera i sistema za prikupljanje podataka postavlja pitanja o privatnosti pojedinaca, naročito u urbanim područjima gdje se prikupljaju ogromne količine ličnih podataka.
- **Sigurnosni rizici:** Kako ITS sistemi postaju sve povezani, postoji rizik od hakiranja i cyber napada koji bi mogli ugroziti sigurnost i integritet saobraćajnog sistema.

Zaključak

Inteligentni transportni sistemi (ITS) transformiraju transportnu industriju, donoseći značajna poboljšanja u sigurnosti saobraćaja, efikasnosti i održivosti. Korištenjem najnovijih tehnologija, kao što su pametni saobraćajni semafori, sistemi za detekciju nesreća, autonomna vozila i napredni sistemi pomoći vozačima, ITS može smanjiti saobraćajne nesreće, poboljšati protok saobraćaja i spasiti živote. Iako postoje izazovi u pogledu troškova, privatnosti i sigurnosti, dugoročne koristi ITS-a u stvaranju sigurnijih i efikasnijih saobraćajnih sistema čine ga ključnim za budući razvoj transportnih sistema. Kako tehnologija nastavlja evoluirati, ITS će nesumnjivo igrati sve centralniju ulogu u oblikovanju budućnosti saobraćaja i sigurnosti na cestama.

Intelligent Transport Systems in the Function of Traffic Safety

Introduction

In the context of rapidly growing urbanization and increasing vehicle numbers globally, the need to address traffic safety has become a priority for governments and transport authorities. Road traffic accidents continue to be a leading cause of death and injury worldwide, posing significant challenges to public health and safety. According to the World Health Organization (WHO), traffic-related injuries result in an estimated 1.3 million deaths each year, while millions more suffer from life-altering injuries. In light of these alarming statistics, innovative solutions are being sought to improve road safety, enhance traffic flow, and reduce the environmental impact of transportation.

Intelligent Transport Systems (ITS) have emerged as a crucial technological response to these challenges. ITS refers to a wide range of technologies that aim to improve the efficiency, safety, and sustainability of transportation systems. By leveraging advanced communication networks, sensors, real-time data analysis, and automated systems, ITS offers the potential to revolutionize the way we manage and interact with road traffic.

This seminar paper will explore the impact of ITS on traffic safety, focusing on key technologies, their practical applications, the benefits they bring to road safety, as well as the challenges and future potential of ITS in reshaping the transportation landscape.

1. Theoretical Framework: Understanding Intelligent Transport Systems

Intelligent Transport Systems are an umbrella term that encompasses various technologies designed to enhance transportation management and improve road safety. The core purpose of ITS is to provide a more efficient and safer transportation system through the integration of information technology, communication networks, and automation.

According to the European Commission, ITS can be defined as “the application of information and communication technologies to transport systems to enhance their efficiency, safety, and environmental sustainability.” These systems use a combination of sensors, cameras, radar, and data analytics to monitor, manage, and optimize traffic in real time.

ITS typically involves four key components:

- **Traffic Management Systems (TMS):** These systems monitor and control traffic flows, ensuring optimal traffic conditions on roads and highways.
- **Driver Assistance Technologies (ADAS):** These technologies are designed to assist drivers by providing real-time information and alerts about potential hazards or issues.
- **Autonomous Vehicles:** These self-driving vehicles use advanced sensors and algorithms to navigate the road without human input.

- **Vehicle-to-Infrastructure (V2I) Communication:** This enables vehicles to communicate with infrastructure elements such as traffic signals, road signs, and sensors to share real-time data.

2. Key Technologies in ITS and Their Role in Enhancing Traffic Safety

The widespread deployment of ITS is made possible by a variety of key technologies, which work together to improve traffic flow, reduce accidents, and ultimately save lives. These technologies are transforming the way traffic is managed and how drivers interact with their vehicles and the road environment.

2.1 Smart Traffic Signals and Traffic Management Systems

Smart traffic signals are one of the most visible and widely implemented components of ITS. These systems use real-time data collected from sensors and cameras to adjust signal timings based on current traffic conditions. This ensures that traffic flow is optimized, reducing congestion and the likelihood of accidents caused by stop-and-go traffic.

In metropolitan areas, where traffic congestion is a major issue, smart traffic lights can play a vital role in enhancing safety. For example, if a traffic signal detects that an intersection is heavily congested, it can extend green light durations for vehicles traveling in that direction, easing the flow of traffic and reducing the risk of accidents. In addition, the integration of advanced algorithms allows for dynamic signal optimization based on factors such as time of day, weather conditions, and traffic patterns.

Traffic Management Systems (TMS) use data collected from a range of sensors, cameras, and GPS devices to monitor traffic conditions across entire regions or highways. These systems can provide real-time updates to drivers, allowing them to avoid congested routes and accidents. For example, TMS can notify drivers of accidents, road closures, or traffic jams via mobile apps or electronic message signs along the road. In the case of an accident, TMS can also reroute traffic to alternative roads, minimizing further congestion and enhancing safety.

2.2 Accident Detection Systems and Automatic Emergency Alerts

The ability to detect accidents in real time and notify emergency services is another critical feature of ITS. Accident detection systems use sensors, cameras, and radar to detect anomalies such as sudden stops, collisions, or vehicles veering off the road. Once an accident is detected, these systems can automatically notify emergency responders, enabling them to reach the scene more quickly and efficiently.

Furthermore, accident detection systems can alert other drivers in the vicinity about the potential danger, allowing them to take preventative measures. For instance, in the event of a crash on a highway, the system could activate warning lights on nearby vehicles or post electronic alerts on digital road signs to reduce the risk of secondary accidents caused by unprepared drivers.

2.3 Autonomous Vehicles and Driver Assistance Technologies (ADAS)

Autonomous vehicles are perhaps the most revolutionary technology in the realm of ITS. These vehicles use an array of sensors, including cameras, LIDAR (Light Detection and Ranging), and radar, to create a detailed map of their surroundings and navigate without human intervention. By eliminating human error, which is responsible for a large percentage of traffic accidents, autonomous vehicles can drastically improve traffic safety.

ADAS (Advanced Driver Assistance Systems) is another important subset of ITS. These systems are designed to assist drivers in making safer decisions by providing real-time information, warnings, and automatic interventions. Some of the most common ADAS features include:

- **Automatic Emergency Braking (AEB):** Automatically applies the brakes when a collision is imminent.
- **Lane Keeping Assist (LKA):** Helps the driver stay within the lane by providing steering assistance.
- **Adaptive Cruise Control (ACC):** Adjusts the vehicle's speed to maintain a safe distance from other vehicles.
- **Blind Spot Detection:** Alerts drivers to vehicles in their blind spots, reducing the risk of accidents during lane changes.

These systems work together to enhance driver awareness and reduce the likelihood of accidents, particularly those caused by distracted or fatigued driving.

2.4 Smart Parking Systems

Finding available parking spaces is a common problem in urban areas, often leading to drivers circling blocks, which contributes to congestion and pollution. Smart parking systems use sensors to monitor the availability of parking spaces in real time. Drivers can access this information via mobile apps, allowing them to find parking spots more quickly and reducing the time spent searching.

Smart parking also reduces the risk of accidents in parking lots and on busy streets by guiding drivers to open spaces and preventing collisions caused by erratic parking or unnecessary movements.

3. Impact of ITS on Traffic Safety

The widespread adoption of ITS has had a profound impact on traffic safety by addressing many of the root causes of accidents and inefficiencies. Some of the most significant effects of ITS on road safety include:

3.1 Reducing Human Error

Human error is the primary cause of traffic accidents, including distracted driving, fatigue, impaired driving, and failure to observe road signs or signals. ITS technologies, particularly ADAS and autonomous vehicles, are designed to reduce human error. For example, automatic emergency braking can prevent collisions if the driver does not react in time, while adaptive cruise control ensures that vehicles maintain a safe distance from one another.

By automating critical aspects of driving, such as steering, braking, and acceleration, ITS technologies can significantly reduce the number of accidents caused by human factors.

3.2 Faster Response to Accidents

Accident detection systems play a crucial role in improving the speed at which emergency responders are notified. Faster response times can make the difference between life and death for those involved in an accident. By automatically detecting accidents and notifying emergency services, ITS ensures that help arrives more quickly, potentially saving lives and minimizing the severity of injuries.

Furthermore, ITS can alert nearby drivers to slow down or take alternative routes, reducing the likelihood of secondary accidents and ensuring a smoother and safer traffic flow.

3.3 Improving Post-Crash Response

In addition to accident detection, ITS systems can also assist with post-crash management. For instance, if a vehicle is involved in a collision, its location and condition can be automatically communicated to emergency responders, who can better prepare for the scene. This real-time data allows emergency personnel to respond more effectively, which can improve outcomes for those involved.

3.4 Optimizing Traffic Flow and Reducing Congestion

By optimizing traffic signals, managing congestion in real time, and providing real-time information to drivers, ITS can reduce traffic congestion. Fewer traffic jams mean less aggressive driving, fewer accidents, and less pollution. Traffic flow optimization also prevents situations where frustrated drivers engage in dangerous behavior, such as speeding or running red lights.

4. Challenges and Limitations of ITS

Despite the numerous benefits, the implementation of ITS also presents several challenges. The primary challenges include:

- **High Initial Costs:** The installation and maintenance of ITS infrastructure, including sensors, cameras, and communication networks, can be expensive, particularly for developing countries or smaller municipalities.
- **Privacy Concerns:** The widespread use of sensors, cameras, and data collection systems raises concerns about the privacy of individuals, particularly in urban areas where vast amounts of personal data are collected.
- **Cybersecurity Risks:** As ITS systems become more connected, they are vulnerable to hacking and cyberattacks, which could compromise the safety and integrity of the transportation system.

Conclusion

Intelligent Transport Systems (ITS) are transforming the transportation landscape, offering significant improvements in traffic safety, efficiency, and sustainability. By leveraging cutting-edge technologies such as smart traffic signals, accident detection systems, autonomous vehicles, and advanced driver assistance systems, ITS can reduce road accidents, improve traffic flow, and save lives. Although challenges remain in terms of cost, privacy, and security, the potential benefits of ITS in creating safer and more efficient transportation systems make it a crucial component of

future urban development. As technology continues to evolve, ITS will undoubtedly play an increasingly central role in shaping the future of transportation and road safety.

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OSPOSABLJAVANJE VOZAČA MOTORNIH VOZILA U CRNOJ GORI U AUTO ŠKOLAMA I UČENIKA U SREDNJIM ŠKOLAMA

Sažetak:

Osposobljavanje kandidata za vozače u Crnoj Gori, obavlja se u auto školi koja ima licencu za rad koju izdaje organ državne uprave nadležan za poslove obrazovanja.

Licenca za rad, izdaje se auto školi koja ispunjava uslove u skladu sa Zakonom o bezbjednosti saobraćaja na putevima.

Osposobljavanje učenika za vozače obavlja se i u stručnoj školi koja ima licencu za izvođenje odgovarajućeg obrazovnog programa za područje rada saobraćaja, koja se izdaje u skladu sa propisima iz oblasti obrazovanja.

U radu je izrađena analiza oba načina sticanja potrebnih kvalifikacija kroz njihove specifičnosti i uspješnosti u sprovođenju istih kroz kadrovske i materijalne uslove za sprovođenje navedenih programa. Takođe je napravljano i poređenje časova osposobljavanja i prolaznosti na pojedinim ispitima.

Ključne riječi:

- Vozač motornog vozila,
- Autoškole
- Srednje stručne škole koje mogu da obavljaju obuku vozača
-

OSPOSABLJAVANJE VOZAČA MOTORNIH VOZILA U CRNOJ GORI U AUTO ŠKOLAMA I UČENIKA U SREDNJIM ŠKOLAMA

1. Zakonski okviri osposobljavanja vozača u Crnoj Gori

Osposobljavanje kandidata za vozače je nastavni proces koji se sprovodi prema Zakonu o bezbjednosti saobraćaja na putevima i programu obrazovanja za osposobljavanje za upravljanje motornim vozilom.

Osposobljavanje kandidata za vozače sastoji se iz teorijskog i praktičnog dijela obuke vozača.

Teoriski dio se sastoji iz sledećih oblasti: Bezbjednost saobraćaja, saobraćajna signalizacija, pravila saobraćaja, ostali učesnici u saobraćaju, prevoz putnika i robe, vozilo, vozač, put, zaštita životne sredine, posebne mjere bezbjednosti, pružanje prve pomoći i priprema za polaganje teorijskog dijela ispita.

Praktični dio programa sastoji se iz sledećih oblasti: provjere i pripreme vozila i opreme za bezbjedno učestvovanje u saobraćaju na putu, upotrebe komandi i uređaja vozila, izvođenja propisanih radnji vozilom na uređenom poligonu, izvođenja radnji vozilom u saobraćaju na putu i postupanje vozača u saobraćaju, upravljanja vozilom u saobraćaju na putu van naselja, u uslovima slabog, srednjeg i jakog intenziteta saobraćaja, upravljanja vozilom na putu u naselju i van naselja, u noćnim uslovima, uvježbavanja radnji vozilom i postupanje vozača u različitim saobraćajnim situacijama i razvijanja odnosa povjerenja i poštovanja prema drugim učesnicima u saobraćaju.

Za osposobljavanje kandidata za vozače autoškola mora da imati:

- 1) najmanje jednu opremljenu školsku učionicu za teorijsku obuku;
- 2) poslovni prostor za administrativne poslove;
- 3) nastavna sredstva i učila;
- 4) najmanje dva vozila kategorije B i najmanje po jedno vozilo ostalih kategorija, koja su registrovana na auto školu ili su obezbijedena po osnovu lizinga;
- 5) uređen poligon za praktičnu obuku vozača.

Učionica, administrativni prostor i poligon za praktičnu obuku vozača može biti u vlasništvu auto škole ili u upotrebi po osnovu zakupa.

Auto škola je dužna da obezbijedi:

- 1) najmanje dva instruktora vožnje za vozila kategorije B i najmanje jednog instruktora za ostale kategorije vozila za koje vrši osposobljavanje kandidata;
- 2) predavača teorijske nastave;
- 3) predavača prve pomoći.

Predavač teorijske nastave mora da ima:

- 1) VI nivo kvalifikacije obrazovanja - studijski program drumski saobraćaj ili studijski program pravne nauke i najmanje tri godine radnog iskustva u oblasti bezbjednosti saobraćaja;
- 2) vozačku dozvolu za vozilo kategorije B, najmanje tri godine.

Instruktor vožnje mora da ima licencu za instruktora vožnje.

Licenca za instruktora vožnje izdaje se sa rokom važenja od pet godina, a važi samo za vrijeme za koje važi i njegova vozačka dozvola za tu kategoriju vozila.

Osposobljavanje kandidata za vozače u autoškoli iz teorijskog dijela vozačkog ispita izvodi predavač, iz praktičnog dijela vozačkog ispita izvodi instruktor vožnje, a dio vezan za pružanje prve pomoći osobama ozlijeđenim u saobraćajnoj nesreći izvodi predavač, doktor medicine.

Predavač teorijske nastave mora da ima:

- 1) VI nivo kvalifikacije obrazovanja - studijski program drumski saobraćaj ili studijski program pravne nauke i najmanje tri godine radnog iskustva u oblasti bezbjednosti saobraćaja;
- 2) vozačku dozvolu za vozilo kategorije B, najmanje tri godine.

Instruktor vožnje mora da ima licencu za instruktora vožnje.

Licenca izdaće se licu, ako:

- 1) ima položen ispit za instruktora vožnje, IV1 nivo kvalifikacije obrazovanja i najmanje 23 godine života;
- 2) je zdravstveno sposoban;
- 3) u posljednje tri godine nije pravosnažno osuđivan za krivično djelo za koje se goni po službenoj dužnosti ili protiv njega za takvo krivično djelo nije pokrenut krivični postupak, odnosno ako mu za posljednje dvije godine nije izrečena zaštitna mjera zabrane upravljanja motornim vozilom ili mjera privremenog ograničenja prava na upravljanje motornim vozilom.

Licenca za instruktora vožnje izdaje se sa rokom važenja od pet godina, a važi samo za vrijeme za koje važi i njegova vozačka dozvola za tu kategoriju vozila.

Po isteku vremena instruktoru vožnje će se, na njegov zahtjev, ponovo izdati licenca, ako:

- 1) je pohađao seminare stručnog usavršavanja;
- 2) je zdravstveno sposoban;
- 3) u posljednje tri godine nije pravosnažno osuđivan za krivično djelo za koje se goni po službenoj dužnosti ili protiv njega za takvo krivično djelo nije pokrenut krivični postupak, odnosno ako mu za posljednje dvije godine nije izrečena zaštitna mjera zabrane upravljanja motornim vozilom.

Licu koje u vrijeme izdavanja licence za instruktora vožnje ima više od 62 godine života licenca za instruktora vožnje izdaje se sa rokom važenja do navršених 67 godina života.

Licencu za instruktora vožnje izdaje Ministarstvo, na propisanom obrascu.

Evidenciju o izdatim licencama za instruktora vožnje vodi Ministarstvo.

Izgled i sadržinu obrasca licence za instruktora vožnje, kao i sadržaj i način vođenja evidencije o izdatim licencama za instruktora vožnje propisuje Ministarstvo.

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Vozački ispit se sastoji iz teorijskog i praktičnog ispita.

Kandidat za vozača nakon završene teorijske nastave podnosi prijavu za polaganje teorijskog ispita u auto školi u kojoj se osposobljava.

Teorijski ispit može da polaže kandidat za vozača kome je izdata potvrda o završenoj teorijskoj obuci za vozača određene kategorije, najranije šest mjeseci prije nego što kandidat za vozača ispuni starosni uslov ovog zakona.

Starosni uslov za sticanje prava upravljanja vozilom odgovarajuće kategorije:

- 1) 16 godina života za kategoriju T;
- 2) 16 godina života za kategorije AM i A1;
- 3) 18 godina života za kategoriju A2;
- 4) 18 godina života za kategorije B, B1 i B+E;
- 5) 18 godina života za kategorije C1 i C1+E;
- 6) 21 godinu života za kategorije C, C+E, D1, D1+E;
- 7) 24 godine života za kategorije D i D+E;
- 8) 20 godina života za kategoriju A, uz uslov da lice ima najmanje dvije godine iskustva vožnje motocikla sa dozvolom kategorije A2. Predhodno vozačko iskustvo nije neophodno ukoliko kandidat ima najmanje 24 godine života.

Izuzetno od stava 1 tačka 6 ovog člana, učeniku srednje škole koji se obrazuje za zanimanje vozač motornih vozila može se izdati vozačka dozvola kategorije C i C+E ako ima navršenih 18 godina života.

Izuzetno od stava 1 tač. 6 i 7 ovog člana, licu koje je navršilo 18 godina života može se izdati vozačka dozvola za kategoriju C, a licu koje je navršilo 21 godinu života za kategoriju D, ako upravlja vozilom vatrogasne službe ili policijskim, odnosno vojnim vozilom.

Praktični ispit može da polaže kandidat za vozača:

- 1) koji je zdravstveno sposoban za vozača određene kategorije;
- 2) koji ispunjava starosni uslov za sticanje prava upravljanja vozilom odgovarajuće kategorije;
- 3) kome je izdata potvrda o položenom teorijskom ispitu, a da od dana polaganja teorijskog ispita nije prošlo više od jedne godine;
- 4) kome je izdata potvrda o završenoj praktičnoj obuci za upravljanje odgovarajuće kategorije vozila.

Kandidat za vozača podnosi prijavu za polaganje praktičnog ispita sa dokazima o ispunjenosti uslova.

Ovlašćeni ispitivač može biti lice koje ima licencu za ovlašćenog ispitivača za polaganje vozačkog ispita za upravljanje motornim vozilom određene kategorije.

Licenca za ovlašćenog ispitivača za polaganje vozačkog ispita za upravljanje motornim vozilom kategorije A (obuhvata kategorije AM, A1, A2 i A) ili kategorije B (obuhvata kategorije B1 i B) može se izdati licu koje ima:

- 1) vozačku dozvolu za upravljanje motornim vozilom kategorije za koju se izdaje licenca, najmanje tri godine;
- 2) najmanje 23 godine života;
- 3) položen ispit za ovlašćenog ispitivača za polaganje vozačkog ispita za upravljanje motornim vozilom kategorije za koju se izdaje licenca;
- 4) VIII nivo kvalifikacije obrazovanja.

Licenca za ovlaštenog ispitivača za polaganje vozačkog ispita za upravljanje motornim vozilom kategorija B+E i C (obuhvata kategorije C1 i C), kategorije C+E (obuhvata kategorije C+E i C1+E), kategorije D (obuhvata kategorije D i D1) i kategorije D+E (obuhvata kategorije D+E i D1+E) može se izdati licu koje ima:

- 1) vozačku dozvolu za upravljanje motornim vozilom kategorije za koju se izdaje licenca, najmanje pet godina;
- 2) najmanje tri godine iskustva kao ovlašteni ispitivač za polaganje vozačkog ispita za upravljanje motornim vozilom kategorije B;

Praktični ispit se polaže na uređenom poligonu i u saobraćaju na javnom putu i tom prilikom se utvrđuje da li kandidat za vozača ima potrebna znanja i vještine.

Polaganje praktičnog ispita sprovodi se na vozilu kategorije za čije upravljanje se osposobljava kandidat za vozača.

Mjesto polaganja praktičnog ispita određuje ispitna komisija.

Na praktičnom ispitu kandidat se ocjenjuje ocjenom "položio" ili ocjenom "nije položio".

Način ocjenjivanja kandidata za vozača na teorijskom i praktičnom ispitu propisuje organ državne uprave nadležan za poslove obrazovanja.

11. Osposobljavanja kandidata u auto školama u Crnoj Gori

Program obrazovanja realizuje se kroz propisani broj časova teorijske nastave i praktične obuke. Trajanje programa obrazovanja u časovima za pojedine kategorije vozila prikazano je u tabeli broj 1.

Tabela broj 1. Pregled fonda časova teorijske nastave i praktične obuke

Obučava se za kategoriju	Vrsta obuke	Ne posjeduje vozačku dozvolu	Posjeduje vozačku dozvolu kategorije															
			AM	A1	A2	A	B1	B	B+E	C1	C1+E	C	C+E	D1	D1+E	D	D+E	T
AM	TN	30+10	-	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0
	PO	5	-	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0
A1	TN	30+10	0	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0
	PO	15	10	-	-	-	10	10	10	10	10	10	10	10	10	10	10	10
A2	TN	30+10	0	0	-	-	0	0	0	0	0	0	0	0	0	0	0	0
	PO	20	15	10	-	-	15	15	15	15	15	15	15	15	15	15	15	15
A	TN	30+10	0	0	0	-	0	0	0	0	0	0	0	0	0	0	0	0
	PO	25	20	15	10	-	20	20	20	20	20	20	20	20	20	20	20	20
B1	TN	30+10	0	0	0	0	-	-	-	-	-	-	-	-	-	-	-	0
	PO	25	15	15	15	15	-	-	-	-	-	-	-	-	-	-	-	15
B	TN	30+10	0	0	0	0	-	-	-	-	-	-	-	-	-	-	-	0
	PO	30	25	25	25	25	25	-	-	-	-	-	-	-	-	-	-	25
B+E	TN	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	-
	PO	-	-	-	-	-	-	10	-	-	-	-	-	-	-	-	-	-
C1	TN	-	-	-	-	-	-	7+3	7+3	-	-	-	-	-	-	-	-	-
	PO	-	-	-	-	-	-	10	10	-	-	-	-	-	-	-	-	-
C1+E	TN	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-
	PO	-	-	-	-	-	-	-	-	10	-	-	-	-	-	-	-	-
C	TN	-	-	-	-	-	-	7+3	7+3	0	0	-	-	-	-	-	-	-
	PO	-	-	-	-	-	-	15	15	10	10	-	-	-	-	-	-	-
C+E	TN	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-
	PO	-	-	-	-	-	-	-	-	-	-	10	-	-	-	-	-	-

D1	TN	-	-	-	-	-	-	-	-	-	0	0	0	0	-	-	-	-	-
	PO	-	-	-	-	-	-	-	-	-	7	7	7	7	-	-	-	-	-
D1+E	TN	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-
	PO	-	-	-	-	-	-	-	-	-	-	-	-	-	10	-	-	-	-
D	TN	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
	PO	-	-	-	-	-	-	-	-	-	-	-	7	7	-	-	-	-	-
D+E	TN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
	PO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	-	-
T	TN	30+10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-
	PO	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-

TN – teorijska nastava obuhvata časove predavanja (prvi broj) i časove vježbi (drugi broj)

PO – praktična obuka

Napomena:

- Čas teorijske nastave traje 45 minuta
- U toku jednog dana kandidat može imati najviše tri časa teorijske nastave.
- Čas praktične obuke traje 60 minuta.
- U toku jednog dana kandidat može imati najviše dva časa praktične obuke.

7.a. Teorijska nastava

Broj časova teorijske nastave za pojedine teme i kategorije vozila dat je u tabeli broj 2

Tabela broj 2. Pregled fonda časova teorijske nastave po temama

Redni broj	NAZIV TEMATSKIH CJELINA	Fond časova za kategorije	
		AM,A1,A2,A,B1,B,T	C1, C
1.	Bezbjednost saobraćaja	2	-
2.	Saobraćajna signalizacija	5+3	-
3.	Pravila saobraćaja	7+3	-
4.	Ostali učesnici u saobraćaju	2	-
5.	Prevoz putnika i robe	1	3
6.	Vozilo	6	2
7.	Vozač	1	1
8.	Put	1	-
9.	Zaštita životne sredine	1	-
10.	Posebne mjere bezbjednosti	1	1
11.	Pružanje prve pomoći	3+1	-
12.	Priprema za polaganje teorijskog dijela ispita	0+3	0+3
Ukupno:		30+10	7+3

7.b. Praktična obuka

Broj časova praktične obuke za pojedine teme i pojedine kategorije vozila dat je u tabeli broj 3.

Tabela broj 3. Pregled fonda časova praktične obuke

KATEGORIJA VOZILA	NAZIV TEMATSKE CJELINE					Ukupno časova
	Praktična obuka na poligonu	Praktična obuka u naselju	Praktična obuka van naselja	Vožnja u posebnim uslovima	Priprema za ispit	
AM	4	0	0	0	1	5
A1*, A2**, A***	5	4	0	0	1	10

A1, A2*, A**	5	6	2	1	1	15
A2, A*	5	6	4	2	3	20
A	5	10	4	3	3	25
B1*	8	4	2	0	1	15
B1, B*	8	7	4	3	3	25
B	8	10	6	3	3	30
C1, C*	3	3	2	1	1	10
C	6	4	3	1	1	15
D1, D	2	2	2	0	1	7
B+E, C1+E, C+E, D1+E, D+E	3	2	3	1	1	10
T	4	0	0	0	1	5

A1* - kategorija A1 ako polaznik posjeduje neku kategoriju

A2* - kategorija A2 ako polaznik posjeduje neku kategoriju izuzev kategorije A1

A2** - kategorija A2 ako polaznik posjeduje kategoriju A1

A* - kategorija A ako polaznik posjeduje neku kategoriju izuzev kategorija A1 ili A2

A** - kategorija A ako polaznik posjeduje kategoriju A1

A*** - kategorija A ako polaznik posjeduje kategoriju A2

B1* - kategorija B1 ako polaznik posjeduje neku kategoriju

B* - kategorija B ako polaznik posjeduje neku kategoriju

C* - kategorija C ako polaznik posjeduje kategoriju C1 ili C1+E

Na teritoriji Crne Gore u 2023 godini obuku vozača obavljale su 62 licencirane auto škole. Sjedišta rada auto škola su sledeća: 16 – Podgorica, 7 - Nikšić, 6 – Rožaje, po 4 - Bar, Berane i Bijelo Polje, 3 – Plav, po 2 – Budva, Herceg Novi, Kotor, Mojkovac, Pljevlja, Tivat, Ulcinj i Zeta i po jedna auto škola je u sledećim opštinama – Cetinje, Žabljak i Kolašin.

Ministarstvo prosvjete za obavljanje ispita je imenovalo 16 ispitnih komisija. Ispitnu komisiju čine dva licencirana ispitivača, koje delegira Ministarstvo prosvjete i Ministarstvo unutrašnjih poslova i predstavnik auto škole.

Komisije su u 2023 godini obavile 16705 teorijskih ispita na kojima je prolaznost bila 52 % i 17286 vozačka ispita za B kategoriju na kojima je prolaznost bila 45%, 1330 ispita za kategoriju A, A1 i A2 na kojima je prolaznost bila 70%, 1017 vozačkih ispita za C kategoriju na kojima je prolaznost bila 74%, 234 vozačka ispita za D kategoriju na kojima je prolaznost bila 70% i 392 vozačka ispita za E kategoriju na kojima je prolaznost bila 85%.

Na nivou 2023 godine obavljeno je 16705 teorijskih ispita sa prolaznošću od 52 % i 20259 vozačkih ispita sa procentom prolaznosti 49 % a na nivou 2022 godine obavljeno je 17256 teorijskih ispita na kojima je prolaznost bila 65 % i 17941 vozački ispit na kojima je prolaznost bila 61%.

Iz navedenog se vidi da je prolaznost u 2023 gđini manja za praktični dio vozačkog ispita 12% što je rezultat povećanja vremena trajanja ispita za A, A1 i A2, B1, B, B-E, T kategoriju na 25 minuta i C1, C. C1-E, C-E, D, D1 kategoriju na 45 minuta i 13% za teorijski dio vozačkog ispita što je rezultat organizovanja ispita po novim ispitnim testovima.

12.Osposobljavanje učenika u srednjim školama u Crnoj Gori

U srednjim školama u Crnoj Gori je moguće da učenici polažu vozački ispit za B kategoriju ako se školuju za obrazovne programe: Vozač motornog vozila, Tehničar drumskog saobraćaja i Tehničar automehatronike.

Vozač motornog vozila je trogodišnje zanimanje koje obuhvata sticanje srednjoškolskog obrazovanja i vozačke dozvole B kategorije. Uslov za uspješan završetak modula Upravljanje motornim vozilom a samim tim i sticanje srednjoškolskog obrazovanja je prelazna ocjena i položen vozački ispit za B kategoriju. Po Zakonu o bezbjednosti saobraćaja na putevima učenici koji su završili za Vozača motornog vozila imaju pravo da polažu u auto školama vozački ispit za C i C+E kategoriju sa 18 godina života i za D kategoriju sa 21 godinu života.

Tehničar drumskog saobraćaja je četvorogodišnje zanimanje ima mogućnost da polaže vozački ispit za B kategoriju ali mu to nije uslov za završetak srednjoškolskog obrazovanja.

Tehničar automehatronike je četvorogodišnje zanimanje ima mogućnost da polaže vozački ispit za B kategoriju ali mu to nije uslov za završetak srednjoškolskog obrazovanja.

Učenici imaju pravo na polaganje vozačkog ispita u četiri ispitna roka bez naknade. Ako ne polože vozački ispit u propisanom roku, plaćaju naknadu za svaki sledeći ispitni rok.

13.Zaključak

Osposobljavanje kandidata za vozače je jedinstveni nastavni proces koji se sprovodi prema propisanom programu.

Osposobljavanje kandidata za vozače je djelatnost koja se obavlja u opštem interesu, a pretpostavlja jedinstveni nastavni proces koji se sprovodi prema propisanim sadržajima utvrđenim Programom obrazovanja za sticanje ključnih vještina za upravljanje motornim vozilom.

Srednjoškolski program za redovne učenike u trogodišnjem trajanju obuhvata sticanje srednjoškolskog obrazovanja i sve ostale navedene kvalifikacije odnosno stjecanje vozačke dozvole B kategorije i sticanje početnih kvalifikacije koje su regulisane Zakonom o bezbjednosti saobraćaja na putevima i Zakonom o prevozu u drumskom saobraćaju a na osnovu nastavnog plana i programa pripisanog od Ministarstva prosvjete nauka i inovacija. Uslov za uspješan završetak modula Upravljanje motornim vozilom a samim tim i sticanje srednjoškolskog obrazovanja je prelazna ocjena i položen vozački ispit za B kategoriju. Ovakvim načinom srednjoškolskog obrazovanja podiže se kvaliteta zanimanja Vozač motornog vozila koji tokom 3 godine siću najkvalitetnija znanja i vještine koje mogu primijeniti u stvarnom prevoznom procesu, a koja su izrazito bitna za ovo zanimanje.

Tehničar drumskog saobraćaja i Tehničar Automehatronike su četvorogodišnja zanimanja i imaju mogućnost da polažu vozački ispit za B kategoriju ali im to nije uslov za završetak srednjoškolskog obrazovanja

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TRAINING OF MOTOR VEHICLE DRIVERS IN MONTENEGRO IN DRIVING SCHOOLS AND STUDENTS IN SECONDARY SCHOOLS

Summary:

Training of candidates for drivers in Montenegro is carried out in a driving school that has a license issued by the state administration body in charge of education.

A work license is issued to a driving school that meets the requirements in accordance with the Law on Road Traffic Safety.

Training of students for drivers is also carried out in a vocational school that has a license to carry out an appropriate educational program in the field of traffic, which is issued in accordance with the regulations in the field of education.

This paper analyses both ways of acquiring the necessary qualifications through their specifics and success in their implementation through personnel and material conditions for the implementation of these programs. There is also a comparison of training and passing hours in individual exams.

Keywords:

- The driver of a motor vehicle,
- Driving Schools
- Vocational Secondary Schools That Can Provide Driver Training
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TRAINING OF MOTOR VEHICLE DRIVERS IN MONTENEGRO IN DRIVING SCHOOLS AND STUDENTS IN SECONDARY SCHOOLS

1. Legal Frameworks for Driver Training in Montenegro

Training of candidates for drivers is a teaching process that is carried out in accordance with the Law on Road Traffic Safety and the education program for training to drive a motor vehicle.

The training of candidate drivers consists of a theoretical and practical part of driver training.

The theoretical part consists of the following areas: Traffic safety, traffic signage, traffic rules, other participants in traffic, transport of passengers and goods, vehicle, driver, road, environmental protection, special safety measures, first aid and preparation for the theoretical part of the exam.

The practical part of the program consists of the following areas: checking and preparing vehicles and equipment for safe participation in traffic on the road, use of vehicle commands and devices, performing prescribed work with a vehicle on a regulated polygon, performing work with a vehicle in traffic on the road and driving behavior in traffic, driving a vehicle in traffic outside the settlement, in conditions of poor conditions, medium and heavy traffic intensity, driving a vehicle on the road in a village and outside a settlement, in night conditions, practicing working with a vehicle and acting as a driver in various traffic situations and developing a relationship of trust and respect towards other road users.

To qualify as a driver, a driver must have:

- 1) at least one equipped school classroom for theoretical training;
- 2) business premises for administrative tasks;
- 3) teaching aids and teaching aids;
- 4) at least two vehicles of category B and at least one vehicle of other categories, which are registered at a driving school or are provided on the basis of a lease;
- 5) A training ground for practical training of drivers has been arranged.

The classroom, administrative space and training ground for practical driver training can be owned by the driving school or used on the basis of a lease.

The school is required to provide:

- (a) at least two driving instructors for category B vehicles and at least one instructor for the other categories of vehicles for which the applicant is trained;
- 2) lecturers of theoretical teaching;
- 3) first aid lecturers.

A theoretical teacher must have:

- 1) VI level of education qualification - study program Road Traffic or Study Program of Legal Science and at least three years of work experience in the field of traffic safety;

(b) a driving licence for a category B vehicle for at least three years.

A driving instructor must have a driving instructor's license.

A driving instructor's license is issued with a validity period of five years, and is valid only for the period for which his driving license is valid for that category of vehicle.

The training of candidates for drivers in the driving school from the theoretical part of the driving test is performed by the lecturer, from the practical part of the driving test is performed by the driving instructor, and the part related to the provision of first aid to persons injured in a traffic accident is performed by the lecturer, doctor of medicine.

A theoretical teacher must have:

1) VI level of education qualification - study program Road Traffic or Study Program of Legal Science and at least three years of work experience in the field of traffic safety;

(b) a driving licence for a category B vehicle for at least three years.

A driving instructor must have a driving instructor's license.

A license will be issued to a person if:

1) Has passed the driving instructor exam, IV1 level of education qualification and is at least 23 years old;

(a) is medically fit;

3) in the last three years, he has not been convicted by a final judgment for a criminal offense for which he is prosecuted ex officio or no criminal proceedings have been initiated against him for such a criminal offense, or if for the last two years he has not been imposed a protective measure prohibiting him from driving a motor vehicle or a measure of temporary restriction of the right to drive a motor vehicle.

A driving instructor's license is issued with a validity period of five years, and is valid only for the period for which his driving license is valid for that category of vehicle.

At the expiry of the time, the driving instructor shall, at his request, be reissued with a licence if:

1) has attended professional development seminars;

(a) is medically fit;

3) in the last three years, he has not been convicted of a criminal offense for which he is prosecuted ex officio or no criminal proceedings have been initiated against him for such a criminal offense, or if he has not been sentenced to a protective measure prohibiting him from driving a motor vehicle for the last two years.

A person who is over 62 years of age at the time of issuance of the driving instructor license is issued with a validity period until the age of 67.

The license for a driving instructor is issued by the Ministry, on the prescribed form.

Records of issued licenses for driving instructors are kept by the Ministry.

The appearance and content of the driving instructor license form, as well as the content and manner of keeping records of issued driving instructor licenses, shall be prescribed by the Ministry.

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The driving test consists of a theoretical and practical test.

After completing theoretical classes, the candidate for a driver submits an application for taking a theoretical exam at the driving school where he or she is trained.

The theoretical exam may be taken by a driver candidate who has been issued a certificate of completion of theoretical training for a driver of a certain category, no earlier than six months before the driver candidate meets the age requirement of this Law.

Age requirement for acquiring the right to drive a vehicle of the appropriate category:

- 1) 16 years of age for category T;
 - 2) 16 years of age for categories AM and A1;
 - 3) 18 years of age for category A2;
 - 4) 18 years of age for categories B, B1 and B+E;
 - 5) 18 years of age for categories C1 and C1+E;
 - 6) 21 years of age for categories C, C+E, D1, D1+E;
 - 7) 24 years of age for categories D and D+E;
- 20 years of age for category A, provided that the person has at least two years of experience driving a motorcycle with a category A2 license. Previous driving experience is not required if the candidate is at least 24 years old.

Notwithstanding paragraph 1, item 6 of this Article, a high school student who is studying for the profession of motor vehicle driver may be issued a driving license of category C and C+E if he or she is at least 18 years of age.

It's a bit of a stretch from 1 point. 6 and 7 of this Article, a person who has reached the age of 18 may be issued a driving license for category C, and a person who has reached the age of 21 for category D, if he drives a fire service vehicle or a police or military vehicle.

The practical exam can be taken by a candidate for a driver:

- (a) who is medically fit to be a driver of a particular category;
- 2) who meets the age requirement for acquiring the right to drive a vehicle of the appropriate category;
- 3) to whom a certificate of passing the theoretical exam has been issued, without more than one year having passed since the date of passing the theoretical exam;
- 4) who has been issued a certificate of completion of practical training for driving the relevant category of vehicle.

The driver candidate submits an application for the practical exam with evidence of meeting the conditions.

An authorized examiner may be a person who holds a license for an authorized examiner to take a driving test for driving a motor vehicle of a certain category.

A licence for an authorised examiner to take the driving test for driving a motor vehicle of category A (includes categories AM, A1, A2 and A) or category B (includes categories B1 and B) may be issued to a person who has:

- (a) a driving licence to drive a motor vehicle of the category for which the licence is issued, for at least three years;
- (b) at least 23 years of age;
- 3) passed the exam for an authorized examiner for taking the driving test for driving a motor vehicle of the category for which the license is issued;

4) VIII1 level of education.

A license for an authorized examiner to take the driving test for driving a motor vehicle of categories B+E and C (includes categories C1 and C), category C+E (includes categories C+E and C1+E), category D (includes categories D and D1) and category D+E (includes categories D+E and D1+E) may be issued to a person who has:

- (a) a driving licence to drive a motor vehicle of the category for which the licence is issued, for at least five years;
- (b) at least three years' experience as an examiner for the driving test for driving a category B motor vehicle;

The practical exam is taken on a regulated polygon and in traffic on a public road, and on that occasion it is determined whether the candidate for a driver has the necessary knowledge and skills.

The practical exam is conducted on a vehicle of the category for which the driver candidate is being trained.

The place of taking the practical exam is determined by the examination board.

In the practical exam, the candidate is assessed with a grade of "passed" or a grade of "failed".

The manner of assessment of candidates for drivers on the theoretical and practical exam is prescribed by the state administration body in charge of education.

2. Training of candidates in driving schools in Montenegro

The education program is implemented through a prescribed number of hours of theoretical teaching and practical training.

The duration of the education program in hours for individual categories of vehicles is shown in Table 1.

Table number 1. Overview of the collection of theoretical classes and practical training

Training for the category	Type of training	He does not have a driver's license	Holds a category driver's license															
			AM	A1	A2	And	B1	B	B+E	C1	C1+E	C	C+E	D1	D1+E	D	D+E	T
AM	TN	30+10	-	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0
	AFTER	5	-	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0
A1	TN	30+10	0	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0
	AFTER	15	10	-	-	-	10	10	10	10	10	10	10	10	10	10	10	10
A2	TN	30+10	0	0	-	-	0	0	0	0	0	0	0	0	0	0	0	0
	AFTER	20	15	10	-	-	15	15	15	15	15	15	15	15	15	15	15	15
And	TN	30+10	0	0	0	-	0	0	0	0	0	0	0	0	0	0	0	0
	AFTER	25	20	15	10	-	20	20	20	20	20	20	20	20	20	20	20	20
B1	TN	30+10	0	0	0	0	-	-	-	-	-	-	-	-	-	-	-	0
	AFTER	25	15	15	15	15	-	-	-	-	-	-	-	-	-	-	-	15
B	TN	30+10	0	0	0	0	-	-	-	-	-	-	-	-	-	-	-	0
	AFTER	30	25	25	25	25	25	-	-	-	-	-	-	-	-	-	-	25
B+E	TN	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	-
	AFTER	-	-	-	-	-	-	10	-	-	-	-	-	-	-	-	-	-
C1	TN	-	-	-	-	-	-	7+3	7+3	-	-	-	-	-	-	-	-	-
	AFTER	-	-	-	-	-	-	10	10	-	-	-	-	-	-	-	-	-
C1+E	TN	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-
	AFTER	-	-	-	-	-	-	-	-	10	-	-	-	-	-	-	-	-
C	TN	-	-	-	-	-	-	7+3	7+3	0	0	-	-	-	-	-	-	-
	AFTER	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

	AFTER	-	-	-	-	-	-	15	15	10	10	-	-	-	-	-	-	-
	TN	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-
C+E	AFTER	-	-	-	-	-	-	-	-	-	-	10	-	-	-	-	-	-
	TN	-	-	-	-	-	-	-	-	0	0	0	0	-	-	-	-	-
D1	AFTER	-	-	-	-	-	-	-	-	7	7	7	7	-	-	-	-	-
	TN	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-
D1+E	AFTER	-	-	-	-	-	-	-	-	-	-	-	-	10	-	-	-	-
	TN	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-
D	AFTER	-	-	-	-	-	-	-	-	-	-	7	7	-	-	-	-	-
	TN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
D+E	AFTER	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	-	-
	TN	30+10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-
T	AFTER	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-

TN – theoretical classes include lecture classes (first issue) and practice classes (second issue)

PO – practical training

Note:

- A theoretical lesson lasts 45 minutes
- A candidate can have a maximum of three hours of theoretical instruction per day.
- The practical training class lasts 60 minutes.
- A candidate can have a maximum of two hours of practical training per day.

7.a. Theoretical classes

The number of hours of theoretical classes for individual topics and categories of vehicles is given in Table 2

Table number 2. Overview of the fund of theoretical teaching classes by topic

Serial Number	NAME OF THEMATIC UNITS	Time for categories	
		AM,A1,A2,A,B1,B,T	C1, C
1.	Traffic Safety	2	-
2.	Traffic Signals	5+3	-
3.	Rules of Traffic	7+3	-
4.	Other participants in the traffic	2	-
5.	Transport of passengers and goods	1	3
6.	Vehicle	6	2
7.	Driver	1	1
8.	Road	1	-
9.	Environmental protection	1	-
10.	Special Safeguards	1	1
11.	Providing first aid	3+1	-
12.	Preparation for the theoretical part of the exam	0+3	0+3
Total:		30+10	7+3

7.b. Practical training

The number of hours of practical training for individual topics and individual categories of vehicles is given in Table 3.

Table number 3. Overview of the fund of practical training hours

VEHICLE CATEGORY	NAME OF THE THEMATIC UNIT					A total of time
	Practical training on the training ground	Practical training in the resort	Practical training outside the resort	Driving in special conditions .	Exam Preparation	
AM	4	0	0	0	1	5
A1*, A2**, A***	5	4	0	0	1	10
A1, A2*, A**	5	6	2	1	1	15
A2, A*	5	6	4	2	3	20
And	5	10	4	3	3	25
B1*	8	4	2	0	1	15
B1, B*	8	7	4	3	3	25
B	8	10	6	3	3	30
C1, C*	3	3	2	1	1	10
C	6	4	3	1	1	15
D1, D	2	2	2	0	1	7
B+E, C1+E, C+E, D1+E, D+E	3	2	3	1	1	10
T	4	0	0	0	1	5

A1* - category A1 if the participant has a category

A2* - category A2 if the participant has a category other than category A1

A2** - category A2 if the participant has category A1

A* - category A if the participant has a category other than categories A1 or A2

A** - category A if the participant has category A1

A*** - category A if the student has category A2

B1* - Category B1 if the student has a category

B* - Category B if the student has a category

C* - category C if the participant has category C1 or C1+E

In 2023, 62 licensed driving schools conducted driver training on the territory of Montenegro. The headquarters of driving schools are as follows: 16 - Podgorica, 7 - Nikšić, 6 - Rožaje, 4 each - Bar, Berane and Bijelo Polje, 3 - Plav, 2 each - Budva, Herceg Novi, Kotor, Mojkovac, Pljevlja, Tivat, Ulcinj and Zeta and one driving school is in the following municipalities - Cetinje, Žabljak and Kolašin.

The Ministry of Education has appointed 16 examination committees to conduct the exams. The examination committee consists of two licensed examiners, delegated by the Ministry of Education and the Ministry of the Interior, and a representative of the driving school.

In 2023, the commissions conducted 16705 theoretical tests with a pass rate of 52% and 17286 driving tests for category B with a pass rate of 45%, 1330 driving tests for categories A, A1 and A2 with a pass rate of 70%, 1017 driving tests for category C with a pass rate of 74%, 234 driving tests for category D with a pass rate of 70% and 392 driving tests for category E with a pass rate of 70%. The pass rate was 85%.

At the level of 2023, 16705 theoretical exams were conducted with a pass rate of 52% and 20259 driving tests with a pass rate of 49%, and at the level of 2022, 17256 theoretical exams were conducted with a pass rate of 65% and 17941 driving tests with a pass rate of 61%.

From the above, it can be seen that the pass rate in 2023 is lower for the practical part of the driving test by 12%, which is the result of increasing the duration of the exam for A, A1 and A2, B1, B, B-E, T category to 25 minutes and C1, C, C1-E, C-E, D, D1 category to 45 minutes and 13% for the theoretical part of the driving test, which is the result of organizing the exam according to the new test tests.

3. Training of students in secondary schools in Montenegro

In secondary schools in Montenegro, it is possible for students to take a driving test for category B if they are educated for the following educational programs: Motor Vehicle Driver, Road Traffic Technician and Automotive Mechatronics Technician.

A motor vehicle driver is a three-year occupation that includes the acquisition of secondary education and a category B driver's license. The condition for the successful completion of the module Driving a motor vehicle, and thus the acquisition of secondary education, is a passing grade and a passed driving test for category B. According to the Law on Road Traffic Safety, students who have completed the Motor Vehicle Driver's Degree have the right to take a driving exam for C and C+E categories at 18 years of age and for D category at 21 years of age.

A road traffic technician is a four-year occupation, he has the opportunity to take a driving test for category B, but this is not a condition for completing secondary education.

Automotive mechatronics technician is a four-year profession, he has the opportunity to take a driving test for category B, but this is not a condition for completing secondary education.

Students have the right to take a driving test in four exam periods free of charge. If they do not pass the driving test within the prescribed period, they pay a fee for each subsequent exam period.

4. Conclusion

Training of candidates for drivers is a unique teaching process that is carried out according to the prescribed program.

Training of candidates for drivers is an activity that is performed in the general interest, and presupposes a unique teaching process that is carried out according to the prescribed contents established by the Education Program for the acquisition of key skills for driving a motor vehicle.

The three-year high school program for full-time students includes the acquisition of secondary education and all other qualifications, i.e. the acquisition of a category B driver's license and the acquisition of initial qualifications regulated by the Law on Road Traffic Safety and the Law on Road Transport, based on the curriculum assigned by the Ministry of Education, Science and Innovation. The condition for the successful completion of the module Driving a motor vehicle, and thus the acquisition of secondary education, is a passing grade and a passed driving test for category B. This way of secondary education raises the quality of the profession of Motor Vehicle Driver, who over the course of 3 years acquire the highest quality knowledge and skills that they can apply in the real transport process, and which are extremely important for this profession.

Road Traffic Technician and Automotive Mechatronics Technician are four-year occupations and have the opportunity to take a driving test for category B, but this is not a condition for completing secondary education

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Strokovni izobraževalni center Ljubljana

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Povzetek: Izobraževalni sistemi v Sloveniji v okviru odprtega kurikula omogočajo, da lahko v določene strokovne predmete vključimo tematike, ki so moderne in aktualne. Vsak izvajalec predmeta sam določi, katere vsebine bo imel v odprtem kurikulu. Preko projekta Erasmus+ KA2 Drones4 STEM smo v izobraževalni proces vpeljali nove tematike in posodobitve vsebine iz področja delovanja dronov ter regulativ in predpisov na področju letenja z droni. Preko samega drona so dijaki spoznali, kako mehatronski sistem deluje ter kako so povezane komponente v samem sistemu. Prav tako so se dijaki učili tudi programirati, preko programa so spoznavali, kako lahko na samo delovanje drona vplivajo določeni ukazi, ki jih programsko spremenimo. Prav tako je bila ključni del projekta tudi analiza stanja za posamezno državo, ki je bila udeležena v projektu. Za vsako državo smo naredili analizo stanja pred začetkom projekta, da smo dobili dobro izhodišče za izvedbo nalog in uporabe dronov.

Ključne besede: droni, drones4STEM, STEM, brez pilotna letala

1. Razvoj tehnologije brezpilotnih letal - dronov

Tehnologija razvoja na področjih avtomobilizma ter ostalih mehatronskih sistemov izjemno napreduje. Predvsem se spodbuja uporaba senzorjev, krmilnikov, uporaba čim več električnih pogonov ter različnih PV modulov za pridobivanje električne energije. Zanimivo je to, da se vsi nagibamo k hitremu razvoju, predvsem zaradi želje po čimbolj enostavni uporabi elektronskih naprav ter želji po čim večjem udobju.

Glede na to, da imamo na šoli dobro pokrita področja s programov avtoremonta in mehatronike, smo razmišljali, kaj bi bil dober doprinos k razvoju učnih tematik s področja razvoja novih tehnologij. Iskali smo tehnologijo, ki je nova, dostopna, s katero bi se mladi lahko seznanili z novimi vsebinami. Odločili smo se za uporabo tehnologije brezpilotnih letal – dronov. Tematika se nam je zdela zanimiva tudi zato, ker zaradi svojega širokega spektra uporabe sega tudi v področje logistike. S tem lahko vpeljemo zgoraj omenjene teme tudi v področja logistike in s tem dijakom logistične smeri predstavimo novo tehnično moderno snov, kot nadgradnjo obstoječih učnih načrtov.

Polona Gros Remec je ugotovila, da so dijaki z uporabo računalniške simulacije bolj samostojni, prav tako pa s pomočjo uporabe elektronskih pripomočkov razvijajo sposobnosti za obdelavo informacij, prejetih iz elektronskih virov (Orel, Brala-Mudrovčič in Miletič 2022).

Dron je brezpilotno zračno plovilo, ki ga krmilimo s pomočjo daljinskih upravljalnikov. Beseda dron izhaja iz angleške besede »drone« (Arlič, Pušnik, 2021). Dron je brezpilotno letalo, ki je sestavljeno iz okvirja, na katerega so pritrjeni brezkrtačni motorji. Poleg teh komponent ima osnovni dron še regulator motorjev in krmilnik za komunikacijo med komponentami ter povezavo z zemljo, od kjer uporabnik upravlja dron. Prvi droni, ki so se pojavili pri nas, so bili narejeni v domači delavnici s kupljenimi komponentami preko tujih spletnih trgovin. Kasneje so začeli na drone pritrjevati kamere za snemanje okolice ali panoramskih posnetkov.

V naslednjem razvojnem koraku so podjetja začela sama izdelovati drone, ki so imeli že vse zgoraj omenjene komponente, samo priključil si ga na napajanje in že si lahko letel z njim. Vse je bilo že vnaprej pripravljeno za uporabnika, da lahko enostavno leti in snema okolico, za različne namene, ki niso bili opredeljeni.

V Sloveniji se je začelo dogajati, da so ljudje kupovali drone, niso pa imeli veščin, kako dron deluje ter kako ga upravljati in v kakšnih razmerah. Težave so se začele pojavljati, ko so droni zaradi nepravilne uporabe, tj. nepravilnih komand, povzročali nesreče. Druga težava, ki se je pojavljala, pa je bila ta, da so ljudje brez dovoljenja snemali ali slikali okolico, za katero niso imeli pooblastila, da lahko to počnejo.

Zaradi tega so v Sloveniji določili naslednja pravila za uporabnike dronov (Slovenska poslovna točka, 2024):

- pri nakupu drona je potrebno dron registrirati in urediti usposabljanje v skladu z predpisi EU pri Javni agenciji za civilno letalstvo RS,
- uporabnik mora sam preveriti, kje lahko in kje ne sme leteti, na spletni strani je objavljen zemljevid (Javna agencija za civilno letalstvo Republike Slovenije, 2024).
- pet kilometrov od letališča je uporaba dronov popolnoma prepovedana,
- dron mora biti vedno v vidnem polju, razen kadar ima upravljalec dodatnega spremljevalca, vendar še vedno ne smeta preseči 120 metrov nad tlemi.

Glede na Uredbo 2019/947 se droni delijo v tri kategorije (Slovenska poslovna točka, 2024):

- odprta kategorija - znotraj kategorije se droni delijo v podkategorije. Vsaka podkategorija ima posebej določeno, koliko je lahko dron težek, na kakšni višini lahko leti, koliko mora biti oddaljen od objektov in ljudi. Za uporabo te kategorije mora narediti upravljalec tečaj in izpit. Masa drona je v tej kategoriji omejena na 250 g. Dron lahko ima kamero, ki zajema sliko, razen če je to igrača, potem ne sme imeti kamere.
- posebna kategorija - v posebno kategorijo spadajo droni, ki imajo kakršno koli maso.
- certificirana kategorija za posebne namene in za posebna področja.

2. Zasnova priprave projekta

Strokovni izobraževalni center Ljubljana se z mednarodnimi projekti ukvarja že več kot 16 let. Imamo močno razvejane partnerje po Evropi in Balkanu. Zato smo se odločili, da bi idejo o vpeljavi novih tematik s področja brezpilotnih letal – dronov v učni proces razširili v mednarodni prostor. Glede na to, da imamo dobro zasnovano mrežo, smo preko te poiskali partnerje za izvedbo projekta. Projekt je bil prijavljen preko Erasmus+ KA2. V zaključni prijavi so se odzvale naslednje države: Španija, Italija, Grčija in Slovenija. Skupaj smo sestavili projekt, sestavljen iz dveh delov.

Bistvo Erasmus+ KA2 projektov temelji na konkretnih potrebah institucij oz. nacionalnih sistemih izobraževanja in usposabljanja. Takšna sodelovanja imajo praktično naravnost, v katerih se išče rešitev za izboljšanje sistema (Cmepius, 2024).

Idejo projekta smo razdelili v dva dela. Prvi del je bil bolj raziskovalno teoretičen, iz vidika uporabe teoretičnega dela pri predmetih stroke na tehničnih šolah. V tem delu nas je zanimalo, ali šole v tujini že uporabljajo drone pri pouku za namen izobraževanja.

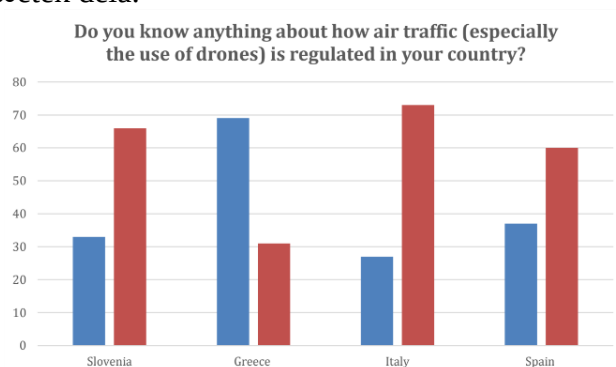
Drugi del pa smo si zadali bolj praktično, da bi udeleženci sami programirali drone in na ta način bolj podrobno spoznali delovanje samih dronov in podsistemov, ki jih je potrebno programirati. Poleg tega nas je zanimalo tudi kako in v kakšni meri se držijo posamezne države uporabe pravil za uporabo dronov ter kako ta pravila poznajo uporabniki v določenih državah.

Ideja drugega dela je bila predvsem takšna, da bi udeleženci lahko kupili dron, ki bi bil delno sestavljen in bi imel odprt krmilnik, preko katerega bi se dalo preprogramirati vse mehatronske sklope.

Prav tako smo v idejno zasnovo projekta vključili panogo STEM, kjer je za vsak opisan problem potrebno zastopati področja znanosti, tehnologije, inženiringa in matematike. S pomočjo teh področij se problematiko najlažje opiše na način, da je najbolj rešljiv (Wikipedia, 2024).

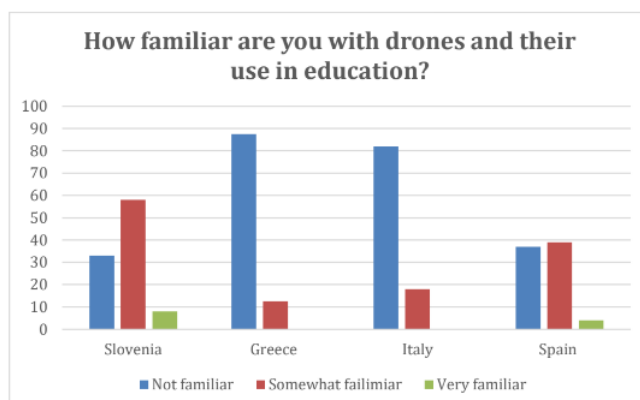
3. Analiza stanja v posameznih državah

V prvi fazi projekta smo naredili analizo stanja, da bi ugotovili, kakšno je stanje v posameznih državah in kako zastaviti začetno točko projekta. Začetna točka je pomembna zato, da imamo vsi partnerji iste pogoje za začetek dela.



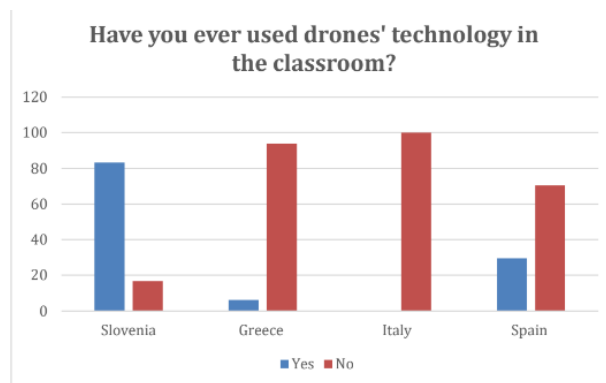
Slika 1: Ali poznate regulative in pravila, ki veljajo za vašo državo?

Rdeči del grafikona na sliki 1 predstavlja odgovor, da anketiranci poznajo regulative, moder pa predstavlja odgovor, da jih ne poznajo. Iz odgovorov lahko vidimo, da v Italiji najbolj poznajo regulative, ravno nasprotno pa se kaže za Grčijo.



Slika 2: Kako dobro ste seznanjeni s področjem uporabe dronov, ali to uporabljate pri pouku?

V Sloveniji in Španiji tematike povezane z droni že vključujejo v izobraževanje, čeprav je odstotek nizek, pod 10 %. Kljub temu so obravnavani. Rezultat je najvišji v Sloveniji, kjer je 60 % vprašanih odgovorilo, da jim je tematika poznana in da jih vključujejo v izobraževanje. Najnižji odstotek nepoznavanja tematike dronov je bil prikazan v Grčiji in Italiji. Rezultati najbolj zagotovo spodbujajo in dodatno motivirajo za izboljšanje stanja v vseh državah. To je tudi cilj projekta.

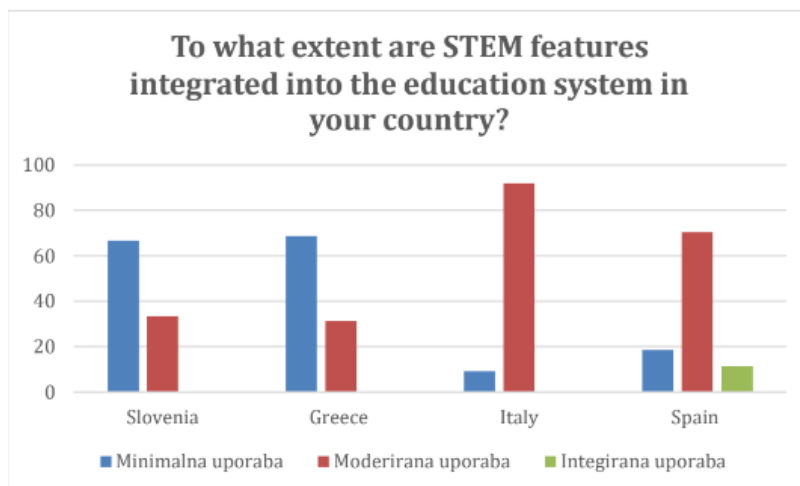


Slika 3: Ali ste že kdaj uporabili drone pri svojem pouku?

Rezultati iz slike 3 kažejo, da so v Sloveniji teme, povezane z droni že vključene v izobraževanje, odstotek je precej visok. V Italiji se s temi temami sploh ne ukvarjajo, kar je v popolnem nasprotju s Slovenijo.

Partnerjem projekta je bilo zastavljeno tudi vprašanje »Kateri programski jezik za programiranje je vam najbolj blizu?«. Večina anketirancev iz Slovenije je odgovorila, da jim je uporaba programskih jezikov sprejemljiva, najbolj so bili naklonjeni programskemu jeziku, kot je Python, morda zato, ker je najpogostejši pri predmetu z informacijskimi sistemi.

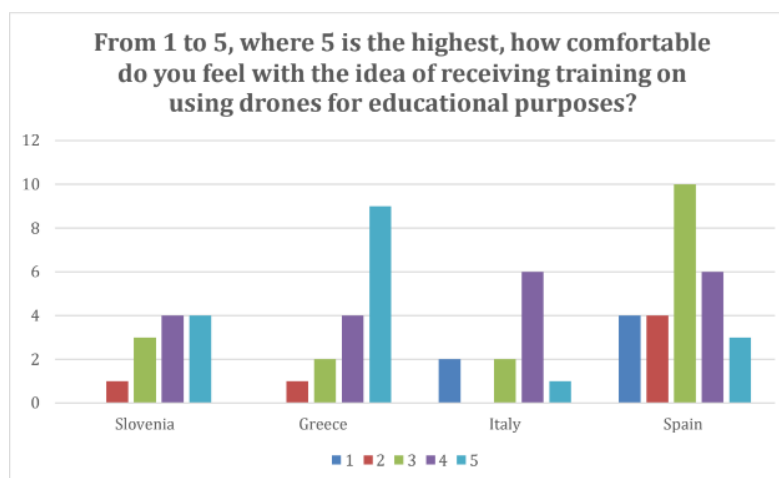
Večina anketirancev iz Grčije je odgovorila, da jim je uporaba programiranja, kot je Scratch najboljša. Večina anketirancev iz Italije je odgovorila, da jim je uporaba programiranja jezikov, kot je C++ najbolj blizu, morda zato, ker je najpogostejši pri predmetu z informacijskimi sistemi. Večina anketirancev iz Španije je odgovorila, da jim uporaba programiranja ni blizu, poznajo pa katerega od njih. Po drugi strani pa za tiste, ki se spoznajo na programski jezik, C++ je najbolj znan jezik in Python drugi. Iz odgovorov lahko sklepamo, da se programski jezik C++ uporablja v vseh partnerskih državah. Udeleženci iz Slovenije uporabljajo tako C++ kot Python. V Grčiji pa se pogosteje uporablja Scratch kot C++.



Slika 4: V kolikšni meri so funkcije STEM vključene v izobraževalni sistem?

Iz slike 4 razberemo, da je večina slovenskih anketirancev odgovorila, da so STEM funkcije minimalno integrirane v slovenski izobraževalni sistem. Večina anketirancev iz Grčije je odgovorila, da so funkcije STEM minimalno integrirane v grški izobraževalni sistem. Skoraj vsi anketiranci iz Italije so odgovorili, da so funkcije STEM zmerno integrirane v italijansko izobraževanje. Večina vprašanih iz Španije je odgovorila, da so funkcije STEM na nek način integrirane v baskovski

izobraževalni sistem. Mnenje španskih anketirancev je, da je disciplina STEM vključena v izobraževalni sistem v minimalnem obsegu v primerjavi z drugimi državami. Vključujejo tudi druge države discipline STEM, vendar le v omejenem/spremenljivem obsegu.



Slika 5: Od 1 do 5 ocenite, kakšna se vam zdi ideja, da bi uporabili tematike dronov v izobraževalne namene?

Iz slike 5 izhaja, da je večina vprašanih odgovorila, da se počutijo zelo zadovoljni z idejo prejemanja usposabljanja o uporabi dronov v izobraževalne namene.

4. Uporabni primeri in droni

Po začetni analizi smo ugotovili, da je pri vseh partnerjih v projektu zanimanje, da se tematike, povezane z droni, vključijo v izobraževalni proces, saj bi bil to dober doprinos k obstoječim učnim načrtom.

Uporaben primer, ki je naveden v nadaljevanju, ima vse elemente, da ga lahko učitelj uporabi pri svojih urah teorije. Lahko ga uporabi v celoti, lahko pa uporabi samo določene elemente iz primera. Bazira predvsem na orientaciji, kako smo si mi zamislili, da bi se tematike dronov uporabljale pri pouku.

Primer uporabnega primera:

1. Besedilo primera: Z dronom bi radi naredili osnovne premike ter zajemanje slik in shranjevanje na kartico.
2. Koraki izdelave: Za dani dron pripravimo programsko opremo, napišemo program za normalne premike ter uporabo kamere. Dron testno zaženemo, naredimo testne korake. Nato se vsak nov program testira na testnem poligonu, če dron ustreza vsem normativom, ki smo jih predvideli pri pisanju programa.
3. Potek dela: Udeleženec preko uporabniškega vmesnika napiše program, ga testira v testnem okolju in naloži na krmilnik drona. Po končanem nalaganju preizkusi dron še v resničnih razmerah, če res deluje, kot si je zamislil.

5. Zaključek

Udeležencem smo pripravili praktične primere, preko katerih so lahko sami ustvarjali različna okolja za uporabo dronov. Preko opravljene analize v vsaki državi smo določili skupno točko izhodišča začetka. Izbrali smo programsko okolje C++ za programiranje. Programski jezik je sicer malo težji, saj gre za jezik, ki se zapisuje s sintaksami. V ta namen bomo organizirali tudi kratke tečaje, preko katerih bodo učitelji učili učitelje, kako lahko najbolj enostavno programirajo osnovne programske ukaze preko dronov.

Opravljena analiza je pokazala, da si udeleženci želijo novih tematik s področja dronov, da to želijo vključiti v izobraževanje. Prav tako so naklonjeni temu, da bi imeli že pripravljene uporabne primere, preko katerih bi lažje izdelovali svoje lastne primere za uporabo dronov.

Kupili smo industrijsko narejen dron, z opcijo dostopa do krmilnika, kar omogoča, da dijaki bolj podrobno spoznajo samo drobovje drona ter ukaz po ukazu s spreminjanjem programa opazujejo spremembo na samem dronu. Tukaj se kaže predvsem uporaba programiranja in reakcija drona na posamezen korak v programiranju.

Anketirani učitelji v vseh državah so izrazili željo po nekem usposabljanju, ki bi moralo biti na mednarodni ravni, da bi bilo širše poskrbljeno, da bi lahko bili izobraževanja deležni vsi deležniki, tako dijaki kot učitelji.

Pomemben aspekt predstavlja tudi STEM, saj so za vsak primer, ki smo ga naredili, zastopana vsa področja, ki jih STEM pokriva - znanost, tehnologija, inženiring in matematika. Pomembno je predvsem zato, da daje širši vpogled, kaj je bilo vse zavzeto pri določenem projektu. Iz vidika razumevanja določenega primera bo preko teh področij veliko lažje, kot pa če bi opisovali primere po klasičnih postopkih, kot smo jih do nedavnega.

6. Viri

Javna agencija za civilno letalstvo Republike Slovenije, zemljevid področja Slovenije <https://caa-slovenia.maps.arcgis.com/apps/webappviewer/index.html?id=25ba69037c264c5faa5381174f76f861&fbclid=IwAR1vx5KkufPjZmLba7aFg-02nuUDEDrgAVnqPn6qJj4T1LYmxUrq8LIDP8Y> dostopno 22. 8. 2024

Slovenska poslovna točka, pregled delitve klasifikacij brezpilotnih letal <https://spot.gov.si/sl/dejavnosti-in-poklici/dovoljenja/brezpilotni-zrakoplovi-droni/> dostopno 22. 8. 2024

M. Orel, J. Brala-Mudrovčič in J. Miletič 2022) (ur). (2022). »Novi izzivi današnjega časa – priložnosti za vključevanje inovativnih rešitev v izobraževanje 21. stoletja« https://www.eduvision.si/Content/Docs/Zbornik_EDUvision_22.pdf 712 - 719

(Arlič, Pušnik, 2021), Raziskovalna naloga, Srednja šola za strojništvo, mehatroniko in medije, Mestna občina Celje Mladi za Celje, 2021 <https://www.knjiznica-celje.si/raziskovalne/4202105836.pdf>

Cmepius, 2024 Opis zgradbe projekta KA2 <https://www.cmepius.si/mednarodno-sodelovanje/moznosti-sodelovanja/erasmus/erasmus-ka2/> dostopno 22. 8. 2024

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The Use of Unmanned Aerial Vehicles (Drones) for Educational Purposes

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Abstract: Due to open curriculum, the Slovenian education system allows modern and up-to-date topics to be included in certain technical subjects. Each educator decides individually which topics are to be included in the open curriculum. Erasmus+ Project KA2Drones4 STEM has enabled us to introduce new topics and updates in the operation of drones as well as regulations and rules for flying drones. Students have used drones to learn how the mechatronics system works and how components in the system are interlinked. Students have also learned to program and through programming they have found out how specific modified commands influence the operation of a drone. An essential part of the project was the situational analysis for each country that was involved in the project. For each country we had provided the situational analysis before the project began which was a good starting point for task execution and drone use.

Keywords: drones, drones4STEM, STEM, unmanned aerial vehicles

1. The development of technology used in unmanned aerial vehicles - drones

Technological development in automobilism and other mechatronics systems is very advanced. People are encouraged to use sensors, controllers, as many electric drives as possible and various PV modules to generate electricity. It is interesting that we are all inclined to rapid development because we wish our electronic devices to be simple to use and because we strive for greater comfort.

Since our school successfully covers topics relating to car repairs and mechatronics we started searching for a possible effective contribution to the development of learning topics connected with the development of new technologies. Our goal was a new, accessible technology that would introduce new topics to students. We decided to use unmanned aerial vehicles – drones. This topic seemed interesting because of its wide range of usage which also covers the area of logistics. Consequently, the aforementioned topics can be introduced to the area of logistics and enable the students of logistics courses to discover a modern technological topic that represents an upgrade in current curriculum.

Polona Gros Remec has established that students are more independent when they use computer simulation. When students use electronic accessories, they are more skilled at processing information received from electronic resources (Orel, Brala-Mudrovčič and Miletić 2022).

A drone is an unmanned aerial vehicle that is steered by using remote controls. The word *drone* is of English origin (Arlič, Pušnik, 2021). A drone is a plane without a pilot and consists of a frame to which brushless motors are attached. Besides these components, a basic drone also has an engine regulator, a controller for the communication among the components and a connection with the ground where a user manages the drone. The first drones in Slovenia were made in home workshops with components bought in foreign online stores. Later people started attaching cameras for recording the surroundings or panoramic shots.

In the next stage of the development, companies started producing drones that had all of the aforementioned components – you just had to connect the drone to the power supply and it was ready to fly. Everything was prepared in advance so that the user could simply fly and record the surroundings for various purposes which were not defined.

In Slovenia, people started buying drones but they did not necessarily know how drones operate or how to use them and in what circumstances. Problems arose when drones were involved in accidents that were caused by inappropriate use, i.e. incorrect commands. Another problem was that people recorded or photographed the surroundings without permission which means that they were not authorised to do so.

For these reasons, the following rules for drone users were implemented in Slovenia (Slovenska poslovna točka, 2024):

- When buying a drone, registration is mandatory and pilots must take exams at the Civil Aviation Agency of the Republic of Slovenia to obtain the EU drone license.
- The user must check the permitted flying areas and no-fly zones, a map can be found on the website of the Civil Aviation Agency of the Republic of Slovenia (2024).
- The use of drones is absolutely forbidden within 5 kilometres from airports.
- A drone must always be in the field of view except when the drone manager has an additional companion. In any case, the maximum altitude of 120 metres above ground must be respected.

According to Regulation 2019/947 there are three drone categories (Slovenska poslovna točka, 2024):

- Open Category (with three subcategories). For each subcategory the drone weight is defined together with the permitted flight altitude and distance from buildings and people. In this category, a remote pilot has to take a course and pass the exam. The drone weight in this category is limited to 250 grams. A drone can be equipped with a camera that records the surroundings unless it is a toy – then a camera is not allowed.
- Specific Category – drones with any kind of weight fall into this category.
- Certified Category for special purposes and special areas.

2. The beginning of project preparation

Technical Education Centre Ljubljana (Strokovni izobraževalni center Ljubljana) has been involved in international projects for more than 16 years. We cooperate with many partners across Europe and the Balkans. Thus we decided to spread abroad the idea of introducing new topics regarding unmanned aerial vehicles – drones into the learning process. Due to our strong network it was possible to find partners for the project implementation. The project was registered via Erasmus+ KA2. In the final registration the following countries responded: Spain, Italy, Greece and Slovenia. Together we created a project with two parts.

Erasmus+ KA2 projects are basically founded on specific needs of institutions or national education and training systems. Such cooperations are practical and aim to find solutions for improving the system (Cmepius, 2024).

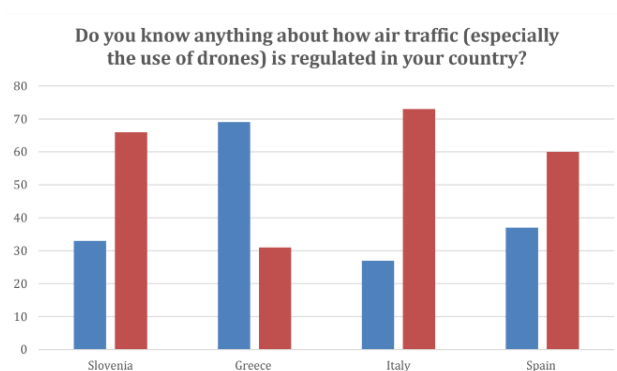
The idea for the project was divided into two parts. The first part involved research and theory from the point of view of the use of theory in technical subjects. We were interested to see whether schools abroad use drones for educational purposes in class.

The second part was more practical. We planned for the participants to program their drones themselves and thus learn how drones operate and also study the subsystems that have to be programmed. Furthermore, we were interested to see how and to what extent the rules for drone use are being followed in individual countries and how well the users from specific countries know these rules.

We had an idea for the realization of the second part. We wanted the participants to buy drones which would be partially assembled and would have an open-source flight controller that could enable all mechatronics assembly steps to be reprogrammed. The project is designed to include STEM where any given problem has to be considered within technical disciplines of science, technology, engineering and mathematics. These disciplines describe the problem in the most solvable way (Wikipedia, 2024).

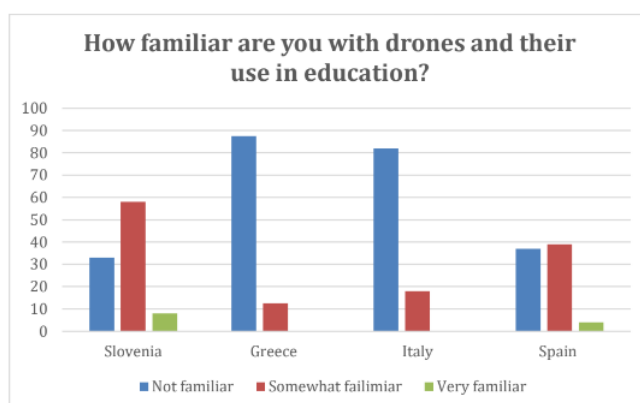
3. Situational analysis in individual countries

In the first stage of the project we conducted a situational analysis to find out the situation in individual countries and to decide upon the starting point of the project. The starting point is important because all partners need the same conditions at the beginning of the project.



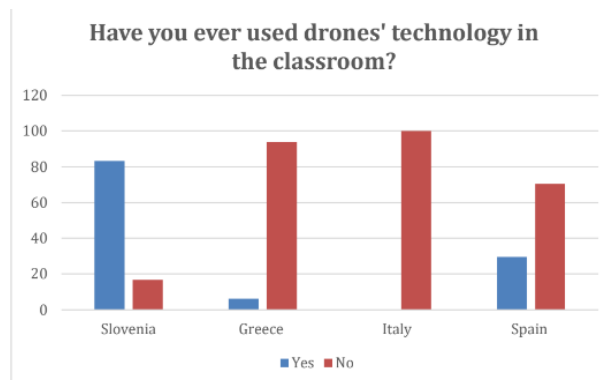
Picture 1: Do you know the regulations and rules that apply to your country?

The red column represents respondents who are aware of the regulations whereas the blue column represents those who are not familiar with the regulations. It is evident that Italians know their regulations the most but it is quite the opposite in Greece.



Picture 2: How familiar are you with drone use and do you use them in class?

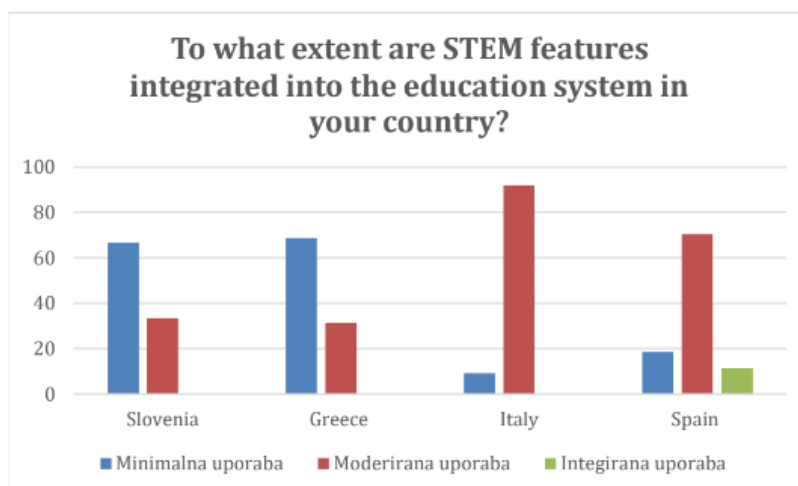
Drones are already being included in educational process in Slovenia and Spain but the percentage is quite low, below 10 %. Nevertheless, they are already present. The highest percentage is in Slovenia where 60 % of the respondents reported that they are familiar with the topic and that they include drones in their courses. The column chart shows that the respondents from Greece and Italy are the least familiar with drone use. The results encourage and additionally motivate for the improvement of conditions in all countries which is also the aim of the project.



Picture 3: Have you ever used drone technology in class?

The answers in picture 3 show that the topics related to drone technology are already included in education in Slovenia, the percentage is quite high. In Italy they ignore these topics which is in complete contrast to Slovenia.

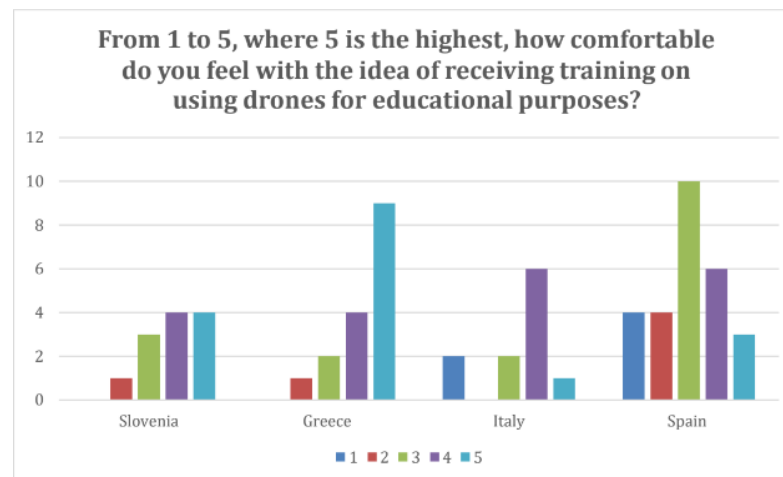
Our partners in the project were also asked the question: What programming language do you use most often? Most Slovenian respondents answered that they find the use of programming languages acceptable, they preferred Python, maybe because it is most commonly used in information systems courses. Most Greek respondents prefer Scratch. Most Italian respondents prefer C++, perhaps because it is most commonly used in information systems courses. Most Spanish respondents stated that they do not use programming but are familiar with some programming languages. Those who are familiar with programming languages recognize C++ the most and Python takes the second place. We can deduce from the answers that the programming language C++ is used in all partner countries. Slovenian participants use C++ as well as Python. Greek participants use Scratch more often than C++.



Picture 4: To what extent are STEM features integrated into the education system?

Picture 4 shows that most Slovenian respondents answered that STEM features are minimally integrated into the Slovenian education system. Most Greek respondents answered that STEM features are minimally integrated into the Greek education system. Almost all Italian respondents answered that STEM features are moderately integrated into the Italian education system. Most Spanish respondents answered that STEM features are in some way integrated into the Basque

education system. The Spanish respondents believe that STEM disciplines are minimally integrated into their education system compared to other countries. Other countries integrate STEM disciplines as well but only in limited/variable range.



Picture 5: From 1 to 5, how do you feel about using drone technology for educational purposes?

Picture 5 shows that most respondents are very comfortable with the idea of receiving training on using drones for educational purposes.

4. Useful examples and drones

After the initial analysis we found out that all partners are interested in integrating topics related to drones into their educational process because this would be a good contribution to their current curricula.

The useful example stated below contains all elements for a teacher to use it in theoretical lessons. It can be used in full or teachers can use only specified elements. It is mostly based on our idea of how the topics related to drones should be used in class.

An example of use:

4. The text of the example: We would like our drone to do basic movements, record pictures and save to card.
5. Steps of manufacturing: We prepare the drone software, write a program for basic movements and camera use. We test run the drone and perform test steps. After that each new program is tested on the testing ground if the drone fits the norm that was expected when the program was written.
6. Workflow: A participant uses a user interface to write a program, then tests it in a test environment and uploads it to the drone's controller. After that the participant tests the drone in real situations to see if it works as planned.

5. Conclusion

Participants were given useful examples to help them in creating different environments to use drones. An initial analysis in each country established the starting point. Programming environment C++ was chosen for programming. This programming language is a little bit more difficult because it is written in syntax. For this purpose we will organize short courses where teachers are going to instruct other teachers how to simply program basic commands for drones.

The finished analysis has shown that participants want new drone technology topics to be included in the education. Furthermore, they are inclined to examples of use prepared beforehand which would help them to come up with their own examples for drone use.

We bought an industrial drone with free controller access that enables the students to study drones in more detail and can see a change in the drone after a command has been altered in the program. In such cases the use of programming and drone's reactions to individual steps in programming become evident.

Teachers from all countries who participated in the survey have expressed a wish for some sort of training which should be international so that training would be available to students as well as teachers.

An important aspect is also STEM because each provided example includes STEM disciplines – science, technology, engineering and mathematics. It provides a broader insight into everything that was included in a specific project. When considering a specific example, these disciplines will enable understanding which should be much easier than describing examples in a traditional way as we did until recently.

6. Sources

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BICIKLOM VIDLJIVI DO ŠKOLE

Sažetak:

Biciklisti spadaju u ranjivu kategoriju sudionika u prometu sa velikom vjerojatnošću za stradavanje noću, ali i danju u uvjetima smanjene vidljivosti ako nisu vidljivi za druge sudionike u prometu.

Kako bi bili vidljivi na prometnicima moraju biti označeni reflektirajućim oznakama na biciklu, prslucima te odgovarajućom biciklističkom odjećom. Dovoljna razina osvijetljenosti u noćnim uvjetima vožnje znatno doprinosi sigurnosti biciklista, a time i sigurnosti za druge sudionike u prometu.

Vozači bicikla moraju upravljati vozilom tako da ne umanjuju stabilnost vozila i ne ometaju druge sudionike u prometu, te se kretati obilježenim dijelovima prometnice.

Promjenom sredine školovanja učenici iz ruralnih područja dolaze u srednje škole u grad gdje je promet puno opasniji i složeniji. Veliki broj učenika Strojarske i prometne škole je iz neposredne blizine grada Varaždina pa do škole posebice za ljepšeg vremena dolaze biciklom. Isto tako bave se različitim sportovima i izvannastavnim aktivnostima gdje im je također osnovno prijevozno sredstvo bicikl.

Kako bi se povećala sigurnost biciklista potrebno ih je educirati o pravilima ponašanja na prometnici i mogućim opasnostima te načinima prevencije.

Cilj ovog rada je predstaviti aktivnosti kojima se nastavnici u Strojarskoj i prometnoj školi bave kako bi prevenirali prometne nesreće sa biciklistima, istražiti postojeće stanje biciklističkih staza i traka u Varaždinskoj županiji te statistiku prometnih nesreća sa biciklistima.

Istraživanje će se provesti na temelju statističkih podataka i registra biciklističkih traka i staza u Varaždinskoj županiji. U sklopu rada biti će predstavljeni i rezultati provedenog projekta.

Ključne riječi: *vidljivost, biciklisti, sigurnost, prometne nesreće, reflektirajuće oznake, biciklističke staze i trake*

1. UVOD

Osnovna obilježja biciklističkog prometa proizlaze iz činjenice da se prijevozno sredstvo pokreće snagom čovjeka, da je za upravljanje vozilom na dva kotača potrebna vještina održavanja ravnoteže te da se tim prijevoznim sredstvom na javnoj površini smiju kretati osobe starije od 14 godina. Prema odredbama Zakona o sigurnosti prometa na cestama biciklom na cesti samostalno smije upravljati samo osoba koja je navršila 14 godina, a djeca s navršених 9 godina samo u pratnji osobe starije od 16 godina, dok djeca mlađa od 9 godina ne smiju sudjelovati u prometu na cesti vozeći bicikl. Starije osobe mogu upravljati biciklom bez ograničenja starosne dobi.

To znači da je bicikl vrlo dostupno prijevozno sredstvo svim starosnim skupinama, da nema provjere psihofizičke sposobnosti biciklista (osim za mlađe od 14 godina) te je povećan rizik u prometu na zajedničkim površinama s motornim vozilima.

S obzirom da se za kretanje bicikla koristi snaga čovjeka, brzina kretanja i duljina prijevoza je ograničena tako da je biciklistički promet kvalitetna alternativa drugim oblicima prijevoza na kraće udaljenosti i na povoljnom topografskom terenu.

Zbog toga su upravo gradska područja manjih i srednjih gradova najpogodnija za razvoj biciklističkog prometa. Ekološka i ekonomska prihvatljivost kao i zdravstveni učinak dodatni su argumenti za stvaranje odgovarajuće prometne infrastrukture. Biciklizam se sve više koristi i kao oblik sporta, rekreacije i turizma (cikloturizam). Takav oblik biciklističkog prometa zahtijeva prometne površine izvan naselja i korištenje javnog prijevoza za prijevoz bicikala.

2. PRAVILA ZA KRETANJE BIKIKLISTA

Vozači bicikla dužni su se kretati biciklističkom stazom ili biciklističkom trakom, a ako one ne postoje, što bliže desnom rubu kolnika.

Vozač bicikla koji se kreće kolnikom na javnoj cesti izvan naselja dužan je noću i danju u slučaju smanjene vidljivosti biti označen reflektirajućim prslukom ili reflektirajućom biciklističkom odjećom. Ako se dva ili više vozača bicikala, mopeda ili motocikala kreću u skupini, dužni su kretati se jedan iza drugoga.

Vozač bicikla, mopeda i motocikla mora upravljati vozilom na način kojim se ne umanjuje stabilnost vozila i ne ometaju drugi sudionici u prometu, a osobito ne smije skidati istodobno obje ruke s upravljača, pridržavati se za drugo vozilo, prevoziti, vući ili gurati predmete koji ga mogu ometati u upravljanju vozilom ili ugrožavati druge sudionike u prometu.

3. REGISTAR BIKIKLISTIČKIH PROMETNICA NA PODRUČJU REPUBLIKE HRVATSKE

Provođenjem Nacionalnog plana razvoja biciklističkog prometa u razdoblju od 2023. do 2027. godine, izrađena je detaljna analiza stanja biciklističke infrastrukture i investicijskih potreba za glavne državne biciklističke prometnice u Republici Hrvatskoj, te je i grad Varaždin uključen u taj plan.

U Republici Hrvatskoj duljina državnih biciklističkih prometnica bez preklapanja na državnim, županijskim, lokalnim i nerazvrstanim cestama iznosi oko 4.175 km, a na Varaždinsku županiju otpada ukupna duljina od 59,4 km ili 2% ukupne duljine biciklističkih prometnica RH.

Tablica 1. Duljina državnih glavnih biciklističkih prometnica (u km) po okolnim županijama prema kategorizaciji javnih cesta (biciklističke rute po državnim, županijskim, lokalnim i nerazvrstanim cestama).

Županija	Duljina u koridoru državnih cesta (km)	Duljina u koridoru županijskih i lokalnih cesta (km)	Duljina u koridoru nerazvrstanih cesta (km)	Ukupna duljina (km)
Krapinsko-zagorska	31,1	37,1	17,6	85,8
Međimurska	17,8	50,2	34,8	102,8
Varaždinska	7,6	36,0	15,8	59,4
Virovitičko-podravska	23,9	147,6	22,8	194,3
Zagrebačka	14,9	65,0	53,4	133,3
Grad Zagreb	0,0	0,0	64,8	64,8

Ukupni procijenjeni investicijski trošak ulaganja u mrežu glavnih državnih biciklističkih prometnica prema Nacionalnom planu razvoja biciklističkog prometa u RH iznosi oko 113 milijuna EUR-a, a za Varaždinsku županiju predviđeno je 2.245.700,00 eura za dionicu Varaždin - Zagreb „Zagorska ruta“.

3.1. Mreža biciklističkih prometnica u koridoru državnih cesta

Biciklističkim prometnicama upravljaju Hrvatske ceste, Županijske uprave za ceste, a nerazvrstane biciklističke prometnice su pod upravljanjem gradova.

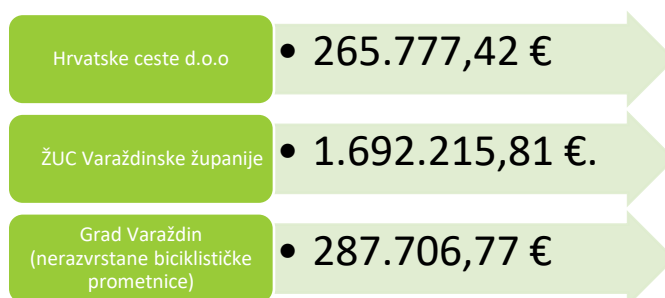
Prema podacima o trenutnoj mreži biciklističkih prometnica te planiranim aktivnostima izgradnje nove od strane Hrvatskih cesta d.o.o., a zaključno sa 2022. godinom, ukupna duljina izgrađenih biciklističkih prometnica (staza i traka) iznosila je oko 436 km, a na Varaždinsku županiju otpada 45 km.

3.2. Planirane aktivnosti izgradnje novih biciklističkih prometnica od 2023. do 2027.

Planirane aktivnosti izgradnje novih biciklističkih prometnica od 2023. do 2027. godine iznosi sveukupno oko 295 km, što je povećanje za oko 68 % u odnosu na 2021. godinu, pri čemu su planirana financijska ulaganja u iznosu oko 26,7 milijuna EUR-a ili oko 91.000 EUR-a/km. Prosječna godišnja vrijednost planiranih ulaganja Hrvatskih cesta d.o.o. u mrežu biciklističkih prometnica po stanovniku RH iznosi oko 1,4 EUR-a. Hrvatske ceste d.o.o. na području Varaždinske županije planiraju ulaganja u biciklističke prometnice vremenskom periodu od 2023. do 2027. godine od 265.777,42 €.

Osim ulaganja Hrvatskih cesta d.o.o. na području Varaždinske županije, Županijska uprava za ceste planira uložiti i vlastita sredstva u biciklističke prometnice.

U planiranom vremenskom razdoblju od 2023.-2027. godine planira uložiti još dodatno u izgradnju 13 kilometara biciklističkih ruta u vrijednosti od 1.692.215,81 €. Ako se tome pridoda i ulaganje grada Varaždina u nerazvrstane biciklističke prometnice ukupno ulaganje prelazi 2.245.700,00 eura.



Slika 1. Prikaz ulaganja pojedinih upravitelja biciklističkih prometnica na području Varaždinske županije

Ukupnim ulaganjem Hrvatskih cesta d.o.o. i ŽUC-a Varaždinske županije povećati će se sigurnost biciklističkog prometa u gradu Varaždinu i Varaždinskoj županiji. Prosječna godišnja vrijednosti planiranih ulaganja u biciklističku infrastrukturu Varaždinske županije iznosi 1,3 eura po stanovniku što će uveliko pridonijeti sigurnosti kretanja biciklista.

4. STATISTIKA PROMETNIH NESREĆA SA BIKIKLISTIMA

Na području Republike Hrvatske u 2023. godini dogodilo se ukupno 34.604 prometnih nesreća, a bicikl kao prijevozno sredstvo sudjelovao je u 1385 nesreća. Ukupno je poginulo 18 biciklista, 357 ih je teško ozlijeđeno, a 678 lakše ozlijeđeno.

Na području Varaždinske županije u 2023. godini zabilježene su sveukupno 1194 prometne nesreće. U 70 prometnih nesreća sudjelovali su biciklisti, gdje su bile 52 ozlijeđene osobe, 17 nesreća je bilo sa materijalnom štetom i 1 s poginulom osobom.

Tablica 2. Poginule osobe u prometnim nesrećama prema vrsti vozila (bicikl) u Republici Hrvatskoj posljednjih 10 godina

Godina	2014.	2015.	2016.	2017.	2018.	2019.	2020.	2021.	2022.	2023.
Broj poginulih	19	34	27	23	22	16	9	28	11	18

Iz tablice je vidljivo da broj poginulih biciklista varira iz godine u godinu te je 2020. znatno pao broj poginulih što je logično zbog pandemije korona virusa, ali u 2021. godini je izuzetno puno poginulih biciklista.

Tablica 3. Prikaz broja prometnih nesreća sa biciklistima prema vrsti vozila u Varaždinskoj županiji

GODINA	BROJ PROMETNIH NESREĆA	POGINULI	TEŠKO OZLIJEĐENI	LAKŠE OZLIJEĐENI	MATERIJALNA ŠTETA
2019.	49	2	10	31	6
2020.	56	1	23	25	7
2021.	76	3	16	37	20

2022.	83	0	21	49	13
2023.	70	1	13	39	17

Iz tablice je vidljivo da broj prometnih nesreća sa biciklistima varira posljednjih 5 godina, ali i da je i dalje izuzetno visok što nam govori da je potrebno još više raditi na prevenciji od najranije dobi.

5. PROJEKT BIKIKLOM VIDLJIVI DO ŠKOLE

Projekt Biciklom vidljivi do škole provela je Strojarska i prometna škola u suradnji sa Ministarstvom unutarnjih poslova u sklopu Nacionalnog plana sigurnosti cestovnog prometa.

Projekt je prijavljen i prošao na natječaju za sufinanciranje iz Nacionalnog plana sigurnosti cestovnog prometa u 2022. godini.

Sredstva koja su projektom odobrena iznose 4.446 eura od čega je 3.112,35 eura iz projekta, a 1333,86 eura je sufinanciranje škole. Ugovor je potpisan 17. svibnja 2023., a završetak je bio 17. svibnja ove godine. Cilj projekta „Biciklom vidljivi do škole“ je povećati sigurnost učenika biciklista srednjih i osnovnih škola te smanjiti broj prometnih nesreća.

5.1. Opis projekta

Projekt “Biciklom vidljivi do škole” je u skladu sa Nacionalnim planom sigurnosti cestovnog prometa za razdoblje 2021. – 2030. godine koji se temelji na smanjenju teških prometnih nesreća sa poginulim osobama u kojima su nerijetko sudionici i biciklisti. Kako bi se povećala sigurnost biciklista potrebno ih je educirati o pravilima ponašanja na prometnici i mogućim opasnostima te načinima prevencije prvenstveno pravilnom označavanju da budu vidljivi za druge sudionike u prometu.

Projekt “Biciklom vidljivi do škole” osmišljen je tako da se učenici izabranih osnovnih(završni razredi) i srednje Strojarske i prometne škole (prvi razredi) koji svakodnevno koriste bicikl informiraju o važnosti vidljivosti i pravilnog kretanja u prometu. Ove skupine učenika odabrane su iz razloga velike mobilnosti i svakodnevnog korištenja bicikla, te samim time pripadaju u najugroženije skupine sudionika u prometu.

Promjenom sredine školovanja učenici iz ruralnih područja dolaze u srednje škole u grad gdje je promet puno opasniji i složeniji. Veliki broj učenika Strojarske i prometne škole je iz neposredne blizine grada Varaždina pa do škole posebice za ljepšeg vremena dolaze biciklom. Isto tako bave se različitim sportovima i izvanastavnim aktivnostima gdje im je također osnovno prijevozno sredstvo bicikl.

5.2. Aktivnosti u projektu

Projekt je proveden u školskoj godini 2023./2024. u 4 osnovne i u jednoj srednjoj školi. Najprije su izrađeni materijali i naručena biciklistička oprema, a zatim su održane radionice sa zanimljivim interaktivnim materijalima.

5.2.1. Izrada materijala i održavanje radionica

Nastavnici prometne skupine predmeta iz Strojarske i prometne škole njih šestero osmislili su materijale u obliku powerpoint prezentacije kroz koju su učenicima objašnjena pravila ponašanja

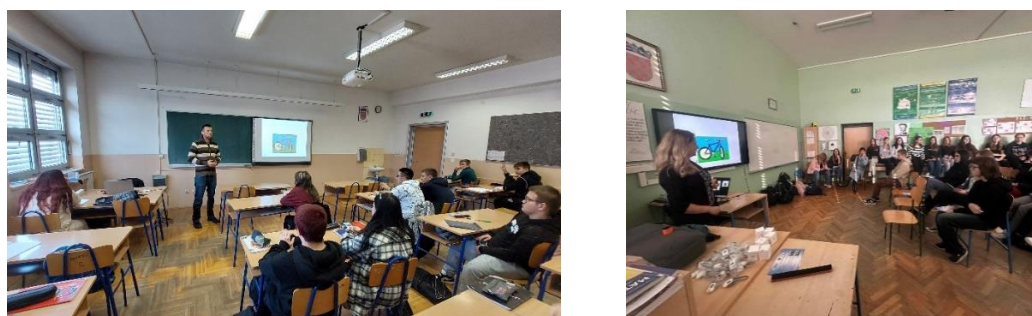
biciklista u prometu, pravilno označavanje biciklista i prometni znakovi koji se odnose na bicikliste. Kroz radionicu učenici su aktivno sudjelovali odgovaranjem na pitanja i logičkim zaključcima vezanim za biciklistički promet.

Za provođenje radionica izrađen je promotivno-edukativni letak na kojem je bio QR kod. Preko QR koda učenici su na kraju radionice pristupili ispitu i pokazali svoje postojeće i stečeno znanje vezano uz sudjelovanje u prometu sa biciklom. Najbolji učenici nagrađeni su prigodnim poklonima za bolju sigurnost u biciklističkom prometu.



Slika 2.i 3. Promotivno-edukativni letak

Radionice su provedene u osnovnoj školi Kneginec Gornji, Sračinec, Druškovec, Radovan, a u srednjoj Strojarškoj i prometnoj školi u projektu su sudjelovali razredi 1.B, 1.D, 1.H, 1.J i 1.E. U radionicama sudjelovalo je ukupno 237 učenika.



Slika 4.i 5. Održavanje radionica po školama

5.2.2. Nabavka biciklističke opreme

U sklopu projekta, a sa ciljem poboljšanja vidljivosti učenika-biciklista nabavljene su reflektirajuće narukvice, svjetla i zvona za bicikle koji su podijeljeni učenicima u sklopu radionica.



Slika 6. Biciklistička oprema

6. ZAKLJUČAK

Na području Grada Varaždina stanovništvo se uglavnom koristi individualnim prometom i to korištenjem osobnih automobila i bicikla dok se u prometnim tokovima šireg teritorijalnog značaja nadopunjuje javnim cestovnim i željezničkim prometom. Biciklistički promet u Gradu Varaždinu ima dugu tradiciju i značajnu ulogu. Korištenju bicikla kao prijevoznog sredstva pogoduje ravničarski teren i relativno male prostorne udaljenosti između mjesta rada, stanovanja i rekreacije (polazišta i odredišta putovanja). Osim toga, u suvremenim uvjetima života, biciklistički promet postaje poželjan oblik prijevoza jer je ekološki prihvatljiv, učinkovit i doprinosi očuvanju zdravlja osoba koje ga koriste.

Zbog navedenih prednosti biciklističkom prometu je potrebno osigurati odgovarajuću prometnu infrastrukturu čime bi se poboljšala sigurnost prometa, omogućilo masovnije korištenje bicikla kao i integracija s drugim oblicima javnog prijevoza. Praćenjem statističkih podataka dolazimo do zaključka da se unatoč svim dosadašnjim naporima vezanim uz edukaciju, poboljšanje infrastrukture, većim kaznama ipak još uvijek događa veliki broj prometnih nesreća sa biciklistima, pa je na tome potrebno stalno raditi i uključiti što veći broj sudionika od najranije dobi.

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STROJARSKA I PROMETNA ŠKOLA VARAŽDIN

Monika Žganec, mag. ing. traff.
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VISIBLE ON THE WAY TO THE SCHOOL BY BIKE

Summary:

Cyclists are considered a vulnerable category of road users with a high likelihood of accidents both at night and during the day in conditions of reduced visibility if they are not visible to other traffic participants-

To be visible on the road, they must be marked with reflective marks on the bicycle, vests, and appropriate cycling clothing. An adequate level of illumination during night riding, significantly contributes to the safety of cyclists and, consequently, the safety of other traffic participants.

Bicyclists must operate their vehicles in a manner that does not diminish the stability of the vehicle or obstruct other road users and must use designated parts of the roadway.

When changing educational environments, students from rural areas come to high schools in the city where traffic is much more dangerous and complex. A large number of students from the Mechanical and Traffic School come from the immediate vicinity of Varaždin and often ride bicycles to school, especially in nicer weather. They are also involved in various sports and extracurricular activities where the bicycle is their primary mode of transport.

To increase cyclist safety, they need to be educated about traffic rules, potential dangers, and prevention methods.

The aim of this paper is to present the activities that teachers at the Mechanical and Traffic School undertake to prevent traffic accidents involving cyclists, to explore the current state of bicycle paths and lanes in Varaždin County, and to analyze traffic accident statistics involving cyclists.

The research will be conducted based on statistical data and the register of bicycle lanes and paths in Varaždin County. The paper will also present the results of the implemented project.

Keywords: visibility, cyclists, safety, traffic accidents, reflective marks, bicycle paths and lanes

1. INTRODUCTION

The main characteristics of bicycle traffic derive from the fact that the vehicle is powered by human strength, that riding a two-wheeled vehicle requires the skill of maintaining balance, and that only individuals over the age of 14 are permitted to ride this vehicle in public spaces. According to the provisions of the Road Traffic Safety Law, only persons who are at least 14 years old are allowed to ride a bicycle independently on the road, while children aged 9 and older may do so only under the supervision of a person aged 16 or older. Children younger than 9 years old are not permitted to participate in road traffic by riding a bicycle. Older individuals can ride bicycles without age restrictions.

This means that bicycles are highly accessible transportation means for all age groups, there is no verification of the cyclists' physical and mental capabilities (except for those under 14 years old), and there is an increased risk in traffic on surfaces shared with motor vehicles.

Since bicycles are powered by human strength, their speed and travel distance are limited, making bicycle traffic a viable alternative to other forms of transportation for shorter distances and on favorable topographic terrain.

Therefore, urban areas of small and medium-sized towns are most suitable for the development of bicycle traffic. Environmental and economic acceptability, as well as health benefits, are additional arguments for creating appropriate traffic infrastructure. Cycling is increasingly used as a form of sport, recreation, and tourism (cycle tourism). This type of bicycle traffic requires traffic areas outside settlements and the use of public transport for bicycle transportation.

2. RULES FOR CYCLIST MOVEMENT

Bicycle riders are required to use the bicycle lane or bicycle path, and if these do not exist, to ride as close as possible to the right edge of the roadway.

A cyclist riding on the roadway of a public road outside of a settlement is required to wear a reflective vest or reflective cycling clothing at night and during the day when visibility is reduced. If two or more cyclists, moped riders, or motorcyclists are traveling in a group, they must ride one behind the other.

A cyclist, moped rider, or motorcyclist must operate their vehicle in a manner that does not reduce the vehicle's stability or interfere with other road users. In particular, they must not remove both hands from the handlebars simultaneously, hold onto another vehicle, transport, tow or push objects that could impede their control of the vehicle or endanger other road users.

3. REGISTER OF CYCLING ROUTES IN THE REPUBLIC OF CROATIA

With the implementation of the National Plan for the Development of Bicycle Traffic for the period from 2023 to 2027, a detailed analysis of the state of bicycle infrastructure and investment needs for the main national cycling routes in the Republic of Croatia was conducted, and the city of Varaždin was included in this plan.

In the Republic of Croatia, the length of national cycling routes, excluding overlaps on state, county, local, and unclassified roads, is approximately 4,175 km, with Varaždin County accounting for a total length of 59.4 km, or 2% of the total length of cycling routes in Croatia.

Table 1. Length of Main National Cycling Routes (in km) by Surrounding Counties According to the Categorization of Public Roads (Cycling Routes on State, County, Local, and Unclassified Roads)

Country	Length in State Road Corridors (km)	Length in County and Local Road Corridors (km)	Length in Unclassified Road Corridors (km)	Total Length (km)
Krapinsko-zagorska	31,1	37,1	17,6	85,8
Međimurska	17,8	50,2	34,8	102,8
Varaždinska	7,6	36,0	15,8	59,4
Virovitičko-podravska	23,9	147,6	22,8	194,3
Zagrebačka	14,9	65,0	53,4	133,3
Grad Zagreb	0,0	0,0	64,8	64,8

The total estimated investment cost for the main national cycling route network according to the National Plan for the Development of Bicycle Traffic in Croatia is approximately 113 million EUR. For Varaždin County, 2,245,700 EUR is allocated for the section Varaždin - Zagreb "Zagorska Route".

3.1. Network of Cycling Routes in the State Road Corridor

Cycling routes are managed by Hrvatske ceste, County Road Administrations, while unclassified cycling routes are under the management of cities.

According to the data on the current network of cycling routes and the planned activities for the construction of new ones by Hrvatske ceste d.o.o., ending with the year 2022, the total length of the built cycling routes (paths and lanes) was about 436 km, with Varaždin County accounting for 45 km.

3.2. Planned Activities for the Construction of New Cycling Routes from 2023 to 2027

The planned activities for the construction of new cycling routes from year 2023 to year 2027 amount to a total of approximately 295 km, which is an increase of about 68% compared to 2021. The planned financial investments are around 26.7 million EUR, or about 91,000 EUR/km. The average annual value of planned investments by Hrvatske ceste d.o.o. in the cycling route network is around 1.4 EUR per inhabitant of Croatia. Hrvatske ceste d.o.o. plan to invest 265,777.42 EUR in cycling routes in Varaždin County over the period from 2023 to 2027.

In addition to investments by Hrvatske ceste d.o.o. in Varaždin County, the County Road Administration also plans to invest its own funds in cycling routes.

During the planned period from 2023 to 2027, it intends to invest in the construction of an additional 13 kilometers of cycling routes worth 1,692,215.81 EUR. Including the investment by the city of Varaždin in unclassified cycling routes, the total investment exceeds 2,245,700.00 EUR.



Image 1. Overview of investments by individual administrators of bicycle roads in Varaždin County

The total investment by Hrvatske ceste d.o.o. and the County Road Administration of Varaždin County will increase the safety of bicycle traffic in the city of Varaždin and Varaždin County. The average annual value of planned investments in bicycle infrastructure in Varaždin County amounts to 1.3 euros per county resident, which will greatly contribute to the safety of cyclists.

4. STATISTICS OF TRAFFIC ACCIDENTS INVOLVING CYCLISTS

In the territory of the Republic of Croatia in the year 2023, a total of 34,604 traffic accidents occurred, with bicycles involved in 1,385 of them. A total of 18 cyclists were killed, 357 suffered severe injuries, and 678 sustained minor injuries.

In the Varaždin County area in 2023, a total of 1,194 traffic accidents were recorded. Cyclists were involved in 70 of these accidents, resulting in 52 injured persons, 17 accidents with material damage, and 1 fatality.

Table 2. Fatalities in traffic accidents by type of vehicle (bicycle) in Croatia over the past 10 years

Year	2014.	2015.	2016.	2017.	2018.	2019.	2020.	2021.	2022.	2023.
Number of fatalities	19	34	27	23	22	16	9	28	11	18

It is evident, from data presented in the table, that the number of cyclist fatalities varies from year to year. In 2020, there was a significant decrease in cyclist fatalities, which is logical due to the coronavirus pandemic. However, in 2021, there were tremendously high cyclist fatalities.

Table 3. Review of the number of traffic accidents involving cyclists by type of vehicle in Varaždin County

YEAR	NUMBER OF TRAFFIC ACCIDENTS	FATALITIES	SEVERELY INJURED	MINORLY INJURED	MATERIAL DAMAGE
2019.	49	2	10	31	6
2020.	56	1	23	25	7
2021.	76	3	16	37	20
2022.	83	0	21	49	13
2023.	70	1	13	39	17

It is evident, from data presented in the table, that the number of traffic accidents involving cyclists has varied over the last 5 years, but remains exceptionally high. This indicates that more efforts are needed in prevention from the earliest ages.

5. PROJECT VISIBLE ON THE WAY TO THE SCHOOL BY BIKE

The project "Visible On The Way To The School By Bike" was implemented by the School of Mechanical Engineering and Traffic in collaboration with the The ministry of the Internal Affairs Republic of Croatia as part of the National Road Traffic Safety Plan.

The project was submitted and approved for co-financing of the funds from the National Road Traffic Safety Plan in the year 2022.

The funds approved for the project amount to 4,446 euros, of which 3,112.35 euros are from the project itself, and 1,333.86 euros are co-financed by the school. The contract was signed on May 17, 2023, and the completion date was May 17 of this year. The goal of the "Visible On The Way To The School By Bike" is to enhance the safety of middle and elementary school student cyclists and reduce the number of traffic accidents.

5.1. Project description

The project "Visible On The Way To The School By Bike" is in accordance with the National Road Traffic Safety Plan for the period 2021-2030, which aims to reduce severe traffic accidents resulting in fatalities, often involving cyclists. To enhance cyclist safety, it is necessary to educate them about road behavior rules, potential hazards, and prevention methods, focusing on proper visibility marking to ensure they are visible to other traffic participants.

The project "Visible On The Way To The School By Bike" is designed to inform students from selected elementary schools (final grades) and the first grades of the School of Mechanical Engineering and Traffic, who regularly use bicycles, about the importance of visibility and proper traffic behavior. These groups of students were selected due to their high mobility and daily use of bicycles, and are therefore classified as the most vulnerable groups of traffic participants.

With the change in their schooling environment, students from rural areas attend high schools in urban areas where traffic is much more dangerous and complex. Many students of the School of Mechanical Engineering and Traffic come from the immediate vicinity of the city of Varaždin and often ride bicycles to school, especially in nicer weather. They are also involved in various sports and extracurricular activities where bicycles serve as their primary means of transportation.

5.2. Activities in the project

The project was implemented in the school year 2023/2024 in 4 elementary schools and 1 high school. Initially, materials were prepared and cycling equipment was ordered, followed by workshops with interesting interactive materials.

5.2.1. Development of materials and holding workshops

Six traffic subjects group teachers at the School of Mechanical Engineering and Traffic designed materials in the form of a PowerPoint presentation to explain the rules of behavior for cyclists in traffic, proper marking of cyclists, and traffic signs relating to cyclists to students. During the workshop, students actively participated by answering questions and making logical conclusions related to cycling traffic.

To conduct the workshops, a promotional and educational leaflet containing a QR code was created. At the end of the workshop, students accessed an exam through the QR code to demonstrate their existing and acquired knowledge about cycling in traffic. The top-performing students were rewarded with appropriate gifts aimed at enhancing safety in cycling traffic.



Images 2. and 3. Promotional and educational leaflet

Workshops were conducted at the elementary schools in Kneginec Gornji, Sračinec, Druškovec, and Radovan, and at the School of Mechanical Engineering and Traffic, involving classes 1.B, 1.D, 1.H, 1.J, and 1.E. A total of 237 students participated in the workshops.



Images 4. and 5. Workshops held at the schools

5.2.2. Purchase of cycling equipment

As part of the project, with the aim of improving the visibility of student-cyclists, is acquired reflective bracelets, lights and bells for bicycles, which were distributed to students as part of the workshops.



Image 6. Cycling equipment

6. CONCLUSION

In the area of the City of Varaždin, the population primarily uses individual transport, specifically personal cars and bicycles, while broader territorial traffic is supplemented by public road and rail transport. Cycling in the City of Varaždin has a long tradition and significant role. The flat terrain and relatively short distances between workplaces, residences, and recreational areas (starting points and destinations of travel) favor the use of bicycles as a means of transport. Additionally, in contemporary living conditions, cycling becomes a desirable form of transportation due to its ecological friendliness, efficiency, and contribution to the health preservation of its users.

Due to the mentioned advantages of cycling, it is necessary to ensure appropriate traffic infrastructure, which would improve traffic safety, enable more widespread use of bicycles, and integrate them with other forms of public transport. Monitoring statistical data leads us to the conclusion that despite all previous efforts related to education, infrastructure improvement, and higher penalties, a significant number of traffic accidents involving cyclists still occur. Therefore, continuous efforts are needed in this regard, involving a greater number of participants from an early age onward.

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Inoviranje plana i programa nastave i učenja za obrazovni profil Vozač motornih vozila

Svetlana Veličković, Marko Popović, Dalibor Stojanov i Nemanja Radović

Sažetak: Novi kurikulum obrazovnog profila „Vozač motornih vozila“ razvijen je na osnovu standarda kvalifikacije, uz doprinos članova radne grupe Sektorskog veća za Saobraćaj i usluge transporta. Sektorsko veće je telo koje je formirala Vlada Republike Srbije i čiji rad koordinira Agencija za kvalifikacije, a čine ga predstavnici industrije, obrazovanja, administracije i sindikata. Standard je pripremljen u saradnji sa transportnim udruženjima, na osnovu ugovora o radu za vozače u transportnim kompanijama. Program je dizajniran da omogući realizaciju dualnog obrazovanja prema propisanom obimu učenja kroz rad. Vozači u obrazovnom sistemu, zbog starosnih uslova, nemaju vozačku dozvolu i postepeno stiču pravo na upravljanje motornim vozilima kategorije B, a zatim kategorije C (uz mogućnost sticanja kategorije CE u skladu sa starosnim ograničenjima). Izmene u regulatornom okviru (Zakonu o bezbednosti saobraćaja na putevima) omogućile su učenicima da ispune sve uslove za profesionalne vozače u Republici Srbiji do završetka svog obrazovanja. Diversifikacija metoda nastave je realizovana, uz uvođenje praktičnih vežbi po prvi put, pored postojeće teorijske nastave, praktične nastave i nastave u bloku. Uveden je poseban predmet „Upravljanje motornim vozilima“, koji obuhvata sve elemente obuke prema propisanim kriterijumima za dobijanje vozačkih dozvola. Program detaljno razvija sve obavezne elemente obuke za sticanje početnog Sertifikata o profesionalnoj kompetenciji (CPC, Kod 95). Osnovni zadatak pred sistemom je implementacija kurikuluma u školama, s obzirom na brojne promene. Obuka i promotivne aktivnosti planirane za prvu godinu implementacije trebalo bi da omoguće postizanje cilja: moderno obrazovanje koje proizvodi kompetentne pojedince za tržište rada, bilo kao vozače u transportnim kompanijama ili kao preduzetnike.

OBRAZOVNI PROFIL VOZAČ MOTORNIH VOZILA

Obrazovanje učenika za obrazovne profile za područje rada Saobraćaj u Republici Srbiji od 2024. godine sprovodi se po novom planu i programu nastave i učenja. Početkom marta 2024. godine objavljen je standard kvalifikacije Vozač motornih vozila. Standard je na predlog radne grupe Sektorskog veća za saobraćaj i usluge transporta (SV SUT) pripremila Agencija za kvalifikacije Republike Srbije. Izradu nacrt dokumenta i pratećih elaborata sproveli su članovi SV SUT, stručnjaci iz privrede, obrazovanja i administracije, uz konsultacije sa predstavnicima državnih institucija – Nacionalne službe za zapošljavanje, Privredne komore Republike Srbije i Kancelarije za dualno obrazovanje i Nacionalni okvir kvalifikacija. Izmeni standarda kvalifikacije prethodio je višegodišnji proces usaglašavanja zakonodavnog okvira u kojem su značajnu ulogu imali Ministarstvo unutrašnjih poslova – Uprava saobraćajne policije Republike Srbije, Ministarstvo građevinarstva, saobraćaja i infrastrukture i Agencija za bezbednost saobraćaja. Inicijative Zajednice saobraćajnih škola Republike Srbije, Poslovnog udruženja „Međunarodni transport“, Poslovnog udruženja drumskog saobraćaja „Srbijatransport“, organizacija brojnih stručnih skupova i okruglih stolova na kojima su učešće uzimali predstavnici Ministarstva unutrašnjih poslova, Ministarstva prosvete, Vojske Srbije, agencija i direkcija, naučnih ustanova i stručnjaci iz transportne privrede, rezultirali su izmenama Zakona o bezbednosti saobraćaja na putevima Republike Srbije. Novi regulatorni okvir omogućava postupnost u sticanju vozačke dozvole za učenike saobraćajnih škola koji se obrazuju za obrazovni profil Vozač motornih vozila. Prvi nivo je obučavanje za upravljanje motornim vozilima B kategorije uz polaganje vozačkog ispita i sticanje probne vozačke dozvole. Vozačka dozvola stiče se nakon godinu dana od dana izdavanja probne vozačke dozvole, usled zakonom propisanog izuzeća za učenike koji se obrazuju za obrazovni profil Vozač motornih vozila (ostali građani koji stiču prvi put pravo da upravljaju motornim vozilima imaju obavezno probnu vozačku dozvolu dve godine, odnosno i duže, do navršetka 21 godine života). Učenici koji steknu probnu vozačku dozvolu, mogu da se obučavaju za upravljanje motornim vozilima C kategorije, što pre izmena zakona nije bilo dozvoljeno. Učenici polažu vozački ispit i kada polože i završni ispit za obrazovanje i steknu diplomu, pored vozačke dozvole za upravljanje motornim vozilima kategorija B i C, Agencija za bezbednost saobraćaja Republike Srbije priznaje ovim učenicima pravo na početnu kvalifikaciju (takozvani CPC). Takođe, ukoliko učenici tokom obrazovanja navrše 18 godina života i polože vozačke ispite za upravljanje motornim vozilima B i C kategorije, mogu se obučiti i polagati ispit i za CE kategoriju sve do završetka školovanja.

Srednje stručne škole u području rada Saobraćaj tradicionalno obrazuju vozače motornih vozila, a planovi i programi inoviraju se periodično (četiri puta u poslednjih tridesetak godina), dok od 2018. godine postoji standard kvalifikacije istog naziva. Republika Srbija nema standarde za većinu zanimanja, pa tako ni za zanimanje vozač, ali metodologija izrade standarda kvalifikacija zahteva da se kvalifikacija poveže sa skupom zanimanja iz Registra zanimanja koji vodi ministarstvo nadležno za rad i zapošljavanje. Novi standard kvalifikacije nije obuhvatio zanimanja vozača autobusa, niti teških teretnih vozila, jer nije postignut dogovor u pogledu tumačenja starosnih uslova propisanih ZoBS-om. Prilikom pripreme plana i programa nastave i učenja zadržan je tradicionalni pristup u obrazovanju, tako da učenici stiču kompetencije za upravljanje teretnim vozilima C kategorije (bez ograničenja). Izbornim programom „Vučna i priključna vozila“, u trećem razredu se učenicima otvara mogućnost sticanja CE kategorije. Zakon o bezbednosti saobraćaja već omogućava sticanje D1 ili D kategorije, odmah nakon sticanja B kategorije (zavisno od starosti lica, 18 ili 21 godina života), putem obuka u auto školama i CPC centrima. Kada se uslovi budu izjednačili tako da i škole mogu obrazovati vozače autobusa, izborni program „Autobuski prevoz“ kojim je propisano teorijsko obučavanje, biće dopunjen programom praktične obuke za upravljanje autobusima D1 kategorije.

NOVI STRUČNI PREDMETI U PLANU

Zavod za unapređivanje obrazovanja i vaspitanja, po nalogu Ministarstva prosvete, pripremio je predlog plana i programa nasatve i učenja za obrazovni profil „Vozač motornih vozila“. Radnu grupu koja je pripremila predlog činili su nastavnici stručnih predmeta iz saobraćajnih škola, predstavnik udruženja prevoznika i jedan univerzitetski profesor. Metodologija izrade se bazira na analizi propisanog standarda kvalifikacije, tako da sve propisane kompetencije moraju imati jasan put razvijanja tokom trogodišnjeg obrazovanja.

Polazna osnova u starom planu i programu, posle analize nije u dovoljnoj meri odgovarala novom standardu i radna grupa se opredelila da delove koje je bilo moguće zadržati, integriše u nove predmete. Lista stručnih predmeta iz starog i novog plana uporedno je prikazana u tabeli 1.

Tabela 1. Lista stručnih predmeta po starom i novom planu

Stari plan od 2018. do 2024. godine		Novi plan od 2024. godine	
1.	Fizika	1.	Teret u drumskom saobraćaju
2.	Tehnologija materijala	2.	Osnovi saobraćaja i transporta
3.	Saobraćajni sistemi	3.	Transportna sredstva u drumskom saobraćaju
4.	Motorna vozila	4.	Upravljanje motornim vozilima
5.	Osnovi saobraćajne psihologije	5.	Saobraćajna psihologija
6.	Propisi u drumskom saobraćaju	6.	Saobraćajna infrastruktura
7.	Osnovi mašinstva	7.	Prevoz putnika u drumskom saobraćaju
8.	Tehnička mehanika	8.	Regulisanje saobraćaja
9.	Prevoz tereta i putnika	9.	Preduzetništvo
10.	Tereti u transportu	10.	Praktična nastava
11.	Saobraćajna infrastruktura		
12.	Bezbednost saobraćaja		
13.	Preduzetništvo		
14.	Praktična nastava		

Razlike u nazivima predmeta ukazuju na odluku da se kompetencije učenika za prevoz tereta i prevoz putnika razvijaju paralelno. Predmeti koji su zadržali nazive ili su sličnih naziva samo delimično se podudaraju sa starim, u pogledu sadržaja programa. Ishodi programa starih predmeta su preuzeti u slučaju da odgovaraju konceptima novih predmeta, a pored promena formulacija ishoda, uvedeni su i novi ishodi. Ovde posebno vredi istaći da se odstupilo od koncepta detaljnog izučavanja konstrukcije motornih vozila, koji je bio dominantno prisutan u starom planu (predmeti Motorna vozila, Praktična nastava i Osnovi mašinstva). Pristup obrazovanju vozača koji radi u savremenim uslovima, gde se održavanje (čak i terensko otklanjanje kvarova) obezbeđuje uslužno, a vozač često nema prava da izvrši ni male intervencije - zbog gubitka prava na garanciju, zahtevao je da se znanja i veštine u pogledu konstrukcije motornih vozila ograničeno razvijaju. Istovremeno, tako se otvorio prostor za izučavanje tehnologija i procedura u transportu, u kojima vozač neposredno učestvuje (pretovar, utovar ili istovar tereta). Programi predmeta realizuju se kroz teorijsku nastavu u kabinetima i učionicama, vežbe koje se pored kabineta izvode i na terenu u odgovarajućim uslovima, a praktična nastava i nastava u bloku propisani su na način da učenici samostalno izvode aktivnosti – radne zadatke u okviru zanimanja vozača različitih kategorija vozila pod nadzorom nastavnika.

Tabela 2. PLAN NASTAVE I UČENJA za obrazovni profil Vozač motornih vozila

		I RAZRED							II RAZRED							III RAZRED							UKUPNO																	
		nedeljno			godišnje				nedeljno			godišnje				nedeljno			godišnje				godišnje																	
		T	V	PN	T	V	P	N	B	T	V	PN	T	V	PN	B	T	V	PN	B	T	V	PN	B	Σ															
B2: OBAVEZNI STRUČNI PREDMETI		8	6		28	8	2	1	6	30	9	6	6	297	19	8	19	8	12	0	3	8	12	93	24	37	2	90	678	66	2	57	0	240	2150					
1	Teret u drumskom saobraćaju	2			72					1	2		33	66		30			2					62		105	66	62	30	263										
2	Osnovi saobraćaja i transporta	2	2		72	7	2			1			33													105	72			177										
3	Transportna sredstva u drumskom saobraćaju	2	2		72	7	2			2			66						4				12	4	30	138	72	12	4	30	364									
4	Upravljanje motornim vozilima	2	2		72	7	2		30	1	2		33	66		90	2	2		62	62		60	167	20	0		180	547											
5	Saobraćajna psihologija									2			66													66				66										
6	Saobraćajna infrastruktura									2			66					2			62				66	62			128											
7	Prevoz putnika u drumskom saobraćaju										2		66														66			66										
8	Regulisanje saobraćaja																1	2		31	62			31	62			93												
9	Preduzetništvo																	2			62					62			62											
10	Praktična nastava										6			19	8				6				18	6				38	4	384										
B2: IZBORNI PROGRAMI										1			33				1			31					64				64											
2	Izborni programi po programu obrazovnog profila**									1			33				1			31						64				64										
Ukupno B1+B2		7	6		25	2	1	6	30	10	(*	6	6	330	(**	19	8	19	8	12	0	3	(*	8	12	93	(*	24	37	2	90	675	(**	66	57	0	240	2147	(**2	211)
Ukupno		13			498				22			846				23			803				2147																	
									(**23)			(**879)				(**24)			(**834)				(**2211)																	

Plan nastave i učenja prikazan je u tabeli 2. Uvođenje vežbi koje nisu postojale kao oblik nastave stručnih predmeta u starom planu, pre svega demonstracija i simulacija postupaka i procedura u transportu, nastavnicima je postavljen jasan zadatak da kod učenika od početka razvijaju veštine potrebne za rad u realnom radnom okruženju. Na vežbama učenici vežbaju uz pomoć i podršku nastavnika, tako da steknu osnovni nivo veštine. Praktična nastava služi za uvežbavanje, ali se insistira na samostalnosti u radu. Nastavnici praktične nastave imaju zadatak da prate rad učenika i učenici daju povratne informacije o napredovanju, uz obavezu da se staraju o bezbednosti tokom časova. Programi predmeta imaju detaljna uputstva za didaktičko-metodičko ostvarivanje programa sa primerima načina obrade različitih ishoda i uputstva za ocenjivanje sa smernicama za formiranje kriterijuma ocenjivanja. Većina stručnih predmeta propisana je tematski (unapred je planiran redosled obrade tema), Praktična nastava je propisana modularno (moguće je da se promeni redosled izučavanja modula).

OPIS PREDMETA U NOVOM PLANU I PROGRAMU

Za potrebe mapiranja predmeta u skladu sa kompetencijama, radna grupa je pripremila analizu. Analiza je obuhvatila 5 ključnih oblasti koje delimično odgovaraju načinu kako su propisane kompetencije:

- Opštestručna znanja o saobraćaju;
- Prevoz tereta u drumskom saobraćaju;
- Prevoz putnika u drumskom saobraćaju;
- Upravljanje motornim vozilima u drumskom saobraćaju;
- Infrastruktura i upravljanje drumskim saobraćajem.

Tabela 3. Analiza oblasti iz standarda kvalifikacije

Vozač motornih vozila		
OBLAST	PREDMETI	NAPOMENA
Opštestručna znanja o saobraćaju	- Osnove saobraćaja i transporta - Saobraćajna psihologija (sa etikom) - Fizika - Tereti u drumskom saobraćaju - Sociologija sa pravima građana	Veza obrazovnog profila sa osnovnim obrazovanjem i uloga vozača u društvu.
Prevoz tereta u drumskom saobraćaju	- Tereti u drumskom saobraćaju - Saobraćajna infrastruktura - Preduzetništvo - Praktična nastava	Poznavanje propisa iz ZORV-a i ZoPTu DS; Infrastruktura u prevozu tereta - terminali i oprema; Uslovi pristupa tržištu; Praktične veštine u prevoženju tereta (utovar, osiguranje tereta, istovar...); Radna vremena.
Prevoz putnika u drumskom saobraćaju	- Prevoz putnika u drumskom saobraćaju - Saobraćajna infrastruktura - Praktična nastava	Propisi iz ZORV-a i ZoPPu DS; Infrastruktura u prevozu putnika - terminali i oprema autobuskih stanica, autobaza, stajališta i terminusa; Postupanje sa putnicima i prtljagom; Radna vremena.
Upravljanje motornim vozilima u drumskom saobraćaju	- Upravljanje motornim vozilima - Transportna sredstva u drumskom saobraćaju - Saobraćajna infrastruktura	Obuka vožnje; Bezbednost drumskog saobraćaja; Motorna vozila (nega i lake intervencije na održavanju ispravnosti i spremnosti vozila za rad); Uslovi tehničke ispravnosti i osnove dijagnostike; Primena IKT tehnologije u prevozu tereta i putnika i na vozilima (navigacije, komunikaciona oprema oprema za naplatu karata, plaćanje putarina, OBD); Zelena agenda.
Infrastruktura i upravljanje drumskim saobraćajem	- Saobraćajna infrastruktura - Regulisanje saobraćaja	Uslovi na putu; Kategorizacija saobraćajnica i namena na mreži; Uslovi pristupa; Terminali u saobraćaju; Režimi rada signala i primena signalizacije u saobraćaju.

Predmeti u Tabeli 3. prikazani su tako da pregledno mogu da se uoče ciljevi izučavanja predmeta prema oblastima iz standarda. Oblast opšte stručnih znanja o saobraćaju treba da omogući razumevanje uloge drumskog saobraćaja u saobraćajnom sistemu, odnosno komparativne prednosti i nedostatke drumskog prevoza u odnosu na druge vidove saobraćaja. Oblasti prevoza tereta i putnika su razdvojene usled jasne razlike u procedurama i regulatornom okviru, dokumentaciji koja prati prevoz, kao i činjenici da na tržištu nema prevoznika koji obavljaju obe vrste prevoza. Ključna oblast je upravljanje motornim vozilima u saobraćaju i izvršenje prevoza tereta i putnika. Pored prevoza, prepoznata je potreba da se vozač obučava za utovar i istovar tereta, da obavlja naplatu putnih isprava i stara se o bezbednosti u saobraćaju. Razvijanje empatije, tolerancije, sposobnosti poput asertivne komunikacije i rešavanja konfliktnih situacija prožimaju sve oblasti. Poslednja oblast je vezana za funkcionisanje signala u saobraćaju i saobraćajnu infrastrukturu. Potrebno je da vozač poznaje principe rada svetlosnih signala, prepozna signalne planove, razume principe postavljanja saobraćajne signalizacije. Takođe, koristeći infrastrukturu poput autobaza, teretnih terminala ili servisa, vozač treba da prepozna mesto ili poziciju gde treba da se postavi vozilo, kao i pravilnu putanju kretanja, načine plaćanja usluga, zakazivanje usluga i slično. Poslovni ugled prevoznika zavisi od ukupnog ponašanja svih zaposlenih, a vozači su najistaknutiji predstavnici kompanija.

Izborni program Vučna i priključna vozila je propisan tako da učenici koji ispunjavaju starosne uslove iz Zakona o bezbednosti saobraćaja na putevima (18 godina života), uz uslov da prethodno polože vozački ispit za upravljanje motornim vozilima B i C kategorije, mogu da se obučavaju i na skupu vozila CE kategorije. Nakon obuke, a sve do završetka redovnog školovanja, učenicima škola može da organizuje polaganje vozačkog ispita, tako da uz diplomu o stečenoj kvalifikaciji učenici dobijaju vozačku dozvolu navedenih kategorija. Učenici po automatizmu dobijaju pravo na izdavanje početnog sertifikata o profesionalnoj kompetenciji (CPC ili KOD 95). Na ovaj način, prevoznik koji bi se opredelio da stipendira učenika, nakon tri godine školovanja, došao bi u priliku da angažuje „kompletnog vozača“. Očekujemo da ova mogućnost promeni situaciju na tržištu rada i aktivira prevoznike da učestvuju u procesu obrazovanja, uključujući i rad u komisijama na završnim ispitima.

1. Osnove saobraćaja i transporta je predmet koji se izučava kroz dve godine teorijske nastave i vežbi. Svrha je da se u prvom razredu uči kao sada iz saobraćajnih sistema (opšte o svim vidovima saobraćaja), u drugom razredu se detaljnije izučavaju karakteristike drumskog saobraćaja i veze drumskog prevoza putnika i tereta sa ostalim vidovima saobraćaja (sredstva pretovara, terminali, „mini logistika“) kako bi se stekla osnovna znanja o tim vidovima saobraćaja.

2. Teret u drumskom saobraćaju je predmet koji se izučava u sva tri razreda, kroz teorijsku nastavu, vežbe i praktičnu nastavu.

Svrha je da u prvom razredu nasledi koncept postojećeg predmeta Tehnologija materijala (osnovno o pogonskim gorivima, mazivima i slično), uz drugi deo koji obuhvata karakteristike robe, slično kao stari predmet „Tereti u saobraćaju i mehanizacija pretovara“, sa delom o svojstvima različitih materijala (ambalaža i trpeljivost, malo nešto o hemijskim svojstvima). **U drugom razredu izučavaju se tereti iz ugla uslova za transport (svojstva trpeljivosti, načini utovara i čuvanja, prevoženja i istovara, ali ne iz ugla propisa, već iz ugla tehnologija).** Ovde se izučavaju delovi koji se odnose na prevoz tereta, na primer putevi vožnje, organizacija u unutrašnjem i međunarodnom prevozu tereta, evidencije i ZORV, uslovi za pristupanje tržištu, carinske procedure, kontrole inspekcija i slično.

3. Prevoz putnika u drumskom saobraćaju je predmet koji se izučava u drugom razredu, samo kroz vežbe. Svrha predmeta je da učenik upozna tehnologije prevoza putnika u drumskom saobraćaju i da usvoji veštine postupanja sa putnicima i prtljagom, a da istovremeno ovaj predmet posluži kao poligon za vaspitavanje vozača (komunikacija, odnos sa ostalim učesnicima u saobraćaju). Ovde se izučavaju delovi koji se odnose na prevoz putnika, na primer redovi vožnje, organizacija u gradskom, prigradskom i međugradskom i međunarodnom prevozu putnika, evidencije i ZORV, uslovi za pristupanje tržištu i sl.

4. Transportna sredstva u drumskom saobraćaju je predmet koji se izučava u sva tri razreda, kroz teorijsku nastavu, vežbe i praktičnu nastavu. Svrha je da učenici u prvom razredu uče na opštem nivou delove motornih vozila, ali kroz sisteme, bez detaljnih izučavanja mehanike. Ovaj predmet uz Fiziku treba da osigura vezu sa osnovnom školom i da učenici steknu znanja o primeni zakona kinematike, dinamike, delimično i

statike, da uče o stabilnosti u vožnji, težištu tereta, a sve u kombinaciji sa Fizikom. Drugi razred obuhvata uslove tehničke ispravnosti i detekciju kvarova na nivou odgovornosti i kompetentnosti vozača (da li je registrovano vozilo, ima važeći šestomesečni tehnički pregled i sl.). Kada je reč o održavanju transportnih sredstava, a misli se na motorna vozila za prevoz tereta ili putnika (dolivanje ulja i po potrebi tehničkih tečnosti, otklanjanje prostih kvarova po nalogu šefa, zamena neispravnog pneumatika na različitim vrstama vozila, montaža lanaca za sneg i korišćenje druge opreme) i negi vozila, svrha ovog predmeta je da učenik može da izvrši proveru spremnosti vozila za rad i da prati rad vozila u toku prevoza (ako nešto nije ispravno vozač to ne popravljajući, već mehaničar). **Ovde se takođe, uči o uređajima za navigaciju i komunikaciju!**

5. Upravljanje motornim vozilima je predmet koji se izučava u sva tri razreda, kroz teorijsku nastavu, vežbe i nastavu u bloku - obuke.

Svrha je da učenici usvoje znanje o propisima za sve kategorije vozila, da se obučavaju za vožnju, da nauče primenu različitih uređaja na vozilima (tahografi, ali i drugi uređaji). Drugi deo predmeta obuhvata bezbednost saobraćaja i predstavlja poligon za vaspitavanje vozača (vaspitavamo ih da se ponašaju profesionalno) u sinergiji sa predmetom Saobraćajna psihologija. Izučavaju se kaznene odredbe za prekršaje u saobraćaju i **primena uređaja za navigaciju i komunikaciju!**

6. Saobraćajna psihologija je predmet koji se izučava u drugom razredu.

Svrha je da se učenici upoznaju sa karakteristikama ličnosti, opažanjem i reagovanjem, kao i da steknu osnovna znanja o etici u saobraćaju.

7. Regulisanje saobraćaja je predmet koji se izučava jednu godinu.

Svrha predmeta je da učenici steknu osnovna znanja o saobraćajnoj signalizaciji (kako se postavlja), o radu signala (ciklusi rada signala, koordinacija...) i o regulisanju saobraćaja putem žive sile. Ovde se uči o sistemima ulica (jednosmerni, dvosmerni i dr.) i o vrstama raskrsnica, uz osnovne pojmove o protoku saobraćaja. Jedan manji deo odnosi se na ITS.

8. Saobraćajna infrastruktura je predmet koji se izučava dve godine.

Svrha ovog predmeta je da učenici steknu znanja o putevima i ulicama (struktura i funkcija na mreži, o autobazama i parkiranju, tehničkom pregledu, terminalima i slično). Izučavaju se posebni uslovi saobraćaja (led, sneg, kiša, magla, dimna zavesa, i izmenljiva saobraćajna signalizacija i ITS).

9. Praktična nastava je predmet koji služi da učenici razvijaju praktične veštine i izučava se dve godine.

Svrha je razvijanje samostalnosti učenika. Nakon što se učenici upoznaju sa svim veštinama na vežbama, praksa služi da ove veštine dovedu do nivoa automatizacije.

10. Preduzetništvo je predmet koji se preuzima i isti je za sve profile u stručnom obrazovanju.

Dualna nastava propisana je od drugog razreda, 2 dana po 6 sati u drugom i 3 dana po 6 sati u trećem razredu.

UMESTO ZAKLJUČKA

Novi Vozač napravljen je u saradnji sa transportnim sektorom u državi, a prevoznici su dobili priliku da direktno utiču na ishode u obrazovnom procesu. Plan i program nastave i učenja omogućava realizaciju učenja po dualnom modelu od drugog razreda (2 dana u drugom razredu i 3 dana u trećem razredu kod poslodavca). Praktična nastava potpuno je propisana na način da priprema učenike da samostalno primenjuju standardne procedure u transportu. Izborni programi nude proširivanje znanja i veština u skladu sa potrebama učenika da se specijalizuju za određeni tip prevoza (putnika ili tereta).

Dokazali smo da je saradnja institucija u državi moguća i da umrežavanje obrazovnog, administrativnog, regulatornog i privrednog sektora može da unapredi ukupan ambijent za obrazovanje učenika u području rada Saobraćaj. Dobili smo izmene regulatornog okvira od Ministarstava unutrašnjih poslova i Ministarstva građevinarstva saobraćaja i infrastrukture, u skladu sa potrebama privrede i škola. Dobili smo stručnjake iz transporta koji su dali jasne zahteve u pogledu kompetencija vozača. Nastavnici su formulisali ishode i dimenzionisali obim izučavanja programa. Sve su verifikovali stručnjaci sa univerzitetskog nivoa i iz transportnih kompanija.

Planiraju se posebne obuke za kadrove koji će sprovesti ocenjivanje na praktičnom delu vozačkog ispita.

Rezultate rada – plan i program, predstavimo na nekoliko stručnih skupova, gde će se ponovo zajedno naći nastavnici, prevoznici i predstavnici institucija koje su dale svoj doprinos ovom procesu. Očekujemo da prevoznici iskoriste priliku za povezivanje sa školama, kako bi osigurali zapošljavanje učenika kada završe obrazovanje, ali i da tokom školovanja učenika preuzmu aktivnu ulogu u vidu učenja kroz rad.

Pokazaćemo uspešan model koji je proistekao iz sistemske saradnje brojnih aktera, sigurni da ništa ne uspeva kao uspeh!

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Innovation of the Teaching and Learning Curriculum For the Educational Profile Motor Vehicles Driver

Svetlana Veličković, Marko Popović, Dalibor Stojanov i Nemanja Radović

ABSTRACT: The new curriculum of the educational profile “Motor Vehicle Driver” has been developed based on qualification standards, with contributions from members of the working group of the Sector Council for Transport and Traffic Services. The Sector Council is an entity formed by the government and coordinated by the Qualifications Agency of the Republic of Serbia, comprising representatives from industry, education, administration, and trade unions. The standard was prepared in collaboration with transport associations, based on employment contracts for drivers in transport companies. The program is designed to enable the implementation of dual learning according to the prescribed scope of work-based learning. Drivers in the education system, due to age requirements, do not have a driving license and are gradually acquiring the right to operate motor vehicles of category B, followed by category C (with the possibility of achieving category CE in accordance with age limits). Changes in the legal framework (The Law on Road Traffic Safety) have enabled students to meet all conditions for professional drivers in the Republic of Serbia by the end of their education. Diversification of teaching methods has been implemented, with practical exercises being introduced for the first time, alongside existing theoretical, practical learning and training, and block teaching and training. A specific subject, "Operating Motor Vehicles" has been created, encompassing all training elements according to the prescribed minimum for obtaining driving licenses. The curriculum details all mandatory training elements for acquiring the initial Certificate of Professional Competence (CPC, Code 95). The primary task is the implementation of the curriculum in schools, given the numerous changes. Training and promotional activities planned for the first year of implementation should enable the achievement of the goal: modern education that delivers competent individuals for labor market, either as drivers in transportation companies or as entrepreneurs.

THE EDUCATIONAL PROFILE “MOTOR VEHICLES DRIVER”

Education of students for educational profiles in the field of Transport and Traffic in the Republic of Serbia, starting from 2024, is carried out according to the new Teaching and Learning Curriculum. In early March 2024, the qualification standard for *Motor Vehicles Driver* was published. The standard was prepared by the Qualification Agency of the Republic of Serbia, based on the initial proposal prepared by the working group of the Sector Council for Traffic and Transport Services (SC for TTS). The drafting of the document and accompanying elaborations was carried out by members of the SC for TTS, experts from the economy, education, and administration, with consultations involving representatives of state institutions – the National Employment Service, the Chamber of Commerce of the Republic of Serbia, the Office for Dual Education and the National Qualifications Framework. The revision of the qualification standard was preceded by a process of harmonizing the legislative framework (nearly three years), in which the Ministry of the Interior – Traffic Police Directorate of the Republic of Serbia, the Ministry of Construction, Transport and Infrastructure, and the Traffic Safety Agency played a significant role. Initiatives from the Association of Traffic Schools of the Republic of Serbia, the Business Association "International Transport", the Business Association for Road Transport "Serbiatransport", and the organization of numerous expert meetings and panel debates, in which representatives from the Ministry of the Interior, the Ministry of Education, the Serbian Army, agencies and directorates, scientific institutions, and experts from the transport industry participated, resulted in amendments to The Law on Road Traffic Safety in the Republic of Serbia. The new regulatory framework allows for a step-by-step process for obtaining a driver's license for students of traffic schools enrolled in the educational profile of *Motor Vehicles Driver*. Basic level involves training for operating category B motor vehicles, followed by taking the driving test and obtaining a probationary driver's license. The driver's license (without probationary restrictions) is obtained one year after the issuance of the probationary license, due to the legally prescribed exception for students of traffic schools enrolled in the educational profile of *Motor Vehicles Driver* (other citizens obtaining their first driving license are required to hold a probationary license for two years, or longer, until reaching the age of 21 in case of obtaining their first driving license at the age of 17 to 19). Students who obtain a probationary driver's license can also be trained for operating category C motor vehicles, which was not allowed before the changes of the legal framework. Students take the driving test, and upon passing both the driving test and their Final Educational Exam, in addition to the driver's license for operating category B and C motor vehicles, The Traffic Safety Agency of the Republic of Serbia recognizes these students' right to an initial qualification (the so-called CPC, Code 95). Additionally, if students turn 18 during their education and pass the driving exam for operating categories B and C motor vehicles, they can also be trained for operating category CE motor vehicles and may take the exam for category CE until the completion of their education.

Vocational secondary schools in the field of Transport and Traffic have a long-lasting tradition in education of the motor vehicle drivers. Their curricula are periodically updated (four times in the past thirty years), and since 2018, a qualification standard with the same title has been implemented. The Republic of Serbia lacks standards for most occupations, including the profession of a driver. However, the methodology for developing qualification standards requires linking the qualification to a set of occupations from the Registry of Occupations managed by the ministry responsible for labor and employment. The new qualification standard did not cover the occupations of bus drivers or heavy truck drivers due to disagreements over the interpretation of age requirements prescribed by the Law on Road Traffic Safety (LRTS). When preparing the teaching and learning curriculum, the traditional approach in education was retained, allowing students to acquire competencies for operating category C cargo motor vehicles (without restrictions). Through the elective program

“Towed and Trailed Vehicles”, students in their third year of education have the opportunity to acquire competencies for operating category CE cargo motor vehicles. The Law on Road Traffic Safety already allows the acquisition of categories D1 or D (depending on the person’s age—18 or 21 years) immediately after obtaining the right to operate category B motor vehicles, through training in driving schools and CPC centers. Once the conditions for acquisition of categories D1 and D are equalized in the way that schools, just like CPC centers, can also train bus drivers, the elective program “Bus Transport”, which currently prescribes theoretical training, will be supplemented with a practical training program for operating D1 category buses.

THE NEW VOCATIONAL SUBJECTS IN THE CURRICULUM

The Institute for Improvement of Education, upon the request of the Ministry of Education, prepared a proposal for The Teaching and Learning Curriculum for the educational profile "Motor Vehicles Driver". The working group that prepared the proposal consisted of vocational subjects teachers from transport and traffic schools, a representative of the transport associations, and a university professor. The methodology for the development is based on the analysis of the prescribed qualification standard, so all the prescribed competencies must have a clear path of development during the three-year education.

The starting point in the old curriculum, after analysis, did not sufficiently align with the new standard, so the working group decided to integrate the parts that could be retained into new subjects. A comparison of the lists of vocational subjects from the old and new curricula is presented in Table 1.

Table 1. Lists of Vocational Subjects from the Old and the New Curricula

The Old Curriculum 2018 - 2024		The New Curriculum 2024	
1.	Physics	1.	Cargo in Road Transport and Traffic
2.	Technology of Materials	2.	Basics of Traffic and Transport
3.	Traffic Systems	3.	Equipment in Road Transport
4.	Motor Vehicles	4.	Operating Motor Vehicles
5.	Basics of Traffic Psychology	5.	Traffic Psychology
6.	Road Traffic Regulations	6.	Traffic Infrastructure
7.	Basics of Mechanical Engineering	7.	Passenger Transportation in Road Transport
8.	Technical Mechanics	8.	Traffic Regulation
9.	Cargo and Passenger Transport	9.	Entrepreneurship
10.	Cargo in Transport	10.	Practical Learning and Training
11.	Traffic Infrastructure		
12.	Traffic Safety		
13.	Entrepreneurship		
14.	Practical Learning and Training		

The differences in the names of the subjects indicate the decision to develop students' competencies for cargo and passenger transport in parallel. Subjects that retained their names or have similar names only partially align with the old ones in terms of the program content. The outcomes of the old subjects' programs have been adopted where they correspond to the concepts of the new subjects, and along with changes in formulations, new outcomes have been introduced. It is particularly important to note that the concept of detailed study of motor vehicle construction, which was predominantly present in the old curriculum (e.g., *Motor Vehicles*, *Practical Teaching and*

Training and Basics of Mechanical Engineering), has been departed from. The approach to educating drivers who work in modern conditions, where maintenance (even on-site fault repair during transport) is provided as a service, and the driver often has no right to make even small interventions - due to the loss of warranty rights, required that the development of students knowledge and skills regarding motor vehicle construction, is planned to a limited extent. At the same time, this opened up space for studying technologies in transport, in which the driver directly participates (e.g., transshipment, loading or unloading cargo). The subject programs are implemented through theoretical lessons in classrooms, exercises conducted both in classrooms and on the field in appropriate conditions, while practical learning and training and block teaching and training are prescribed in such a way that students independently carry out activities under the supervision of the teachers.

Table 2. The Teaching and Learning Curriculum For the Educational Profile Motor Vehicles Driver

		I GRADE						II GRADE						III GRADE						TOTAL																								
		weekly			by year			weekly			by year			weekly			by year			by year																								
		T	E	P	T	E	P	B	T	E	P	T	E	P	B	T	E	P	B	T	E	P	B	Σ																				
B2: MANDATORY VOCATIONAL SUBJECTS		8	6		28	21		3	0	9	6	6	297	19	8	19	8	1	2	0	3	8	12	93	24	8	37	2	90	678	66	2	57	0	24	0	2150							
1	Cargo in Road Transport and Traffic	2			72					1	2		33	66			3	0				2				62			105	66	62	30		263										
2	Basics of Traffic and Transport	2	2		72	72				1			33																105	72				177										
3	Equipment in Road Transport	2	2		72	72				2			66								4					12	4	30	138	72	12	4	30		364									
4	Operating Motor Vehicles	2	2		72	72		3	0	1	2		33	66		9	0	2	2		62	62		60				60	167	20	0		18	0	547									
5	Traffic Psychology									2			66																66					66										
6	Traffic Infrastructure									2			66					2						62					66	62				128										
7	Passenger Transportation in Road Transport										2			66																	66			66										
8	Traffic Regulation															1	2			31	62				31	62			31	62				93										
9	Entrepreneurship																2							62						62				62										
10	Practical Learning and Training										6				19	8			6					18	6						38	4		384										
B2: ELECTIVE PROGRAMS										1			33				1				31								64					64										
2	Elective programs by vocational profile curriculum**									1			33				1				31									64					64									
Total B1+B2		7	6		25	21	6	3	0	10	(**	6	6	330	19	8	19	8	1	2	0	3	(**	8	12	93	(**1	24	8	37	2	90	675	(**7	39)	66	2	57	0	24	0	2147	(**221	1)
Total		13			498			22			846			23			803			2147																								
								(**23)			(**879)			(**24)			(**834)			(**2211)																								

T – theoretical, E – exercises, P – practical learning and training, B – block teaching and training

The teaching and learning curriculum is presented in Table 2. The introduction of exercises that did not exist, as a form of vocational subject teaching in the old curriculum, primarily demonstrations and simulations of procedures and processes in transport, sets a clear task for teachers to develop skills needed for work in a real work environment from the very beginning. In the exercises, students practice with the help and support of teachers, so they acquire the basic level of skills. Practical

learning and training is intended for practical skills development, while independence of the students in execution of tasks is emphasized. Practical learning and training instructors are required to supervise students' work and to provide feedback on the students' progress, while also being responsible for ensuring safety during lessons. The subjects' programs include detailed guidelines for didactic-methodical implementation and assessment instructions. The majority of the subjects is prescribed thematically, and Practical Learning and Training is prescribed in modular form.

VOCATIONAL SUBJECTS DESCRIPTION IN THE NEW CURRICULUM

For the purpose of mapping subjects in accordance with competencies, the working group prepared an analysis. The analysis covered five key fields that partially align with the way competencies are defined in The Qualification Standard:

- General professional knowledge of transportation and traffic;
- Cargo transportation in road transport;
- Passenger transportation in road transport;
- Operation of motor vehicles in road traffic;
- Infrastructure and road traffic management.

The subjects in Table 3 are presented in a way that allows a clear overview of the objectives of subject studies according to the areas specified in the standards. The field of general professional knowledge of transportation and traffic aims to enable an understanding of the role of road transport and traffic within the transportation system, highlighting the comparative advantages and disadvantages of road transport compared to other modes of transportation. The fields of cargo transport and passenger transport are separated due to distinct differences in procedures, regulatory frameworks, accompanying documentation, and the fact that there are no transport companies (carriers) in the transportation services market, that perform both types of transport (passenger and cargo). The key field is operation of motor vehicles in traffic and the execution of cargo and passenger transport services. In addition to transport, there is a recognized need to train drivers in loading and unloading cargo, processing transportation fees payments and issuance of tickets, and ensuring traffic safety. Developing empathy, tolerance and skills such as assertive communication and procedures in conflict situations span across all fields. The final field is related to the functioning of traffic signals and infrastructure characteristics. Drivers need to understand the principles of traffic light operations, recognize signal plans, and grasp the principles of traffic signage placement. Additionally, by utilizing infrastructure such as bus depots, freight terminals, or service stations, drivers should be able to identify appropriate locations for vehicle positioning, correct circulation paths, payment methods for services, scheduling services, and more. The business reputation of carriers depends on the overall behavior of all employees, and drivers are the most prominent representatives of companies.

The elective program Towing and Trailing Vehicles is designed to allow students who meet the age requirements outlined in The Law on Road Traffic Safety (18 years old) and who have previously passed the driving test for operating motor vehicles of categories B and C to be trained for operating category CE ensemble of heavy cargo vehicles. After completing drivers' training, and until the end of regular schooling, schools can organize driving exams for students, thus giving them at least two opportunities to obtain a driver's license for the specified categories along with their qualification diploma. Students are automatically granted the right to receive an initial Certificate of Professional Competence (CPC or Code 95). In this way, a transport company that decides to provide a scholarship for students would, after three years of schooling, have the opportunity to hire a "fully trained driver". We anticipate that this opportunity will improve the labor market situation and encourage carriers to participate in the education process, including involvement in final exam committees.

Table 3. Analysis of the fields of the Qualification Standard

Motor Vehicles Driver		
Field	Vocational Subjects	Comment
General Professional Knowledge of Transportation and Traffic	- Basics of Transportation and Traffic - Traffic Psychology with Ethics - Physics - Cargo in Road Transport and Traffic - Sociology with civil rights	Relation between the educational profile and elementary education, and the role of the driver in society.
Cargo Transportation in Road Transport	- Cargo in Road Transport and Traffic - Traffic Infrastructure - Entrepreneurship - Practical Learning and Training	Knowledge of regulations from Low on the Working Hours of Vehicle Crews in Road Transport and Law on Cargo Transportation in Road Transport; Infrastructure in cargo transport - terminals and equipment; Market access conditions; Practical skills in cargo transport (loading, securing cargo, unloading...); Working hours.
Passenger Transportation in Road Transport	- Passenger Transportation in Road Transport - Traffic Infrastructure - Practical Learning and Training	Knowledge of regulations from Low on the Working Hours of Vehicle Crews in Road Transport and Law on Passenger Transportation in Road Transport; Infrastructure in passenger transport – terminals and equipment of bus stations, bus depots, stops, and terminals; Handling of passengers and luggage; Working hours.
Operating Motor Vehicles in Road Traffic and Transportation	- Operating Motor Vehicles - Equipment in Road Transport - Traffic Infrastructure	Drivers' training; Road traffic safety; Motor vehicles (maintenance and minor interventions to ensure vehicle safety and readiness for operation); Conditions for technical correctness and basic diagnostics; Application of ICT technology in cargo and passenger transport and on vehicles (navigation, communication equipment, ticketing systems, toll payment, OBD); The Green agenda.
Traffic Infrastructure and Road Traffic Management	- Traffic Infrastructure - Traffic Regulation	Road conditions; Categorization of roads and their purpose on the network; Access conditions; Terminals in traffic; Signal operating modes and application of traffic signage.

1. Basics of Transportation and Traffic is a vocational subject studied over two years of theoretical lessons and exercises.

The purpose is for the first year to cover traffic systems (general information about all modes of transport) as it is currently taught, while in the second year, more detailed study focuses on the characteristics of road traffic and the connection between road transport of passengers and cargo with other modes of transport (handling equipment, terminals, "basic logistics"), in order to acquire basic knowledge about these modes of transport.

2. Cargo in Road Transport and Traffic is a vocational subject studied during all three years, through theoretical lessons, exercises, and practical learning and training.

The purpose is for the first year to inherit the concept of the existing subject *Technology of Materials* (basic knowledge about fuels, lubricants, and similar topics), along with a second part that covers the characteristics of goods, similar to the old subject *Cargo in Transport and Handling Equipment*, including a section on the properties of different materials (packaging and durability, and basics about chemical properties of goods). **In the second year, the focus shifts to cargo from the perspective of transport conditions (properties of durability, loading and storage methods, transport and unloading, but not from the regulatory angle, rather from a technological standpoint).** Here, topics related to cargo transport are studied, such as driving routes, organization in domestic and international cargo transport, records keeping and The Law on the Working Hours of Vehicle Crews in Road Transport, market access conditions, customs procedures, inspection controls, and similar topics.

3. Passenger Transportation in Road Transport is a vocational subject studied in the second year, exclusively through exercises.

The purpose of the vocational subject is to familiarize students with passenger transportation technologies in road transport and to develop skills in handling passengers and luggage, while simultaneously serving as a platform for development of driver habits and behavior (communication, interaction with other traffic participants). Here, topics related to passenger transport are studied, such as timetables, organization of urban, suburban, intercity, and international passenger transport, records keeping and The Law on the Working Hours of Vehicle Crews in Road Transport, market access conditions, and similar subjects.

4. Equipment in Road Transport is a vocational subject studied during all three years, through theoretical lessons, exercises, and practical instruction.

The purpose is for students in the first year to learn about the general components of motor vehicles, but through systems, without in-depth study of mechanics. This subject, along with Physics, should ensure a connection to elementary education and enable students to acquire knowledge about the application of the laws of kinematics, dynamics, and partially statics, as well as learning about stability in driving, the center of gravity of cargo, all in combination with Physics. The second year covers conditions for technical correctness and fault detection at the level of the driver's responsibility and competence (whether the vehicle is registered, has a valid six-month technical inspection, etc.). When it comes to maintaining transportation equipment, specifically motor vehicles for cargo or passenger transport (oil refills and technical fluids as needed, fixing simple faults as instructed by the supervisor, replacing defective tires on various types of vehicles, installing snow chains, and using other equipment), the purpose of this subject is for the student to be able to check the vehicle's readiness for operation and monitor the vehicle's performance during transport (if something is not working, the driver does not repair it, but the mechanic does). **This subject also includes learning about navigation and communication devices!**

5. Operating Motor Vehicles is a vocational subject studied during all three years, through theoretical lessons, exercises, and block training.

The purpose is for students to acquire knowledge about regulations for all categories of vehicles, to be trained for driving, and to learn the use of various devices on vehicles (tachographs, as well as other devices). The second part of the subjects' curriculum covers road traffic safety and serves as a platform for development of driver habits and behavior (teaching them to behave professionally) in synergy with the subject Traffic Psychology. Students also study about penalties for traffic violations and **how to use of navigation and communication devices.**

6. Traffic Psychology is a subject studied in the second year.

The purpose is for students to become familiar with characteristics of personality, perception mechanisms, and reactions, as well as to acquire basic knowledge about ethics in traffic.

7. Traffic Regulation is a subject studied for one year.

The purpose of the subject is for students to acquire basic knowledge about traffic signage (how it is installed), the operation of signals (signaling cycles, coordination...), and traffic regulation by the police officer or by other authorized person. Here, students learn about street systems (one-way, two-way, etc.) and types of intersections, along with basic concepts of traffic flow. A smaller part of the subjects' curriculum relates to ITS (Intelligent Transportation Systems).

8. Traffic Infrastructure is a subject studied for two years.

The purpose of this subject is for students to acquire knowledge about roads and streets (structure and function within the road network), bus depots and parking, technical inspections, terminals, and similar topics. Students also study specific traffic conditions (ice, snow, rain, fog, smoke curtains, and variable traffic signals and ITS).

9. Practical Learning and Training is a subject designed to help students develop practical skills and is studied for two years.

The purpose is to develop students' independence. After students become familiar with all the skills through the exercises, the practical training serves to bring these skills to the level of automation.

10. Entrepreneurship is a subject that is adopted and has the same curriculum for all profiles in vocational education.

Work-based learning is prescribed in the second and third year of education, with 2 days of 6 hours activities in the second year and 3 days of 6 hours activities in the third year.

INSTEAD OF A CONCLUSION

Нови Возач направљен је у сарадњи са транспортним сектором у држави, а превозници су добили прилику да директно утичу на исходе у образовном процесу. План и програм наставе и учења омогућава реализацију учења по дуалном моделу од другог разреда (2 дана у другом разреду и 3 дана у трећем разреду код послодавца). Практична настава потпуно је прописана на начин да припрема ученике да самостално примењују стандардне процедуре у транспорту. Изборни програми нуде проширивање знања и вештина у складу са потребама ученика да се специјализују за одређени тип превоза (путника или терета).

Доказали смо да је сарадња институција у држави могућа и да умрежавање образовног, административног, регулаторног и привредног сектора може да унапреди укупан амбијент за образовање ученика у подручју рада Саобраћај. Дobili смо измене регулаторног оквира од министарстава унутрашњих послова и саобраћаја, у складу са потребама привреде и школа. Дobili смо стручњаке из транспорта који су дали јасне захтеве у погледу компетенција возача. Наставници су формулисали исходе и димензионисали обим изучавања програма. Све су верификовали стручњаци са универзитетског нивоа и из транспортних компанија.

Планирају се посебне обуке за кадрове који ће спроводити оцењивање на практичном делу возачког испита.

Резултате рада – план и програм, представићемо на неколико стручних скупова, где ће се поново заједно наћи наставници, превозници и представници институција које су дале свој допринос овом процесу. Очекујемо да превозници искористе прилику за повезивање са школама, како би осигурали запошљавање ученика када заврше образовање, али и да током школовања ученика преузму активну улогу у виду учења кроз рад.

Показаћемо успешан модел који је проистекао из системске сарадње бројних актера, сигурни да ништа не успева као успех!

The new Driver curriculum was created in collaboration with the transport sector industry in the country, giving transportation companies the opportunity to directly influence the outcomes of the educational process. The curriculum allows for the implementation of work-based learning starting from the second year (2 days in the second year and 3 days in the third year in real working conditions in the companies). Practical training is fully designed to prepare students to independently apply standard procedures in transportation. The elective programs offer opportunities to expand knowledge and skills in line with students' needs to specialize in a specific type of transport (passenger or cargo).

We have proven that collaboration between institutions in the country is possible and that networking between the educational, administrative, regulatory, and business sectors can improve the overall environment for educating students in the field of Transport and Traffic. We have received amendments to the regulatory framework from the ministries of internal affairs and transport, in line with the needs of the transport industry and schools. We have received expert input from the transport sector that provided clear requirements regarding driver competencies. Teachers formulated learning outcomes and defined the scope of the curriculum. All of this has been verified by experts from the university level and experts from transport companies.

Special training is planned for teaching staff who will conduct the practical part of the driver's exam assessment.

The results – the curriculum – will be presented at several professional conferences, where teachers, transporters, and representatives from the institutions that contributed to this process will come together once again. We expect transport companies to take advantage of these opportunities to connect with schools to ensure employment for students upon completion of their education and also take an active role in students' work-based learning during their education.

We will showcase a successful model that has emerged from systematic collaboration among numerous actors, confident that nothing succeeds like success!

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PРАВNA UREDITEV NALAGANJA IN PRITRJEVANJA TOVORA V CESTNEM PROMETU V REPUBLIKI SLOVENIJI

LEGAL REGULATION OF LOADING AND SECURING OF CARGO IN ROAD TRANSPORT IN THE REPUBLIC OF SLOVENIA

Povzetek:

V prispevku je predstavljena pravna ureditev nalaganja in pritrjevanja tovora v cestnem prometu v Republiki Sloveniji. Pravilno nalaganje in pritrjevanje tovora je ključnega pomena za varnost in preprečevanje nesreč med prevozom blaga. V Sloveniji je pravna ureditev nalaganja in pritrjevanja tovora v cestnem prometu podrobno določena v različnih predpisih, ki se nanašajo na varnost cestnega prometa, transport nevarnega blaga, delovni čas voznikov in druge povezane vidike. V nadaljevanju je predstavljen kratek pregled stanja varnosti cestnega prometa voznikov tovornih vozil v Sloveniji v obdobju 2019 – 2023 ter nekaj primerov pritrjevanja tovora.

Ključne besede: Pravna ureditev, nalaganje in pritrjevanje tovora, varnost cestnega prometa, pripomočki za pritrjevanje tovora.

Summary:

The article presents the legal regulation of loading and securing cargo in road transport in the Republic of Slovenia. Proper loading and securing of cargo is crucial for safety and the prevention of accidents during the transport of goods. In Slovenia, the legal regulation of loading and securing cargo in road transport is detailed in various regulations related to road traffic safety, the transport of dangerous goods, drivers, working hours, and other related aspects. The following is a brief overview of the state of road traffic safety for truck drivers in Slovenia during the period 2019 – 2023, along with some examples of cargo securing.

Keywords: Legal regulation, loading and securing cargo, road traffic safety, cargo securing equipment..

1 UVOD

Priprava tovora za prevoz zahteva skrbnost in pozornost, da se zagotovi varna in učinkovita dostava tovora na ciljno mesto. Pravna ureditev nalaganja in pritrjevanja tovora v cestnem prometu je ključna za zagotavljanje varnosti tako voznikov kot tudi drugih udeležencev v prometu. Z natančnim upoštevanjem predpisov se zmanjšuje tveganje za nesreče in poškodbe ter se ohranja učinkovitost in zanesljivost logističnih procesov.

2 PRAVNA UREDITEV

Pravna ureditev se nanaša na sistem zakonov, pravil in institucij, ki urejajo družbeno življenje z določenim pravnim redom. Pravna ureditev nalaganja in pritrjevanja tovora je pomembna za zagotavljanje varnosti pri prevozu blaga in preprečevanje nesreč. Ta ureditev običajno zajema zakonodajo, predpise in standarde, ki določajo, kako se mora tovor pravilno naložiti, pritrjevati in prevažati.

Nekateri ključni elementi pravne ureditve nalaganja in pritrjevanja tovora v cestnem prometu vključujejo:

- a) Omejitve mase in dimenzij - Zakoni določajo največje dovoljene mase in dimenzije tovora, ki se smejo prevažati po cestah, da se preprečijo preobremenitve vozil in poškodbe cestne infrastrukture.
- b) Metode pritrjevanja - Predpisi določajo, kako mora biti tovor pritrjen na vozilo, vključno z uporabo varnostnih pasov, verig, mrež, palet in drugih sredstev za zagotavljanje stabilnosti in varnosti med prevozom. Zelo pomembno je upoštevanje sil med prevozom (Slika 1)
- c) Posebna pravila za določene vrste tovora - Za nekatere vrste tovora, kot so nevarne snovi, žive živali ali presežno dimenzioniran tovor, veljajo posebni predpisi in zahteve za varno prevažanje.
- d) Nadzor in kazni - Organizacije za nadzor izvajajo nadzor nad skladnostjo s predpisi in sankcionirajo prevoznike, ki ne upoštevajo zakonskih zahtev.

Pogoje za prevoz tovora natančneje predpisujeta Zakon o pravilih cestnega prometa (Uradni list RS, št. 156/21 – uradno prečiščeno besedilo in 161/21 – popr.) v VIII. poglavju (Pogoji za prevoz tovora v cestnem prometu) in Pravilnik o nalaganju in pritrjevanju tovora v cestnem prometu (Uradni list RS, št. 70/11). Pravilnik sledi dokumentu Evropske komisije z naslovom »Evropske smernice za varovanje tovora v cestnem transportu« (European Best Practice Guidelines on Cargo Securing for Road Transport).

Zakon o pravilih cestnega prometa v členih 74, 75 in 76 v že prej omenjenem VIII. poglavju Pogoji za prevoz tovora v cestnem prometu določa:

V 74.členu (tovor na vozilu)

(1) Tovor in naprave, ki so namenjene za prevoz, nalaganje, razlaganje ali pritrditev tovora, morajo biti na in v vozilu naložene in pritrjene oziroma pokrite tako, da:

- 1. ne predstavljajo nevarnosti ali ovire za druge udeležence cestnega prometa;
- 2. ne povzročajo škode na cesti in objektih;
- 3. ne onesnažujejo okolja;
- 4. ne zmanjšujejo stabilnosti vozila;

5. ne povzročajo več hrupa, kot je dovoljeno;
6. ne zmanjšujejo preglednosti vozniku;
7. se ne razsipajo ali padajo z vozila.

(2) Če tovor, naložen na motornem ali priklopnem vozilu, ali naprave, ki so namenjene za prevoz ali pritrditev tovora, zakrivajo mesto, na katerem je nameščena registrska tablica ali svetilke na zadnji strani vozila, mora biti kot najbolj izpostavljen del na zadnji strani vozila nameščen nosilec z registrsko tablico in predpisanimi svetilkami in odsevniki.

(3) Tovor ne sme segati čez sprednji del vozila. Lažje predmete je dovoljeno prevažati na zunanjem prtljažniku na osebнем avtomobilu ali tovornem vozilu tako, da sega tovor največ 1 m preko sprednjega dela vozila. Del tovora, ki sega preko sprednjega dela vozila, ne sme biti nižje od nivoja strehe vozila.

(4) Tovor lahko sega največ 1,5 m preko zadnjega dela vozila oziroma skupine vozil, razen pri izrednih prevozi, ki se opravljajo na podlagi dovoljenja pristojnega organa. Na tovornem ali priklopnem vozilu mora biti tovor oprt na najmanj 5/6 svoje dolžine.

(5) Na enoslednih vozilih tovor lahko sega največ pol metra preko sprednjega in zadnjega dela vozila, njegova širina pa ne sme presegati enega metra. Na enoslednih vozilih ni dovoljeno prevažati nezavarovanega nevarnega orodja (kose, vile ipd.).

(6) Tovor mora biti naložen in pritrjen v skladu s predpisom, s katerim se podrobneje predpiše način namestitve, pritrditve in zavarovanja tovora na vozilu

V 75.členu

(označevanje tovora)

(1) Če sega tovor več kot 1 m preko zadnjega dela vozila, mora biti na najbolj izpostavljeni točki označen na:

1. osebnih avtomobilih, trikolesih, lahkih štirikolesih, štirikolesih in lahkih priklopnikih, ki jih vlečejo osebni avtomobili – s tablo, veliko najmanj 25 × 25 cm, pobarvano izmenično s poševnimi trakovi rdeče in bele barve, ki odseva svetlobo, nameščeno prečno na smer vožnje;

2. drugih vozilih – s tablo, veliko najmanj 40 × 40 cm, pobarvano izmenično s poševnimi trakovi rdeče in bele barve, ki odseva svetlobo, nameščeno prečno na smer vožnje.

(2) Ob zmanjšani vidljivosti in ponoči je treba znaku iz druge alineje prejšnjega odstavka dodati rdečo neslepečo svetilko.

(3) Izjemoma je lahko podnevi ob dobri vidljivosti tovor, ki se prevaža na osebнем avtomobilu, označen z rdečo tkanino, veliko najmanj 40 x 40 cm.

V 76.členu

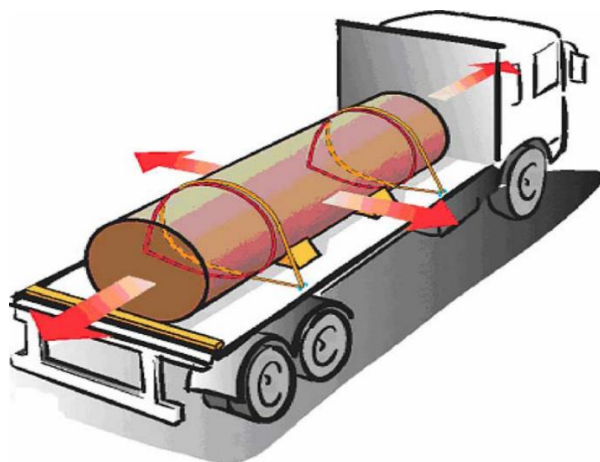
(označevanje tovora na bočnih straneh)

(1) Če sega tovor čez vozilo na bočnih straneh, mora biti glede na vrsto vozila označen na bočno najbolj izpostavljenih mestih na sprednji in zadnji strani s tablam iz prve oziroma druge alineje prvega odstavka prejšnjega člena, ki morajo biti nameščene prečno na smer vožnje. Ponoči in ob zmanjšani vidljivosti mora biti tak tovor označen na bočno najbolj izpostavljenih mestih tudi z belima svetilkama na sprednji strani in z rdečima svetilkama na zadnji strani.

(2) V primeru, da tovor na vozilu zakriva vidno polje v vzvratnih ogledalih, je treba namestiti dodatni vzratni ogledali, ki omogočata normalno vidno polje. Dodatnih vzvratnih ogledal ni treba namestiti na vozila, s katerimi se opravlja izredni prevoz, pri katerem zagotavljata varnost prevoza najmanj eno spremljevalno vozilo.

Pravilnik o nalaganju in pritrjevanju tovora v cestnem prometu v 3. členu dodatno nalaga naslednje:

“Med prevozom v cestnem prometu mora biti tovor na vozilu naložen, pritrjen in zavarovan v skladu z navodili za varno nalaganje in pritrjevanje tovora v cestnem prometu, ki so kot priloga sestavni del tega pravilnika.” V Navodilih za varno nalaganje in pritrjevanje tovora v cestnem prometu so na 144 straneh navedeni in opisani osnovni napotki za varno nalaganje tovora.



Slika 1: Puščice kažejo glavne sile, ki jih mora prenesti pritrditev tovora

Vir: Navodilo za nalaganje in pritrjevanje tovora, Uradni list RS,
št. 70/11

3 PREGLED STANJA VARNOSTI CESTNEGA PROMETA VOZNIKOV TOVORNIH VOZIL V SLOVENIJI V OBDOBJU 2019 – 2023

Kot prikazuje Tabela 1, so bili v letu 2023 vozniki tovornih vozil udeleženi v 2.610 prometnih nesrečah oziroma v več kot vsaki 7 prometni nesreči na cestah v Sloveniji (v zadnjih letih vedno podobno razmerje).

V letu 2023 so povzročili 1.617 prometnih nesreč oz. 62 % vseh prometnih nesreč, v katerih so bili udeleženi. Na slovenskih cestah je v letu 2023 v prometnih nesrečah, ki jih je povzročil voznik tovornega vozila, umrlo 8 udeležencev cestnega prometa (14,3% več kot v letu 2022), 37 udeležencev je bilo hudo telesno poškodovanih (24,5 % manj v primerjavi z letom 2022), 322 pa je bilo lažje telesno poškodovanih udeležencev (15,3 % manj kot v letu 2022). Od 8 umrlih, ki so jih povzročili vozniki tovornih vozil, so bili 3 umrli vozniki tovornih vozil sami, 3 umrli so bili vozniki osebnih avtomobilov, po 1 voznik motornega kolesa ter 1 potnik v vozilu. Hudo telesno poškodovanih voznikov tovornih vozil pa je bilo 10 (52,4 % manj kot v letu 2022). Lažje telesno poškodovanih voznikov tovornih vozil je bilo 120 oz. 9,1 % manj kot v 2022.

LETO	Št. PN z udeležbo TV	Št. PN – povzr. voznik TV	Delež	Posledice na voznikih TV			Posledice na udeležencih - povzr. voznik TV		
				Umrli	Hudo tel. pošk.	Lažje tel. pošk.	Umrli	Hudo tel. pošk.	Lažje tel. pošk.
2019	2793	1630	58%	3	13	113	6	37	374
2020	2183	1409	65%	2	6	117	6	26	339
2021	2426	1537	63%	5	11	117	17	38	327
2022	2528	1627	64%	6	21	132	7	49	380
2023	2610	1617	62%	3	10	120	8	37	322
Sprememba 2019/2023	-6,6%	-0,8%		0,0%	-23,1%	6,2%	33,3%	0,0%	-13,9%
Sprememba 2022/2023	3,2%	-0,6%		-50,0%	-52,4%	-9,1%	14,3%	-24,5%	-15,3%

Tabela 1: Prometne nesreče in posledice v zadnjih petih letih voznikov tovornih vozil
Vir: Javna agencija Republike Slovenije za varnost prometa, 2024

Najbolj pogosti vzrok pri prometnih nesrečah (Tabela 2), ki jih povzročijo vozniki tovornih vozil, je nepravilen premik z vozilom – 37 % vseh prometnih nesreč. Sledi nepravilna stran/smer vožnje s 14 % in neustrezna varnostna razdalja ter ostali vzroki z 12 %. Zaradi neprilagojene hitrosti voznikov tovornih vozil je umrlo največ udeležencev cestnega primeta in sicer 20 oz. 44 % umrlih. Sledi mu nepravilna stran/smer vožnje – 7 umrlih oz. 14 % ter premiki z vozilom in neupoštevanje pravil o prednosti, vsak s po 6 umrli oz. 13 %.

Vzrok za nastanek PN	Št. PN - TV povzr.	Posledice na vseh udeležencih			Št. PN - TV povzr.	Posledice na vseh udeležencih		
		S	H	L		S	H	L
Premiki z vozilom	2894	6	29	257	37%	13%	15%	15%
Nepravilna stran/smer vožnje	1079	7	34	188	14%	16%	18%	11%
Ostalo	965	4	18	122	12%	9%	9%	7%
Neustrezna varnostna razdalja	933	1	8	392	12%	2%	4%	22%
Neprilagojena hitrost	814	20	52	376	10%	44%	27%	22%
Neupoštevanje pravil o prednosti	756	6	40	354	10%	13%	21%	20%
Nepravilnosti v tovoru	183	0	0	10	2%	0%	0%	1%
Nepravilno prehitevanje	162	1	9	37	2%	2%	5%	2%
Nepravilnosti na vozilu	56	0	0	5	1%	0%	0%	0%
Nepravilnosti na cesti	8	0	0	0	0%	0%	0%	0%
Nepravilnost pešca	6	0	0	4	0%	0%	0%	0%

Tabela 2: Vzrok za nastanek prometnih nesreč – povzročitelj voznik tovornega vozila v obdobju 2019 – 2023
Vir: Javna agencija Republike Slovenije za varnost prometa, 2024

V letu 2023 (2022) je bilo pri voznikih tovornih vozil ugotovljeno 47.229 (38.339) kršitev CPP. Najpogostejše kršitve so povezane s hitrostjo – 11.568 (10.085), uporabo mobitela – 6.707 (6.194),

neuporaba varnostnega pasu – 4.386 (4.005), varnostna razdalja – 2.296 (1.176) in **nepravilnost na tovoru – 2.348 (1.684).**

Med preventivno akcijo za večjo varnost voznikov tovornih vozil in avtobusov, ki je potekla med 19. in 25. februarjem 2024, so policisti kontrolirali 3.442 voznikov tovornih vozil in 385 voznikov avtobusov. Pri voznikih tovornih vozil so ugotovili 990 kršitev cestnoprometnih predpisov, pri voznikih avtobusov pa 68. Pri voznikih tovornih vozil so bile najpogostejše kršitve povezane s preobremenjenostjo vozila in prekoračitvijo hitrosti, pri voznikih avtobusov pa neuporaba varnostnih pasov in prekoračitev hitrosti. Zaradi nepravilnosti na tovoru ali vozilu je bilo iz prometa izločenih 135 tovornih vozil.

4 PRIMERI PRITRJEVANJA TOVORA IN PRITRDILNIH TEHNIK

Pri nalaganju tovara je pomembno, da se upoštevajo varnostni predpisi in predpisi, ki urejajo prevoz blaga. To vključuje pravilno razporeditev tovara na vozilu, uporabo ustreznih pripomočkov za pritrditev tovara in izogibanje preobremenitvi vozila. V nadaljevanju bo predstavljenih nekaj tipičnih primerov pritrjevanja tovara, pritrdilnih tehnik in pripomočkov za pritrjevanje tovara.

4.1 Povezovalni trakovi

Povezovalni trakovi (Slika 2) imenovani tudi povezovalni pasovi (v žargonu voznikov »gurtne«) so osnovni element pritrjevanja tovara in varnega prevoza.



Slika 2: Pritrdilni trak (pas)

Vir: Varen prevoz tovara. Brošura, Javna agencija Republike Slovenije za varnost prometa 2021, Ljubljana.

Na vsakem pritrdilnem pasu (Slika 3), kot tudi na raglji, mora biti:

- certifikat s podatki o poreklu oz. proizvajalcu,
- standard,
- največja dovoljena natezna sila (LC – Lashing Capacity),
- sila zatezanja z roko (SHF – Standard Hand Force),
- sila v zategnjenem pasu, ki deluje na ragljo (STF – Standard Tension Force),
- mesec in leto proizvodnje,
- največji dovoljeni raztezek v % pri polni obremenitvi,
- material, iz katerega je narejen pas,
- opozorilo oz. prepoved za uporabljanje pasov za dvigovanje.

Če pas ali raglja nimata lista oz. certifikata z ustreznimi podatki, nadzorni organi obravnavajo tovor enako, kot da tega priveza ni.

PREPOVEDI UPORABE

Prepovedana je uporaba pasov, ki so:

- poškodovani,
- zavozlani,
- brez etikete.



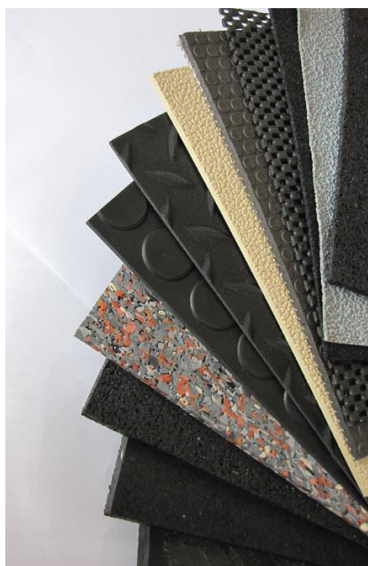
Slika 3: Oznaka na pritrdilnem traku

Vir: Varen prevoz tovora. Brošura, Javna agencija Republike Slovenije za varnost prometa 2021, Ljubljana.

4.2 Protidsrne podloge

Protidsrne podloge (Slika 4) in tovarne pode s povečanim oprijemom uporabimo, da povečamo trenje tovora s podlago in s tem njegovo nepremičnost med vožnjo. Če povečamo silo trenja, potrebujemo manjšo silo pritrditve (manjše število nameščenih pasov za pritrjevanje).

Praviloma delež trenja znaša med 0,2 in 0,3, torej med 25 in 30 %, preostanek od 70 do 75 %, pa moramo zagotoviti s pritrjevanjem. V primeru uporabe protidsrskih podlog, večini bolj znanih kot protidsrna guma, tovor po celotni površini leži na torni podlogi, pomeni, da znaša koeficient trenja vsaj 0,6 in s tem delež trenja znaša 75 %, in je treba z metodami pritrjevanja zagotoviti le še preostalih 25 %.

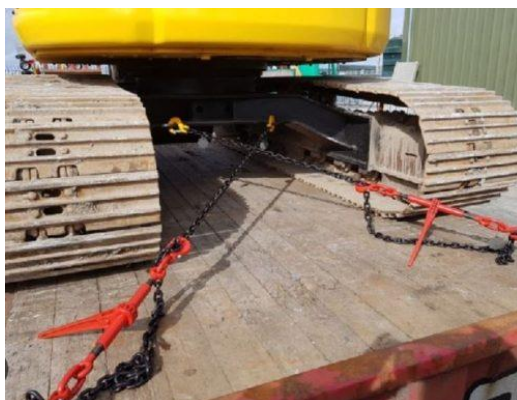


Slika 4: Protidrsne podloge

Vir: Varen prevoz tovora. Brošura, Javna agencija Republike Slovenije za varnost prometa 2021, Ljubljana.

4.3 Verige za pritrjevanje tovora

Za pritrjevanje pri prevozu težjih tovorov, delovnih strojev in opreme se najpogosteje uporablja sredstvo verige.



Slika 5: Primer pritrjevanja z verigami

Vir: Prolitech – dvizna in transportna oprema, <https://prolitech.si/category/nekategorizirano/>

4.4 Pritrjevanje kosovnega tovora

Ob prevozu večje količine tovora različnih in običajno manjših dimenzij se lahko uporabijo mreže za pritrjevanje tovora (Slika 6). Mreže iz tekstilnih trakov so zelo primerne za pritrjevanje lomljivega ali stisljivega blaga, ki ga zaradi njegovih lastnosti ne smemo pasovno obremeniti, s tekstilnimi mrežami pa silo porazdelimo na večjo površino in se tako izognemo poškodbam tovora.



Slika 6: Primer mrež za pritrjevanje tovora

Vir: Varen prevoz tovora. Brošura, Javna agencija Republike Slovenije za varnost prometa 2021, Ljubljana.

5 ZAKLJUČEK

Pravna ureditev nalaganja in pritrjevanja tovora je pomembna za zagotavljanje varnosti pri prevozu blaga in preprečevanje nesreč. Ta ureditev običajno zajema zakonodajo, predpise in standarde, ki določajo, kako se mora tovor pravilno naložiti, pritrjevati in prevažati. Naloge nalaganja in pritrjevanja tovora v EU so urejene z različnimi predpisi in standardi, ki zagotavljajo varnost med prevozom. Tukaj so ključne točke, ki veljajo v EU:

1. Zakonodajni okvir

- **Direktiva EU 2014/47/EU** - nanaša se na tehnične preglede gospodarskih vozil v cestnem prometu in zajema tudi varnost pritrjevanja tovora.
- **ADR** (Evropski sporazum o mednarodnem cestnem prevozu nevarnega blaga) - za nevarno blago vključuje zahteve glede pritrjevanja.
- **EN 12195-1** - Evropski standard za izračun sile pritrjevanja tovora.

2. Odgovornost

- **Prevoznik** je odgovoren za varno pritrjevanje tovora.
- **Pošiljatelj** mora zagotoviti ustrezno pakiranje in označevanje tovora, da omogoča pravilno pritrjevanje.
- **Voznik** ima nalogo preveriti pritrjenost tovora pred in med vožnjo, še posebej po 50 kilometrih vožnje in v rednih intervalih.

3. Osnovna načela pritrjevanja

- **Metode pritrjevanja** - Vključujejo vezanje (npr. jermeni, verige) in uporabo pritrdilnih sredstev, kot so klini, mreže, okvirji ali zaščitne folije.
- **Porazdelitev tovora** - Teža mora biti enakomerno porazdeljena na vozilu, da se preprečijo premiki tovora ali prevrnitev.
- **Dovoljene sile** - Standard EN 12195-1 določa zahteve za maksimalne sile pritrjevanja glede na maso tovora in druge dejavnike, kot so trenje in nagibi med prevozom.

4. Izobraževanje in usposabljanje

- Vozniki in prevozniki morajo biti ustrezno usposobljeni glede pravilnega nalaganja in pritrjevanja tovora. Veljajo obvezni treningi, ki zajemajo teoretična in praktična znanja.

5. Inšpekcijski pregledi

- Inšpektorji lahko izvajajo naključne tehnične preglede vozil, kjer preverjajo, ali je tovor pravilno pritrjen. V primeru kršitev lahko sledijo globe in prepoved nadaljevanja poti.

Varno in ustrezno pritrjevanje tovora ni pomembno le zaradi izpolnjevanja zakonodajnih zahtev, ampak tudi zaradi varnosti vseh udeležencev v prometu.

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LEGAL REGULATION OF LOADING AND SECURING OF CARGO IN ROAD TRANSPORT IN THE REPUBLIC OF SLOVENIA

Summary:

The article presents the legal regulation of loading and securing cargo in road transport in the Republic of Slovenia. Proper loading and securing of cargo is crucial for safety and the prevention of accidents during the transport of goods. In Slovenia, the legal regulation of loading and securing cargo in road transport is detailed in various regulations related to road traffic safety, the transport of dangerous goods, drivers, working hours, and other related aspects. The following is a brief overview of the state of road traffic safety for truck drivers in Slovenia during the period 2019 – 2023, along with some examples of cargo securing.

Keywords: Legal regulation, loading and securing cargo, road traffic safety, cargo securing equipment..

1 INTRODUCTION

Preparing cargo for transport requires care and attention to ensure the safe and efficient delivery of goods to their destination. The legal regulation of loading and securing cargo in road transport is crucial for ensuring the safety of both drivers and other road users. By strictly adhering to regulations, the risk of accidents and injuries is reduced, and the efficiency and reliability of logistics processes are maintained.

2 LEGAL REGULATION

Legal regulation refers to the system of laws, rules, and institutions that govern social life with a specific legal order. The legal regulation of loading and securing cargo is important for ensuring safety during the transport of goods and preventing accidents. This regulation typically includes legislation, regulations, and standards that specify how cargo must be properly loaded, secured, and transported.

Some key elements of the legal regulation of loading and securing cargo in road transport include:

- e) **Weight and dimension limits** - Laws specify the maximum allowable weights and dimensions of cargo that can be transported on roads to prevent vehicle overloading and damage to road infrastructure.
- f) **Securing methods** - Regulations specify how cargo must be secured to the vehicle, including the use of safety belts, chains, nets, pallets, and other means to ensure stability and safety during transport. It is very important to consider the forces during transport (Figure 1).
- g) **Special rules for certain types of cargo** - Specific regulations and requirements apply to certain types of cargo, such as hazardous materials, live animals, or oversized loads, to ensure safe transportation.
- h) **Monitoring and penalties** - Regulatory organizations oversee compliance with regulations and sanction carriers who do not adhere to legal requirements.

The conditions for cargo transport are more precisely prescribed by the Road Traffic Rules Act (Official Gazette of the Republic of Slovenia, No. 156/21 – official consolidated text and 161/21 – correction) in Chapter VIII (Conditions for Cargo Transport in Road Traffic) and the Regulation on Loading and Securing Cargo in Road Transport (Official Gazette of the Republic of Slovenia, No. 70/11). The regulation follows the European Commission document titled “European Best Practice Guidelines on Cargo Securing for Road Transport.”

The Road Traffic Rules Act in Articles 74, 75, and 76 in the previously mentioned in the aforementioned Chapter VIII, Conditions for Cargo Transport in Road Traffic, stipulates:

in Article 74

(cargo on the vehicle)

- (1) Freight and devices intended for transport, loading, unloading or affixing freight shall be loaded and affixed on and in the vehicle or covered so as to:
 - 1. not present any danger or obstacle to other road-users;
 - 2. not cause damage on a road or structures;
 - 3. not pollute the environment;
 - 4. not diminish the stability of a vehicle;
 - 5. not cause more noise than permitted;
 - 6. not reduce visibility for drivers;

7. not scatter or fall from a vehicle.
- (2) If freight loaded on a motor vehicle or trailer vehicle or devices intended for transport of or affixing freight conceal the place where the registration plate or lamp on the back of a vehicle are mounted, the most extended part at the back of the vehicle shall be equipped with a mount for the registration plate and prescribed lamps and reflectors.
- (3) Freight shall not extend over the front part of a vehicle. Light objects may be transported in an outer luggage compartment on a passenger car or cargo vehicle so that the cargo does not extend more than 1 m over the front part of the vehicle. The part of cargo extending over the front part of a vehicle shall not be lower than the roof level of the vehicle.
- (4) Freight may extend not more than 1.5 m over the back part of a vehicle or group of vehicles, except for special freight transport conducted on the basis of the competent authority's permission. The freight on a cargo vehicle or a trailer vehicle shall be supported on at least 5/6 of its length.
- (5) Cargo on single-track vehicles may extend not more than half a metre over the front and the back part of the vehicle, with its width not extending one metre. Transport of unsecured dangerous goods (scythes, forks and so forth) on single-track vehicles shall not be permitted.
- (6) Cargo shall be loaded and affixed according to the Act regulating methods of loading, affixing and securing of freight on a vehicle in detail.

in Article 75

(Labelling freight)

- (1) If freight extends more than 1 m over the back of a vehicle, it shall be labelled on its most extended point on:
- passenger cars, motor tricycles, light four-wheelers, four-wheelers and light trailers drawn by passenger cars - with a plate of at least 25 x 25 cm, coloured in alternating red and white oblique bars, emitting light and mounted transverse to the driving direction;
- other vehicles - with a plate of at least 40 x 40 cm, coloured in alternating red and white oblique bars, emitting light and mounted transverse to the driving direction.
- (2) During reduced visibility and at night, a red non-dazzling lamp shall be added to the sign referred to in indent two of the preceding paragraph.
- (3) As an exception, by day and in good visibility freight transported on a passenger car could be labelled with red cloth of at least 40 x 40 cm.
- (4) A fine of EUR 120 shall be imposed on a driver failing to comply with the provisions of this Article.

in Article 76

(Labelling freight on lateral sides)

- (1) If freight extends over lateral sides it shall be labelled depending on the type of vehicle on laterally the most extended parts on the front and the back side with plates referred to in indents one or two of paragraph one of the preceding Article. The plates shall be mounted transverse to the driving direction. At night or during reduced visibility such freight shall also be labelled with white lamps on the front and red lamps on the back of the laterally most extended parts of the vehicle.
- (2) If the freight covers the vision area in rear-view mirrors, additional rear-view mirrors enabling a normal vision area shall be mounted. Additional rear-view mirrors are not necessary on vehicles used for special freight transport when transport safety is ensured with at least one escort vehicle.

The Regulation on Loading and Securing Cargo in Road Traffic in Article 3 additionally stipulates

the following: ‘During transport in road traffic, the cargo on the vehicle must be loaded, secured, and protected in accordance with the instructions for safe loading and securing of cargo in road traffic, which are an integral part of this regulation as an appendix. The Instructions for Safe Loading and Securing of Cargo in Road Traffic contain basic guidelines for safe cargo loading, described over 144 pages.

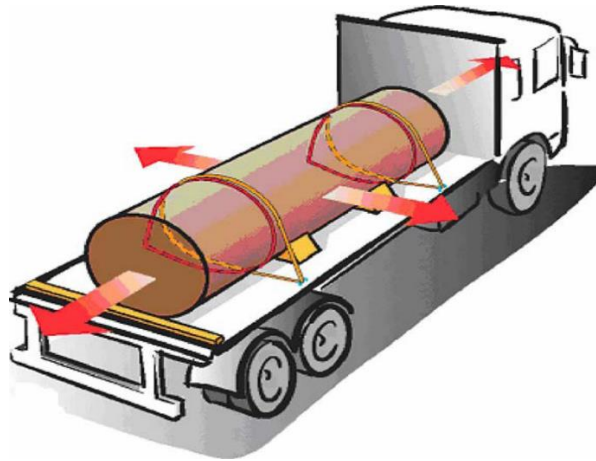


Figure 1: The arrows indicate the main forces that the cargo securing must withstand.

Source: Instructions for Loading and Securing Cargo, Official Gazette of the Republic of Slovenia, No. 70/11

3 OVERVIEW OF ROAD TRAFFIC SAFETY FOR TRUCK DRIVERS IN SLOVENIA FOR THE PERIOD 2019 – 2023

As shown in Table 1, in 2023, truck drivers were involved in 2,610 traffic accidents, accounting for more than one in every seven traffic accidents on Slovenian roads (a similar ratio has been observed in recent years). In 2023, truck drivers caused 1,617 traffic accidents, accounting for 62% of all traffic accidents they were involved in. On Slovenian roads in 2023, 8 road users died in traffic accidents caused by truck drivers (14.3% more than in 2022), 37 road users were seriously injured (24.5% less compared to 2022), and 322 were slightly injured (15.3% less than in 2022). Of the 8 fatalities caused by truck drivers, 3 were truck drivers themselves, 3 were car drivers, 1 was a motorcyclist, and 1 was a passenger. There were 10 seriously injured truck drivers (52.4% less than in 2022). There were 120 slightly injured truck drivers, which is 9.1% less than in 2022.

LETO	Št. PN z udeležbo TV	Št. PN – povzr. voznik TV	Delež	Posledice na voznikih TV			Posledice na udeležencih - povzr. voznik TV		
				Umrli	Hudo tel. pošk.	Lažje tel. pošk.	Umrli	Hudo tel. pošk.	Lažje tel. pošk.
2019	2793	1630	58%	3	13	113	6	37	374
2020	2183	1409	65%	2	6	117	6	26	339
2021	2426	1537	63%	5	11	117	17	38	327
2022	2528	1627	64%	6	21	132	7	49	380
2023	2610	1617	62%	3	10	120	8	37	322
Sprememba 2019/2023	-6,6%	-0,8%		0,0%	-23,1%	6,2%	33,3%	0,0%	-13,9%
Sprememba 2022/2023	3,2%	-0,6%		-50,0%	-52,4%	-9,1%	14,3%	-24,5%	-15,3%

Table 1: Traffic Accidents and Consequences in the Last Five Years for Truck Drivers

Source: Public Agency of the Republic of Slovenia for Traffic Safety, 2024

The most common cause of traffic accidents (Table 2) caused by truck drivers is improper vehicle maneuvering – accounting for 37% of all traffic accidents. This is followed by driving on the wrong side/direction with 14%, and inadequate safety distance along with other causes at 12%. Due to inappropriate speed by truck drivers, the highest number of road users died, specifically 20 or 44% of the fatalities. This is followed by driving on the wrong side/direction – 7 fatalities or 14%, and vehicle maneuvers and failure to observe right-of-way rules, each with 6 fatalities or 13%.

Vzrok za nastanek PN	Št. PN - TV povzr.	Posledice na vseh udeležencih			Št. PN - TV povzr.	Posledice na vseh udeležencih		
		S	H	L		S	H	L
Premiki z vozilom	2894	6	29	257	37%	13%	15%	15%
Nepravilna stran/smer vožnje	1079	7	34	188	14%	16%	18%	11%
Ostalo	965	4	18	122	12%	9%	9%	7%
Neustrezna varnostna razdalja	933	1	8	392	12%	2%	4%	22%
Neprilagojena hitrost	814	20	52	376	10%	44%	27%	22%
Neupoštevanje pravil o prednosti	756	6	40	354	10%	13%	21%	20%
Nepravilnosti v tovoru	183	0	0	10	2%	0%	0%	1%
Nepravilno prehitivanje	162	1	9	37	2%	2%	5%	2%
Nepravilnosti na vozilu	56	0	0	5	1%	0%	0%	0%
Nepravilnosti na cesti	8	0	0	0	0%	0%	0%	0%
Nepravilnost pešca	6	0	0	4	0%	0%	0%	0%

Table 2: Causes of Traffic Accidents – Truck Driver as the Cause in the Period 2019 – 2023

Source: Public Agency of the Republic of Slovenia for Traffic Safety, 2024

In 2023 (2022), 47,229 (38,339) traffic violations were recorded for truck drivers. The most common violations were related to speed – 11,568 (10,085), use of mobile phones – 6,707 (6,194), not using seat belts – 4,386 (4,005), safety distance – 2,296 (1,176), and cargo irregularities – 2,348 (1,684).

During the preventive action for the increased safety of truck and bus drivers, which took place from February 19 to 25, 2024, the police checked 3,442 truck drivers and 385 bus drivers. They found 990 traffic violations among truck drivers and 68 among bus drivers. The most common violations among truck drivers were related to vehicle overloading and speeding, while for bus drivers, the most common violations were not using seat belts and speeding. Due to irregularities in the cargo or vehicle, 135 trucks were taken out of service.

4 EXAMPLES OF CARGO SECURING AND FASTENING TECHNIQUES

When loading cargo, it is important to follow safety regulations and rules governing the transport of goods. This includes proper distribution of cargo on the vehicle, using appropriate tools for securing the cargo, and avoiding overloading the vehicle. The following will present some typical examples of cargo securing, securing techniques, and tools for securing cargo.

4.1 Securing straps

Securing straps (Figure 2), also known as binding straps are a fundamental element for securing cargo and ensuring safe transport.



Figure 2: Securing strap

Source: *Varen prevoz tovora. Brochure, Public Agency of the Republic of Slovenia for Traffic Safety 2021, Ljubljana.*

On each securing strap (Figure 3), as well as on the ratchet, there must be:

- a certificate with information about the origin or manufacturer,
- the standard,
- the maximum allowable tensile force (LC – Lashing Capacity),
- the hand tensioning force (SHF – Standard Hand Force),
- the force in the tightened strap acting on the ratchet (STF – Standard Tension Force),
- the month and year of manufacture,
- the maximum allowable stretch percentage under full load,
- the material from which the strap is made,
- a warning or prohibition against using the straps for lifting.

If the strap or ratchet does not have a label or certificate with the appropriate information, the supervisory authorities treat the cargo as if it is not secured.

PROHIBITED USE

The use of straps that are:

- damaged,
- knotted,
- without a label, is prohibited.



Figure 3: Label on the securing strap

Source: *Varen prevoz tovora*, Brochure, Public Agency of the Republic of Slovenia for Traffic Safety 2021, Ljubljana.

4.2 Anti – slip mats

Anti-slip mats (Figure 4) and cargo floors with increased grip are used to increase the friction between the cargo and the surface, thereby ensuring its immobility during transport. By increasing the friction force, we need less securing force (fewer securing straps).

Typically, the friction ratio ranges between 0.2 and 0.3, which means between 25% and 30%, while the remaining 70% to 75% must be ensured by securing. When using anti-slip mats, commonly known as anti-slip rubber, the cargo lies on the friction mat over the entire surface, meaning that the friction coefficient is at least 0.6, and thus the friction ratio is 75%. Therefore, only the remaining 25% needs to be secured by other methods.

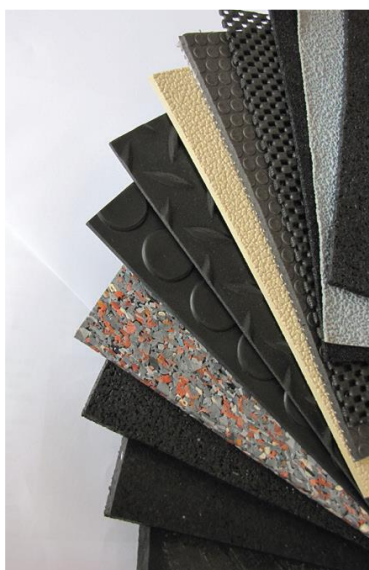


Figure 4: Anti – slip mats

Source: *Varen prevoz tovora, Brochure, Public Agency of the Republic of Slovenia for Traffic Safety 2021, Ljubljana.*

4.3 Cargo Securing Chains

Chains are most commonly used for securing heavier loads, machinery and equipment during transport.

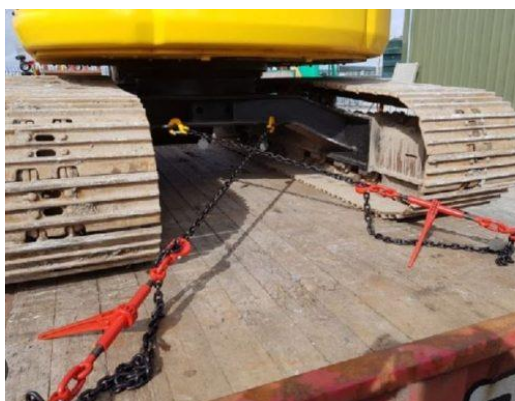


Figure 5: Example of securing with chains

Source: *Prolitech – dvižna in transportna oprema, <https://prolitech.si/category/ne kategorizirano/>*

4.4 Securing general cargo

When transporting larger quantities of cargo with various and usually smaller dimensions, cargo nets can be used for securing the load (Figure 6). Nets made from textile straps are highly suitable for securing fragile or compressible goods that should not be directly strapped due to their properties. With textile nets, the force is distributed over a larger surface area, thus avoiding damage to the cargo."



Figure 6: Example of Cargo Securing Nets

Source: *Varen prevoz tovora. Brošura, Brochure, Public Agency of the Republic of Slovenia for Traffic Safety 2021, Ljubljana.*

5 CONCLUSION

The legal regulation of loading and securing cargo is crucial for ensuring the safety of goods transportation and preventing accidents. This regulation typically includes legislation, regulations, and standards that dictate how cargo should be properly loaded, secured, and transported. In the EU, the tasks of loading and securing cargo are governed by various regulations and standards that ensure safety during transportation. Here are the key points applicable in the EU:

1. Legislative Framework.

- **EU Directive 2014/47/EU** relates to the technical inspections of commercial vehicles in road traffic and includes cargo securing safety.
- **ADR** (European Agreement concerning the International Carriage of Dangerous Goods by Road) includes requirements for securing dangerous goods.
- **EN 12195-1** European Standard for Calculating Cargo Securing Forces.

2. Responsibility

- **The carrier** is responsible for the safe securing of the cargo.
- **The consignor** must ensure proper packaging and labeling of the cargo to enable correct securing.
- **The driver** is tasked with checking the securing of the cargo before and during the journey, especially after 50 kilometers of driving and at regular intervals.

3. Basic Principles of Attachment

- **Securing Methods** include lashing (e.g., straps, chains) and the use of securing devices such as wedges, nets, frames, or protective films.
- **Load Distribution** The weight must be evenly distributed on the vehicle to prevent cargo shifts or overturning.
- **Permissible Forces** Standard EN 12195-1 specifies the requirements for maximum securing forces based on the cargo mass and other factors such as friction and inclines during transport.

4. Education and Training

- Drivers and carriers must be properly trained in the correct loading and securing of cargo. Mandatory training includes both theoretical and practical knowledge.

5. Inspections

- Inspectors can conduct random technical inspections of vehicles to check if the cargo is properly secured. In case of violations, fines and a prohibition to continue the journey may follow.

Safe and proper securing of cargo is important not only for meeting legislative requirements but also for the safety of all road users.

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Damijan Krašovec, dipl. inž. str.

KOLESARJENJE, VELIK POTENCIAL TRAJNOSTNE MOBILNOSTI

Ključne besede: Trajnostna mobilnost, kolesarska infrastruktura, kolesarjenje, ogljični odtis, onesnaževanje okolja, strategija razvoja kolesarske infrastrukture, zelena logistika, tovorna kolesa

Povzetek

V tem prispevku so navedene možnosti za zmanjšanje onesnaževanja okolja na račun prometa z ustvarjanjem potrebnih pogojev za množičnejšo trajnostno mobilnost ljudi in tovora v večjih mestih v obliki kolesarjenja. Prednosti kolesarjenja za posameznika, družbo, okolje in gospodarstvo, pomembnost vlaganja v kolesarjem prijazno in varno infrastrukturo ter ostale oblike motivacije, za povečanje števila uporabnikov koles za prevoz na delo, po opravkih, v šolo, na sestanke, v trgovino. Pomembno vlogo ima tudi vključevanje tovornih koles za logistično podporo v prvih in zadnjih kilometrih oskrbovalnih verig. Našteti so primeri dobre prakse v evropskih državah, kjer je kolesarjenje že tradicionalno, ali pa kjer so s korenitimi in hitrimi posegi v kratkem času povečali število uporabnikov koles za prevoz ali rekreacijo in sprostitev

Navedene so pomanjkljivosti in napake pri umeščanju nove infrastrukture, predlogi za izboljšanje kolesarjem prijazne infrastrukture v Sloveniji, videni s strani uporabnika. Po izkušnjah iz mnogih evropskih mest, boljša infrastruktura hitro bistveno poveča število kolesarjev.

Uvod

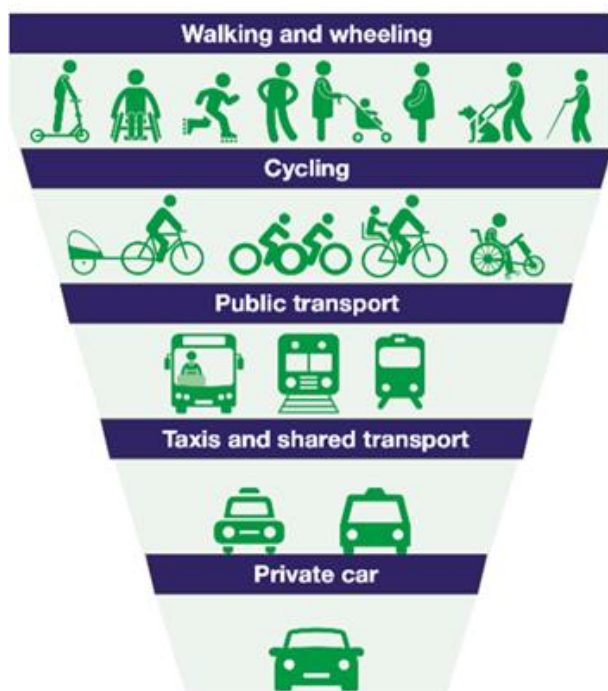
Podnebne spremembe so ena izmed največjih groženj, s katerimi se sooča človeštvo. Gre za dolgoročne spremembe podnebja na zemlji, ki jih povzroča predvsem človek z izpusti toplogrednih plinov, krčenjem gozdov, ki predelajo toplogredne pline v kisik, industrijo in energetiko, kmetijstvom in prometom.

Na zemlji nimamo neomejene količine naravnih virov s katerimi je danes potrebno zadovoljiti potrebe že več kot 8 milijard vedno bolj potrošnih prebivalcev. Če bi povprečni zemljan potrošil toliko, kot povprečni Američan, bi po nekaterih podatkih že danes potrebovali štiri zemlje naravnih dobrin za zagotavljanje potreb vseh zemljanov. Ker je predvidevanje, da bo število prebivalcev naglo raslo vsaj še do števila 10 milijard, je skrajni čas za ukrepanje in racionaliziranje na vseh področjih izrabe naravnih virov. Velik del onesnaževanja ozrača globalnega segrevanja in podnebnih sprememb prispeva prav cestni promet. Prav na tem področju obstajajo velike možnosti za vključevanje strategije zelene logistike in trajnostne mobilnosti.

Trajnostna mobilnost zmanjšuje obremenitev okolja

Osnovni cilj trajnostne mobilnosti je zadovoljiti potrebe vseh ljudi po mobilnosti in obenem zmanjšati promet, posledično onesnaževanje, emisije toplogrednih plinov in porabo energije. Trajnostna mobilnost je okoljsko sprejemljiva, socialno pravična in spodbuja razvoj gospodarstva. Promet je kljub velikemu napredku in dvigu življenjske ravni postal resna grožnja okolja in kakovosti življenja v mestih. V Sloveniji so se emisije iz prometa od osamosvojitve podvojile in predstavljajo okoli 30 % vseh emisij toplogrednih plinov. V urbanih okoljih je postal promet glavni onesnaževalec ozrača

(prašni delci, dušikovimi oksidi in ozon). Z ukrepi prometne politike je potrebno zagotoviti, da bo trajnostni način mobilnosti motiviran, udoben, atraktiven in varen. Trajnostna mobilnost na krajše razdalje prednostno vključuje hojo, kolesarjenje, uporabo javnega potniškega prometa in alternativne oblike mobilnosti. Njen cilj je zagotavljanje učinkovite in enakopravne dostopnosti za vse, s poudarkom na omejevanju osebnega motornega prometa in porabe energije ter na spodbujanju trajnostnih potovalnih načinov. Zlasti za potovanja znotraj mest in povezavo s primestjem ima kolesarjenje vse večji pomen, saj so v večjih mestih potovalne hitrosti s kolesom v povprečju višje



Slika 1: trajnostna mobilnost, vir: transport gov.

kolesarje, pešce, večina prostih površin so zasedli parkirani avtomobili, ki preko 90% časa samo zasedajo prostor. Kolesarji so ostali v podrejenem položaju.

S strategijo trajnostne mobilnosti se v mestna središča ponovno vrača več prostora pešcem, kolesarjem, javnemu prevozu, s tem postaja uporaba osebnih vozil manj priljubljena zaradi dragih številčno omejenih parkirišč, gneče, plačevanja pristojbin za vstop v mesto.

Evropske kolesarske prestolnice kot so Copenhagen, Utrecht, Amsterdam, Stockholm itd. popolnoma preurejajo prometno infrastrukturo, ki sledi načelom trajnostne mobilnosti.

Razlogi za kolesarjenje

Kolesarjenje pozitivno vpliva na zdravje uporabnika, okolje, družbo in gospodarstvo. Kolo ima v primerjavi z ostalimi prevoznimi sredstvi številne prednosti. Je enostavno in ekonomično za vzdrževanje, cenovno dostopno vsem prebivalcem, uporabniku omogoča večji radij gibanja kot pešačenje, pri krajših razdaljah uspešno nadomešča uporabo avtomobila, predvsem v bližini naselij in znotraj njih, zagotavlja svobodnejšo in učinkovitejšo izrabo prostega časa in intenzivnejše, bolj zdravo doživljanje okolja. Omogoča hitro dostavo blaga v mestih z gostim prometom. Vsakodnevna pot v službo je v nasprotju s pogosto gnečo na cesti in spremljajočo slabo voljo, lahko prijetna izkušnja.

Pozitivni učinki kolesarjenja na zdravje: Redno kolesarjenje poveča fizično kondicijo in moč, zmanjša možnost srčnih obolenj do 50%, manj odsotnosti z dela do 15 %, pomaga pri premagovanju

od povprečne hitrosti potovanja z avtomobilom. Potniška kolesa primerna za zadovoljevanje potreb po mobilnosti dnevnih migracij na delo, v šolo ali po opravkih.

Tovorna kolesa lahko zagotavljajo podporo logistični oskrbni verigi prvega in zadnjega kilometra, na ta način lahko pomembno zmanjšajo onesnaževanje, zastoje, ter prostorsko stisko mestnih središč.

»Razvita država ni tista, kjer imajo revni avtomobile. Je tista, kjer bogati uporabljajo javni promet.« Enrique Peñalosa

Kolesarjenje, oblika trajnostne mobilnosti

Kolo se je kot prevozno sredstvo pojavilo v 18. stoletju. Do razvoja avtomobila je bilo pomembnejše prevozno sredstvo v mestih in naseljih. Razvoj avtomobilov je kmalu izrinil kolesarje iz mest, ki so postala nevarna za

stresa, izboljša počutje, izboljša delovanje možganov, izboljša spanec, podaljša življenjsko dobo. Zdravstveni proračun lahko letno prihranili do 10 % sredstev.

Okoljski učinki: Ne onesnažuje okolja s strupenimi plini (NO_x CO, C_x, H_x), trdnimi delci, hrupom, ima od vseh oblik prevoza v celotnem ciklu (proizvodnja, uporaba, razgradnja) najmanjši delež ogljičnega odtisa na prevožen kilometer: (kolo: 21 g CO₂/km, avtobus:, 101 CO₂/km, osebni avto: 271 g CO₂/km). (Vir: ECF). Ne povzroča zastojev v mestih, omogoča večjo pretočnost prometa. Z energijo, potrebno za izdelavo enega avtomobila, lahko izdelamo 70 do 100 koles. Za parkiranje potrebuje približno 10-krat manj prostora kot osebno vozilo. Kolesarska infrastruktura zaseda bistveno manj prostora, potrebni so manjši posegi v prostor medtem ko motorni promet povzroča tudi posredne stroške zaradi hrupa, vibracij, onesnaževanja ozračja, tal in vode, zastojev, porabe prostora, prometnih nesreč itd.

Družbeni učinki: Kolo lahko za prevoz uporabljajo tudi otroci in starejši. Otroci postanejo neodvisni in s tem stroškovno in časovno razbremenijo starše oziroma stare starše. Mestna središča postanejo manj onesnažena, manj hrupna, ulice niso prepolne vozil, so prijetnejša za prebivalce in obiskovalce, privlačnejša za turiste. V primerjavi s pešcem, kolesar ob enaki porabi energije, doseže vsaj 3-krat večjo hitrost in ima hkrati večji doseg v enakem času ter ima možnost dostopa od vrat do vrat, v večini primerov lahko parkira neposredno pred ciljem.

Gospodarski učinki: Kolesarstvo prinaša nova delovna mesta v proizvodnji koles, turizmu, trgovini na drobno, storitvah ter pri gradnji in vzdrževanju infrastrukture. Kolesarjenje razbremeni promet, s kombiniranim načinom prevoza (kolo-javni prevoz-kolo) lahko povečajo zasedenost sredstev javnega prevoza. Kolesarji pogosteje obiskujejo restavracije, trgovine, kavarne in prispevajo k rasti lokalnega gospodarstva.

Ukrepi za motiviranje kolesarjev - povečanje števila kolesarjev

Za povečanje števila dnevno mobilnih kolesarjev (prevoz v službo, po opravkih, šolo itd.), je potrebna mreža sodobnih, povezanih, dovolj širokih, varnih, direktnih, po najkrajši trasi speljanih kolesarskih poti brez nepotrebnih ovir, kjer se kolesarji vozijo s stalno hitrostjo brez neprestanega ustavljanja. Kolesarske površine morajo biti vzdrževane in prevozne v vseh vremenskih razmerah in letnih časih. Poskrbeti je potrebno za nadzorovana parkirna mesta.

V Sloveniji se zadnja leta veliko vloga v promocijo kolesarjenja kot obliko trajnostne mobilnosti, gradi se mreža kolesarske infrastrukture, izvajajo se različne akcije (npr. polni zagona, pripelji srečo v službo, dan brez avtomobila, teden mobilnosti, itd.). Od leta 2011 zelo dobro deluje sistem izposoje koles BICIKELJ, podobne sisteme imajo vsa večja mesta v Sloveniji. V šolah poteka že drugi triletni projekt spodbujanje trajnostne mobilnosti, v katerem aktivno sodeluje tudi naša šola. V osnovnih šolah vsi učenci opravijo kolesarski izpit skupaj s projektom varno s kolesom.

Veliko zaslugo za popularizacijo kolesarstva imajo, s svojimi uspehi, tudi naši vrhunski kolesarji (Roglič, Pogačar, Mohorič, Mezgec, Tratnik, itd.)

Ljubljana uspešno izvaja projekte trajnostne mobilnosti (dvakrat zmagovalka Evropskega tedna mobilnosti, projekt CIVITAS, celostna prometna strategija). Nekaj kilometrov s kolesom bi morda opravili tudi zapriseženi avtomobilisti, če bi uvedli pravično plačevanje okoljskih dajatev ob registraciji glede na letni ogljični odtis posameznega vozila v odvisnosti od prevoženih kilometrov z avtom. Pomembno vlogo pri promociji kolesarjenja kot način transporta imajo tudi mednarodne organizacije in projekti: ECF (European cyclist federation) s številnimi mednarodnimi projekti in promocijskimi akcijami (EuroVelo, SWITCH, CYCLE logistics, Past projects, Pro E-bike, Bike2Work, Velo City, B-TRACK-B, NowWeMove)

Vizija razvoja kolesarstva v Sloveniji

Slovenija naj bi do leta 2030 postala ena od držav z najboljšimi pogoji za kolesarjenje v Evropi z

izgradnjo sklenjenega, varnega, udobnega, privlačnega kolesarskega omrežja. To privede do povečanje rabe kolesa, zmanjšanje rabe energije fosilnih goriv v prometu in izpustov toplogrednih plinov, izboljšanje kakovosti življenja prebivalcev.



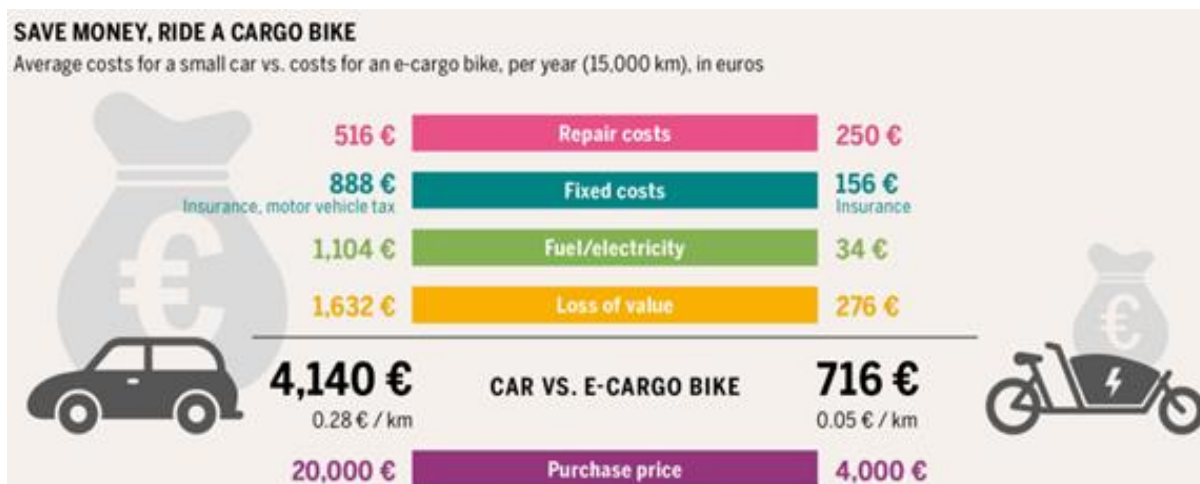
Slika 2: ukrepi za povečanje števila kolesarjev po načelu PRESTO, vir: Mobile 2000

Infrastrukturni cilji: vzpostavitev sklenjenega omrežja kakovostnih kolesarskih povezav, njihovo vzdrževanje in zagotavljanje varne uporabe v vseh vremenskih pogojih, dostop do podatkov o kolesarskem omrežju ter povezanost s sredstvi javnega prometa. **Cilji mehkih ukrepov:** povečanje priljubljenosti, varnosti kolesarjenja, izboljšanje kulture v prometu. Izvajajo se različne motivacijske akcije (npr. Polni zagona, Pripelji srečo v službo, Dan brez avtomobila, Evropski teden mobilnosti, Zimski kolesarski dan). **Sprejeti dokumenti s področja spodbujanja kolesarstva:** Pravilnik o kolesarskih površinah, Kolesarjem prijazna infrastruktura - smernice za umeščanje kolesarske infrastrukture v urbana območja, Celovita kolesarska strategija mesta Ljubljana, Navodila za projektiranje kolesarskih površin, Strategija turističnega proizvoda kolesarjenje po Sloveniji, Tehnična specifikacija za javne ceste - kolesarske površine, Usmeritve za vključitev tovornih koles v Strateški načrt za razvoj kolesarskega omrežja v Republiki Sloveniji, Zasnova državnega kolesarskega omrežja v republiki Sloveniji, itd.

Zelena logistika z vključevanjem tovornih koles

Tovorna kolesa lahko pomembno vplivajo na doseganje cilja zmanjšati izpuste CO₂ do leta 2030 za 55 % (»Fit for 55«) v primerjavi z ravnmi iz leta 1990 in podnebno nevtralna Evropa do leta 2050. Tovorna kolesa lahko zamenjajo dostavna vozila na dizelski pogon v delu oskrbne verige prvega in zadnjega kilometra. Vsako tovorno kolo, ki nadomesti motorno vozilo, zmanjša emisije CO₂ najmanj 5 ton letno, porabi manj energije, zmanjša obremenitev mest s prometom, hrupom, onesnaževanjem ter sprostijo premalo številna parkirna mesta. Proizvodnja kolesa porabi le 5 % materiala in energije v primerjavi z avtomobilom. V kolesarskih mestih uporabljajo tovorna kolesa pošte, dostava paketov, dostava hrane, čistilci ulic, prevoz živali, za prevoz oseb predvsem mlade družine, domovi starejših občanov, vrtci. Mnoge odgovorne mlade družine v večjih evropskih mestih namesto avtomobila raje

uporabljajo električno tovorno kolo tudi zaradi bistveno nižjih stroškov.. Letni stroški osebnega vozila zelo hitro naraščajo tudi zaradi dragih parkirnin in taks za vožnjo v mestih. Tovorna kolesa so se v posameznih primerih pričela uporabljati tudi v Sloveniji, čeprav infrastruktura v večini primerov ni prilagojena tovrstnim kolesom. Lep primer je mlad par, ki za pot na delo iz Kamnika v Ljubljano uporablja tovorno kolo.



Slika 3: Primerjava letnih stroškov, malega vozila in tovornega kolesa, vir: Europeam mobility

Primeri dobre prakse

V zadnjih letih se v Sloveniji, po zgledu skandinavskih držav, vse več prometnih površin ponovno namenja kolesarjem, v obdobju 2014 – 2025 se dokončuje 501,65 km novih kolesarskih površin financiranih s pomočjo evropskih sredstev. To izboljšuje pogoje za kolesarjenje in povečuje število uporabnikov koles za dnevno mobilnost. Zgrajenih je nekaj zelo atraktivnih turističnih kolesarskih poti (Mojstrana - Trbiž, Štrekna na relaciji Velenje - Dravograd, kolesarska pot ob Dravi, Muri, Parencana, itd) Po podatkih SURSa, smo Slovenci v letu 2021 s kolesom opravili 5,3% vseh potovanj, v letu 2017 pa 4,5%, za 40% pa se je povečala razdalja potovanj s kolesom. Števci kolesarjev so v obdobju 2019 – 2021 zabeležili kar 30% rast števila kolesarje. Novih Stadlerjevi vlaki omogočajo tudi prevoz koles, kar velja tudi mednarodne vlake. V primerjavi z nizozemsko ali dansko prometno kulturo pa po številu kolesarjev še vedno zelo zaostajamo. Copenhagenize je v 2019 ocenila več kot 600 mest, kolesarjem prijaznejša so Copenhagen, Amsterdam, Utrecht, Antwerpen, Ljubljana pa se je uvrstila na 14 mesto, v letu 2017 pa je bila uvrščena celo na 8. mesto. Slovenija med državami članicami, ki beležijo povišanje prometne varnosti. V času med leti 2010 in 2018 Slovenija beleži kar 7 % manj smrti med kolesarji, kar je za 4 %.



Slika 4: Parkirna hiša Utrecht, vir: archdaily.com

letu
naj

Kolesarjenje v skandinavskih deželah je zelo prijetno, varno, vsa naselja, mesta in turistične destinacije so povezano dostopne z atraktivno kolesarsko infrastrukturo, ki se ne srečuje s prometnimi površinami za motoriziran promet, nima ostrih zavojev, obvoznih pentelj, neravnin, robnikov, jaškov. Vse kolesarske površine so v nočnem času osvetljene, križanja s cestami so izvedena z nadvozi ali podvozi, ni nikakršnih ovir, ki bi oteževale kolesarjenje. Poskrbljeno je za ustrezna parkirna mesta.

V nizozemskem mestu Utrecht je od leta 2018 v uporabi največja garažna hiša za kolesa na svetu, na 17100 kvadratnih metrih lahko parkira kar 12500 koles.



Slika 4: Dobro urejena atraktivna in varna kolesarska infrastruktura, vir: lastni

Pomanjkljivosti pri gradnji kolesarske infrastrukture v Sloveniji

Kljub velikemu izboljšanju pogojev za trajnostno mobilnost v obliki kolesarjenja v Sloveniji, opažam pomanjkljivosti, ki ovirajo kolesarje. Novo zgrajene hitrostne poti niso povezane z vsemi naselji, imajo ostre zavoje v krivinah z nagibom na zunanjo stran in nevarnim dvignjenim robnikom. “Zaradi varnosti” so postavljeni stebrički, ti zelo ovirajo kolesarje, ki morajo paziti na izogibanje in s tem ne morejo opazovati odvijanje prometa. Omenjeni stebrički ne omogočajo vožnje s tovornim kolesom. V velikih primerih so na kolesarskih površinah odtočni in infrastrukturni jaški, ki naredijo vožnjo zelo neudobno. Nevarne so veliki reklamni panoji nameščeni ob krivinah kolesarskih poti, ki onemogočijo preglednost. Težavo predstavlja tudi neosvetljenost kolesarskih poti speljanih v nižjem nivoju ob prometni cesti. V nočnem času tako nasproti vozeča vozila z žarometi popolnoma zaslepijo kolesarja. V zimskem času ni poskrbljeno za čiščenje snega, celo nasprotno, kolesarske površine služijo za odmetavanje snega, kar za več tednov onemogoči kolesarjenje.



Slika 6: Neprimerni detajli na kolesarski infrastrukturi, vir: lastni

Zaključek

Slovenija ima odlične naravne pogoje za kolesarjenje. Mesta in urbana središča ležijo predvsem v ravninskem delu, kar je idealno za kolesarjenje iz potrebe po dnevnem prevozu. Vpadnice v večja slovenska mesta so vedno bolj obremenjena, ob prometnih konicah nastajajo nepregledne stoječe kolone vozil, večina s po eno osebo. Prehod na trajnejše oblike mobilnosti lahko ta problem bistveno zmanjša. Kolesarjenje je pomembnejša oblika trajnostne mobilnosti, a je potrebno ustvariti dobre pogoje, da postane privlačno, uporabno, varno in konkurenčno. V Sloveniji se že poznajo učinki načrtnega vlaganja v izboljšanje kolesarske mreže in motiviranje za pridobitev večjega števila uporabnikov. Kot zaposleni v vzgoji in izobraževanju na področju logistike in transporta imamo

nalogo, da mladim predstavimo pomembnost trajnostne mobilnosti, jih spodbujamo s svojimi zgledi in dejanji. Na naši šoli aktivno sodelujemo že v drugem triletnem projektu trajnostne mobilnosti tudi kot regijsko središče. V okviru tega projekta smo izvedli kolesarski dan v obliki nekaj urne vodene vožnje z e kolesi. Navdušenje dijakov je bilo nepopisno. Večina dijakov se je registriralo v sistem izposoje koles BICIHELJ.

V letošnjem šolskem letu je oddelek logistike 3.I zmagal na nacionalnem natečaju šole odprte kohezije s temo Transport je vedno bil ključna industrija in si s tem prislužili tri dnevni izlet v Bruselj z obiskom evropske komisije.

Sam dajem zgled dijakom tudi z vsakodnevno uporabo kolesa za prevoz na delo v razdalji 18 km v eno smer. Prepričan sem, da se bo v Sloveniji močno povečalo število uporabnikov trajnostne mobilnosti, če se bo še naprej izboljševalo pogoje in podpiralo tovrstno mobilnost.

Morda se celo uresniči ambiciozni cilj, postati kolesarjem ena najprijaznejših držav v Evropi.

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Damijan Krašovec, dipl. inž. str.

CYCLING, A GREAT POTENTIAL FOR A SUSTAINABLE MOBILITY

Keywords: Sustainable mobility, cycling infrastructure, cycling, carbon footprint, environmental pollution, cycling infrastructure development strategy, green logistics, cargo bikes

Summary

This article outlines options for reducing environmental pollution caused by traffic by creating the necessary conditions for increased sustainable mobility of people and goods in larger cities through cycling. It highlights the benefits of cycling for individuals, society, the environment, and the economy, the importance of investing in cyclist-friendly and safe infrastructure, and other forms of motivation to increase the number of users cycling to work, for errands, to school, to meetings, or to the store. The inclusion of cargo bikes for logistical support in the first and last miles of supply chains also plays an important role. Examples of good practices in European countries, where cycling is either traditional or where radical and rapid interventions have significantly increased the number of cyclists for transport or recreation and relaxation in a short time, are listed. The shortcomings and mistakes in implementing new infrastructure, as well as suggestions for improving cyclist-friendly infrastructure in Slovenia from the user's perspective, are mentioned. Experience from many European cities shows that better infrastructure quickly and significantly increases the number of cyclists.

Introduction:

Climate change is one of the greatest threats humanity faces. It involves long-term changes in the Earth's climate, primarily caused by human activities such as the emission of greenhouse gasses, deforestation, industry and energy production, agriculture, and traffic. On Earth, we do not have an unlimited amount of natural resources, which today must meet the needs of over 8 billion increasingly consumer-oriented inhabitants. If the average human consumed as much as the average American, some data suggests that we would already need the resources of four Earths to meet the needs of all. Given that the population is expected to grow rapidly to at least 10 billion, it is high time to take action and rationalize the use of natural resources in all areas. A significant part of air pollution, global warming, and climate change is contributed by road traffic. This sector offers substantial opportunities for incorporating green logistics and sustainable mobility strategies.

Sustainable mobility reduces the environmental burden:

The primary goal of sustainable mobility is to meet the mobility needs of all people while simultaneously reducing traffic, and consequently pollution, greenhouse gas emissions, and energy consumption. Sustainable mobility is environmentally acceptable, socially just, and promotes economic development. Despite significant progress and improvements in living standards, traffic has become a serious threat to the environment and quality of life in the cities. In Slovenia, emissions from traffic have doubled since independence and now account for around 30% of all greenhouse gas emissions. In urban environments, traffic has become the main air pollutant (dust particles, nitrogen oxides and ozone). Traffic policy measures need to ensure that sustainable ways of mobility are motivated, comfortable, attractive, and safe.

Sustainable mobility for shorter distances primarily includes walking, cycling, using public transportation, and alternative forms of mobility. Its goal is to provide efficient and equitable accessibility for all, with an emphasis on limiting personal motorized traffic and energy consumption, and promoting sustainable travel modes. Particularly for intra-city travel and suburban connections, cycling is becoming increasingly important, as travel speeds by bike in larger cities are on average higher than the average travel speed by car. Passenger bikes are suitable for meeting the mobility needs of daily commutes to work, school, or errands.

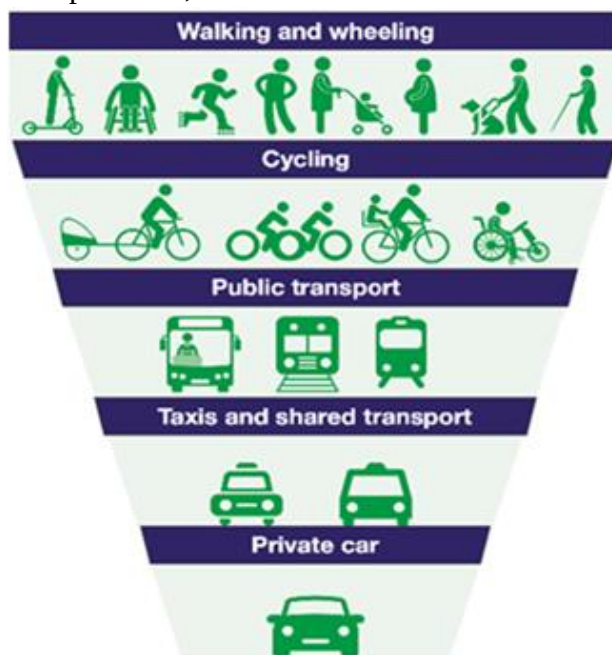


Figure 1: Sustainable mobility, source: transport gov.

Cargo bikes can support the logistics supply chain in the first and last mile, significantly reducing pollution, congestion, and spatial constraints in city centers.

"A developed country is not a place where the poor have cars. It's where the rich use public transportation." - Enrique Peñalosa,

Cycling, a form of sustainable mobility

The bicycle emerged as a means of transportation in the 18th century. Until the development of the automobile, it was the primary means of transport in cities and towns. The rise of automobiles soon pushed cyclists out of cities, making them dangerous for cyclists and pedestrians. Most free spaces were occupied by parked cars, which take up space over 90% of the time. Cyclists were left in a subordinate position. With the strategy of sustainable mobility, more space is being returned to pedestrians, cyclists, and public transportation in city centers, making the use of personal vehicles less popular due to expensive and limited parking, congestion, and fees for entering the city. European cycling capitals like Copenhagen, Utrecht, Amsterdam, Stockholm, etc., are completely redesigning their transportation infrastructure to follow the principles of sustainable mobility.

Reasons for cycling:

Cycling has positive effects on the user's health, the environment, society, and the economy. Compared to other means of transportation, bicycles offer numerous advantages. They are easy and economical to maintain, affordable for all residents and provide a greater range of movement than walking. For shorter distances, bicycles successfully replace car use, especially near and within settlements. They offer a freer and more efficient use of free time and a more intense, healthier experience of the environment. Bicycles enable quick delivery of goods in densely trafficked cities. The daily commute to work can be a pleasant experience, unlike the frequent traffic jams and accompanying bad moods.

Positive health effects of cycling: Regular cycling increases physical fitness and strength, reduces the risk of heart disease by up to 50%, decreases work absenteeism by up to 15%, helps overcome stress, improves mood, enhances brain function, improves sleep, and extends life expectancy. The health budget can save up to 10% of funds annually.

Environmental effects: Cycling does not pollute the environment with toxic gasses, dust particles, or noise. Of all forms of transport, it has the smallest carbon footprint per kilometer traveled in the entire cycle (production, use, disposal): (bicycle: 21 g CO₂/km, bus: 101 g CO₂/km, car: 271 g

CO₂/km) (Source: ECF). Cycling does not cause traffic congestion in cities and allows for greater traffic flow. With the energy required to produce one car, 70 to 100 bicycles can be made. Bicycles require about 10 times less space for parking than cars. Cycling infrastructure occupies significantly less space, requiring smaller spatial interventions. Motorized traffic also causes indirect costs due to noise, vibrations, air, soil, and water pollution, congestion, space consumption, traffic accidents, and other negative environmental impacts.

Social effects: Bicycles can be used by children and the elderly for transportation. Children become independent, relieving parents or grandparents of time and cost burdens. City centers become less polluted, less noisy, streets are not overcrowded with vehicles, making them more pleasant for residents and visitors, and more attractive to tourists. Compared to a pedestrian, a cyclist achieves at least three times the speed with the same energy expenditure, has a greater range in the same amount of time, and has the ability to access door-to-door, with the possibility of parking directly in front of the destination in most cases.

Economic effects: Cycling creates new jobs in bicycle manufacturing, tourism, retail, services, and the construction and maintenance of infrastructure. Cycling relieves traffic congestion, and by using a combined mode of transportation (bicycle-public transport-bicycle), public transport occupancy can increase. Cyclists more frequently visit restaurants, shops, and cafes, contributing to the growth of the local economy.

Measures to motivate cyclists- increasing the number of cyclist:

To increase the number of daily cyclists (commuting to work, running errands, going to school, etc.), a network of modern, connected, sufficiently wide, safe, and direct cycling paths with the shortest possible routes and without unnecessary obstacles is required. Cyclists should be able to ride at a constant speed without continuous stopping. Cycling paths must be maintained and passable in all weather conditions and seasons. It is also necessary to provide supervised parking spaces.

In recent years, Slovenia has invested heavily in promoting cycling as a form of sustainable mobility. A network of cycling infrastructure is being built, and various campaigns are being carried out (e.g., "Full of Energy," "Ride to Work with Joy," "Car-Free Day," "Mobility Week," etc.). Since 2011, the bike-sharing system BICIKEJ has been operating very well, and similar systems exist in all major cities in Slovenia. Schools are now running the second three-year project to promote sustainable mobility, in which our school is actively participating. In primary schools, all students pass the cycling exam as part of the "Safe with a Bicycle" project. Our top cyclists (Roglič, Pogačar, Mohorič, Mezgec, Tratnik, etc.) have also greatly contributed to the popularization of cycling with their successes. Ljubljana is successfully implementing sustainable mobility projects (twice a winner of the European Mobility Week, CIVITAS project, comprehensive traffic strategy). Even dedicated motorists might ride a few kilometers by bike if fair environmental taxes were introduced upon vehicle registration, based on the annual carbon footprint of each vehicle depending on the kilometers driven. International organizations and projects also play an important role in promoting cycling as a mode of transport: the European Cyclists' Federation (ECF) with numerous international projects and promotional campaigns (EuroVelo, SWITCH, CYCLE logistics, Past projects, Pro E-bike, Bike2Work, Velo City, B-TRACK-B, NowWeMove).

Vision for the development of cycling in Slovenia:

By 2030, Slovenia aims to become one of the countries with the best conditions for cycling in Europe by building a comprehensive, safe, comfortable, and attractive cycling network. This will lead to increased use of bicycles, reduced fossil fuel energy consumption in transport, decreased greenhouse gas emissions, and improved quality of life for residents.



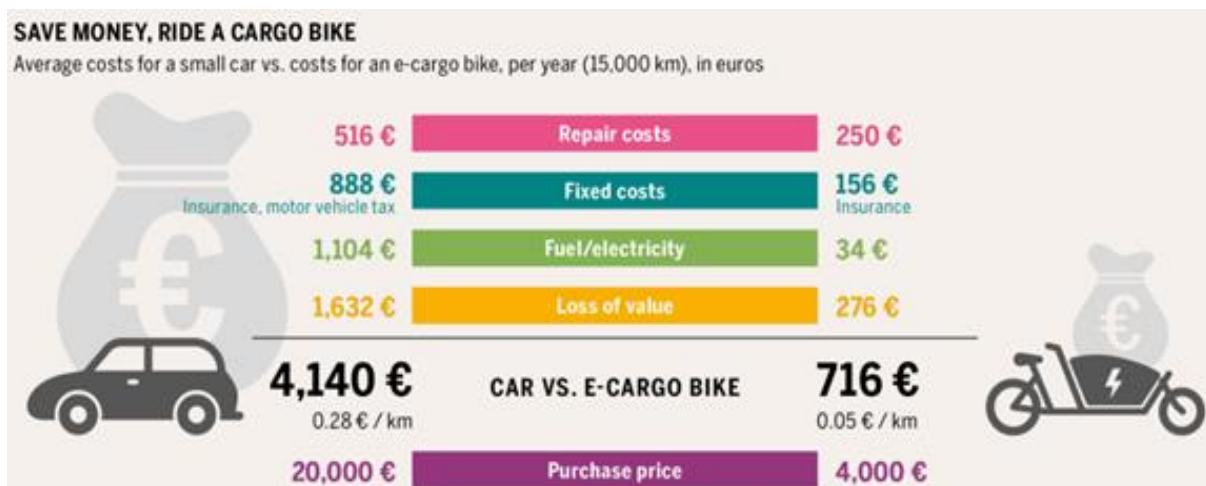
Figure 2: Measures to increase the number of cyclists according to the PRESTO principle, source: Mobile 2000

Infrastructure goals: Establish a comprehensive network of high-quality cycling connections, maintain them, and ensure safe use in all weather conditions, access to information about the cycling network, and connectivity with public transportation. **Goals of soft measures:** Increase the popularity and safety of cycling, improve traffic culture. Various motivational campaigns are being implemented (e.g., "Full of Energy," "Ride to Work with Joy," "Car-Free Day," "European Mobility Week," "Winter Cycling Day"). **Documents adopted in the field of promoting cycling:** Regulations on Cycling Areas, Cyclist-Friendly Infrastructure - Guidelines for Integrating Cycling Infrastructure into Urban Areas, Comprehensive Cycling Strategy for the City of Ljubljana, Guidelines for Designing Cycling Areas, Tourism Product Strategy for Cycling in Slovenia, Technical Specifications for Public Roads - Cycling Areas, Guidelines for Including Cargo Bikes in the Strategic Plan for the Development of the Cycling Network in the Republic of Slovenia, Design of the National Cycling Network in the Republic of Slovenia, etc.

Green logistics with the inclusion of cargo bikes:

Cargo bikes can significantly contribute to achieving the goal of reducing CO₂ emissions by 55% by 2030 ("Fit for 55") compared to 1990 levels and a climate-neutral Europe by 2050. Cargo bikes can replace diesel-powered delivery vehicles in the first and last mile of the supply chain. Each cargo bike that replaces a motor vehicle reduces CO₂ emissions by at least 5 tons annually, consumes less energy, reduces urban traffic congestion, noise, and pollution, and frees up scarce parking spaces. The production of a bike uses only 5% of the material and energy compared to a car. In cycling cities, cargo bikes are used by postal services, package deliveries, food deliveries, street cleaners, animal transport, and for transporting people, mainly used by young families for the rides to schools or kindergartens or by senior homes. Many responsible young families in larger European cities prefer to use electric cargo bikes instead of cars due to significantly lower costs. The annual costs of a personal vehicle increase rapidly due to expensive parking fees and city driving taxes. Cargo bikes

have also started to be used in Slovenia in some cases, although the infrastructure is mostly not adapted for such bikes. A good example is a young couple who commute from Kamnik to Ljubljana by cargo bike.



Picture 3: Comparison of Annual Costs Between a Small Vehicle and a Cargo Bike,
Source: European mobility

Examples of good practices:

In recent years, Slovenia has increasingly allocated traffic areas to cyclists, following the example of Scandinavian countries. Between 2014 and 2025, 501.65 km of new cycling paths are being completed with the help of European funds. This improves conditions for cycling and increases the number of people using bicycles for daily mobility. Several very attractive tourist cycling routes have been built. According to SURS data, Slovenians made 5.3% of all trips by bicycle in 2021, compared to 4.5% in 2017, with a 40% increase in the distance traveled by bike. Cyclist counters recorded a 30% increase in the number of cyclists between 2019 and 2021. New Stadler trains also allow for transportation of bicycles, which is also true for international trains. However, compared to the traffic culture in the Netherlands or Denmark, we still lag significantly in the number of cyclists. In 2019, Copenhagen evaluated more than 600 cities, ranking Copenhagen, Amsterdam, Utrecht, and Antwerp as the most cyclist-friendly, with Ljubljana ranking 14th, down from 8th in 2017. Slovenia is among the countries that have recorded an increase in traffic safety. Between 2010 and 2018, Slovenia saw a 7% reduction in cyclist deaths, which is a 4% improvement.



Figure 4: Utrecht bike parking house, source: archdaily.com.

Cycling in Scandinavian countries is very pleasant and safe. All settlements, cities, and tourist destinations are connected with attractive cycling infrastructure that does not intersect with motorized traffic areas, and lacks sharp turns, detours, bumps, curbs, and manholes. All cycling paths are illuminated at night, and road crossings are managed with overpasses or underpasses, with no

obstacles hindering cycling. Adequate parking spaces are provided. In the Dutch city of Utrecht, the world's largest bicycle parking garage has been in use since 2018, covering 17,100 square meters and accommodating up to 12,500 bicycles.

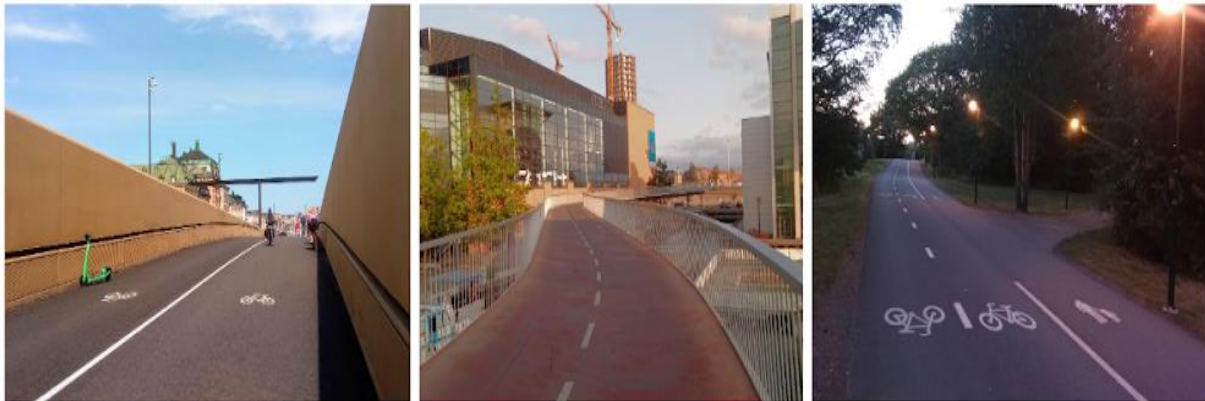
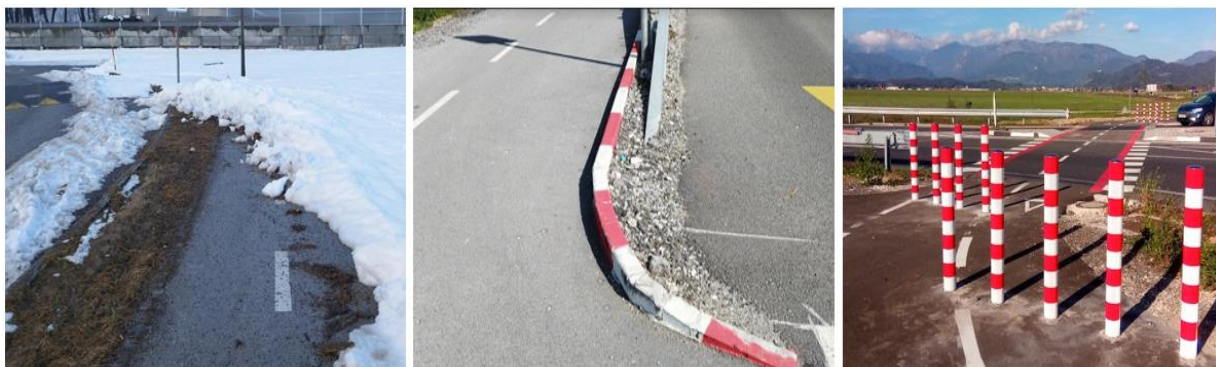


Figure 5: Well-arranged, attractive and safe cycling infrastructure, source: own

Shortcomings in the construction of cycling infrastructure in Slovenia:

Despite significant improvements in conditions for sustainable mobility through cycling in Slovenia, I observe shortcomings that hinder cyclists. Newly constructed cycling paths are not connected to all settlements, have sharp turns with outward tilting curves and dangerous raised curbs. Bollards are placed "for safety reasons," which greatly obstruct cyclists who must maneuver around them, thereby compromising their ability to observe traffic flow. These bollards do not allow for the passage of cargo bikes. In many cases, drainage and infrastructure manholes are placed on cycling paths, making riding very uncomfortable. Large advertising billboards placed along curves of cycling paths pose safety hazards by obstructing visibility. Another issue is the lack of lighting on cycling paths at lower levels alongside traffic roads, which can during nighttime completely blind the cyclists due to oncoming vehicles' headlights. In winter, there is no snow clearing on cycling paths; on the contrary, they serve as dumping grounds for snow, rendering cycling impossible for weeks.



Picture 6: Inappropriate details on the cycling paths, source: own.

Conclusion:

Slovenia boasts excellent natural conditions for cycling. Cities and urban centers are primarily situated in flat areas, which is ideal for cycling as a daily transportation mode. Entrances to major Slovenian cities are increasingly congested, with dense queues forming during peak traffic hours, most vehicles occupied by just one person. Transitioning to more sustainable forms of mobility can significantly alleviate this issue. Cycling represents a crucial form of sustainable mobility, but it is essential to create favorable conditions to make it attractive, usable, safe, and competitive. Slovenia

is already experiencing the effects of strategic investment in improving the cycling network and motivating more users. As educators in logistics and transportation, we have a responsibility to emphasize the importance of sustainable mobility to young people, encouraging them through our examples and actions. At our school, we actively participate as a regional center in a three-year sustainable mobility project. As part of this project, we organized a cycling day involving a few hours of guided e-bike rides. The enthusiasm among the students was indescribable. Most students registered for the BICIHELJ bike-sharing system. In the current school year, the logistics department 3.I won the national competition "School of Open Cohesion" with the theme "Transport has always been a key industry," earning them a three-day trip to Brussels with a visit to the European Commission. Personally, I set an example for students by using my bike daily for commuting 18 km each way to work. I am confident that Slovenia will see a significant increase in sustainable mobility users if conditions continue to improve. **Perhaps Slovenia's ambitious goal of becoming the most cyclist-friendly country in Europe might even be realized.**

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Zoran Jazbinšek, dipl. inž. str. (VS)

Adaptivni žarometi za motocikle: prednosti, načini delovanja in samogradnja

Povzetek

Eno izmed ključnih področij aktivne varnosti je osvetlitev cestišča. Na področju avtomobilizma se je v zadnjih 30 letih na tem področju zgodila prava mala revolucija: poleg halogenskih žarometov lahko na cestah srečamo tudi ksenonske, LED, laser, mehansko prilagodljive, matrične projektorje, namenske žaromete, namenjene zavijanju itd. Na področju motociklov se je na tem področju zgodilo precej manj, šele zadnjih nekaj let se na trgu uveljavljajo LED žarometi, le redki proizvajalci pa trenutno ponujajo kaj več od tega.

Ker je adaptivna osvetlitev za vožnjo motocikla vsaj toliko, če ne še bolj koristna kot pri avtomobilu, sem se lotil samogradnje adaptivnega žarometa. Nastalo je nekaj različnih delujočih prototipov, zadnjo verzijo pa podrobneje predstavljam v tem članku.

Ključne besede: adaptivni žaromet, varnost, motocikel, samogradnja

Summary

One of the key areas of active safety is road lighting. A small revolution has happened in car headlight technology in the last 30 years: not only halogen headlights, nowadays we can have HID, LED, laser, mechanically adjustable, matrix projectors, dedicated cornering lights etc. In the field of motorcycle headlights, much less has happened, halogen technology is still entry level standard, and it has been only in the last few years that LED headlights started to gain ground on the market, and only a few manufacturers currently offer anything better than that.

Since adaptive lighting for riding a motorcycle is at least as, if not more, useful than for a car, I set out to build an adaptive headlight myself. Several different working prototypes were created, and I present the latest version in more detail in this article.

Keywords: adaptive headlight, safety, motorcycle, self-building

Uvod

Adaptivni žaromet za motocikel predstavlja pomembno napredno rešitev za izboljšanje aktivne varnosti v cestnem prometu. Konvencionalni žarometi, bodisi LED ali halogenski, osvetlujejo cestišče pred vozilom, ne morejo pa prilagajati vzorca svetlobnega snopa glede na dano situacijo in pogoje kot so nagib motocikla, zavijanje in nihanje vozila po prečni osi zaradi zaviranja in pospeševanja. Adaptivni žaromet lahko to slabost odpravi z uporabo napredne elektronike in senzorike, ki prilagaja osvetlitev v realnem času glede na trenutno situacijo.

Prednosti adaptivnih žarometov

Bistvo adaptivnih žarometov je sposobnost prilagajanja vzorca svetlobnega snopa glede na nagib motocikla. Med zavijanjem se motocikel nagne, kar pri konvencionalnem žarometu vodi do zmanjšane osvetlitve cestišča v smeri zavijanja – ravno tam, kjer je osvetlitev najbolj potrebna. Krmilnik adaptivnega žarometu zazna kot nagiba, in ustrezno prilagodi svetlobni snop tako, da je notranja stran zavoja osvetljena, s čimer se bistveno izboljšata vodljivost in varnost, zmanjša pa se tveganje za nesrečo.



Slika 5: osvetljeni del cestišča pri klasičnem zasenčenem (levo) ter pri adaptivnem zasenčenem žarometu (desno)

Poleg prednosti adaptivne funkcije žarometov ne moremo mimi prednosti LED tehnologije, ki se odlično ujame s tovrstno tehnologijo. Prednosti le te so jasne: visoka energetska učinkovitost, dolga življenjska doba LED svetila, prostorska ekonomičnost ter cenovna dostopnost. Hkrati so LED žarometi vzdržljivejši, manj odporni na mehanske obremenitve (vibracije, udarci,..), ter na splošno manj nagnjeni k okvaram od halogenskih in ksenonskih svetil. Vse to so pogoji, ki dajejo LED svetilom precej prednosti pri uporabi le teh v adaptivnih svetilnih telesih.

Način delovanja adaptivnih žarometov

Adaptivni žarometi za svoje delovanje uporabljajo različne komponente: senzorji v obliki akcelometrov, žiroskopska zaznavala, senzorji za hitrost itd., ki pošiljajo podatke v krmilno enoto, le ta pa v realnem času prilagaja vzorec svetlobnega snopa.

Svetlobni snop se lahko prilagaja na različne načine: lahko se premikajo leče ali reflektorji znotraj žarometu, lahko se premika zrcalo, lahko pa se prižigajo in ugašajo posamični segmenti svetlobnega telesa – slednje se v avtomobilski industriji imenuje matrika. Ti mehanizmi omogočajo različne tipe usmerjanja svetlobe tako, da imamo osvetljen del cestišča, ki bi sicer med zavijanjem ostal neosvetljen. Le to omogoča optimalno osvetlitev ceste.

Stroški vgradnje adaptivnih žarometov

Halogenski žarometi so najenostavnejša in najcenejša izvedenka svetilnih teles za motocikel, žal pa imajo pomanjkljivosti v obliki krajše življenjske dobe, nižje svetilnosti in višje porabe energije. Te pomanjkljivosti s seboj prinesejo tudi dodatne stroške, saj je potrebno zaradi krajše življenjske dobe svetilnega elementa konstruirati motocikel tako, da je žarnica zamenljiva. Zaradi manjše svetilnosti je potrebno uporabiti boljše materiale ali žaromet podvojiti, zaradi relativno visoke porabe električne energije pa je potrebno ustrezno dimenzionirati tudi instalacijo, baterijo in sistem polnjenja.

LED žaromet je za izdelavo bolj kompliciran in dražji, ponudi pa višjo svetilnost, večjo energetsko učinkovitost, daljšo življenjsko dobo, enostavnejšo vgradnjo in nemalokrat tudi boljše prostorsko ekonomičnost. Cena LED žarometa je za proizvajalca med 3- in 6x višja od primerljivega halogenskega žarometa.

Adaptivni žaromet je najkompleksnejša možnost, kar s seboj prinese tudi najvišjo ceno, omogoča pa prilagajanje svetlobnega snopa. Strošek je višji predvsem zaradi dodatnih senzorjev in krmilnikov, je pa odvisen tudi od izvedbe morebitnega mehanskega aktuatorja, ki izvaja prilagajanje svetlobnega vzorca. Povprečen strošek za adaptivni žaromet avtomobila je približno dvakrat višji od primerljivega klasičnega žarometa, kar ne zajema dodatnih podsistemov, potrebnih za krmiljenje. Vgradnja teh sistemov zahteva tudi individualno kalibracijo, kar predstavlja dodatni strošek pri proizvodnji ali kasnejšem popravilu vozila. Povprečne cene tovarniške vgradnje adaptivnega žarometa v motocikel nisem uspel najti.

Primeri uporabe adaptivnih žarometov

BMW je pionir te tehnologije. Njihova motocikla K1600GT in K1600GTL uporabljata sistem adaptivnega zasenčenega žarometa, ki za svoje delovanje uporablja po dveh oseh premično zrcalo. Ta sistem prilagaja svetlobni snop glede na hitrost in naklon motocikla. Drugi motocikli, kot je npr. S1000XR, za prilagajanje svetlobnega snopa uporabljajo dodatne žaromete.



Slika 6: BMW adaptivni žaromet

KTM je razvil adaptivni žaromet za nekatere svoje modele, kot je KTM 1290 Super Adventure S. Ta model uporablja podatke s senzorjev za zaznavanje orientacije v prostoru, ki jih sicer uporablja tudi za regulacijo vozne dinamike, svetlobni snop pa prilagaja tako, da vklaplja in izklaplja posamične segmente LED žarometa, kar »sestavlja« svetlobni snop, in s tem osvetljuje različne dele cestišča.

Ducati Multistrada V4 je še en primer motocikla z adaptivnim žarometom. Sistem prilagaja svetlobni snop glede na nagib in hitrost, za osvetljevanje posamičnih segmentov cestišča uporablja ločena svetlobna telesa.

Na trgu pa so se pojavili tudi proizvajalci dodatne opreme, ki obljublajo funkcionalnost adaptivne osvetlitve, malo za tem pa so se pojavili tudi poceni kitajski izdelki, ki so neposredne kopije le teh. Eden izmed prvih resnično uporabnih izdelkov je J.W. Speaker Model 8790 Adaptive LED Headlight. Ta model je nadomestek klasične 7-inčne parabole, in vsebuje vse, kar tovrstni žaromet potrebuje: LED svetilni elementi s pripadajočo optiko, krmilniki LED elementov, zaznavala nagiba in mikroprocesor, ki delovanje nadzoruje. Ta žaromet se je v praksi izkazal zelo dobro, a se zaradi relativno visoke cene (530-680 USD) na trgu ni močno uveljavil.



Slika 7: univerzalni adaptivni žaromet J.W. Speaker Model 8790 Adaptive LED Headlight

Izdelava kompleta za naknadno vgradnjo

Zaradi enostavnosti same ideje in široke dostopnosti komponent, potrebnih za izdelavo adaptivne osvetlitve, je smiseln poskus izdelave sistema, ki pomaga osvetljevati cestišče, ki ga klasični žaromet nagnjenega motocikla ne osvetli. Ideja ni nova, izvedbe obstajajo v več različicah. Do sedaj sem izdelal in dodobra preizkusil dve mehanski izvedbi, v tem članku pa bom predstavil izvedbo brez premikajočih se delov.

Verzija 1

Verzija 1 je nastala leta 2013, sestavljena je bila iz treh komponent: senzorjev, procesorja in žarometa. Za senzorje sem uporabil tri optične merilnike razdalje Sharp GP2Y0A21YK0F, ki so bili fiksno nameščeni na tri različne točke na motociklu, in so merili razdaljo do tal. Z nagibanjem so se te razdalje spreminjale, in ti podatki so bili povsem dovolj za izračun orientacije (nagiba) motocikla po prečni in vzdolžni osi.

Procesor AtMega8 je z analognimi vhodi prejel signale senzorjev razdalje, s pomočjo trigonometrije izračunal orientacijo motocikla ter tako določil potrebni legi dveh servomotorjev v žarometu, katerima signal je zgeneriral na PWM izhoda.

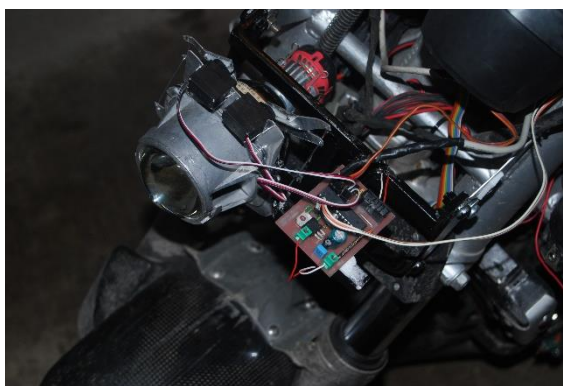
Žaromet je v principu bil klasičen G3 projektor z D2S žarnico, ki pa je za razliko od standardne izvedbe imel premično zaslonko, katera je na vsaki strani imela en servomotor, ki ji je določal položaj (višino). Zaslonka se je lahko pomikala gor in dol (višina snopa) ter nagibala levo in desno (nagib snopa), kar je kompenziralo spremembe položaja motocikla: nagibanje, močno pospeševanje in močno zaviranje.

Delovanje adaptivnega žarometa s premično zaslonko je bilo sprva več kot zadovoljivo, so se pa kasneje pokazale težave z zanesljivostjo delovanja: obraba potenciometrov v servomotorjih je povzročala trzanje zaslonke, z umazanijo na senzorjih se je zanesljivost delovanja poslabšala, pri

vožnji po mokri (bleščeči) podlagi pa se senzorji niso izkazali kot dovolj zanesljivi. Vseeno se je sistem kot »proof of concept« izkazal nadpovprečno dobro.



Slika 8: samogradnja prve verzije adaptivnega žarometa



Slika 9: žaromet, montiran na motocikel Kawasaki ZZ-R 600



Slika 10: delovanje žarometa z izklopljeno (levo) in vklopljeno (desno) funkcijo prilagajanja svetlobnega snopa

Verzija 2

Verzija 2 se je zaznave orientacije motocikla lotila na povsem drugačen princip: z uporabo elektronskega žiroskopa. Cilj je bil narediti enoto, ki ne potrebuje zunanjih elementov: žaromet se zamenja z adaptivnim, in sistem postane operativen brez zunanjih sprememb.

Senzor za zaznavo orientacije motocikla v prostoru je MPU6050, slaven triosni akcelometer in triosni žiroskop, zapakiran v majhen čip, s katerim mikroprocesor komunicira preko serijske komunikacije. Senzor je bil razvit za uporabo v telefonih, kjer se zahteva majhen format in visoka zmogljivost.

Za procesor je tokrat služil manj zmogljivi in fizično manjši AtTiny13A, ki je dovolj zmogljiv za izračunavanje položaja preko algoritma Kalman filtra, hkrati pa je sposoben tudi izračunavati potreben položaj servomotorjev in hkrati generirati tudi PWM signal za upravljanje servomotorjev. Zaradi novega načina zajema podatkov naenkrat nimamo več opravka z absolutnimi, pač pa z inkrementalnimi podatki: Predpostavimo, da je motocikel v času zagona v pokončnem položaju; na akcelometre se zaradi vibracij v trenutku zagona ne moremo zanesti, upoštevajo se le podatki z žiroskopov. Če je zaznan položaj napačen (v času inicializacije motocikel ni v navpičnem položaju), ali pa če pride do t.i. drifta senzorja, nam kompenzacijski algoritem sčasoma to napako položaja kompenzira. Vsakih 10 sekund se namreč položaj žarometa pomakne za eno stopinjo proti nevtralni legi. In ker gre statistično gledano polovica zavojev v levo, polovica pa v desno, bo sčasoma svetlobni snop žarometa zavzemal pravilno vodoravno lego. V praksi je ta algoritem neopazen, deluje brez vidnih premikov, hkrati pa je zelo učinkovit, in tudi pri dolgotrajnejši vožnji drifta senzorja ni zaznati.

Za žaromet sem v drugi verziji uporabil 1,8-inčni (46 mm) projektorski žaromet, vpet preko krogličnega ležaja tako, da ga je za kompenzacijo nagiba motocikla modelarski servomotor vrtel okrog vzdolžne osi. Hkrati je zunanji okvir skrbel za višinsko korekcijo, in hkrati omogočal pritrditev na standardni 7-inčni reflektor z ohišjem.

Sistem se je izkazal kot precej natančnejše delujoč od prve izvedenke, bil je manj dojemljiv za motnje, in se je izkazal kot zanesljivejši. V nasprotju s prvo izvedenko je bil namenjen kot dodatek za predelavo originalnega žarometa, tako da bi se zunanji izgled motocikla ohranil v originalnem stanju.



Slika 11: druga verzija adaptivnega žarometa

Verzija 3

Verzija 3 je predelava Verzije 2, in sicer tako, da se poenostavi delovanje oz. skrči funkcionalnost le na kompenzacijo nagiba okrog vzdolžne osi (brez korekcije višine snopa), poleg tega pa je sistem vgrajen v nestandardno ohišje originalne luči motocikla Aprilia RST 1000 Futura. Sistem je kljub poenostavitvam evolucija Verzije 2, in kot tak vsebuje precej manjših izboljšav.

Senzor je ostal MPU6050 kot pri Verziji 2, le da sta fizična namestitvev in algoritem delovanja spremenjena tako, da je senzor pritrjen na ohišje žarometa, in ne na premikajoči se del žarometa. S tem se je izboljšalo zaznavanje in poenostavil algoritem, hkrati pa žaromet ne vsebuje več gibljive električne povezave, ki se je v praksi izkazala kot šibka točka, ki je v skrajnem primeru z odlomom povezovalnega kabla povzročila odpoved delovanja.

Procesor je v Verziji 3 ploščica Arduino Nano, ki vsebuje mikrokontroler AtMega 328 z zelo zmogljivim procesorjem z velikim številom vhodov in izhodov, a njegovi glavni prednosti nista zmogljivost in razširljivost, pač pa »off the shelf« uporabnost (ne potrebujemo dodatne PCB ploščice, spajkanja itd) in pa serijski pretvornik z USB priključkom, kar omogoča enostavno programiranje, testiranje, hkrati pa tudi diagnozo delovanja v realne času s telefonom ali računalnikom, pri kateri preko serijskega vozila na ekran pošiljamo trenutne podatke.

Algoritem se je v primerjavi z Verzijo 2 močno poenostavil: verzija 2 s pomočjo žiroskopskega senzorja zaznava lego žaromet, in če le ta ni v pravilni legi, jo servomotorja premakneta v željeni položaj. Algoritem deluje z zaprto zanko in s pomočjo PID algoritma, da je odziv pravočasen in hkrati ne pride do nihanja. Algoritem je precej odporen na motnje, a zahteva precej preizkušanja za pravilno nastavitve PID parametrov. Algoritem Verzije 3 je precej enostavnejši: Senzor zazna položaj ohišja žaromet (in s tem motocikla), ta vrednost se preko translacijske formule preračuna v vrednost potrebnega položaja servomotorja, in nova vrednost se prenese na servomotor, ki žaromet obrne v pravilno lego. Ta algoritem sicer zahteva nekaj preizkušanja in meritev da se translacijska formula pravilno sestavi, a je enostavnejši, hitrejši in zanesljivejši.

Ohišje žaromet je originalen žaromet motocikla, za katerega je ta sistem nastal - Aprilia RST 1000 Futura, ki je zahteval manjšo predelavo. V ležišče žarnice H7 nezasenčenega žaromet sem vgradil ležaj, v katerega je prišel vgrajen 1.8-inčni projektorski LED žaromet, ki se sicer na trgu prodaja kot nadomestek H4 žarnice. Ta žaromet se je izkazal s precejšnjo svetilnostjo, odsotnostjo visoke napetosti, ki je pri uporabi HID žarometov ob zagonu nemalokrat povzročala motnje pri delovanju žiroskopa, hkrati pa se je zaradi odsotnosti visokonapetostnega balasta LED izvedenka izkazala kot prostorsko ugodnejša. Ob projektor se je namestil še modelarski servomotor, krmilna elektronika (5V stabilizator napetosti, Arduino in MPU6050) pa je bila pritrjena na zunanjo stran žaromet, za odpornost na vlago in vibracije pa je bila prelita s tekočo plastiko.

Tretja izvedenka se je izkazala kot najzanesljivejša do sedaj. Prepotovala je 10.000 km brez ene težave, in se v praksi izkazala kot zelo uporaben pripomoček. Edina slaba lastnost je to, da zadeva ni univerzalna – potrebuje predelavo originalnega žaromet. To slabost lahko odpravi četrta izvedenka...



Slika 12: predelan žaromet motocikla Aprilia RST Futura - dodan 1,8" LED projektor v levem fokusu

Verzija 4

Prve tri verzije so pokazale prednosti in slabosti posameznih odločitev: izbor žarometov, namestitvev senzorja, izbor procesorske enote itd. so faktorji, ki imajo močan vpliv na zahtevnost izvedbe, algoritma, na nabor funkcij in na samo zanesljivost. Kljub vsemu temo pa so prve tri verzije bile orientirane na vgradnjo v glavni žaromet, kar v principu pomeni, da zadeva ni zelo univerzalna. Ker ima vedno več motociklov nameščene razne cevne zaščite (t.i. bullbare, rollbare itd), na katerih se pogosto znajdejo dodatne »meglenke« (ki to niso), bi lahko tovrstno namestitev izkoristili za izvedbo adaptivne osvetlitve. S to izvedbo bi se izognili še zadnjemu premičnemu delu, in tako bi vsa naprava bila povsem »solid state« oz. brez mehansko premičnih delov. S tem bi zmanjšali možnost mehanske odpovedi. Cilj sistema je, da senzor zazna nagib motornega kolesa in ustrezno vklopi LED reflektorje, ki osvetlijo del cestišča, ki bi sicer ostal neosvetljen. Arduino bo uporabljen za obdelavo podatkov senzorja in krmiljenje LED reflektorjev.

MPU6050 se je tako dobro izkazal, da bi ga bilo nesmiselno menjati s čimerkoli drugim. Senzor je poceni, zanesljiv, majhen, odporen, ter združuje vse in še več, kar trenutna naloga potrebuje. Zelo dobro se je izkazala namestitev na motocikel in ne na premični del žarometov.

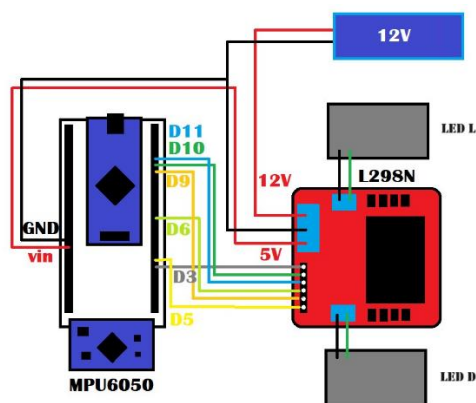
Arduino Nano se je s funkcijo diagnoze, nizko ceno, odlično podporo ter s svojo enostavnostjo za uporabo izkazal kot odličen izbor. Vendar pa zaradi solid state izvedbe tokrat ne bi krmilil servomotorja, pač pa samo prižiganje žarometov, ki bi za svoje delovanje uporabljali posamično prižiganje posameznih segmentov. Za to lahko uporabimo dve možnosti: relejne kartice ali posebne driverje. Ker lahko relejna kartica žaromet samo prižge in ugasne, in ponovno vsebuje mehansko premični element (rele), sem se raje odločil za solid state izvedbo – kot najenostavnejši, primerno majhen, dokazano zanesljiv in cenovno ugoden se je izkazal dvojni driver za motor, znan tudi kot »double H-bridge« L298N. Zaradi »H-bridge« konstrukcije lahko ta driver na izhodu tudi obrne polariteto, kar lahko s pomočjo dveh diod izkoristimo za prižiganje štirih ločenih svetilnih teles. Hkrati je prav tako v algoritmu prisoten del, ki kompenzira drift senzorja.

Žaromet je tokrat brez premičnih delov. Gre za posamične žaromete z odrezanim svetlobnim snopom tako, da je odrez pod določenim kotom – npr. če je odrez svetlobnega snopa pod kotom 30 stopinj glede na vodoravnico motocikla, se le ta prižge šele ko je motocikel nagnjen več kot 20 stopinj. Z uporabo štirih žarometov lahko sistem deluje dvostopenjsko za vsako smer nagiba.

Sistem je bil narejen kot univerzalni komplet komponent za naknadno vgradnjo. Sestavljen je iz krmilnega modula in dveh žarometov, razširljiv pa je na 4 žaromete, vendar za to potrebuje spremembo v programski opremi. Senzor nagiba bo nameščen na stabilno mesto na motorju, da natančno zazna spremembe naklona. LED reflektorji bodo nameščeni na sprednji del motornega kolesa, usmerjeni v smer, kjer je potrebna dodatna osvetlitev med zavijanjem. Krmilni modul mora biti pritrjen na motocikel v pravilni poziciji, le tako lahko pravilno zaznava nagib motocikla in ob določenem nagibu prižge ali ugasne določen žaromet.

Programski del je precej enostavnejši od izvedb s servomotorji. Gre za branje kota nagiba naprave (in s tem motocikla), izvedbeni del pa namesto translacijske formule ali tabele vsebuje le nekaj IF stavkov.

Poenostavljena vezalna shema celotnega sistema je vidna na naslednji sliki:



Slika 13: poenostavljena vezalna shema naprave: levo Arduino Nano na breakout boardu z integriranim senzorjem nagiba MPU6050, desno izhodni modul L298n in LED žarometa

Poenostavljen izvedbeni del izvirne kode programa:

```
if (angleX > 25) {
    digitalWrite(leftLightPin, HIGH);
} else if (angleX < 20) {
    digitalWrite(leftLightPin, LOW);
}
if (angleX < -25) {
    digitalWrite(rightLightPin, HIGH);
} else if (angleX > -20) {
    digitalWrite(rightLightPin, LOW);
}
```

Delovanje sistema sem preveril tako, da sem motocikel nagnil, in preverjal vklop in izklop LED reflektorjev. Potrebno je bilo prilagoditi pragove za vklop LED reflektorjev v Arduino kodi, hkrati pa fizično nastaviti položaj reflektorjev na motociklu, da sem dosegel optimalno delovanje sistema.

Vsak sistem ima tudi določene slabosti. Pri zadnji verziji sistema adaptivne osvetlitve sem naletel na dve izstopajoči slabosti. Prva je ta, da sistem ne deluje proporcionalno (za osvetlitev uporablja vklop in izklop segmenta, ne pa brezstopenjskega prilagajanja snopa). Druga pa ta, da gre za dodatne zunanje komponente na motociklu, ki zahtevajo natančno pritrditev na točno določena mesta, hkrati pa zahtevajo medsebojno kabelsko povezavo, in so v določenih primerih občutljive na vibracije, le te namreč za delovanje predstavljajo motnjo.

Zaključek

Izdelava kompleta za naknadno vgradnjo LED žarometov, ki imitirajo funkcijo adaptivnega žarometa, je odličen način izboljšanja vidljivosti ter varnosti motocikla brez visokih stroškov, ki jih prinesejo originalni tovrstni sistemi. S pomočjo žiroskopskega senzorja, platforme Arduino in LED žarometov se lahko ustvari prilagodljiv sistem, ki vožnjo v zavojih ob slabi vidljivosti naredi varnejšo.

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Zoran Jazbinšek, dipl. inž. str. (VS)

Adaptive headlights for motorcycles: advantages, operation and self-construction

Summary

One of the key areas of active safety is road lighting. A small revolution has happened in car headlight technology in the last 30 years: not only halogen headlights, nowadays we can have HID, LED, laser, mechanically adjustable, matrix projectors, dedicated cornering lights etc. In the field of motorcycle headlights, much less has happened, halogen technology is still entry level standard, and it has been only in the last few years that LED headlights started to gain ground on the market, and only a few manufacturers currently offer anything better than that.

Since adaptive lighting for riding a motorcycle is at least as, if not more, useful than for a car, I set out to build an adaptive headlight myself. Several different working prototypes were created, and I present the latest version in more detail in this article.

Keywords: adaptive headlight, safety, motorcycle, self-building

Introduction

The adaptive headlight for a motorcycle represents an important advanced solution for improving active safety in road traffic. Conventional headlights, whether LED or halogen, illuminate the road in front of the vehicle, but they cannot adjust the light beam pattern according to the given situation and conditions such as the motorcycle's lean angle during cornering and the vehicle's transverse axis movements due to braking and acceleration. Adaptive headlights can overcome this by using advanced electronics and sensors that adjust the lighting in real time based on the current situation.

Advantages of adaptive headlights

The essence of adaptive headlights is the ability to adjust the pattern of the light beam depending on the inclination of the motorcycle. When turning, the motorcycle leans, which with a conventional headlight leads to reduced illumination of the road in the direction of the turn - exactly where illumination is most needed. The adaptive headlight controller detects the angle of inclination and adjusts the light beam accordingly so that the inside of the turn is illuminated, significantly improving handling and safety, and reducing the risk of an accident.



Picture 14: Illuminated part of a road with conventional (left) and adaptive (right) headlight

In addition to the advantages of the adaptive function of the headlights, we cannot ignore the advantages of LED technology, which fits perfectly with this type of technology. These advantages are high energy efficiency, long lifetime of LED lights, space economy and affordability. At the same time, LED headlights are more durable, less resistant to mechanical loads (vibrations, shocks,...) and generally less prone to breakdowns than halogen and xenon lights. These are factors that give LED lights considerable advantages when used in adaptive light fixtures.

Operation of adaptive headlights

Adaptive headlights use various components for their operation: sensors like accelerometers, gyroscope sensors, speed sensors, etc., which send data to the control unit, which adjusts the light beam pattern in real time.

The light beam can be adjusted in various ways: lenses or reflectors inside the headlight can be moved, the mirror can be moved, and individual segments of the light body can be turned on and off - the latter is called a matrix in the automotive industry. These mechanisms enable different types of light direction, so that we have an illuminated part of the road, which would otherwise remain unlit while turning. This can enable to illuminate the road optimally.

The cost of adaptive headlights

Halogen headlights are the simplest and cheapest form of lighting for a motorcycle, but unfortunately they have strong disadvantages in the form of a shorter lifespan, lower brightness and higher energy consumption. These shortcomings also bring additional costs, because due to the shorter life of the lighting element, it is necessary to design the motorcycle in such a way that the bulb is replaceable. Due to the lower luminosity, it is necessary to use better materials or to have a double headlight, and due to the relatively high consumption of electricity, it is also necessary to properly dimension the installation, battery and charging system.

LED headlights are more complicated and expensive to manufacture, but they offer higher luminosity, greater energy efficiency, a longer lifespan, simpler installation, and in many cases they are simpler to use when designing a motorcycle which can result in cheaper design and production of the motorcycle. The price of an LED headlight is between 3 and 6 times higher for the manufacturer than a comparable halogen headlight.

The adaptive headlight is the most complex option with the highest price, but it allows the light beam to be adjusted. The cost is higher mainly due to additional sensors and controllers, but it also depends on the implementation of a possible mechanical actuator that adjusts the light pattern. The average cost for an adaptive car headlight is about twice that of a comparable classic headlight, not including required additional subsystems. The installation of these systems also requires individual calibration, which represents an additional cost during the production or subsequent repair of the vehicle. I have not been able to find the average price of factory installation of an adaptive headlight in a motorcycle.

Examples of motorcycle adaptive headlights

BMW is a pioneer of this technology. Their K1600GT and K1600GTL motorcycles use an adaptive dimmed headlight system that uses a bi-axially movable mirror to operate. This system adjusts the light beam according to the speed and lean angle of the motorcycle. Other motorcycles, such as S1000XR, use additional headlights to adjust the light beam.



Picture 15: BMW adaptive headlight

KTM has developed an adaptive headlight for some of its models, such as the KTM 1290 Super Adventure S. This model uses data from IMU sensor, which it also uses to regulate driving dynamics, and adjusts the light beam by turning on and off individual segments of the LED headlight, which changes the light beam pattern according to current needs, and thus illuminates different parts of the road.

The Ducati Multistrada V4 is another example of a motorcycle with an adaptive headlight. The system adjusts the light beam according to lean angle and speed, and uses separate light bodies to illuminate individual segments of the road.

Manufacturers of aftermarket additional equipment have also appeared on the market, promising the functionality of adaptive lighting, and not long after, cheap Chinese products that are direct copies of these have also emerged. One of the first promising products was the J.W. Speaker Model 8790 Adaptive LED Headlight. This model is a replacement for the classic 7-inch parabola, and contains everything that this type of headlight needs: LED lighting elements with corresponding optics, LED element controllers, tilt sensors and a microprocessor that controls the operation. This headlight has proven itself very well in practice, but due to its relatively high price (530-680 USD), it has not gained much traction in the market.



Picture 16: Universal adaptive headlight J.W. Speaker Model 8790

A retrofit kit self-construction

Due to the simplicity of the idea itself and the wide availability of the components needed to create adaptive headlight, it makes quite a lot of sense to try to create a system that helps to illuminate the road which is not illuminated by the classic headlight of a turning motorcycle. The idea is not new, implementations exist in several versions. So far I have built and thoroughly tested two mechanical versions, and in this article I will present the version without moving parts.

Version 1

Version 1 was created in 2013 and consisted of three main component groups: sensors, processor and a headlight itself. For the sensors, I used three Sharp GP2Y0A21YK0F optical distance meters that were fixed at three different points on the motorcycle and measured the distance to the ground. With tilting, these distances changed, and these data were enough to reliably calculate the orientation (tilt) of the motorcycle along the transverse and longitudinal axes.

The AtMega8 processor received signals from the distance sensors with analog inputs, calculated the orientation of the motorcycle with the help of trigonometry, and thus determined the necessary positions of the two servomotors in the headlight, to which the signal was generated on the PWM output.

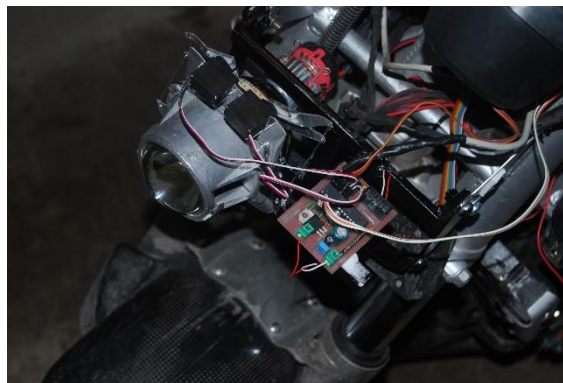
The base of the headlight was a classic G3 projector with a D2S bulb, but unlike the standard version, it had a movable shield, which had one servo motor on each side, which determined its position (height and angle). The shutter could move up and down (beam height) and tilt left and right (beam

pitch), compensating for changes in the motorcycle's position: leaning, hard acceleration and hard braking.

The operation of the adaptive headlight with a motorised shield was initially more than satisfactory, but later problems with the reliability of operation became apparent: the wear of the potentiometers in the servomotors caused the shield to jerk, with dirt on the sensors the reliability of operation deteriorated, when driving on a wet (shiny) surface however, the sensors did not prove to be reliable enough. Nevertheless, the system performed above average as a "proof of concept".



Picture 17: self-construction of a Version 1



Picture 18: Version 1 on a Kawasaki ZZ-R 600



Picture 19: Version 1 with adaptive function off (left) and on (right)

Version 2

Version 2 was sensing the motorcycle orientation on a completely different principle: using an electronic gyroscope. The goal was to make a unit that does not need external elements: the headlight is replaced with an adaptive one, and the system becomes operational without external changes.

The sensor for detecting the orientation of the motorcycle is the MPU6050, the famous little three-axis accelerometer and three-axis gyroscope, packed into a small chip with which the microprocessor communicates via serial communication. The sensor was developed for use in phones where a small format and high performance are required.

In this version, a less powerful and physically smaller microcontroller AtTiny13A was used, which is powerful enough to calculate the position via the Kalman filter algorithm, it is also capable of calculating the required position of the servomotors and at the same time generating a PWM signal for controlling the servomotors. Due to the new way of capturing data, it is suddenly no longer dealing with absolute data, but with incremental data: It assumes that the motorcycle is in an upright position at the time of start-up; it cannot rely on accelerometers due to vibrations at the moment of start-up, only data from gyroscopes are taken into account. If the detected position due to startup is incorrect (the motorcycle is not in a vertical position at the time of initialization), or if the so-called sensor drift has happened, the compensation algorithm eventually compensates for this position error. Every 10 seconds, the current position angle in the program decreases for one degree towards neutral which moves the position of the headlight by one degree towards the neutral position. And since, statistically speaking, half of the turns go to the left and half to the right, eventually the light beam of the headlight will take the correct horizontal position. In practice, this algorithm is imperceptible, it works without visible movements, and at the same time it is very efficient, and even during long-term driving the drift of the sensor is not detected.

For the second version of a headlight, I used a 1.8-inch (46 mm) projector headlight, mounted via a ball bearing so that the model servo motor rotated it around its longitudinal axis to compensate for the lean of the motorcycle. At the same time, the outer frame and additional servomotor took care of the height correction, and at the same time allowed attachment to a standard 7-inch reflector with a housing.

The system proved to be much more accurate than the first version, was less sensitive to interferences, and proved to be more reliable. In contrast to the first version, it was intended as an accessory for the conversion of the original headlight, so that the external appearance of the motorcycle would remain in its original condition.



Picture 20: A Version 2

Version 3

Version 3 is a rework of Version 2 with simplified operation and reduced functionality - it only compensates the tilt around the longitudinal axis (without beam height correction), and it is integrated into the standard (non-universal) housing of the original headlight of the motorcycle Aprilia RST 1000 Futura. The system, despite its simplification, is an evolution of Version 2, and as such contains quite a few minor improvements.

The sensor remains the MPU6050 as in Version 2, except that the physical placement and operation algorithm are changed so that the sensor is attached to the headlight housing, rather than the moving part of the headlight. This improved the detection and simplified the algorithm, and at the same time, the headlight no longer contains a flexible electrical connection, which in practice proved to be a weak point, which in the extreme case caused a failure of operation due to the breakage of the connection.

The processor in Version 3 is an Arduino Nano board, which contains an AtMega 328 microcontroller with a very powerful processor with a large number of inputs and outputs, but its main advantages are not performance and expandability, but "off the shelf" usability (no need for a PCB board production, soldering etc.) and a serial converter with a USB connection, which enables easy programming, testing, and at the same time real-time operation diagnosis with a smartphone or computer, in which current data is sent to the screen via the serial bus.

The algorithm has been greatly simplified compared to Version 2: Version 2 detects the position of the headlight with the help of a gyroscopic sensor, and if it is not in the correct position, the two servomotors move it to the desired position. The algorithm works with a closed loop and with the help of the PID algorithm, so that the response is done in time and at the same time there is no excess oscillation. The algorithm is quite resistant to disturbances, but requires a lot of trial and error to set the PID parameters correctly. The algorithm of Version 3 is much simpler: The sensor detects the position of the headlight housing (and thus the motorcycle), this value is converted into the value of the required position of the servomotor via a translation formula, and the new value is transferred to the servomotor, which turns the headlight into the correct position. Although this algorithm requires some testing and measurements in order to construct the translation formula correctly, it is simpler, faster and more reliable.

The headlight housing is the original headlight of the motorcycle for which this system was created - the Aprilia RST 1000 Futura, which required minor modification. I installed a bearing in the H7 bulb socket of the high beam headlight, into which came a 1.8-inch projector LED headlight, which is otherwise sold on the market as a replacement for the H4 bulb. This projector proved to be very powerful, it does not operate with high voltage, which when using HID headlights at start-up often caused strong interferences in the operation of the gyroscope, and at the same time, due to the absence of a high-voltage ballast, the LED version proved to be more space-efficient. Right next to the projector, a model servomotor was installed. The control electronics (5V voltage stabilizer, Arduino and MPU6050) were attached to the outside of the headlight, and they were covered in liquid plastic for moisture and vibration resistance.

The third version proved to be the most reliable by far. It has done over 10,000 km without a single problem, and proved to be a very useful. The only disadvantage is that the kit itself is not universal - it needs the conversion of the original headlight. This disadvantage can be overcome by the fourth expert...



Picture 21: A modified headlight assembly of a motorcycle Aprilia RST 1000 Futura – there is a 1.8« LED projector that rotates and acts as an adaptive headlight seen in the left part of a picture

Version 4

The first three versions showed the advantages and disadvantages of individual components and principles: headlight selection, sensor placement, processor unit selection, etc. are factors that have a strong influence on the complexity of the implementation, the algorithm, the set of functions and the reliability itself. The first three versions were oriented towards installation in the main headlight, which in principle means that the device is not very universal. Since more and more motorcycles have various protection bars installed (i.e. bullbars, rollbars, etc.), on which additional so called "fog lights" are often installed, this type of installation can be used to implement adaptive lighting. With this implementation, the use of moving parts is completely avoided, and thus the entire device is completely "solid state" - without mechanically moving parts. This greatly reduces the possibility of mechanical failure. The goal of the system is for the sensor to detect the inclination of the motorcycle and accordingly turn on the LED reflectors, which illuminate a part of the road that would otherwise remain unlit. The Arduino is used to process the sensor data and control the LED lights.

The MPU6050 performed so well that it would be pointless to replace it with anything else. The sensor is cheap, reliable, small, rugged, and combines everything and more that the current task requires. The installation on the motorcycle itself (and not on the moving part of the headlight) proved to be a game changer for reliability and simplicity.

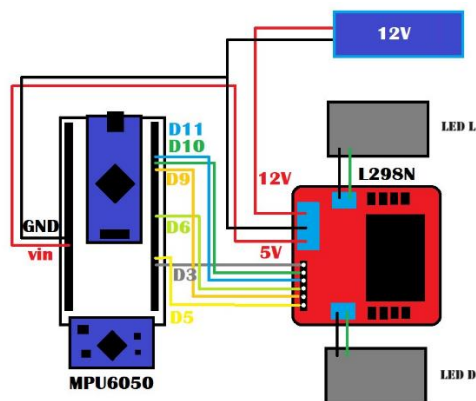
With its diagnostic function, low price, excellent support and ease of use, the Arduino Nano proved to be an excellent choice. However, due to the solid state implementation, this time it does not control the servomotor, but switching of additional headlights. We could use one of two options for the task: relay cards or special drivers. Since the relay card can only turn the headlight on and off, and they contain a mechanically movable element (relay), I preferred a solid state implementation - the double H motor driver L298N, which proved to be the simplest, suitably small, proven reliable and affordable solution. Due to the "H-bridge" construction, this driver can not only work in PWM mode, but it can also reverse the output polarity, which can be used to light four separate lamps.

The headlight has no moving parts. Used headlights are individual LED lights with the light beam cutoff so that the cut is at a certain angle - e.g. if the section of the light beam is at an angle of 30 degrees with respect to the horizontal of the motorcycle, it will only light up when the motorcycle is tilted more than 25 degrees. By using four headlights, the system could operate in two stages for each tilt direction.

The system was designed as a universal kit of components for retrofitting. It consists of a control module and two headlights, and it is expandable to 4 headlights, but this would require a small change in the software. The gyro sensor is mounted in a fixed location on the motorcycle to accurately detect lean angle. LED lamps are placed on the front of the motorcycle, directed in the direction where additional lighting is needed during cornering. The control module is attached to the motorcycle in the correct position in order to correctly detect the inclination of the motorcycle and turn on or off a certain headlight at a certain inclination.

The program is much simpler than the implementations with servomotors. It is detecting the tilt angle of the device (and thus the motorcycle), and the execution part contains only a few IF statements instead of a translation formula or a table.

A simplified wiring diagram of the entire system can be seen in the following picture:



Picture 22: a simplified wiring schematic of the device: Arduino Nano with a breakout board with MPU6050 on the left, L298N and LED headlights on the right

A simplified part of a program that executes adaptive lights switching:

```
if (angleX > 25) {
    digitalWrite(leftLightPin, HIGH);
} else if (angleX < 20) {
    digitalWrite(leftLightPin, LOW);
}
if (angleX < -25) {
    digitalWrite(rightLightPin, HIGH);
} else if (angleX > -20) {
    digitalWrite(rightLightPin, LOW);
}
```

I conducted the test of operation of the system by tilting the motorcycle and checking the switching of LED lights. It was necessary to adjust the thresholds for switching the LED reflectors in the

Arduino code, and at the same time to physically adjust the position of the reflectors on the motorcycle in order to achieve optimal system performance.

With the latest version of the adaptive lighting system, I encountered two prominent weaknesses. The first is that the system does not work proportionally (it uses segment on and off for lighting, not proportional beam adjustment). The second disadvantage is that they are additional external components on the motorcycle, which require precise fixing in precisely defined places, and at the same time require cable connections, and in certain cases the strong vibrations can represent a disturbance in operation.

Conclusion

A retrofitted LED headlights that imitate the function of an adaptive headlight is an excellent way to improve the visibility and safety of the motorcycle without high costs that come with original systems of this type. With the help of a gyro sensor, an Arduino platform and LED headlights, an adaptive headlight system can make riding in corners with poor visibility safer.

Sources

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STROJARSKA I PROMETNA ŠKOLA, Varaždin, 24.06.2024.

Andreja Koščak Lacković, dipl. ing.
Željko Antunović, dipl. ing.

UTJECAJ EDUKACIJA I FORMALNOG OBRAZOVANJA NA POZNAVANJE PROMETNIH PRAVILA I PROPISA KOD SUDIONIKA U PROMETU

Sažetak:

Sve veći broj vozila na cestama, sve veći broj vozača različite životne dobi koji upravljaju vozilima na cestama uzrokuje i sve veći broj prekršaja koji su često uzrok prometnih nesreća. Često se pitamo da li su uzroci tih prometnih prekršaja i prometnih nesreća nedovoljno poznavanje prometnih pravila i propisa ili neki drugi čimbenici. Također smo i svjedoci velikih migracija ljudi zbog zapošljavanja u stranim zemljama. Velik broj stranih državljana radi i na području Republike Hrvatske, pa tako i u sektoru prometa i logistike, uglavnom kao vozači motornog vozila.

U hrvatskoj se propisi u cestovnom prometu uče uglavnom kroz redovnu nastavu u osnovnom školama i prometnim strukovnim školama, te u autoškoli. Nakon položene vozačke dozvole vozači više nikada ne trebaju učiti propise, osim ako su profesionalni vozači motornog vozila koji moraju svakih 5 godina pohađati osposobljavanje u obliku Periodičke izobrazbe vozača KOD 95.

Cilj ovoga rada je istražiti i prikazati utjecaj starosne dobi i formalnog obrazovanja na poznavanje prometnih pravila i propisa, te postoji li potreba za dodatnim osposobljavanjem u određenim vremenskim intervalima.

Istraživanje će se provesti na temelju statističkih podataka i anketiranjem sudionika u prometu različite životne dobi i formalnog obrazovanja. Usporedbom podataka iz navedenih izvora generirati će se prijedlozi za poboljšanje sigurnosti sudionika u prometu.

Ključne riječi: sigurnost, prometne nesreće, prometni prekršaji. poznavanje prometnih pravila i propisa, vozač motornog vozila, vozači iz stranih zemalja

1. UVOD

Promatrajući prometne situacije u svakodnevnom životu i rješavanje istih od strane vozača, često se postavlja pitanje koliko pojedini vozači razumiju i poštuju prometna pravila i propise. Svjesni smo da pojedini vozači i te kako razumiju prometna pravila i propise ali ih svjesno ne poštuju. Isto tako, ima vozača koji također znadu prometna pravila i propise ali ih se ne mogu pridržavati zbog svoje psihičke ili fizičke nesposobnosti. Također ima i vozača koji su jednostavno zaboravili prometna pravila i propise koje su učili nekih davnih dana. Tu su i razne promjene u zakonskoj regulativi koja mijenja prometna pravila i propise kao i tehnička rješenja izvođenja određenih prometnih situacija koja često zbunjuju vozače. Cilj ovoga rada je istražiti i prikazati poznavanje prometnih pravila i propisa sudionika u prometu različite životne dobi i različitog formalnog obrazovanja na temelju kojeg bi se mogli donijeti zaključci o potrebama za dodatnim osposobljavanjem u određenim vremenskim intervalima.

2. EDUKACIJA SUDIONIKA U PROMETU

Edukacija sudionika u prometu uglavnom započinje edukacijom djece u vrtiću gdje se oni susreću sa prvim poznavanjem prometnih pravila i propisa koji su primjereni njihovoj dobi. To su uglavnom posjeti policijskih službenika koji djeci objašnjavaju, na njima prihvatljiv način, na koji način se prelazi cesta i kako se treba ponašati u prometu. Kasnije u OŠ djeca jako mali broj sati kroz nastavne predmete uče o prometnim pravilima i propisima te ponašanju u prometu, odnosno, prometnoj kulturi. Od prvog do 4. razreda učenici o prometu uče kroz nastavni predmet Priroda i društvo i tu je kurikulum tog predmeta propisano da u prvom razredu o prometu uče 4 sata, u drugom razredu 5 sati, u trećem razredu samo 1 sat dok u četvrtom razredu uče 4 sata. Od petog do osmog razreda o prometu se uči još manje. O prometu, tj. o prometnim pravilima i propisima učenici uče samo u petom razredu 6 – 8 sati kada imaju mogućnost polaganja vozačkog ispita za bicikl koji provodi policijska uprava u suradnji sa Hrvatskim autoklubom. Nakon toga o prometu do kraja osnovnoškolskog obrazovanja se ne uči niti u jednom nastavnom predmetu. O prometu mogu učiti učenici, ako postoji ta mogućnost u školi, putem izvannastavnih aktivnosti ili građanskog odgoja na satovima razrednika. Postoji i mogućnost učenja kroz online državno natjecanje učenika „Prometna učilica“ i provedbom različitih projekata. Ali sve je to na volju pojedinih nastavnika.

U srednjoj školi o prometu se uglavnom ne uči, osim u prometnim školama gdje propise u cestovnom prometu, kao redovni predmet, uče učenici koji se školuju za zanimanja Tehničar cestovnog prometa i Vozač motornog vozila u trajanju od dva sata tjedno. I učenici srednjih škola kao i učenici osnovnih škola imaju mogućnost sudjelovanja u online državnom natjecanju „Prometna učilica“ u kojem, da bi postigli određene rezultate moraju savladati određeno gradivo iz poznavanja prometnih pravila i propisa sukladno svojoj dobi. O prometu se može učiti i kroz različite projekte i građanski odgoj na satovima razrednika.

Uobičajeno je da učenici kada steknu uvijete za pohađanje autoškole, upisuju autoškolu. To je uglavnom u trećem ili četvrtom razredu srednje škole, ovisno o starosti. Prilikom pohađanja autoškole, učenici o prometnim pravilima i propisima uče 30 sati. Nakon položenog ispita iz Prometnih pravila i propisa mogu započeti upravljanje motornim vozilom koje traje 35 sati. Prije polaganja vozačkog ispita potrebno je položiti i ispit iz pružanja prve pomoći ozlijeđenima u prometnoj nesreći. Nakon što polože vozački ispit i dobiju vozačku dozvolu vozači vozila B

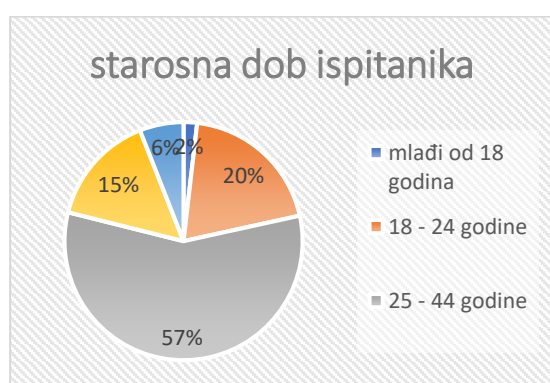
kategorije (osobno vozilo) više nikada nisu dužni osposobljavati se u području poznavanja prometnih pravila i propisa. Profesionalni vozači, vozači teretnih vozila i autobusa, nakon završenog osposobljavanja za vozača motornog vozila i položene vozačke dozvole C ili D kategorije dužni su se periodički osposobljavati, tzv. Kod 95 u razdoblju od 5 godina. U posljednjih 10 godina više od 90% kandidata u autoškoli su mladi vozači. Tek 10 % su kandidati stariji od 24 godine. To su vozači koji polažu vozački ispit C, CE ili D kategorije, te vozači koji su upućeni na ponovno polaganje vozačkog ispita zbog velikog broja kaznenih bodova i trajnog oduzimanja vozačke dozvole.

3. POZNAVANJE PROMETNIH PRAVILA I PROPISA KOD SUDIONIKA U PROMETU

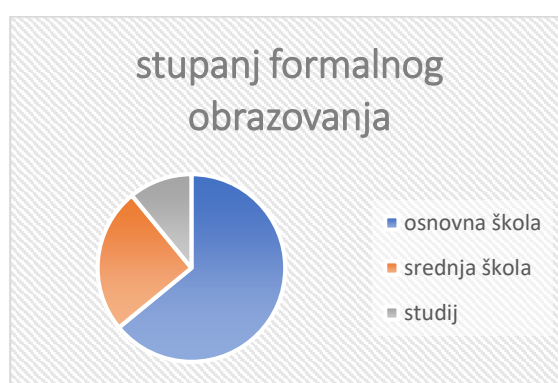
Mišljenje okoline je da osobe starije životne dobi zbog vremena u kojem su polagali vozački ispit, promjene cestovne infrastrukture i količine prometa na cesti ne poznaju dovoljno prometna pravila i propise te da ne prate zakonske promjene. Također vlada mišljenje okoline da osobe koje imaju završeno slabije formalno obrazovanje, da lošije poznaju pravila i propise u prometu. Posljednjih nekoliko godina trend je emigracije stanovništva koje u RH dolazi radi zapošljavanja, mišljenje okoline također je kako ljudi koji dolaze iz istočnih zemalja, Indije, Filipina, Nepala i drugih zemalja također ne poznaju prometna pravila i propise. Kako bismo potvrdili /odbacili te tvrdnje, izradili smo test sa 12 pitanja vezanih za poznavanje prometnih pravila i propisa i nekoliko općih anketnih pitanja kako bi dobili uvid o osobama koje su rješavale test. Cijela anketa sa testom bila je anonimna a provela se online putem društvenih mreža i slanjem direktno u poduzeća koja zapošljavaju vozače koji su strani državljani.

Test je putem društvenih mreža riješilo 218 ispitanika; 153 ženskih i 65 muških ispitanika, dok je stranih državljana riješilo samo 10 muških ispitanika.

Životna dob ispitanika bila je uglavnom između 18 i 60 godina ali test je riješilo i 4 ispitanika mlađih od 18 godina i 13 ispitanika starijih od 60 godina. Razlog tome može biti i taj što se ispitanici starije životne dobi slabije služe društvenim mrežama pa im anketa nije ni bila dostupna.



Grafikon 1. Prikaz starosne dobi ispitanika



Grafikon 2. Prikaz stupnja formalnog

Stupanj formalnog obrazovanja ispitanika je da je 121 ispitanik završio srednju školu, 90 preddiplomski, diplomski ili poslijediplomski studij, dok je manji broj ispitanika završio samo osnovnu školu. Na pitanje o posjedovanju vozačke dozvole, gotovo svi ispitanici posjeduju vozačku dozvolu određene kategorije, samo njih 7 ne posjeduje vozačku dozvolu. 40 ispitanika posjeduje vozačku dozvolu profesionalnih kategorija, C, CE, D, DE, dok 170 ispitanika posjeduje vozačku

dozvolu samo za B kategoriju vozila. Ispitanika mlađih od 18 godina, bilo je četvero, dvoje muških i dvoje ženskih ispitanika. Muški su točno riješili test sa 96% točnih odgovora, dok su žene test riješile sa 38% točnih odgovora.



Grafikon 3. Prikaz rezultata ankete prema spolu

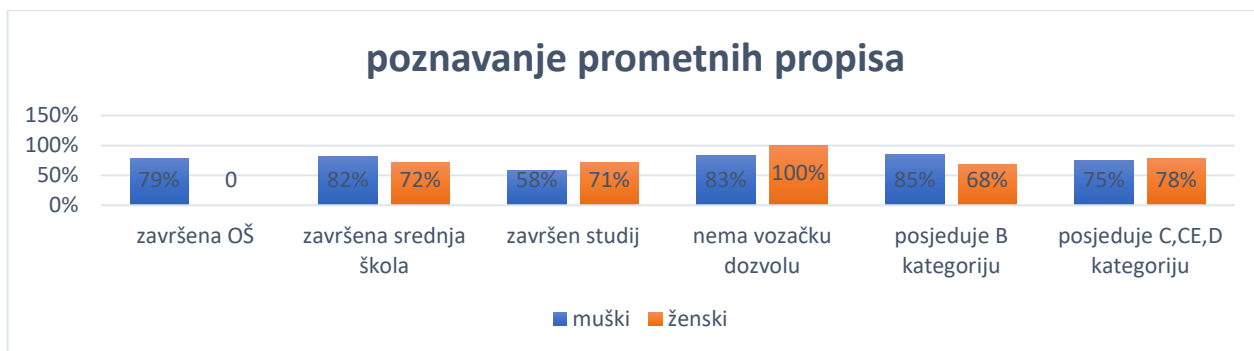
Mladi vozači po hrvatskom zakonu su vozači starosti do 24 godine. Mladi vozači su posebno rizična skupina vozača zbog manje iskustva, potrebi dokazivanja i isticanja i svoje povodljivosti. Anketi je pristupilo 43 mladih vozača (19 muških i 24 ženskih ispitanika).



Grafikon 4. Prikaz broja ispitanika ankete starosne dobi 18 – 24 godine (mladi vozači)

Najveći broj mladih vozača ima završenu srednju školu i posjeduje vozačku dozvolu B kategorije, podjednako muški i ženski ispitanici. Prema posjedovanju vozačke dozvole određene kategorije test iz poznavanja prometnih pravila i propisa najbolje je riješila ženska osoba koja ne posjeduje vozačku dozvolu (pretpostavlja se da je ta osoba polaznik autoškole) a najslabije također ženska osoba koja posjeduje vozačku dozvolu B kategorije. Prema završenom formalnom obrazovanju najbolje su test riješili muški ispitanici koji imaju završenu srednju školu, dok su najlošije test riješili muški ispitanici sa završenim studijem, 58%.

Najveći broj ispitanika, čak njih 125, bilo je starosne dobi od 25 do 44 godine, 75% ženskih i 25 % muških ispitanika. Podjednak broj ispitanika je završio srednju školu ili studij. Podjednak je broj muškaraca koji posjeduju vozačku dozvolu B i C kategorije dok veći broj žena posjeduje vozačku dozvolu B kategorije, a puno manje vozačku dozvolu C kategorije.

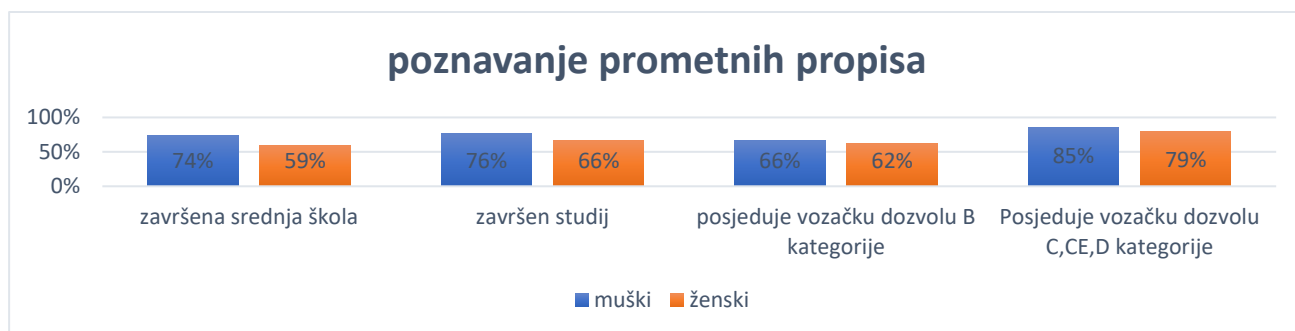


Grafikon 5. Prikaz rezultata ankete starosne dobi 18 – 24 godine (mladi vozači)



Grafikon 6. Prikaz broja ispitanika ovisno o starosnoj dobi 25 – 44 godine

Muškarci koji imaju završenu srednju školu poznaju prometne propise 74% dok oni sa završenim studije poznaju ih 76%. Žene sa završenom srednjom školom prometne propise poznaju 59% a sa završenim studijem 66%. Muškarci koji posjeduju vozačku dozvolu B kategorije propise poznaju 66%, dok oni koji posjeduju vozačku dozvolu C ili CE kategorije propise poznaju 85%. Žene koje posjeduju vozačku dozvolu B kategorije iz poznavanja prometnih propisa imaju 62% točnih odgovora, dok one koje posjeduju vozačku dozvolu C ili CE kategorije, imaju 79% točnih odgovora.



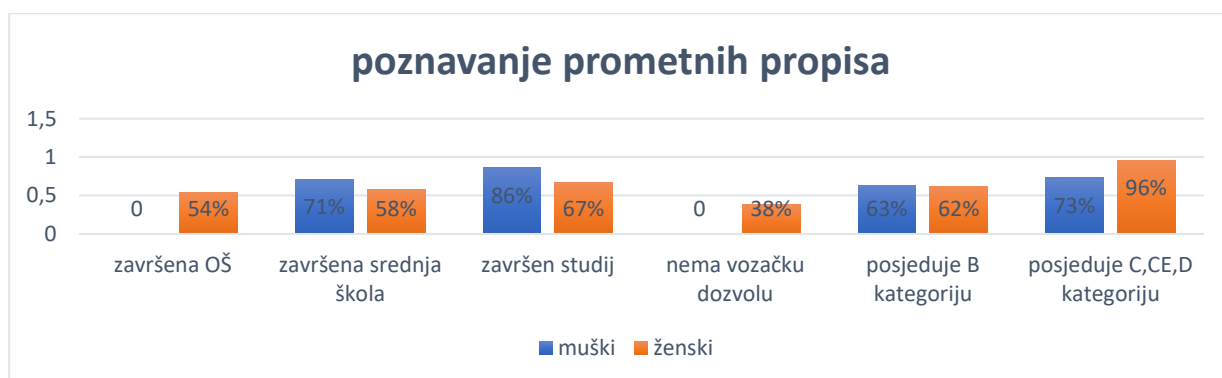
Grafikon 7. Prikaz rezultata ankete za ispitanike starosne dobi 25 – 44 godina

Anketi je pristupilo 33 ispitanika starosti između 45 i 60 godina, 23 ženskih i 10 muških ispitanika. Dvije žene imaju završenu osnovnu školu, 8 ih ima završenu srednju školu dok ih 13 ima završen studij, 2 nemaju vozačku dozvolu, 19 ih posjeduje vozačku dozvolu B kategorije a 2 posjeduju vozačku dozvolu C ili CE kategorije. 7 muškaraca završilo je srednju školu, 3 studij, 5 ih posjeduje vozačku dozvolu B kategorije a 5 ih posjeduje vozačku dozvolu C ili CE kategorije.



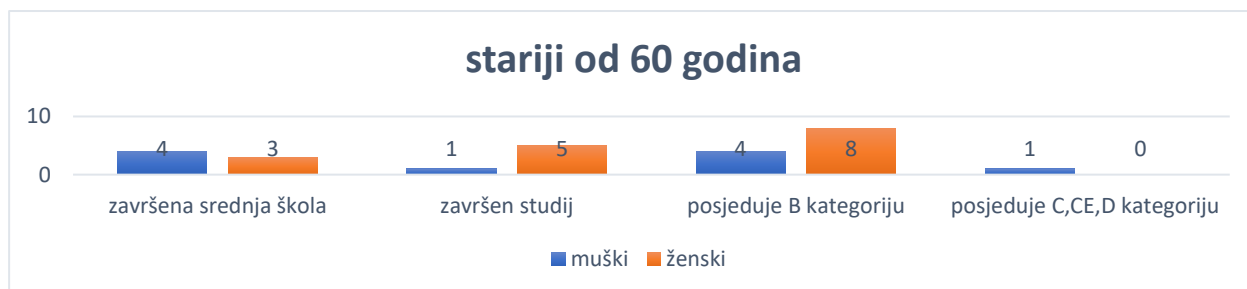
Grafikon 8. Prikaz broja ispitanika starosne dobi 45-60 godina

Žene sa završenom osnovnom školom točno su odgovorile na 54% pitanja iz poznavanja prometnih pravila i propisa, 58% točnih odgovora imaju žene sa završenom srednjom školom a sa završenim studijem imaju 67% točnih odgovora. One koje ne posjeduju vozačku dozvolu točno su odgovorile na 38% pitanja, one koje posjeduju vozačku dozvolu B kategorije točno su riješile na 62% pitanja, dok su žene koje posjeduju C ili CE kategoriju točno odgovorile na 96% pitanja. Muškarci sa završenom srednjom školom točno su odgovorili na 71% pitanja dok su oni sa završenim studijem točno odgovorili na 86% pitanja. Muškarci koji posjeduju vozačku dozvolu B kategorije točno su odgovorili na 63% pitanja a oni koji posjeduju C ili CE kategoriju točno su odgovorili na 73% pitanja.



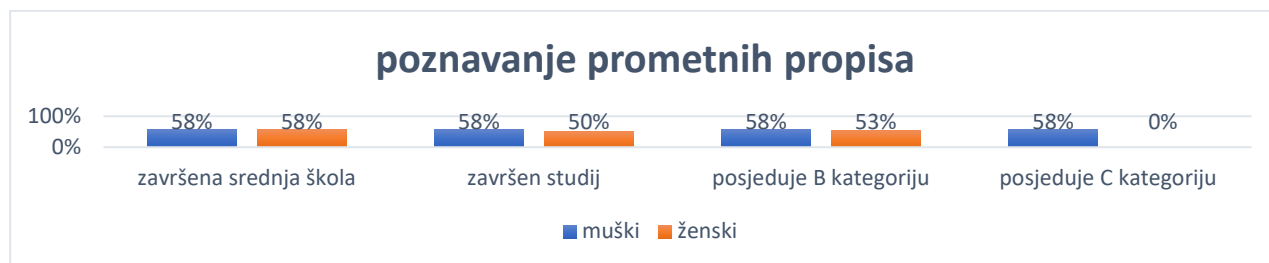
Grafikon 9. Prikaz rezultata ankete za ispitanike starosne dobi 45 – 60 godina

Anketi su pristupili i ispitanici stariji od 60 godina, njih 13, 8 ženskih i 5 muških ispitanika. 4 muškaraca završilo je osnovnu školu, 1 je završio studij, 4 ih posjeduje vozačku dozvolu B kategorije dok 1 posjeduje vozačku dozvolu C ili CE kategorije. 3 žene završile su osnovnu školu a 5 ih je završilo studij i svih 8 posjeduje vozačku dozvolu B kategorije.



Grafikon 10. Prikaz broja ispitanika starosne dobi iznad 60 godina

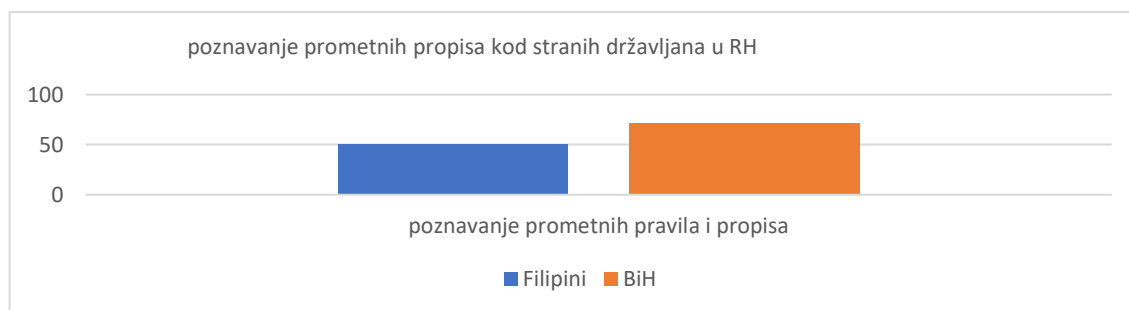
Svi ispitanici ankete sa završenom srednjom školom točno su riješili 58% testa dok su muškarci sa završenim studijem točno odgovorili na 58% pitanja, žene koje su završile studij točno su odgovorile na 53% pitanja. Muškarci koji posjeduju vozačku dozvolu B kategorije, kao i oni C i CE kategorije točno su odgovorili na 58% pitanja. Žene koje posjeduju vozačku dozvolu B kategorije točno su riješile na 53% pitanja.



Grafikon 11. Prikaz rezultata ankete za ispitanike starosne dobi iznad 60 godina

4. REZULTATI ANKETE STRANIH DRŽAVLJANA U REPUBLICI HRVATSKOJ

U Republici Hrvatskoj svakim je danom sve veći broj stranih državljana. Predviđanja su da bi se 2024. godine moglo izdati 200 000 odobrenih radnih dozvola. Najveći broj stranih državljana iz Trećih zemalja (zemlje koje nisu članice EU) je iz Nepala i BiH, slijede ih radnici iz Indije, Filipina, Makedonije, Bangladeša, Kosova... Velik broj tih radnika zaposlen je u sektoru prometa i logistike, njih oko 5 000 ove godine, najvećim dijelom kao vozači motornih vozila. Dolaskom u RH oni moraju zadovoljiti određene propise i završiti određena osposobljavanja. Uglavnom nisu željeli pristupiti ovoj anketi, bojeći se da neće dovoljno dobro riješiti test ili zbog ne poznavanja jezika iako je anketa bila i na engleskom jeziku. Anketi je pristupilo samo 10 ispitanika, koji su profesionalni vozači autobusa, svi muški sa završenom srednjom školom, 5 iz Filipina i 5 iz BiH. Ispitanici iz Filipina su starosti između 45 i 60 godina. Na testu iz poznavanja prometnih pravila i propisa ostvarili su prosječno 50 % točnih odgovora. Ispitanici iz BiH jedan je starosti između 18 i 24 godine, 1 starosti 45 do 60 godina i 3 su starosti 25 do 44 godine. Na testu iz poznavanja prometnih pravila i propisa ostvarili su prosječno na 72% točnih odgovora. Uglavnom su krivo riješili zadatke sa pravilima prednosti prolaska vozila na raskrižju, pravilima mimoilaženja vozila na uzbrdici i pitanjem vezanim za ponašanje na autocesti. Filipinci nisu u stanju razlikovati značenje prometnih znakova, što ne mora nužno biti problem nepoznavanja znakova već razumijevanja pitanja.



Grafikon 12. Prikaz rezultata poznavanja prometnih propisa stranih državljana u RH

5. ZAKLJUČAK ISTRAŽIVANJA

U anketi je sudjelovao veći broj žena a najveći broj sudionika je bio starosti od 25 do 44 godine. Pretpostavlja se da je to iz razloga što te osobe u najvećoj mjeri aktivno koriste društvene mreže putem kojih se dijelila anketa. Iz ankete je vidljivo da veći stupanj formalnog obrazovanja ne uvjetuje boljem poznavanju prometnih pravila i propisa. Vozači profesionalnih vozačkih kategorija, C, CE i D, bolji su u poznavanju prometnih pravila i propisa u cestovnom prometu. Uglavnom su muški, u manjem postotku, bolji u poznavanju prometnih pravila i propisa, osim u profesionalnim kategorijama, gdje su žene bolje mada su u manjem broju zastupljene. Najslabije poznavanje prometnih propisa je kod ispitanika starijih od 60 godina.

Veliki broj ispitanika nije u stanju točno riješiti zadatke sa poznavanjem pravila prednosti prolaska vozila na raskrižju i prednošću prolaska kod mimoilaženja na uzbrdici, ne prepoznaju značenje prometnih znakova te nisu u stanju nabrojati radnje koje su zabranjene na autocesti. Vozači uglavnom znaju kako pravilno postupati vozilom prilikom vožnje kružnim tokom ali nije jasno zašto se onda toga ne pridržavaju i to ne poštuju u stvarnim uvjetima.

Sudionike u prometu teško je educirati nakon što polože vozački ispit i uglavnom uče na greškama, kad skrivaju prometnu nesreću ili plate kaznu. Rijetko će se tko samostalno educirati.

Najvažnija je edukacija od najranije životne dobi, kroz period predškolske i školske dobi kada se usvaja prometna kultura koja uglavnom ostaje usađena kroz cijeli život. Prometna kultura je veći problem u većim gradovima gdje je veća gustoća i intenzitet prometa. Vozači koji se profesionalno bave vožnjom motornog vozila obvezni su svakih 5 godina pohađati periodičko obrazovanje, Kod 95. Iz ankete je vidljivo da ti vozači puno bolje bez obzira koje su životne dobi poznaju prometna pravila i propise. Možda bi se tako nešto trebalo uvesti i za sve vozače sa vremenskim periodom od svakih 10 godina koliko im vrijedi i vozačka dozvola. Svaka edukacije sudionika u prometu, pa čak i rješavanje ovakve ankete, je dobrodošlo i sigurno utječe na smanjenje broja prometnih prekršaja i broj prometnih nesreća.



STROJARSKA I PROMETNA ŠKOLA, Varaždin, 24.06.2024.

Andreja Koščak Lacković, dipl. ing.
Željko Antunović, dipl. ing.

THE IMPACT OF EDUCATION AND FORMAL EDUCATION ON KNOWLEDGE OF TRAFFIC RULES AND REGULATIONS AMONG ROAD USERS

Abstract:

The increasing number of vehicles on the roads and the growing number of drivers of various ages driving on the roads also lead to an increasing number of violations, which are often the cause of traffic accidents. We often wonder whether the causes of these traffic violations and accidents are due to insufficient knowledge of traffic rules and regulations or other factors. We are also witnessing large migrations of people due to employment in foreign countries. A large number of foreign nationals work in the Republic of Croatia, including the transport and logistics sector, mainly as motor vehicle drivers.

In Croatia, traffic regulations are mainly taught through regular classes in primary schools and vocational traffic schools, as well as in driving schools. After obtaining a driver's license, drivers never need to study the regulations again, except for professional motor vehicle drivers who must attend training in the form of Periodic Driver Training CODE 95 every 5 years.

The aim of this paper is to investigate and present the impact of age and formal education on the knowledge of traffic rules and regulations, and whether there is a need for additional training at certain intervals.

The research will be conducted based on statistical data and surveys of traffic participants of different ages and formal education levels. By comparing data from these sources, proposals will be generated to improve the safety of traffic participants.

Keywords: *safety, traffic accidents, traffic violations, knowledge of traffic rules and regulations, motor vehicle driver, foreign drivers*

1. INTRODUCTION

Observing traffic situations in everyday life and how drivers handle them often raises the question of how well individual drivers understand and adhere to traffic rules and regulations. We are aware that some drivers do understand traffic rules and regulations but deliberately do not follow them. Similarly, there are drivers who know the rules but cannot comply with them due to their psychological or physical incapacity. Additionally, some drivers have simply forgotten the traffic rules and regulations they learned long ago. There are also various changes in legal regulations that alter traffic rules and regulations, as well as technical solutions for certain traffic situations that often confuse drivers.

The aim of this paper is to investigate and present the knowledge of traffic rules and regulations among traffic participants of different age groups and formal education levels, based on which conclusions could be drawn about the need for additional training at certain intervals.

2. EDUCATION OF TRAFFIC PARTICIPANTS

The education of traffic participants mainly begins with the education of children in kindergarten, where they encounter their first knowledge of traffic rules and regulations appropriate for their age. These are mainly visits by police officers who explain to the children, in an age-appropriate manner, how to cross the road and how to behave in traffic. Later, in primary school, children receive very few hours of instruction on traffic rules, regulations, and behavior, i.e., traffic culture. From first to fourth grade, students learn about traffic through the subject "Nature and Society." The curriculum specifies that in the first grade, they learn about traffic for 4 hours, in the second grade for 5 hours, in the third grade only for 1 hour, and in the fourth grade for 4 hours. From fifth to eighth grade, the instruction on traffic is even more limited. In the fifth grade, students learn about traffic rules and regulations for only 6-8 hours, during which they have the opportunity to take the bicycle driver's exam conducted by the police in collaboration with the Croatian Auto Club. After that, traffic education is not included in any subject until the end of primary school. Students can learn about traffic through extracurricular activities or civic education during homeroom classes if such opportunities exist in their schools. There is also an option to participate in the online national competition "Traffic Classroom" and through various projects, but this depends on the initiative of individual teachers.

In high school, traffic education is generally not provided, except in traffic vocational schools, where students who are training to become Road Traffic Technicians and Motor Vehicle Drivers have regular classes on traffic regulations for two hours per week. High school students, like primary school students, can participate in the online national competition "Traffic Classroom," where they must master certain content related to traffic rules and regulations according to their age to achieve specific results. Traffic education can also be integrated into various projects and civic education during homeroom classes.

Typically, students enroll in driving school when they meet the age requirements, usually in the third or fourth year of high school. During driving school, students receive 30 hours of instruction on traffic rules and regulations. After passing the exam on Traffic Rules and Regulations, they begin 35 hours

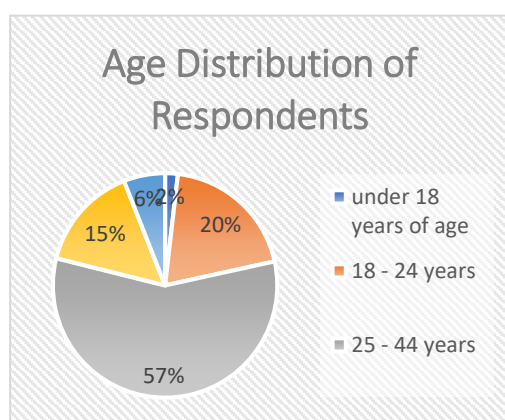
of practical driving training. Before taking the driving test, they must also pass a first aid exam for traffic accident victims. Once they pass the driving test and obtain their driver's license, category B vehicle drivers (personal vehicles) are no longer required to receive further training in traffic rules and regulations. Professional drivers, such as truck and bus drivers, must undergo periodic training, known as Code 95, every five years after obtaining their category C or D driver's license. In the past 10 years, more than 90% of driving school candidates have been young drivers. Only 10% are candidates over the age of 24, including those obtaining category C, CE, or D licenses and drivers retaking the driving test due to a high number of penalty points and permanent revocation of their driver's license.

3. KNOWLEDGE OF TRAFFIC RULES AND REGULATIONS AMONG TRAFFIC PARTICIPANTS

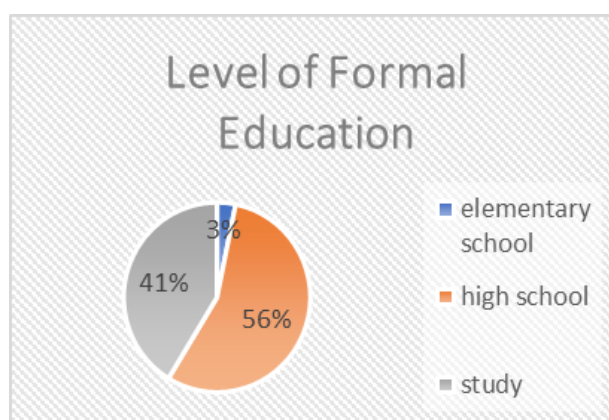
The general opinion is that older individuals, due to the time when they took their driving test, changes in road infrastructure, and the volume of traffic, do not sufficiently know traffic rules and regulations and do not keep up with legal changes. It is also a common belief that individuals with lower levels of formal education have poorer knowledge of traffic rules and regulations. In recent years, there has been a trend of population emigration to Croatia for employment, and it is also believed that people coming from Eastern countries, such as India, the Philippines, Nepal, and others, do not know traffic rules and regulations well.

To confirm or refute these claims, we created a test with 12 questions related to the knowledge of traffic rules and regulations, along with several general survey questions to gain insight into the individuals taking the test. The entire survey and test were anonymous and conducted online via social media and direct outreach to companies employing foreign drivers.

The test was completed by 218 respondents via social media: 153 female and 65 male respondents, with only 10 male foreign nationals participating. The age of the respondents was mainly between 18 and 60 years, but the test was also completed by 4 respondents younger than 18 and 13 respondents older than 60. This age distribution may be because older respondents are less familiar with social media, making the survey less accessible to them.



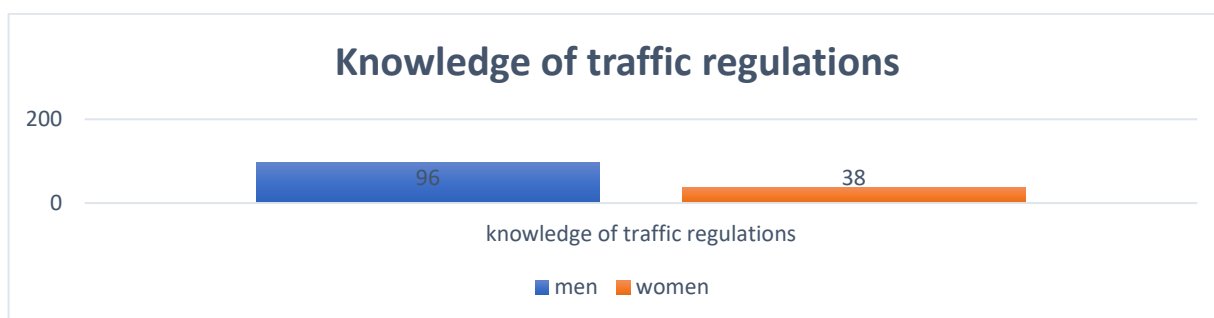
Graph 1: Age Distribution of Respondents



Graph 2: Level of Formal Education

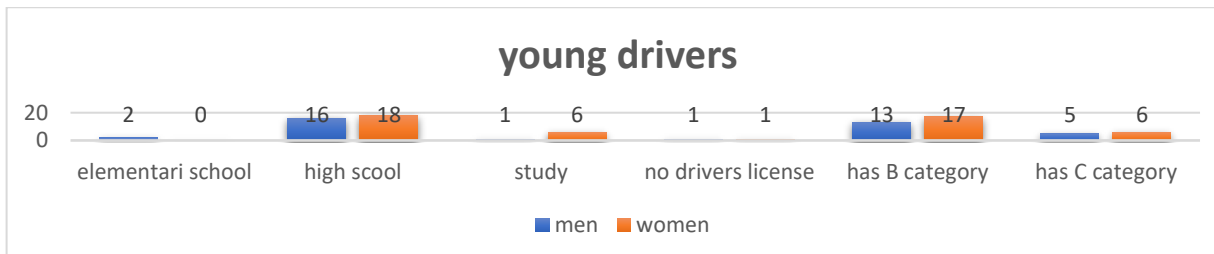
Regarding formal education, 121 respondents had completed secondary school, 85 had completed undergraduate or graduate studies, while a smaller number had only completed primary school or postgraduate studies.

On the question of possessing a driver's license, almost all respondents had a driver's license of some category, with only 7 respondents not having a license. Forty respondents had professional driver's licenses (categories C, CE, D, DE), while 170 respondents had a license for category B vehicles only. Among respondents younger than 18 years, there were four participants (two male and two female). The males scored 96% correct answers on the test, while the females scored 38% correct answers.



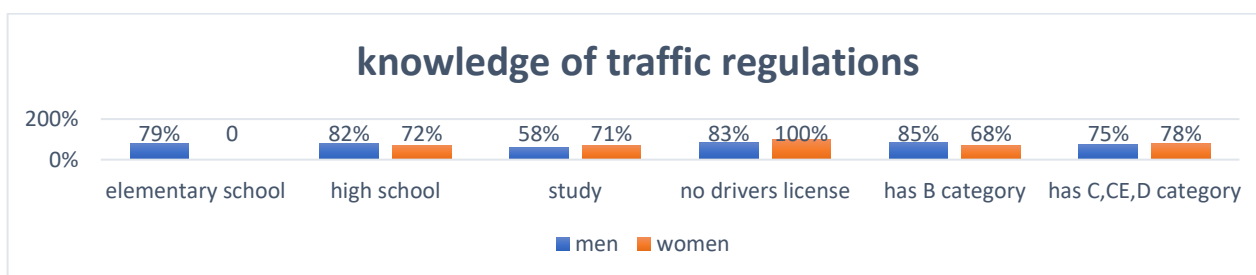
Graph 3: Survey Results by Gender

According to Croatian law, young drivers are those up to 24 years old. Young drivers are a particularly risky group due to their lack of experience, need to prove themselves, and susceptibility to influence. The survey included 43 young drivers (19 male and 24 female respondents).



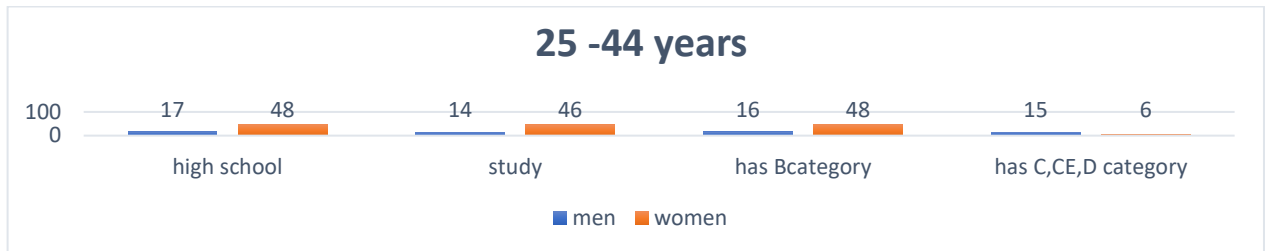
Graph 4: Number of Respondents Aged 18-24 (Young Drivers)

The majority of young drivers had completed secondary school and held a category B driver's license, equally among male and female respondents. The best test result for traffic rules and regulations was achieved by a female who did not have a driver's license (presumably a driving school attendee), while the weakest result was also by a female with a category B license. Based on formal education, the best results were achieved by male respondents with secondary education, while the worst results were by male respondents with a degree (58%).



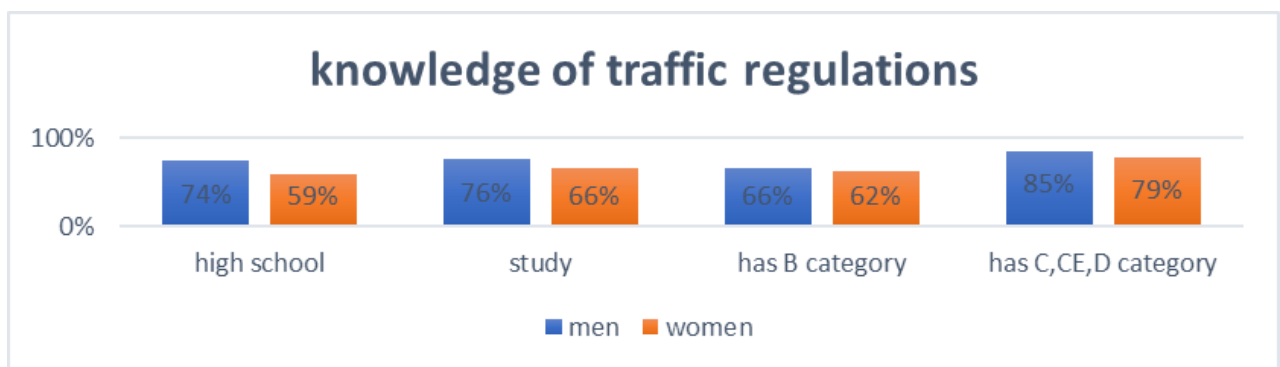
Graph 5: Results of Respondents Aged 18-24 (Young Drivers)

The largest number of respondents, 125, were aged 25 to 44, with 75% female and 25% male respondents. An equal number of respondents had completed secondary school or a degree. An equal number of males had category B and C licenses, while more females had a category B license, and fewer had a category C license.



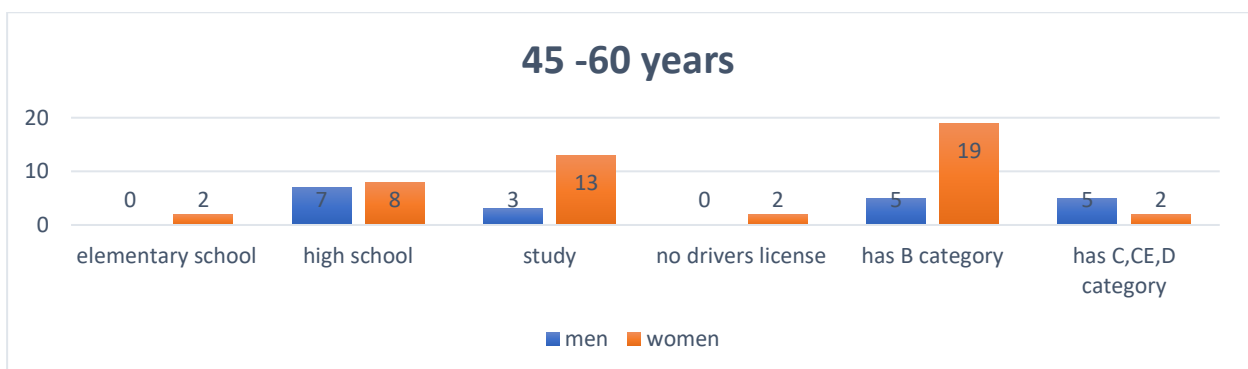
Graph 6: Number of Respondents Aged 25-44

Males with secondary education knew traffic regulations 74%, while those with a degree knew them 76%. Females with secondary education knew traffic regulations 59%, and those with a degree knew them 66%. Males with a category B license knew regulations 66%, while those with a category C or CE license knew them 85%. Females with a category B license had 62% correct answers, while those with a category C or CE license had 79% correct answers.



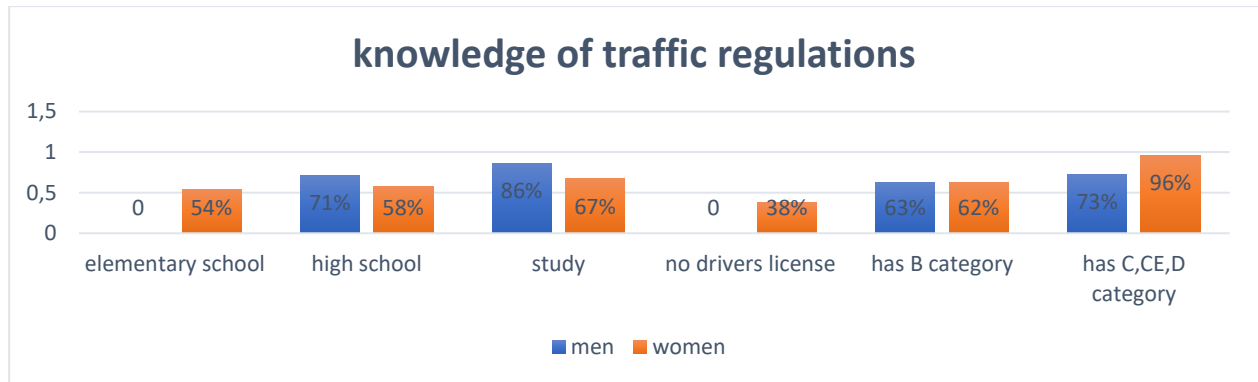
Graph 7: Survey Results for Respondents Aged 25-44

The survey included 33 respondents aged 45 to 60, with 23 female and 10 male respondents. Two women had completed primary school, eight had completed secondary school, and 13 had a degree. Two did not have a driver's license, 19 had a category B license, and 2 had a category C or CE license. Seven men had completed secondary school, three had a degree, five had a category B license, and five had a category C or CE license.



Graph 8: Number of Respondents Aged 45-60

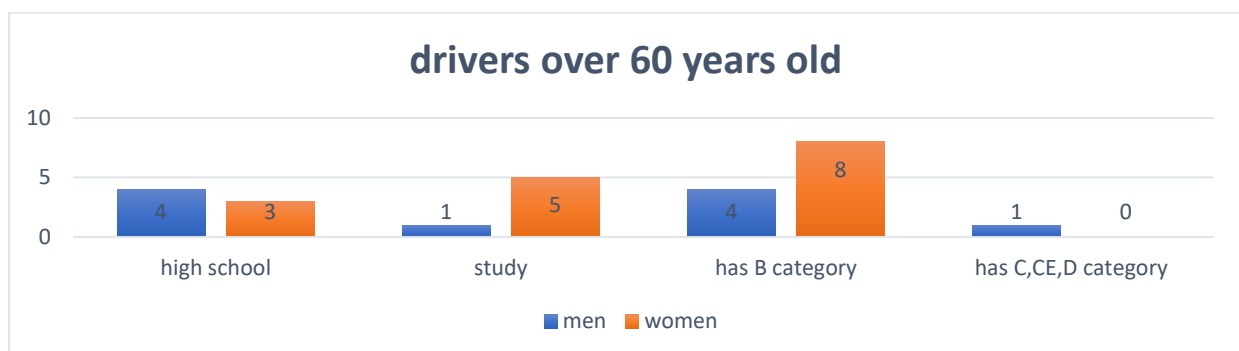
Women with primary education answered 54% of the questions correctly, those with secondary education answered 58% correctly, and those with a degree answered 67% correctly. Women without a driver's license answered 38% correctly, those with a category B license answered 62% correctly, and those with a category C or CE license answered 96% correctly. Men with secondary education answered 71% correctly, and those with a degree answered 86% correctly. Men with a category B license answered 63% correctly, and those with a category C or CE license answered 73% correctly.



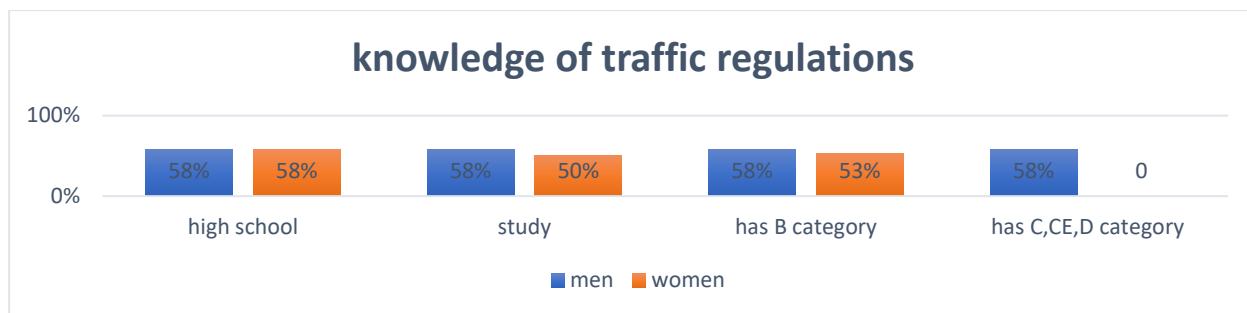
Graph 9: Survey Results for Respondents Aged 45-60

The survey also included 13 respondents older than 60 years, with 8 female and 5 male respondents. Four men had completed primary school, one had a degree, four had a category B license, and one had a category C or CE license. Three women had completed primary school, five had a degree, and all eight had a category B license.

All respondents with secondary education answered 58% of the test correctly, while men with a degree answered 58% of the questions correctly, and women with a degree answered 53% correctly. Men with category B licenses, as well as those with category C and CE licenses, answered 58% of the questions correctly. Women with category B licenses answered 53% of the questions correctly.



Graph 10: Number of Respondents Older than 60 Years

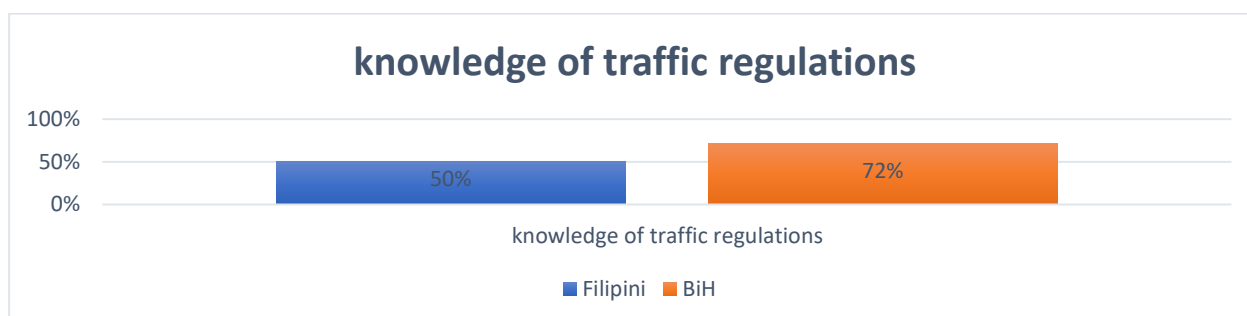


Graph 11: Survey Results for Respondents Older than 60 Years

4. RESULTS OF THE SURVEY OF FOREIGN NATIONALS IN THE REPUBLIC OF CROATIA

In the Republic of Croatia, the number of foreign nationals is increasing daily. Projections suggest that by 2024, up to 200,000 work permits could be issued. The majority of foreign nationals from non-EU countries come from Nepal and Bosnia and Herzegovina (BIH), followed by workers from India, the Philippines, Macedonia, Bangladesh, Kosovo, and others. A significant number of these workers are employed in the transport and logistics sector, with around 5,000 this year, predominantly as motor vehicle drivers. Upon arrival in Croatia, they must comply with specific regulations and complete certain training programs.

Most foreign nationals were reluctant to participate in this survey, fearing they might not perform well on the test or due to language barriers, even though the survey was also available in English. Only 10 respondents participated in the survey, all of whom are professional bus drivers, male, with completed secondary education, 5 from the Philippines and 5 from BIH. The respondents from the Philippines were aged between 45 and 60 years. They scored an average of 50% correct answers on the traffic rules and regulations test. The respondents from BIH included one aged between 18 and 24 years, one aged 45 to 60 years, and three aged 25 to 44 years. They scored an average of 72% correct answers on the traffic rules and regulations test. The primary mistakes made by the respondents were related to right-of-way rules at intersections, vehicle passing rules on inclines, and questions about behavior on highways. Respondents from the Philippines had difficulty distinguishing the meanings of traffic signs, which may not necessarily be a problem of knowledge but rather understanding the questions.



Graph 12: Results of Traffic Rules Knowledge Among Foreign Nationals in Croatia

5. CONCLUSION OF THE RESEARCH

A larger number of women participated in the survey, and the majority of participants were aged between 25 and 44 years. This is likely because this age group is the most active on social media, through which the survey was shared. The survey results indicate that a higher level of formal education does not necessarily correlate with better knowledge of traffic rules and regulations. Professional drivers with categories C, CE, and D licenses have a better understanding of traffic rules and regulations in road traffic. Generally, men are slightly better at knowing traffic rules and regulations, except in professional categories where women performed better, although they are less represented.

The weakest knowledge of traffic rules and regulations was observed among respondents older than 60 years. A significant number of respondents were unable to correctly solve tasks related to right-of-way rules at intersections, vehicle passing rules on inclines, recognizing the meaning of traffic signs, and listing actions prohibited on highways. Drivers generally know how to navigate roundabouts correctly, but it is unclear why they do not adhere to these rules in real-world conditions.

It is challenging to educate traffic participants after they obtain their driver's license, and they mostly learn from mistakes, such as causing a traffic accident or paying fines. Rarely will anyone educate themselves voluntarily.

The most crucial education starts from an early age, during preschool and school years, when traffic culture is adopted and usually remains ingrained for life. Traffic culture poses a more significant problem in larger cities with higher traffic density and intensity. Professional drivers are required to attend periodic training every five years (Code 95). The survey shows that these drivers, regardless of age, have a much better understanding of traffic rules and regulations.

Perhaps a similar requirement should be introduced for all drivers, with a training period every ten years, which matches the validity of their driver's license. Any form of traffic participant education, even participating in a survey like this, is welcome and certainly contributes to reducing the number of traffic violations and accidents.

**Улогата на Сообраќајната училишна единица во подигање на сообраќајната
култура**

Автори:

Јошески Борче

Пипиџаноска Ирена

Прилеп, Септември, 2024

Абстракт: Главна цел во овој труд е да се нагласи важноста од вклученоста на учениците од Сектор сообраќај, транспорт и складирање во рамките на работата и активностите на училишната сообраќајна единица како самостојна ученичка заедница во училиштето.

Преку овој труд цениме дека ќе ги објасниме можностите за придонес кон подигање на свеста, пред сè на културата во сообраќајот и зголемување на интересот на учениците за следење на наставните содржини и програми посебно од стручните предмети во рамките на овој Сектор како и привлекување на ученици при упис во следните години поради споделување на претходни добри практики и искуства. Акцентот ќе се стави на улогата, значењето, потребата, начини на функционирање на оваа самостојна ученичка заедница како и придобивките кои Секторот Сообраќај, транспорт и складирање, училиштето воопшто па и локалната заедница го имаат од нејзиното постоење.

Нашите предвидувања и очекувања е дека доколку и во иднина продолжи да дејствува оваа ученичка заедница повторно ќе се зголеми атрактивноста и интересот на учениците од основните училишта за упис во овој сектор и двете квалификации во истиот. Пред сè преку учеството на учениците во оваа ученичка заедница -единица можност наши ученици да се вклучат во проекти како во овој за кој што ќе стане збор во трудот во голема мера ќе се подобри квалитетот на наставната во овој сектор, ќе бидеме препознатливи во локалната заедница и ќе имаме се поквалитетни, позадоволни, поисполнети ученици.

Клучни зборови: Сообраќајна училишна единица, сообраќајна култура, зголемена свест, улога, задачи, активности.



1. ВОВЕД

Во СОУ “Ристе Ристески-Ричко” од 2006 година отпочна реализирање на настава и наставни програми од тогашната Сообраќајна струка со еден профил, Техничар за транспорт

и шпедиција. На самиот почеток интересот за упис во оваа струка беше огромен но со ограничувачки можности поради тоа што беше одобрена само 1 паралелка со вкупен број на ученици , 34.За потребите на реализација на наставните содржини од стручните предмети беше ангажиран само 1 професор.Во годините што одминуваа се приклучија и други двајца предметни наставници така да нивниот број во 2010 година изнесуваше вкупно 3.Токму во таа година за првпат на работен состанок на ниво на Стручен актив потекна идејата за формирање на Училишната сообраќајна единица.

На самиот почеток улогата, значењето на оваа единица не беше доволно афирмирана, некако срамежливо отпочна со скромни активности и со вклученост на така речиси многу мал број на ученици.За постоењето и улогата на истата така речиси не бевме доволно информирани ниту вработените, едноставно дејствуваше како издвоена, за нејзините активности никогаш не беше ништо нотирано во изготвувањето на годишната програма.

Поради зголемениот интерес за упис во оваа струка дејноста на истата се прошири во 2013 година кога во училиштето се отвори уште 1 профил и тоа Техничар за патен сообраќај. Со тоа се зголеми и бројот на предметни професори по стручни предмети како и бројот на запишани ученици, со максимален број на запишани ученици вкупно 34 во профил.

Ова беше момент на зголемување на мотивот меѓу самите наставници малку повеќе да се ангажираат кон работата и функционирањето на Училишната сообраќајна единица,за нејзино целосно формулирање, формализирање и давање значење кон тоа што се ќе превзема како активности во рамките на нејзиното функционирање.

Се поголем беше и интересот на учениците за земање перманентно учество во нејзино членување и превземање на различни активности.

Со цел да се добие на квалитет во нејзиното работење беа делегирани ученици од втора, трета и четврта година.

За тоа како е организирана работата, кои се целите, задачите , активностите, улогата на оваа училишна единица пред се во делот на чподигање на сообраќајната култура во заедницата ќе стане збор подолу во овој труд.

2.Формирање на Сообраќајна училишна единица, критериуми за членство во единицата

Во учебната 2010/11 година на првиот работен состанок предметните наставници од активот помеѓу другите точки, фокусот го ставија на формирањето на Училишната сообраќајна единица, но и на тоа која ќе биде нејзината улога, целите, задачите а пред се врз основа на кои критериуми ќе се формира истата.

Како училиште кое ги поддржува политиките на инклузивност во наставата според Националната стратегија наставниците завзедоа став дека нема да се врши никаков дискриминациски однос при изборот на ученици кои ќе членуваат во истата. Според тоа беа согласни дека единицата ќе биде хетерогена, што подразбира учество на ученици од различен пол, националност, ученици кои потекнуваат од различна социо-економска

средина. Сепак мораше да се поставата одредени критериуми врз основа на кои ќе се изврши изборот, а тие беа следните:

1. Пред се да се одговорни ученици во наставата;
2. Да имаат примерно поведение;
3. Ученици кои имаат компетитивни карактеристики во процесот на учењето;
4. Ученици кои умеат и знаат да почитуваат правила и да понесуваат одговорност;
5. Ученици кои низ нивното школување не го прекршиле Куќниот ред и Кодексот на однесување на училиштето;
6. Ученици кои меѓусебно несебично споделуваат добри ученички практики;
7. Ученици кои навистина имаат желба своите знаења, вештини, компетенции да ги прошируваат, зајакнуваат низ низа други активности кои воглавном ќе се одвиваат надвор од училиштето.
8. Поднесено мотивационо писмо врз основа на кое ќе се утврди кои се мотивите од нивни аспект според кои како тие гледаат на функционирањето на единицата и нивната партиципација во неа.
9. Да се ученици од II до IV година;
10. Да немаат изречени педагошки мерки и не се водат никакви дисциплински постапки кон нив.

Единствениот начин преку кој наставниците можеа да ги запознаат учениците за оваа иницијатива беше на самите часови по стручни предмети каде усно беа информирани околу иницијативата за формирање на училишната единица, кој се може да земе учество и кои се условите за да се стане член на истата.

Наставниците беа пријатно изненадени од големиот интерес кој беше појавен од страна на учениците сепак изборот се изврши врз основа на горенаведените критериуми. На транспарентен начин беа избрани првите членови на училишната единица, вкупно 20 ученици од II до IV година кои беа таканаречени мразокршачи во обидот тие како млади лица да придонесат кон подигнување на сообраќајната култура во заедницата, особно меѓу младите, учениците од сосновно и средно образование.

За постоењето на училишната единица беше запознат и Републичкиот совет за безбедност на сообраќајот и патиштата од кој ја доби целокупната поддршка во неговите активности.

Формирањето и функционирањето на училишната сообраќајна единица претставува чекор напред кон унапредување на сообраќајно превентивното дејствување. Придобивките од постоењето на училишната сообраќајна единица се повеќекратни. Имено од една страна таа ќе претставуваат поддршка во работата на сообраќајната полиција во делот на управување и контрола на сообраќајот, од друга страна ќе дејствува превентивно во насока на информирање, едукација и подигање на јавната свест за одговорно учество во сообраќајот а исто така училишната сообраќајна единица ќе значи и практична едукација и унапредување на знаењата и капацитетите на учениците пред се од основните па и од средните училишта.

Учениците кои членуваат од втора, трета и од четврта година воедно ги исполнуваат условите предвидени со Правилникот за организација, обука и начин на работа на училишните сообраќајни единици.

Секако дека за нивната работа, функционирање за сето време се грижат предметните наставници по стручни предмети кои споделуваат идеи, ги мотивираат и храбрат идеите да потекнуваат од нив, да промовираат ученички иницијативи, да ги споделуваат замислите, да дискутираат, дебатираат што според нив би било најцелесходно да се превземе како активност во дадено место и време.

Она што можеби на самите почетоци беше пропуст и слаба страна е тоа што единицата функционираше на начин без истата пред себе да има претходно изготвен акционен план за работа, не беше нотирано во Годишната програма за работата на училиштето, едноставно функционираше спонтано и превземените активности не беа толку системски спроведени и осмислени но сепак за поздравување беше секој нивни обид.

3. Улога, цели, задачи и активности на Училишната сообраќајна единица

Со проширување на Сообраќајниот актив со останат наставен кадар по стручни предмети се прошируваше листата на идеи за работата и функционирањето на училишната единица по што самиот момент налагаше таа да добие поформален карактер па така беа избрани двајца одговорни наставници за водење и координација на истата низ сите активности, се отпочна со изготвување на акционен план со активности кој влезе во Годишната програма за работата на училиштето така што на некој начин секој имаше можност од поблизу да се запознае со тоа која е улогата, целите и задачите на единицата.

Како главна цел која беше поставена пред училишната единица беше следната:

Да се подигне сообраќајната свест и да се унапреди сообраќајната култура кај учесниците во сообраќајот во град Прилеп.

Начелно намерата е преку низа акции е да се подигне културата и етиката кај граѓаните за одговорно учество во сообраќајот, но и да се поттикне локалното население активно да се вклучи во општествените процеси за креирање на општество со високо ниво на сообраќајна култура и издигнување на безбедноста во сообраќајот како највисока општествена вредност.

За постоењето на единицата значајни се двата аспекти и продобивки што ќе се добијат од промовирањето на истата. Првиот е сообраќајниот аспект, каде што влегува намалувањето на сообраќајниот метеж, зголемувањето на безбедноста во сообраќајот, како

и намалување на бројот на сообраќајни незгоди. Вториот е едукативниот аспект, каде што ќе се едучира помладата популација за сообраќајните правила и култура.

Една од целите е поголема едукација на децата и нивна активна партиципација во напорите за креирање на средина безбедна за движење. Во прв план, Училишната сообраќајна единица ќе биде насочена кон креирање на безбедни училишни зони, а понатаму ќе учествуваат и во останати активности со цел побезбеден сообраќај.

Имено, членовите на Училишните сообраќајни единици со претставниците на Министерството за внатрешни работи учествуваат во активности за регулирање на сообраќајот и предупредување на неодговорните учесници во сообраќајот, имаат за задача превентивно да дејствуваат и да ги едучираат учесниците во сообраќајот за последиците од неодговорното учество во сообраќајот.

Членовите на училишната сообраќајна единица се препознатливо облечени во портокалови елечи на кои е напишано името „Училишна сообраќајна единица“, покрај облеката се опремени и со сите потребни реквизити за регулирање на сообраќајот во ситуации кога ќе превземаат активности превземени со регулирање на сообраќајот.

Начелно, главната улога и задачи на Училишната сообраќајна единица се следните:

- Превенција;
- Промоција на стекнатите знаења во делот на стручните предмети пред Локалната заедница;
- Подигање на сообраќајната култура меѓу населението;
- Промоција на струката пред Локалната заедница;
- Учество при промена на режимот на сообраќај во градот;
- Помош при регулирање на сообраќајот во градот (еднаш до двапати годишно);
- Одржување на ученички сообраќаен семафор;
- Спроведување на едукативни работилници меѓу учениците од основните училишта на тема правила, прописи, однесување во сообраќајот и негување на правилна сообраќајна култура;
- Вршење на тестирање на знаења поврзани со општите правила и однесување во сообраќајот на учениците од основните училишта;
- Спроведување анкети меѓу месното население, првата на тема “Детектирање на проблеми и пропусти во сообраќајната инфраструктура и организацијата на сообраќајот во градот”, втората на тема “Степенот на задоволство меѓу населението од организацијата на градскиот превоз во градот”;
- Изработка и дистрибуција на едукативен материјал меѓу месното население со корисни информации за подигање свеста и сообраќајната култура;

Покрај горенаведените задачи и активности кои пред себе ги има оваа одговорна Училишна заедница таа е препознатлива во училиштето па и пошироко во градот и населените места по многубројните хуманитарни акции кои по иницијатива на нејзините членови се спровеле низ годините и згреале многу срца. Воедно повторно на нивна иницијатива се појавиле во улога на организирање на бројни културни и забавни активности во кои учество зеле бројни млади од градот и населените местана што сме посебно горди како училиштте и токму покрај нејзиното постоење и активности сме едни од најпрепознатливите на мапата во градот во делот на хуманитарни акции и културно-забавни активности.

4.Досегашни конкретни активности на Училишната сообраќајна единица

Почетоците на Сообраќајната училишна единица беа скромни,недоволно афирмирани како во училиштето така и во локалната средина.Тоа се должеше на недоволната упатеност се што треба да превзема како акција единицата, како да функционира за сето тоа две до три години покасно да прерасне во единица по која училиштето стана најпрепознатливо преку мноштвото акции кои беа превземени и реализирани од нејзина страна во делот на подигањето на сообраќајната култура и свест меѓу месното население, посебно меѓу младите а исто така беше и повеќе од активна во делот на помош во регулирањето на градскиот сообраќај.

Помеѓу многуте активности кои подолу ќе ги наведеме би ги издвоиле редовните активности кои ги спроведе а се поврзани со интернационални и државни денови на сообраќајот како што се:

- 16-22 септември – Европска недела на мобилност
- 7-13 мај – ООН Недела на безбедност на патиштата
- 21 септември – Европски ден без жртви на патиштата
- 22 септември – Ден без автомобили
- 3 јуни – Ден на велосипедот
- втори и деветти месец– Ден за со велосипед на работа
- 11 мај – Ден на културата во сообраќајот

По претходен договор, добра координација од страна на предметните наставници кои ревностно помагаа во работата на единицата во сите споменати акции единицата покажа подготвеност, знаење, вештини да се справи со сите предизвици.За целокупниот нивни ангажман редовно беа пофалувани од страна на локалните медиуми со што уште повеќе се популаризираа меѓу локалната средина.

Покрај овие акции за одбележување на интернационални и државни денови на сообраќајот на единицата истата посебно се истакна во многубројните акции кои произлегоа на нивна иницијатива што е успешен пример и практика во делот на ученичките иницијативи.

Во рамките на едукативен домен, единицата одржа бројни работилници пред учениците од основните училишта каде акцентот беше ставен на однесувањето на учениците во сообраќајот, препознавање и почитување на сообраќајни знаци. Предавањата беа на тема „Култура во сообраќај на сите учесници (пешаци,мотоциклисти, и возачи на разни моторни возила)“. За да има поголема тежина со своја логистика помогнаа сообраќајни полицајци како и предметно наставници.

Повторно пред учениците од основните училишта беше спроведена едукативна работилница која се однесуваше на незнаењето, некултурата, непочитувањето на правилата и прописите во сообраќајот кои чинат изгубени човечки животи.

Пред учениците од основните училишта во рамките на нашето училиште беше спроведен „Ученички семафор“, или популарно наречен полигон каде според одредени правила под надзор на Училишната единица учениците требаа успешно да го поминат истиот.

Во соработка на компетентни лица од МВР Битола, сектор за превенции Училишната заедница зеде учество во спроведувањето на едукативна работилница пред учениците од училиштето на тема „Превенција во сообраќајот, превенција од користење на психотропни супстанции, наркотици, алкохол“.

Училишната единица во соработка со полициски службеници од ОВР Прилеп а во рамките на денот на сообраќајната култура како и во соработка со станицата за технички преглед спроведоа превентивна активност за подигнување и унапредување на сообраќајната култура за побезбеден сообраќај и намалување на бројот на сообраќајни незгоди. За оваа цел на возачите во општина Прилеп им беше поделуван едукативен материјал-флаери.

Во делот на континуираните активности УСЕ во соработка со РСБСП како и вработени од СВР Битола во 2 работни дена беа спроведени превентивни активности на подрачјето на општина Битола во рамките на кампањата „Стави појас“ и „Не користи мобилен телефон додека возиш“. За таа цел на возачите им беше поделуван едукативен материјал со пригодна содржина а воедно и преку непосредна комуникација им беа укажани можните несакани последици и незгоди во сообраќајот а поврзани како последица од двете теми.

Не помалку од значење е ангажманот на УСЕ во рамките на регулирањето на сообраќајот во градот. Во контекст на тоа би ги споменале неколку активности во кои со несебично учество и заложби беше регулиран сообраќајот во градот.

Во деновите кога се одржуваа велосипедски трки на кои имаше масовно учество на велосипедисти во градот имаше променет режим на сообраќај и тогаш УСЕ зеде одговорна позиција помагајќи истите да се одржат беспрекорно и покажаа огромна професионалност.

За настанот „Сите на велосипед“ повторно имаше ангажман на УСЕ која несебично ја обезбедуваше патеката предвидена за сообраќај на велосипедите на релација Прилеп - с.Коњари.

Традиционално во градот неколку години по ред се одржува манифестацијата „Че трчае“, спортски настан, атлетска трка на 5 и 10 км во времетраење од 3 часа на која учество земаат голем број на професионалци и рекреативци. За успешно спроведување на истата која е под надзор на полициската станица во Прилеп сеподеднакво се грижеа и учениците кои членуваат во УСЕ. Во сите досегашни трки тие успешно ја обезбедија целокупната рута која беше предвидена за одржување на трката.

Во градот на крајот од месец август редовно се одржува дефиле на мотори кога повторно има променет режим на сообраќај и за таа цел покрај сообраќајната полиција при ПС Прилеп на нивно барање се вклучува и УСЕ со задача да се грижи за променетиот сообраќај и пренасочувањето на возачите и пешаците кон други насоки.

Од не помала важност се и бројните хуманитарни акции кои на ниво на општина беа спроведени и успешно реализирани токму на иницијатива на УСЕ. На таков начин во неколку наврати беа собрани пари за лекување на деца, алишта за социјално-загрозени семејства, организирани забави од чиишто собрани парични средства им се помогна на загрозени семејства, купување на храна, облека како и акцијата за собирање на парични средства со кои се купија дел од новогодишните пакетчиња за дечињата од населените места.

Со ова само се потврдува дека УСЕ е една од најактивните и најодговорни ученички заедници не само во градот туку и во државата а исто така на училишно ниво најзаслужната во делот на покренување на ученички иницијативи.

5. Заклучок

Постоењето, функционирањето, бројните активности кои ги превзема УСЕ несомнено е од огромно значење во подигањето на сообраќајната култура и свест посебно меѓу младата популација како и во помагањето на регулирањето на сообраќајот во градот.

За тоа колкав е нивниот придонес и успех во делот на работните задачи потврда се многубројните признанија кои ги добиле учениците од страна на релевантните институции од градот. Како мотив во нивните напори несебично како логистика стои училиштето и училишниот менаџмент, пред се одговорните наставници. За нивниот целокупен ангажман на денот на одбележувањето на Патрониот празник на училиштето редовно добиваат благодарници а сите нивни активности благовремено се објавуваат на WEB страната на училиштето како и на FB профилот од училиштето. За сите нивни активности информираат и локалните медиуми со што оваа единица добива на популарност и значење меѓу месното население.

Вреди да се истакне дека оваа единица има своја препознатливост и одржливост а потврда за тоа се учениците кои низ годините посебно се истакнале во нејзината работа и веќе имаат работен ангажман во ПС. Прилеп, некои од нив работат во поедини шпедициски сектори како и во техничките прегледи на автомобили кои постојат во градот.

И понатаму училиштето, менаџментот, Локалната заедница ќе ја помагаат оваа единица во сите нивни наредни ангажмани и активности, затоа што она што го оценуваме како добро и корисно треба да го негуваме и одржуваме.



6. Користена литература:

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2. Web страна, ricko.edu.mk
3. ОВР - Битола
4. ПС. Прилеп
5. Закон за безбедност на сообраќајот на патиштата „Службен весник на СРМ“ бр 21/84
6. <https://www.zenitprilep.com.mk>

The role of the Traffic School Unit in raising traffic culture

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Abstract: The main goal of this paper is to emphasize the importance of the involvement of students from the Department of Traffic, Transportation and Storage within the work and activities of the school traffic unit as an independent student community in the school.

Through this paper, we appreciate that we will explain the possibilities for contributing to raising awareness, especially of the culture in traffic and increasing the interest of students in following the teaching contents and programs, especially from the vocational subjects within this Sector, as well as attracting students in enrollment in the following years due to the sharing of previous good practices and experiences. The emphasis will be placed on the role, meaning, need, ways of functioning of this independent student community, as well as the benefits that the Department of Traffic, Transport and Storage, the school in general and the local community have since its existence.

Our predictions and expectations are that if this student community continues to operate in the future, the attractiveness and interest of elementary school students for enrollment in this sector and the two qualifications in it will increase again. First of all, through the participation of students in this student community - a single opportunity for our students to get involved in projects like this one, which will be discussed in the paper, the quality of the teaching in this sector will be greatly improved, we will be recognizable in the local community and we will have better quality, more satisfied, more fulfilled students.

Keywords: Traffic school unit, traffic culture, increased awareness, role, tasks, activities.



1. INTRODUCTION

In "Riste Risteski-Ricko" secondary school, since 2006, the realization of teaching and curricula of the then Traffic profession with one profile, Technician for transport and forwarding, began. At the very beginning, the interest in enrolling in this profession was huge, but with limited opportunities due to the fact that only 1 class with a total number of students, 34, was approved. Two other subject teachers joined as well, so that in 2010 their number amounted to a total of 3. Exactly in that year, for the first time, at a working meeting at the level of Professional Assets, the idea of establishing the School Traffic Unit arose.

At the very beginning, the role and significance of this unit was not sufficiently affirmed, it started somewhat timidly with modest activities and with the involvement of a so-called very small number of students. We were not sufficiently informed about the existence and role of the same so-called employees, it simply acted as a separate, nothing was ever noted about her activities in the preparation of the annual program.

Due to the growing interest in enrolling in this profession, its activity expanded in 2013 when another profile was opened in the school, that of Road Traffic Technician. With that, the number of subject professors in vocational subjects increased as well as the number of enrolled students, with a maximum number of enrolled students totaling 34 in a profile.

This was a moment of increasing the motivation among the teachers themselves to get a little more involved in the work and functioning of the School Traffic Unit, for its complete formulation, formalization and giving meaning to what will be undertaken as activities within its functioning.

The students' interest in taking a permanent part in its membership and undertaking various activities was growing.

In order to achieve quality in its work, second, third and fourth year students were delegated.

About how the work is organized, what are the goals, tasks, activities, the role of this school unit, first of all, in the part of raising the traffic culture in the community will be discussed below in this paper.

2. Formation of the Traffic school unit, criteria for membership in the unit

In the academic year 2010/11, at the first working meeting, subject teachers from the asset, among other points, focused on the establishment of the School Traffic Unit, but also on what will be its role, goals, tasks and, above all, on the basis of which criteria will be formed the same.

As a school that supports the policies of inclusiveness in teaching according to the National Strategy, the teachers took the position that there will not be any discriminatory treatment in the selection of students who will be members of it. Accordingly, they agreed that the unit would be heterogeneous, which implies the participation of students of different genders, nationalities,

students who come from different socio-economic backgrounds. However, certain criteria had to be set on the basis of which the selection would be made, and they were the following:

1. Above all, students should be responsible in teaching;
2. To have exemplary behavior;
3. Students who have competitive characteristics in the learning process;
4. Students who know how to respect rules and take responsibility;
5. Students who throughout their schooling did not violate the House Rules and the Code of Conduct of the school;
6. Students who selflessly share good student practices with each other;
7. Students who really have a desire to expand their knowledge, skills, competencies, strengthen through a series of other activities that will mainly take place outside the school.
8. Submitted motivational letter based on which it will be determined what are the motives from their point of view, according to how they see the functioning of the unit and their participation in it.
9. To be students from II to IV year;
10. That they have no pedagogic measures imposed and no disciplinary procedures are conducted against them.

The only way through which the teachers could introduce the students to this initiative was in the lessons of vocational subjects themselves, where they were verbally informed about the initiative for the formation of the school unit, who can take part and what are the conditions to become a member of it.

The teachers were pleasantly surprised by the great interest shown by the students, however, the selection was made based on the above criteria. The first members of the school unit were selected in a transparent manner, a total of 20 students from II to IV years who were so-called icebreakers in the attempt. as young people to contribute to raising the traffic culture in the community, especially among young people, students from primary and secondary education.

The Republic Council for Traffic and Road Safety was also aware of the existence of the school unit, from which it received full support in its activities.

The formation and functioning of the school traffic unit represents a step forward towards the advancement of traffic prevention action. The benefits of having a school traffic unit are multiple. Namely, on the one hand, they will represent support in the work of the traffic police in the area of traffic management and control, on the other hand, they will act preventively in the direction of informing, educating and raising public awareness for responsible participation in

traffic, as well as the school traffic unit it will also mean practical education and improvement of the knowledge and capacities of students, primarily from primary and secondary schools.

The students who are members from the second, third and fourth year also fulfill the conditions stipulated by the Rulebook for the organization, training and way of working of the school traffic units.

Of course, their work and functioning are always taken care of by subject teachers of professional subjects who share ideas, motivate and encourage ideas to come from them, promote student initiatives, share ideas, discuss, debate what they think would be most expediently to be undertaken as an activity in a given place and time.

What may have been an omission and a weak point at the very beginning is that the unit functioned without having a pre-prepared action plan for work, it was not noted in the Annual Program for the work of the school, it simply functioned spontaneously and the actions undertaken were not so systematically implemented and thought out, but still to be welcomed was their every attempt.

3. Role, goals, tasks and activities of the School Traffic Unit

With the expansion of the Traffic asset with the rest of the teaching staff in professional subjects, the list of ideas for the work and functioning of the school unit was expanded, after which the very moment demanded that it get a more formal character, so two responsible teachers were chosen to lead and coordinate it through all activities, started with the preparation of an action plan with activities that was included in the Annual Program for the work of the school, so that in some way everyone had the opportunity to become more familiar with the role, goals and tasks of the unit.

The main goal that was set before the school unit was the following:

To raise traffic awareness and improve traffic culture among road users in the city of Prilep.

In principle, the intention is, through a series of actions, to raise the culture and ethics among citizens for responsible participation in traffic, but also to encourage the local population to be actively involved in social processes for creating a society with a high level of traffic culture and increasing safety in traffic as the highest social value.

For the existence of the unit, two aspects and benefits that will be obtained from its promotion are significant. The first is the traffic aspect, which includes reducing traffic congestion, increasing traffic safety, and reducing the number of traffic accidents. The second is the educational aspect, where the younger population will be educated about traffic rules and culture.

One of the goals is greater education of children and their active participation in efforts to create a safe environment for movement. In the first place, the School Traffic Unit will be focused on creating safe school zones, and further they will participate in other activities with the aim of safer traffic.

Namely, the members of the School Traffic Units with the representatives of the Ministry of Internal Affairs participate in activities to regulate the traffic and warn the irresponsible traffic participants, their task is to act preventively and educate the traffic participants about the consequences of irresponsible traffic participation.

The members of the school traffic unit are recognizably dressed in orange vests on which the name "School Traffic Unit" is written, in addition to the clothes, they are also equipped with all the necessary requisites for regulating traffic in situations where they will undertake activities undertaken by regulating traffic.

In principle, the main role and tasks of the School Traffic Unit are the following:

- Prevention;
- Promotion of the acquired knowledge in the area of professional subjects before the Local Community;
- Raising the traffic culture among the population;
- Promotion of the profession before the local community;
- Participation in changing the traffic regime in the city;
- Assistance in regulating traffic in the city (once to twice a year);
- Maintenance of student traffic lights;
- Conducting educational workshops among elementary school students on the topic of rules, regulations, traffic behavior and fostering a proper traffic culture;
- Conducting knowledge testing related to general rules and traffic behavior of elementary school students;
- Conducting surveys among the local population, the first on the topic "Detection of problems and omissions in the traffic infrastructure and the organization of traffic in the city", the second on the topic "The degree of satisfaction among the population with the organization of urban transport in the city";
- Creation and distribution of educational material among the local population with useful information for raising awareness and traffic culture;

In addition to the above-mentioned tasks and activities that this responsible school community has before it, it is recognizable in the school and more widely in the city and settlements for the numerous humanitarian actions that have been carried out on the initiative of its members over the years and have warmed many hearts. These initiatives appeared in the role of organizing numerous cultural and entertainment activities in which numerous young people from the city and populated areas took part, which we are especially proud of as a school, and precisely in addition to its existence and activities, we are one of the most recognizable on the map in the city in the area of humanitarian actions and cultural and entertainment activities.

4.Current specific activities of the School Traffic Unit

The beginnings of the Traffic school unit were modest, insufficiently affirmed both in the school and in the local environment. This was due to the lack of knowledge of everything that the unit should take as an action, how to function in order for it to grow into a unit after two to three years. which the school became most recognizable through the multitude of actions that were

undertaken and implemented by it in the area of raising traffic culture and awareness among the local population, especially among young people, and was also more than active in the area of assistance in the regulation of city traffic.

Among the many activities that we will list below, we would single out the regular activities that we carried out and are related to international and national traffic days, such as:

- September 16-22 – European Mobility Week
- May 7-13 – UN Road Safety Week
- September 21 – European day without victims on the roads
- September 22 – Day without cars
- June 3 – Bicycle Day
- second and ninth months – Bike to work day
- May 11 – Day of Culture in Traffic

After a previous agreement, good coordination by the subject teachers who zealously helped the work of the unit in all the mentioned actions, the unit showed readiness, knowledge, skills to deal with all challenges. For their overall commitment, they were regularly praised by the local media, which they became even more popular among the local environment.

In addition to these actions to mark international and national traffic days, the unit stood out in the numerous actions that resulted from their initiative, which is a successful example and practice in the area of student initiatives.

Within the educational domain, the unit held numerous workshops for students from primary schools where the emphasis was placed on the behavior of students in traffic, recognition and respect for traffic signs. and drivers of various motor vehicles). In order to have more weight with their own logistics, traffic policemen as well as subject teachers helped.

Once again, an educational workshop was conducted for elementary school students, which was about ignorance, lack of culture, disobeying the rules and regulations in traffic that cost lost human lives.

In front of the elementary school students within our school, a "Student traffic light" or popularly called training ground was conducted where, according to certain rules under the supervision of the School Unit, the students had to successfully pass it.

In cooperation with competent persons from the Ministry of Internal Affairs of Bitola, department for prevention, the school community took part in the implementation of an educational workshop for school students on the topic of prevention in traffic, prevention of the use of psychotropic substances, narcotics, alcohol.

The school unit, in cooperation with police officers from the Prilep Police Department, within the framework of the day of traffic culture as well as in cooperation with the technical inspection station, carried out a preventive activity to raise and improve the traffic culture for safer traffic and

reduce the number of traffic accidents. For this purpose educational material-fliers were distributed to the drivers in the municipality of Prilep.

In the part of continuous activities, USE in cooperation with RSBSP as well as employees from SVR Bitola carried out preventive activities in the area of Bitola municipality within the campaign "Put on a seat belt" and "Don't use a mobile phone while driving". For this purpose, educational material with suitable content was distributed to the drivers, and at the same time, through direct communication, the possible side effects and traffic accidents related to both topics were pointed out to them.

No less important is the engagement of USE within the framework of traffic regulation in the city. In the context of that, we would mention the several activities in which the traffic in the city was regulated with selfless participation and commitment.

On the days when bicycle races were held with massive participation of cyclists in the city, the traffic regime changed and then USE took a responsible position helping to keep them flawless and showed great professionalism.

For the event "All on a bike", there was once again the involvement of USE, which unselfishly provided the path intended for bicycle traffic on the route Prilep - village of Konjari.

Traditionally, for several years in a row, the "We run" event is held in the city, a sports event, an athletic race of 5 and 10 km for a duration of 3 hours, in which a large number of professionals and recreational people take part. For the successful implementation of the same, which is under supervision at the police station in Prilep, students who are members of USE were equally taken care of. In all previous races, they successfully secured the entire route that was planned for holding the race.

In the city, at the end of August, a motorcycle parade is regularly held when the traffic regime has changed again, and for this purpose, in addition to the traffic police at the Prilep police station, at their request, the USE is involved with the task of taking care of the changed traffic and the diversion of drivers and pedestrians to other directions.

Of no less importance are the numerous humanitarian actions that were implemented and successfully implemented at the municipal level precisely at the initiative of USE. In this way, on several occasions, money was collected for the treatment of children, clothes for socially-endangered families, parties were organized, the money collected from which helped endangered families, food and clothes were bought, as well as the action to collect money with which some of the Christmas packages were bought for the children from the settlements.

This only confirms that USE is one of the most active and responsible student communities not only in the city but also in the country, and also at the school level, the most deserving in terms of initiating student initiatives.

5. Conclusion

The existence, functioning, numerous activities undertaken by USE is undoubtedly of great importance in raising the traffic culture and awareness, especially among the young population, as well as in helping the regulation of traffic in the city.

Their contribution and success in the field of work tasks is confirmed by the numerous recognitions that the students received from the relevant institutions of the city. The school and the school management, above all the responsible teachers, stand as a motive in their efforts selflessly as logistics. For their overall engagement on the day of the celebration of the school's patron saint, they regularly receive thank you notes and all their activities are promptly published on the school's WEB page as well as on the school's FB profile. The local media also inform about all their activities, which makes this unit gain popularity and importance among the local population.

It is worth pointing out that this unit has its own recognition and sustainability, and this is confirmed by the students who have particularly excelled in its work over the years and already have a work engagement in PS. Prilep, some of them work in individual forwarding sectors as well as in the technical inspections of cars that exist in the city.

In the future, the school, the management, the local community will help this unit in all their subsequent engagements and activities, because what we evaluate as good and useful should be nurtured and maintained.



6. References:

1. Republican Council for Traffic and Road Safety
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IMPLEMENTACIJA BATERIJSKIH I HIBRIDNIH VLAKOVA NA PRUGMA HŽ-A

Sažetak:

U svrhu poboljšanja regionalne povezanosti i mobilnosti, a istodobno osiguranja učinkovitijeg i kvalitetnijeg željezničkog prijevoza putnika željeznicom HŽPP je započeo s nabavom novih vlakova. Nabava novih vlakova obuhvaća samo zamjenu dijela voznog parka koji se koristi za sadašnju organizaciju prometa. Predmet nabave je baterijski elektromotorni vlak (BEMV), baterijski motorni vlak (BMV) sa punionicama za punjenje baterija.

Novi motorni vlakovi moraju udovoljavati tehničkim specifikacijama za interoperabilnost u skladu sa odredbama Zakona o sigurnosti i interoperabilnosti željezničkog sustava (NN 63/20) te se usklađenost s TSI-jevima mora održavati kroz cijelo vrijeme njihove uporabe a utvrđeni su u odgovarajućim TSI-jevima koji su na snazi za strukturne podsustave: građevinski podsustav, elektroenergetski podsustav te na funkcionalnim podsustavima: odvijanje i upravljanje prometom, održavanje i telematske aplikacije za putnički promet.

U ovom radu iznijeti ćemo stanje postojećeg voznog parka HŽPP-a, plan i prijedlog modernizacije voznog parka HŽPP-a, navesti postojeće pogonske tehnologije te analizirati prototip BEMV i BMV vlaka kao i stabilne energetske priključke za punjenje

Ključne riječi: vozni park, pogonske tehnologije, baterijski elektromotorni vlak (BEMV), baterijski motorni vlak (BMV), punionica baterije, elektrificirana pruga, neelektrificirana pruga, izmjenični sustav vuče, pogonske baterije

1. ANALIZA POSTOJEĆEG VOZNOG PARKA HŽPP-a

Hrvatske željeznice (HŽ) osnovane su 1990. godine nakon raspada Jugoslovenskih željeznica (JŽ). Od tog razdoblja vozni park je s vremenom moderniziran no potrebno ga je i dalje modernizirati i obnavljati.

HŽ Putnički prijevoz danas raspolaže sljedećim voznim parkom u kojeg ubrajamo lokomotive HŽPP-a, dizel motorne vlakove HŽPP-a i elektromotorne vlakove HŽPP-a čije brojčano stanje je prikazano u sljedećim tablicama.

Lokomotive HŽPP-a

Vrsta vozila	Manevarska lokomotiva na dizel pogon	Dizel lokomotive	Električna lokomotive	Električna lokomotive
	2 132	2 044	1 141	1 142
Serijska				
U prometu od	1969.	1981.	1980. (1996.)	1983.
Životni vijek	50	39	40	47
Brzina (km/h)	30/60	120	140	160
Ukupno inventarskih vozila u 2023.	10	14	21	15
Ukupno aktivnih vozila u 2023.	10	14	18	15

Izvor: HŽPP

Dizel motorni vlakovi HŽPP-a

Vrsta vozila	DMV	DMV	DMV	DMV	DMV
	7 121	7 122	7 123	7 022	7 023
Serijska					
U prometu od	1981.	1979.	2004.	2012.	2016.
Životni vijek	44	33	45	40	40
Brzina (km/h)	120	130	160	160	120
Ukupno inventarskih vozila u 2023.	29	34	8	1	5
Ukupno aktivnih vozila u 2023.	28	32	6	1	5

Izvor: HŽPP

Elektromotorni vlakovi HŽPP-a

Vrsta vozila	EMV	EMV za regionalni promet	EMV za gradsko-prigradski	EMV za gradsko-prigradski	EMV za regionalni promet
	6 111	6 112 0xx	6 112 1xx	6 112 2xx	6 112 3xx
Serijska					
U prometu od	1977.	2011.	2011.	2023.	2023.
Životni vijek	44	40	40	40	40
Brzina (km/h)	120	160	160	160	160
Ukupno inventarskih vozila u 2023.	21	48			
Ukupno aktivnih vozila u 2023.	16	48			

Izvor: HŽPP

2. PLAN I PRIJEDLOG MODERNIZACIJE VOZNOG PARKA HŽPP

Kako bi se poboljšala regionalna i međugradska povezanost, a samim tim osigurao i učinkovitiji prijevoz putnika na mreži pruga HŽ-a potrebno je modernizirati vozni park i ponuditi korisnicima prijevoza nove usluge i novu organizaciju prijevoza.

Neki od prijedloga vezanih uz ponudu novih prijevoznih usluga korisnicima i unaprjeđenje postojećih usluga su: vlakovi za prijevoz automobila, parkiranje automobila, prijevoz bicikala, prijevoz prtljage, noćni vlakovi, program vjernosti, usluge za vrijeme putovanja, prodaja karata i upravljanje cijenama.

Operativni plan za novu organizaciju prometa bi obuhvaćao međugradske, regionalne i lokalne linije, ponuda opisa scenarija voznog reda i mogućnosti povezivanja i poboljšanje voznog reda (učestalost vlakova na pojedinim linijama). Također je potrebno planirati i nabavu novih vlakova.

3. ANALIZA POGONSKIH TEHNOLOGIJA

U željezničkom prometu koristi se više pogonskih tehnologija. Gledano kroz povijest jedna od prvih tehnologija koja naravno više nije u komercijalnoj uporabi je parni pogon. Zadnjih desetak godina razvoj pogonskih tehnologija usmjeren je prvenstveno k ekološkom aspektu odnosno smanjenju emisija stakleničkih plinova.

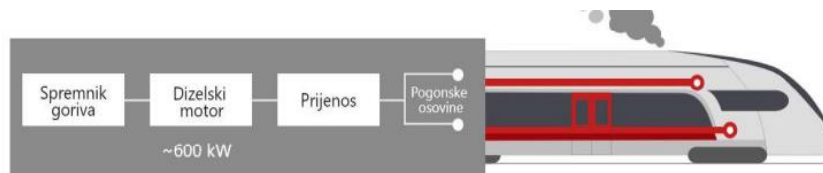
Ukratko ćemo opisati tehničke karakteristike pojedinih vrsta pogonskih tehnologija koje možemo podijeliti na:

3.1.DIZELSKI POGON

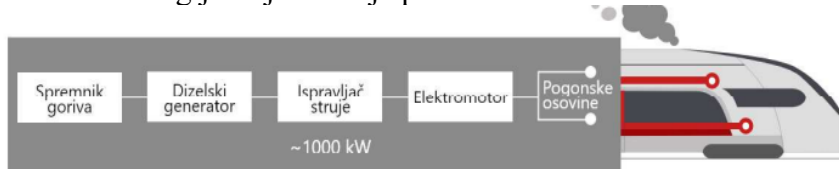
Dizelski pogon najčešće se koristi kod putničkih vlakova koji prometuju na neelektrificiranim prugama HŽ-a.

Postoje tri načina prijenosa snage između dizelskog motora i pogonske osovine, pa možemo razlikovati:

- dizel-mehanički pogon i dizel-hidraulični pogon – snaga se prenosi iz dizelskog motora preko mjenjača i osovine izravno na pogonsko vratilo.



- b. dizel- električni pogon - dizelski motor spojen je na glavni generator koji pretvara mehaničku snagu u električnu energiju koja se dalje prenosi na vučne motore.



Prednost dizelskog pogona očituje se u tome što ne zahtijeva elektrifikaciju pruge i ima domet do 1 000 km. Glavni nedostatak je u proizvodnji stakleničkih plinova i zahtijeva izgradnju punionica.

3.2.ELEKTRIČNI POGON

Elektromotorni vlak pokreće se uz pomoć elektromotora koji se napajaju električnom energijom iz kontaktne mreže preko pantografa lokomotive ili motornog vlaka.

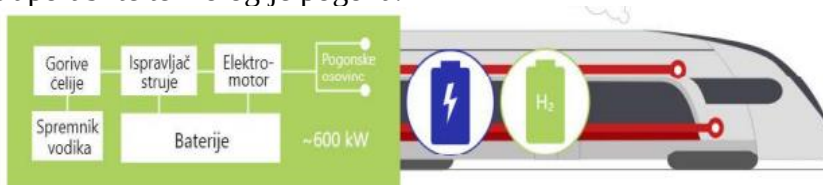
Energija koja se koristi je pod naponom od 25 KV i 50 HZ.



Prednost uporabe električnog pogona očituje se u tome što se on koristi na svim elektrificiranim prugama pri čemu ne zahtijeva punionicu gorivom i ne proizvodi stakleničke plinove. Glavni nedostatak je u tome što je potrebna elektrifikacija pruge.

3.3. POGON NA VODIK

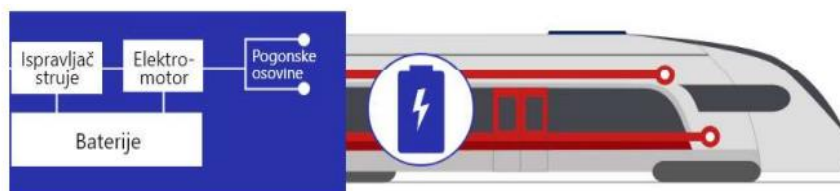
Prednost korištenja vlakova na pogon vodikom očituje se u mogućnosti primjene tih valova na neelektrificiranom dijelu pruga mreže Hrvatskih željeznica. Smanjenje stakleničkih plinova daje dodatnu prednost uporabi te tehnologije pogona.



Proizvođač Siemens Mobility započeo je proizvodnju svojih vlakova na pogon vodikom modela Mireo Plus H koji se trenutno testira u Francuskoj, Njemačkoj i Austriji.

3.4. POGON NA BATERIJE

HŽPP će biti dio projekta kojim će se razviti vlak pogonjen na baterije.

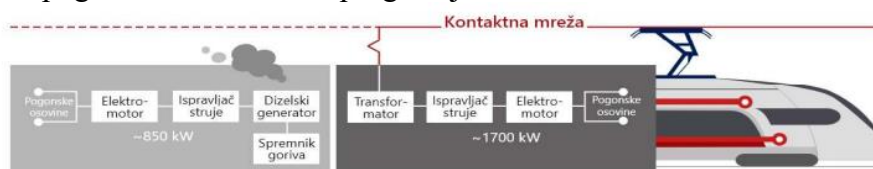


BMV odnosno baterijski motorni vlak nema ugrađen pantograf i zbog toga ne može koristiti kontaktnu mrežu kao izvor napajanja električnom energijom. Tu vrstu vlakova planira se implementirati na prugama koje nisu dio elektrificirane mreže. U tom slučaju BMV vlakovi bi se punili putem punionica u početnoj i završnoj stanici prometovanja.

3.5. HIBRIDNI POGON

Hibridni pogon pokretanja vozila može biti izveden u nekoliko kombinacija:

- vodik-električni pogon – vlak koristi pogon vodikom na neelektrificiranom dijelu željezničke pruge, akada se vozilo vrati na elektrificirani dio mreže, može se prebaciti u električni način rada pri čemu ga istovremeno koristi i za punjenje. Domet kretanja je do 700 km i cijela elektrificirana mreža pruga.
- dizelsko-električni pogon – na dijelovima gdje je željeznička pruga neelektrificirana koristi se dizelski pogon, a na dionicama pruge koje su elektrificirane koristi se električni pogon



- dizelsko-baterijski pogon – dizelski motor proizvodi energiju i puni bateriju. Nakon što se dizel motor isključi, vlak nastavlja kretanje korištenjem električne energije iz baterije. Prednost se očituje u smanjenju potrošnje goriva.
- baterijsko-električni pogon - ti vlakovi imaju ugrađenu dodatnu litij-ionsku bateriju koja se puni putem pantografa napajanjem iz kontaktne mreže. Stajanjem na elektrificiranim postajama kao i kretanjem elektrificiranom mrežom vlak se puni i pokreće elektromotore. Prednost ove vrste napajanja očituje se u kretanju tih vlakova elektrificiranom i neelektrificiranom mrežom željezničkih pruga bez emisije štetnih plinova.

4. PLAN I RASPODJELA POGONSKIH SUSTAVA NA PRUGAMA HRVATSKIH ŽELJEZNICA

Tehnologija vodikovog i baterijskog pogona još uvijek se razvija, te je potrebno procijeniti njihov stupanj razvoja u trenutku nabavke novih valkova.

Baterijsko-električni vlak može se navesti kao rješenje na cijeloj mreži pruga, ali treba uzeti u obzir njegov domet na neelektrificiranim prugama.

Raspodjela EMV-a Izvor:Eys

Raspodjela BEMV-a Izvor:Eys

Max. Brzina (bat/kv): 120/160 km/h
Aku baterije energija/masa: 633 kWh/6t
Autonomija: cca. 80 km

TEHNIČKE KARAKTERISTIKE

Niskopodna garnitura, s upravljačnicama na oba kraja garniture, automatskim kvačilom za spajanje na oba čela sa mogućnošću spajanja u višestruki sastav i upravljanjem 3 garniture MV iste serije sa jednog upravljačkog mjesta u smjeru vožnje.

Nazivni napon napajanja za BEMV iznosi 25 kV 50 Hz, sukladno EN 50163 ili jednakovrijedno.

Elektromagnetska kompatibilnost električne opreme i uređaja ugrađenih na vozilo moraju biti sukladna normama HRN EN 50121-3-1 ili jednakovrijedno i HRN EN 50121-3-2 ili jednakovrijedno.

Profil vlaka sukladan EN 15273 ili jednakovrijedno za prometovanje na prugama u Republici Hrvatskoj, osim na dionicama pruge za koje je to upravitelj infrastrukture odredio u Izvješću o mreži. Osovinski pritisak treba biti manji od 180 Kn.

Dužina BEMV preko kvačila treba biti maksimalno 60 m. Najveća visina BEMV sa spuštenim pantografom 4280 mm. Dužina BMV preko kvačila treba biti maksimalno 45 m. Širina sanduka sukladno EN15273:2016 ili jednakovrijedno.

Startno ubrzanje pod punim opterećenjem za BEMV (E mod) mora biti veće od 0,7 m/s², a za BEMV (B mod) i BMV mora biti veće od 0,5 m/s², pri nepovoljnim adhezijskim uvjetima ($\mu = 0,17$) startno ubrzanje mora biti veće od 0,5 m/s².

Ubrzanje pod punim opterećenjem od brzine 0 do 120 km/h mora biti za BEMV (E mod) za maksimalno 120 sekundi, za BEMV (B mod) za maksimalno 180 sekundi i za BMV za maksimalno 180 sekundi.

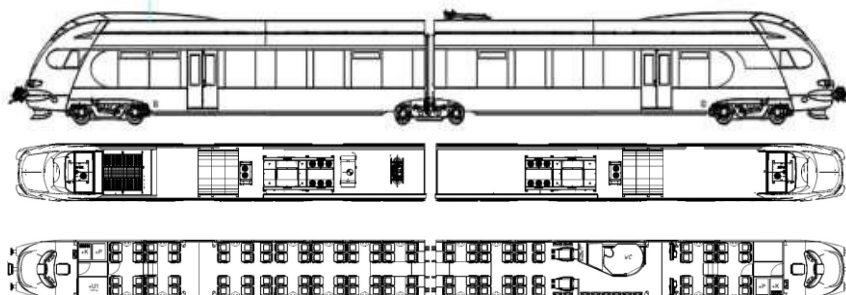
Glavni elektromotorni pogon BMV-a sastoji se od motorskog i baterijskog pretvarača te pogonskih baterija. Glavni elektromotorni pogon BEMV-a dodatno sadrži visokonaponsku opremu i mrežne pretvarače. Sustav pogonskih baterija sastoji od tri cjeline; baterijskih paketa, elektro-upravljačkog ormara te klimatizacijske jedinice.

Baterijski paketi sadrže baterijske članke, serijsko i/ili paralelnim kombinacijama međusobno povezane u jednu cjelinu te smještene u kućište s integriranim instalacijama za regulaciju temperature članaka. Također, unutar kućišta se može nalaziti i elektronička oprema, za nadzor i upravljanje radom baterija (BMS – Battery Management System).

Unutar električnog ormara nalazi se glavno mikroprocesorsko BMS računalo za nadzor i kontrolu rada baterija kao i energetske komponente za povezivanje svih baterijskih jedinica. Klimatizacijska (BTMS – Battery Thermal Management System) jedinica je zadužena za održavanje optimalne temperature baterija. Ovisno o konfiguraciji i izvedbi, na MV-ima se može nalaziti više baterijskih sustava ukupne energije preko 500 kWh.

Punjenje baterija BMV-a se odvija na dva načina, u vožnji rekuperacijom energije kočenja ili u stajanju preko stabilnih energetskih priključaka. Uz ovo već navedeno, BEMV dodatno ima mogućnost punjenja baterija priključenjem na visokonaponsku mrežu 25 kV 50 Hz.

4.2. BMV- BATERIJSKI MOTORNI VLAK



Dužina: 42 m

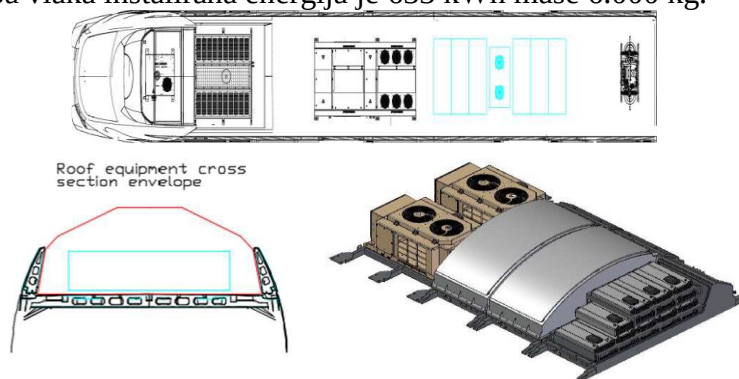
Masa: 86/102 t
Sjedeći/Ukupan broj putnika: 100/200
Snaga gl. pogona(kW): 600 kW
Max. brzina: 120 km/h
Aku baterije energija/masa: 633 kWh/6t
Autonomija: cca.100 km

4.3. POGONSKE BATERIJE NA BEMV I BMV

Pogonske baterije sa BMS i priključnom kutijom, na obje izvedbe vlakova, montiraju se na krovu vlaka.

Na svakoj strani vozila ugrađuju se tri paketa baterija od 105,6 kWh, dimenzija D x V x Š u mm 700 x 2150 x 774 mase oko 1.000 kg.

Na razini vozila na oba vlaka instalirana energija je 633 kWh mase 6.000 kg.



4.4. PUNJAČ BATERIJSKIH VLAKOVA

Stabilni punjači pogonskih baterija će biti izvedeni tako da se osigura optimalna napunjenost baterijskog paketa sa vremenom punjenja od maksimalno 30 min s ciljem povećanja životnog vijeka i same funkcionalnosti baterijskog sustava. Postavljanjem punjača za punjenje pogonskih baterija na lokacijama u Varaždinu, Bjelovaru, Virovitici, Osijeku, Splitu i Puli osiguravaju se uvjeti za promet baterijskih vlakova na velikoj većini neelektrificiranih pruga u Republici Hrvatskoj.

Referentna dionica za ocjenjivanje BEMV je Zabok – Varaždin (64,92 km), a za BMV je dionica Osijek – Strizivojna Vrpolje – Osijek (95,24 km) sa zaustavljanjima i obrtima prema voznom redu.

4.5. PUNIONICE

Za punjenje svojih ugrađenih baterijskih spremnika smještenih na krovu vlaka koriste novoizgrađenu željezničku infrastrukturu za punjenje. Riječ je o punionicama snage 1MW koje su prilagođene za punjenje vlakova. Dodatno, BEMV ima pantograf i može se napajati na dijelovima pruge koji su elektrificirani, bateriju na vlaku može puniti dok je spojen na kontakti vod.

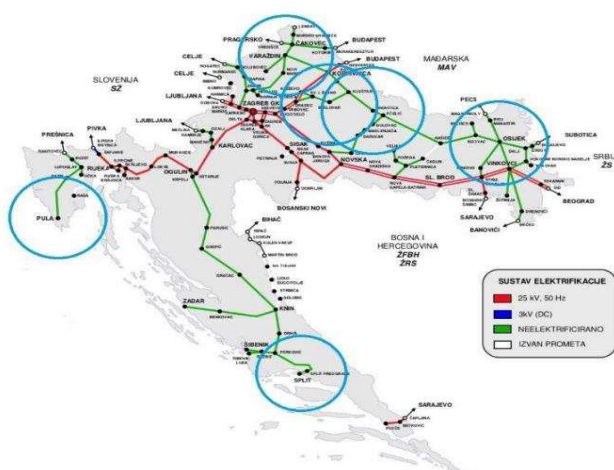
U ovom trenutku gradi se 6 punionica za baterijske vlakove na lokacijama Osijek, Virovitica, Bjelovar, Varaždin, Pula i Split koje se spajaju na srednje naponsku mrežu 10 ili 20 kV HEP-ODS-a i obavljaju transformaciju na odgovarajući niski napon te sadrže pretvaračke sklopove koji se sastoji od dva punjača, svaki nazivne snage 500 kW koji služi za punjenje pogonskih baterija vlaka.

Kako bi se povećala mogućnost uporabe baterijskih vlakova, u planu je izgradnja dodatnih punionica u Lupoglavu i Velikoj. Identična punionica planirana je ovim projektom u kolodvoru Kotoriba. Nove tri punionice moraju biti kompatibilne sa postojećima (odnosno punionicama koje se sada grade) u

smislu načina priključenja na vlakove. Pri tom se misli i na fizičku izvedbu priključka i na komunikacijski protokol između punionice i vlaka. Također zbog unificiranja infrastrukture i obuke osoblja za rukovanje punionicama, potrebno je da nove punionice imaju jednaku proceduru uključenja i isključenja punjenja, odnosno jednaki protokol punjenja.

Nove bi punionice dakle bile hibridne punionice koje bi uz priključak na elektroenergetsku mrežu te bi imale i vlastitu proizvodnju i skladištenje električne energije.

4.6. LOKACIJE PUNJAČA BATERIJSKIH VOZILA



Literatura

1. Baterijski elektromotorni vlak (BEMV) i baterijski motorni vlak (BMV) Za HŽ putnički prijevoz sa priključcima za punjene pogonskih baterija-Specifikacija tehničkih zahtjeva, Zagreb: 30.08.2022.-HŽPP
2. Elektrodizelski motorni vlak za daljinski promet- Specifikacija tehničkih zahtjeva, Zagreb: ožujak 2024.-HŽPP



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THE IMPLEMENTATION OF BATTERY AND HYBRID TRAINS ON HŽ RAILWAYS

SUMMARY

HŽPP have begun the aquisition of new trains in order to improve regional connection and mobility and, at the same time, enable more efficient and higher quality railway passenger transport. The aquisition of new trains implies only the replacement of a part of railway fleet which is used for current traffic organisation. The objective of this aquisition is the battery electric multiple unit vehicle (BEMV), battery multiple units vehicle (BMV) with charging stations for batteries recharge.

New multiple units trains have to meet technical specifications for interoperability in accordance with the regulations of the Safety and Interoperability of the Railway System Law (NN 63/20) and the conformity with TSI-s must be maintained throughout the period of their use. They are determined by particular TSI-s which are in force for structural subsystems: construction subsystem, electric-power subsystem and for functional subsystems: operating and traffic control, maintenance and telematic applications for the passenger transport.

This paper will be the analysis of the existent rolling stock of railway vehicles in HŽPP, will lay out the plan and proposal of the modernisation of the HŽPP roling stock of railway vehicles. We will also specify the existent power technologies and analyse the prototype of BEMV and BMV train as well as stable energy charging connectors.

Key words: *rolling stock of railway vehicles, driving technologies, battery electric multiple unit vehicle (BEMV), battery multiple units vehicle (BMV), battery charging unit, electrified railway, non-electrified railway, the alternate system of traction, power batteries*

1. THE ANALYSIS OF THE EXISTENT ROLLING STOCK OF RAILWAY VEHICLES IN HŽPP

Croatian Railways (HŽ) was founded in 1990, after the disintegration of Yugoslav Railways (JŽ). Since then, the rolling stock of railway vehicles has gradually been modernized, but it requires further modernization and renewal.

The passenger transport on HŽ has the following rolling stock: the HŽPP locomotives, HŽPP diesel multiple units, and HŽPP electric multiple units trains and their number is shown in the following charts.

HŽPP locomotives

Vrsta vozila	Manevarska lokomotiva na dizel pogon	Dizel lokomotive	Električna lokomotive	Električna lokomotive
	2 132	2 044	1 141	1 142
Serijska				
U prometu od	1969.	1981.	1980. (1996.)	1983.
Životni vijek	50	39	40	47
Brzina (km/h)	30/60	120	140	160
Ukupno inventarskih vozila u 2023.	10	14	21	15
Ukupno aktivnih vozila u 2023.	10	14	18	15

Source HŽPP

HŽPP Diesel multiple units trains

Vrsta vozila	DMV	DMV	DMV	DMV	DMV
	7 121	7 122	7 123	7 022	7 023
Serijska					
U prometu od	1981.	1979.	2004.	2012.	2016.
Životni vijek	44	33	45	40	40
Brzina (km/h)	120	130	160	160	120
Ukupno inventarskih vozila u 2023.	29	34	8	1	5
Ukupno aktivnih vozila u 2023.	28	32	6	1	5

Source HŽPP

HŽPP electric multiple units trains

Vrsta vozila	EMV	EMV za regionalni promet	EMV za gradsko-prigradski	EMV za gradsko-prigradski	EMV za regionalni promet
	6 111	6 112 0xx	6 112 1xx	6 112 2xx	6 112 3xx
Serijska					
U prometu od	1977.	2011.	2011.	2023.	2023.
Životni vijek	44	40	40	40	40
Brzina (km/h)	120	160	160	160	160
Ukupno inventarskih vozila u 2023.	21	48			
Ukupno aktivnih vozila u 2023.	16	48			

Source HŽPP

2. THE PLAN AND PROPOSAL OF THE MODERNISATION OF THE HŽPP ROLLING STOCK OF RAILWAY VEHICLES

The improvement of regional and intercity connectivity and, at the same time the possibility of more efficient passenger transport on the HŽ railway network, requires the modernisation of the rolling stock, new services offered to the users of such type of transport, and a new organisation of the transport.

Some of the proposals connected to the offer of new transport services to the users and the improvement of existent services are: the trains for car transport, car parks, the transport of bicycles, the transport of luggage, night trains, loyalty programme, the services during travel, ticket sale and the management of the fares.

The operational plan of the new traffic organisation would comprise intercity, regional and local lines, the offer of the description of timetable scenario and the possibility of connection and improvement of the timetable (the frequency of trains on particular lines). It is also necessary to plan the acquisition of new trains.

3. THE ANALYSIS OF POWER TECHNOLOGIES

Railway transport uses a number of power technologies. Historically, one of the first technologies which, naturally, is not in commercial use any more, is steam power. The recent development of power technologies has been directed to ecological aspect, that is, to the reduction of greenhouse gases emission.

We will shortly outline technical characteristics of several types of power technologies which can be divided into:

3.1.DIESEL DRIVE

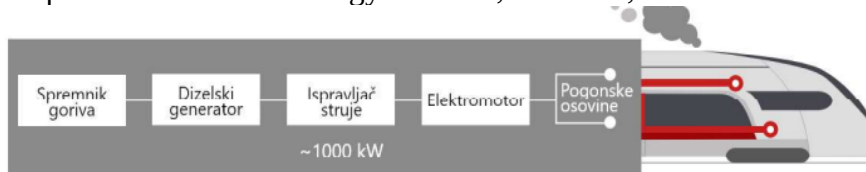
Diesel drive is mostly used in passenger trains which run along non-electrified HŽ railways.

There are three ways of power transmission between diesel engine and drive axis, so there are:

- a. diesel-mechanical drive and diesel-hydraulic drive – the power is transmitted from the diesel engine via gears and the axis directly to the driveshaft.



- b. diesel electric drive – diesel engine is connected to the main generator which transforms mechanical power into electric energy which is, after that, transmitted to the drive engines.



The advantage of the diesel drive is in the fact that it does not require electrification of the railway line and has a range of about 1000 km. The major disadvantage is its emission of greenhouse gases and the necessity of oil-filling stations.

3.2.ELECTRIC DRIVE

Electric multiple unit train is driven by electromotor which is powered by the energy from the contact network over the locomotive or electric multiple unit train pantograph.

The energy used is of 25 KV and 50 HZ voltage.



The advantage of electric drive can be seen in the fact that it is used on every electrified railway. What is more, does not require charging station and does not create greenhouse gases. The major disadvantage is the necessity of the railway electrification.

3.3. HYDROGEN DRIVE

The advantage of the hydrogen driven trains use is manifested in the possibility that such trains can be used on non-electrified parts of the Croatian Railways railway network. The reduction of greenhouse gases emission gives additional advantage to the use of such driving technology.



The manufacturer Siemens Mobility has begun the construction of their hydrogen driven trains of the model MireoPlus H which is presently being tested in France, Germany and Austria.

3.4.BATTERY DRIVE

HŽŽP will be a part of the project which will develop battery driven train.



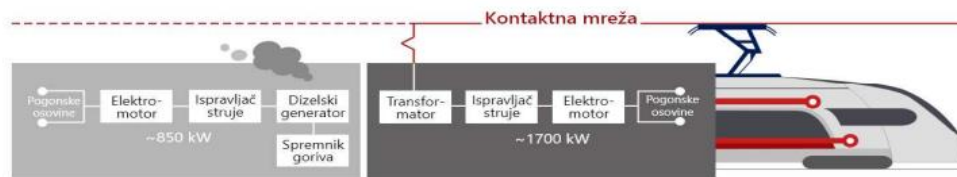
BMV or battery multiple units vehicle has no built-in pantograph and, for this reason, can not use the contact network as its source of energy. This type of trains is going to be implemented on the railway lines which are not the part of the electrified network. In such a case, BMV trains would be charged at the charging stations at the points of train's departure and arrival.

3. 5.HYBRID DRIVE

Hybrid drive of the vehicles can be carried out in a few combinations:

- hydrogen-electric drive – the train used hydrogen drive on the non-electrified part of the railway line and, when the vehicle returns to the electrified part, it can be shifted to electric mode also using this electricity for charging. Its movement range is up to 700 km and the entire electrified railway network.

- b. Diesel-electric drive – diesel drive is used on the parts where the railway is not electrified, and electric drive on its electrified sections.



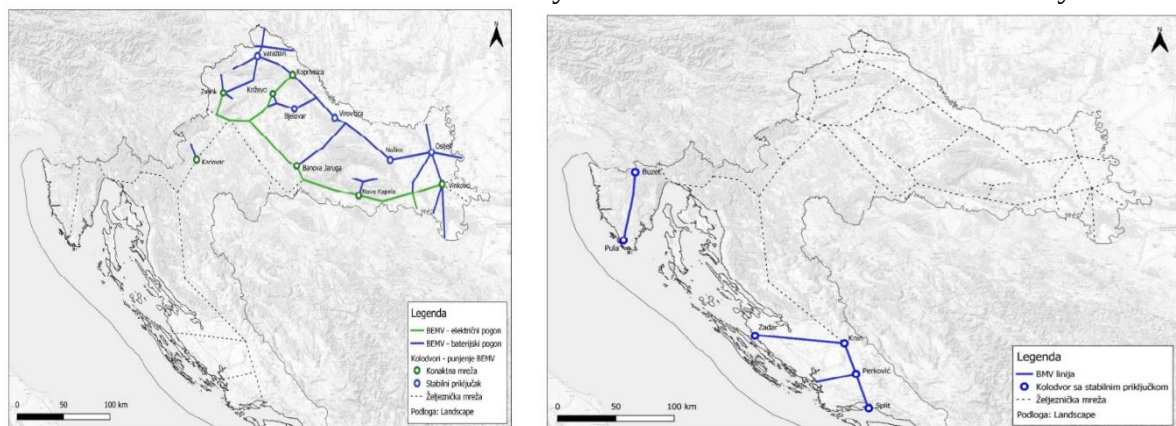
- c. diesel-battery drive – diesel engine creates energy and charges the battery. After the diesel engine is turned off, the train continues its movement using the electric energy from the battery. Its advantage is manifested in reduced fuel consumption.
- d. Battery-electric drive – such trains have an additional built-in lithium-ion battery which is charged via pantograph by supplying from the contact network. The train is charged while stopping or moving along the electrified railway lines and this energy drives the electromotors. The advantage of such kind of energy supply is seen in the usage of those trains on both electrified and non-electrified railway network without harmful gases emission.

4. THE PLAN AND ALLOCATION OF DRIVE SYSTEMS ON CROATIAN RAILWAYS NETWORK

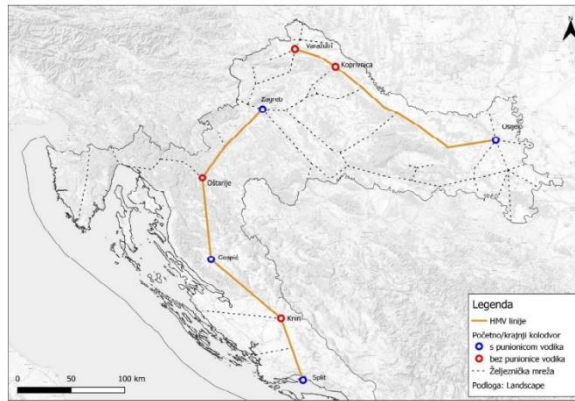
The technologies of hydrogen and battery drive are still at their infancy, so it is important to determine the degree or their development at the time when trains are purchased.

Battery-electric train can be chosen as a solution for the entire railway network but what should not be forgotten is its range on the non-electrified lines.

The allocation of EMV-a Source:Eys The allocation of BEMV-a Source:Eys



The allocation of BMV-a Source:Eys



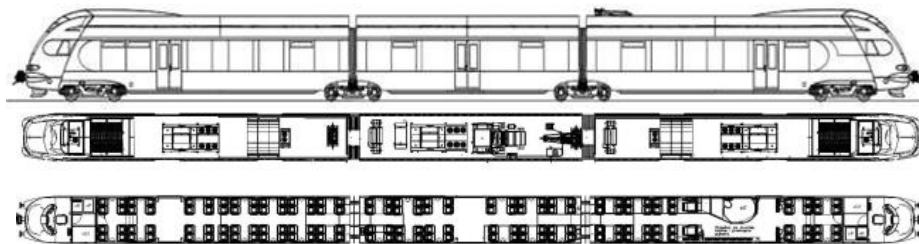
The allocation of HVM-a Source:Eys

4.1. BEMV - BATTERY ELECTRIC MULTIPLE UNIT VEHICLE

Battery electric multiple unit vehicle (BEMV) will be used for passenger transport on both non-electrified and electrified railway network in RH (The Republic of Croatia) which employ alternate 25kV, 50Hz (AC) current system of electric drive. On the non-electrified railway network drive is performed by in-built drive batteries, while the electrified one uses a traditional system of supply via pantograph.

Drive batteries can be charged from the contact line or by stable energy units for drive batteries charging.

Battery electric multiple unit vehicle (BEMV) is a three-part multiple unit train used for passenger transport on both electrified and non-electrified section of the railway in The Republic of Croatia.



Length: 56,2 m
 Mass: 113/141 t
 Sitting/Total number of passengers: 150/300
 The strength of the main drive (bat/kv): 600/1200 kW
 Max. speed (bat/kv): 120/160 km/h
 Acu. of the battery energy/mass: 633 kWh/6t
 Authonomy: app. 80 km

TECHNICAL CHARACTERISTICS

Low-floor train set, with control desks on both sides of the set, automatic clutch for connecting on two fronts with the possibility of connecting into multiple composition and with control over 3 sets MV of the same series from one control points in the direction of train movement.

Nominal voltage for BEMV is 25kV, 50 Hz in accordance with EN 50163, or it is the voltage of the same value.

The electromagnetic compatibility of electrical gear and equipment built into the vehicle has to be in accordance with the norms of HRN EN 50121-3-1 or of the same value, and HRN EN 50121-3-2 or of the same value.

The profile of the train should be in accordance with EN 15273 or of the same value for travelling along the railways in The Republic of Croatia, except for the sections of the railway which are

excluded by the infrastructure manager's Report on the Network. Axis pressure must not exceed 180 Kn.

The length of BEMV over the clutch should be 45 m maximum. The top height of BEMV with lowered pantograph is 4280 mm. The length of BMV over the clutch should be 45 m. The width of the crate is in accordance with EN 15273 or of the same value.

The initial acceleration under full load for BEMV (E mod) must be over $0,7 \text{ m/s}^2$, and for BEMV (B mod) and BMV, it must be over $0,5 \text{ m/s}^2$. Under some more unfavourable adhesive conditions (0-0,17) the initial acceleration has to exceed $0,5 \text{ m/s}^2$.

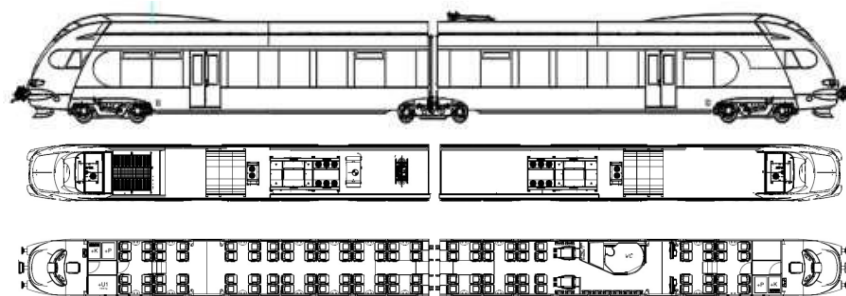
The initial acceleration for undef full load from the speed of 0 to 120 km/h has to be maximum 120 seconds for BEMV (E mod), while for BEMV (B mod) and BMV it has to be 180 seconds maximum. The main electromotor drive of BMV consists of a motor and battery converter and power batteries. The main electromotor drive of BEMV additionally consists of high voltage gear and network converters. The system of power batteries consists of three units: battery packages, electro-controlled cabinets and air-conditioning unit.

Battery packages consist of battery cells, connected in series or in parallel combinations, interconnected into one unit and placed inside a case with integrated installations for cells temperature regulation. Inside the casing there can also be electronic equipment for surveillance and control of batteries' function (BMS – Battery Management System)

Inside the electric cabinet there is a main microprocessing BMS computer for surveillance and control of batteries function as well as energy components for the connection of all battery units. Air-conditioning (BTMS-Battery Thermal Management Syste) unit is responsible for the maintenance of optimal battery temperature. Depending on configuration and design MV-s can contain several battery systems of 500 kW maximum.

Charging of BMV bateries is done in two ways, in movement by the regeneration of brake energy, or during stand from energy connectors. Together with already mentioned elements, BEMV has an additional possibility of battery charging via high-voltage network of 25kV 50 Hz.

4.2. BMV – BATTERY MULTIPLE UNITS VEHICLE



Length: 42 m

Mass: 86/102 t

Sitting/Total number of passengers: 100/200

Power of main drive (kW): 600 kW

Max. speed: 120 km/h

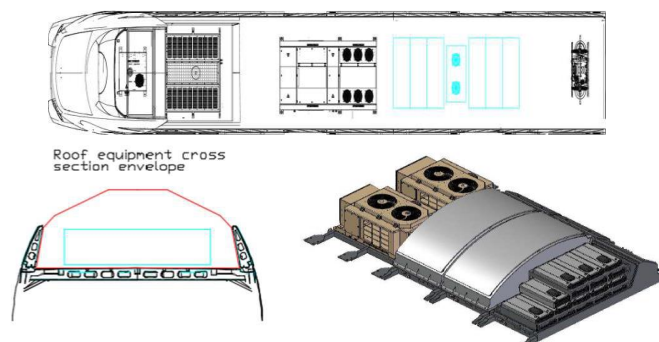
Acu batteries energy/mass: 633 kWh/6t

Authonomy: app.100 km

4.3. DRIVING BATTERIES ON BEMV AND BMV

Driving batteries with BMS and connection box, in both train designs, are mounted on the train roof. On both sides of the vehicle three packages of batteries of 105,6 kWh, size L x H x W in mm x 2150 x 774 with mass of about 1000 kg are mounted.

The installed energy on the vehicle level of both trains is 633kWh, with the mass of 6000 kg.



4.4. THE CHARGER OF BATTERY TRAINS

Stable chargers of drive batteries will be designed in a way which ensures optimal battery package state of charge with the 30 minutes of charging maximum and with the aim of increasing their life cycle and the functionality of battery system itself. By installing drive battery chargers on the locations of Varaždin, Bjelovar, Virovitica, Osijek, Split and Pula the conditions for battery trains traffic on the majority of non-electrified railway lines in The Republic of Croatia are fulfilled.

The referet BEMV assessment section is Zabok – Varaždin (64,92 km), and for BMV it is the section Osijek – Strizivojna Vrpolje – Osijek (95,24 km) including stops and changes according to the timetable.

4.5. CHARGING STATIONS

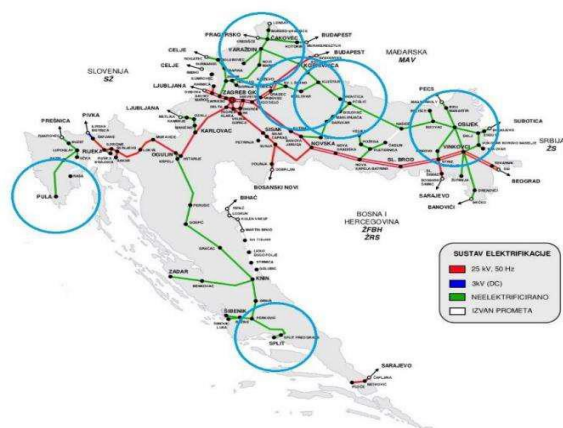
Battery trains use a newly constructed railway charging infrastructure for charging of their embedded battery storage units situated on the roof. Those are charging stations of 1MW which are adapted to charging of trains. Additionally, BEMV has a pantograph and can be charged on the electrified railway sections. The train battery can be charged while the train is connected to the contact line.

At the moment 6 charging stations for battery trains on the locations of Osijek, Virovitica, Bjelovar, Varaždin, Pula and Split are being built. They will be connected to medium voltage network 10 or 20 HEP-ODS and transform this voltage to an appropriate low voltage. Their converting assembly contains two chargers, each of nominal power of 500 kW which is used for charging drive batteries of the train.

In order to increase the possibility of battery trains usage, the construction of additional charging stations in Lupoglav and Velika is planned. The identical charging station on the railway station in Kotoriba is also a part of this project. Those three new charging stations should be compatible with the existent ones (or the ones that are being built) in the way they are connected to the trains. Saying that, we imply the design of the connector and the communication protocol between a charging station and a train. What is more, because of the unification of infrastructure and the training of the staff responsible for charging stations handling, it is vital that those new charging stations have the same procedure of activation and deactivation of charging, that is, the same charging protocol.

New charging stations would, therefore, be hybrid charging stations which, apart from the connection to the grid, would have their own production and storage of electric energy.

4.6. THE LOCATIONS OF BATTERY VEHICLES CHARGERS



Sources:

1. Baterijski elektromotorni vlak (BEMV) i baterijski motorni vlak (BMV) Za HŽ putnički prijevoz sa priključcima za punjene pogonskih baterija-Specifikacija tehničkih zahtjeva, Zagreb: 30.08.2022.-HŽPP
2. Elektrodizelski motorni vlak za daljinski promet- Specifikacija tehničkih zahtjeva, Zagreb: ožujak 2024.-HŽPP



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MOBILNOST V MESTNI OBČINI CELJE

POVZETEK

V Mestni občini Celje že od leta 2018 mobilnost izvajajo glede na načela trajnostne mobilnosti. Občina ima izdelano Celostno prometno strategijo, ki je v Mestni občini uvedla trajnostni potniški promet, možnost izposoje javnih koles ter postavila pešce in kolesarje na prvo mesto v mikro mobilnosti. Poleg trajnostne mobilnosti pa se občina ponaša z naslovom »Invalidom prijazna občina«, kar želimo preveriti s študijo primera. Invalidnosti poznamo več vrst, prispevek se osredotoča na slepe in slabovidne skupine.

Ključne besede: mobilnost, Mestna občina Celje, invalidi.

1 UVOD

Mestna jedra so ključna za zagotavljanje osnovnih delavnosti posameznikov. V mesto se odpravimo kadar potrebujemo zdravnika, ko urejamo zadeve na upravni enoti, si želimo izposoditi knjigo v knjižnici, obiskati muzej in še marsikaj drugega. Mestna središča morajo biti dostopna vsem posameznikom, ne glede na ovire pri mobilnosti, ki jih imajo. Vedno več je posameznikov, ki imajo določene potrebe oziroma težave pri mobilnosti. Ali jim je omogočena alternativa pri dostopu v mestno središče, ali lahko potujejo trajnostno, ali je mestna infrastruktura prilagojena takšnim osebam? Vsa ta vprašanja so ključna pri zagotavljanju mobilnosti slepih in slabovidnih.

2 MOBILNOST

Mobilnost predstavlja zadovoljevanje potreb posameznikov po opravljanju osnovnih, vsakodnevnih nalogah, kjer je potrebno premagovati razdalje. Ključni cilj mobilnosti je, da bi s pomočjo logistike omogočili transport ljudi in blaga in bi s tem zagotovili večjo zanesljivost, varnost in prilagodljivost. Ob zavedanju problema, ki ga mobilnost posameznikov in blaga povzroča okolju, se moramo osredotočiti na trajnostno mobilnost, katere namen je zmanjšati ogljični izpust in porabo fosilnih goriv. Zavedamo se, da se število ljudi skozi leta večja, kar pomeni, da bo vedno želja in potreba po povečanju celotne infrastrukture. Da bi ta bila učinkovita in funkcionalna, bomo morali imeti v mislih sodobne, trajnostne in učinkovitejše sisteme za transport blaga in potnikov, poleg arhitekture hiš in ostalih objektov.¹

Mobilnost se nenehno razvija, a to ne pomeni le spremembe v transportu za iskanje okolju prijaznejše alternative za zmanjšanje onesnaževanja, kot so uporaba alternativnih goriv, alternativnih pogonov, pobuda k nakupu električnih transportnih sredstev in tako dalje, ampak tudi v mišljenju posameznikov.²

2. 1 TRAJNOSTNA MOBILNOST V CELJU

Zavedamo se, da je globalno segrevanje ozračja postalo velik problem v okolju v katerem živimo. Želimo si najti trajnostne rešitve s katerim bi zagotovili čim manjše poseganje v naravo. Ko govorimo o emisijah toplogrednih plinov najprej pomislimo na promet. Prav s tega vidika je potrebno ukrepati in to na trajnostni način. V Celju se problema onesnaževanje okolja dobro zavedamo, a sprememba ne vključuje le možnosti dostopa trajnostne mobilnosti ampak tudi spremembo potovalnih navad posameznikov. To v praksi pomeni, da se po opravkih, če je možno odpravimo peš, z javnim prevozom, s kolesom ali pa drugimi alternativnimi oblikami trajnostne mobilnost.

V Celju so z različnimi projekti na področju trajnostne mobilnosti naredili velik korak naprej. Ključni med projekti je predvsem izdelava Celostne prometne strategije Mestne občine Celje, ki opredeljuje mestno mobilnost in poudarja vidik trajnostni. S tem so zagotovili bolj zdravo, prijetno in kvalitetnejše okolje za življenje in delo. Med ukrepi trajnostne mobilnosti so sistem izposoje javnih koles – kolesCE, uvedba mestnega potniškega prometa na stisnjen zemeljski plin (metan) – CELEBUS ter povečano število električnih polnilnih postaj.

Mestna občina Celje vsako leto izvaja Evropski teden mobilnosti med 16. in 22. septembrom. V tem času je središče vsem razen dostavi zaprto, na glavnem trgu se izvajajo razne delavnice, ki ozaveščajo o problemih polucije, ki jo ustvarjajo promet in podnebne sprememb. Poleg vseh aktivnosti se v tednu trajnostne mobilnosti promovira uporaba javnega mestnega prometa. V ta namen je možna brezplačna vožnja s CELEBUSOM.³

2.2 CELOSTNA PROMETNA STRATEGIJA MESTNE OBČINE CELJE

Ministrstvo za infrastrukturo ima ključno vlogo pri sofinanciranju Celostnih prometnih strategij posameznih mestnih občin. V letu 2016 je Mestna občina Celje prejela Sklep o izbiri in odobritvi sredstev sofinanciranja s strani Ministrstva za infrastrukturo. Sledila je izdelava Celotne prometne strategije Mestne občine Celje, ki ga je s postopkom javnega naročila izvedelo podjetje Savaprojekt, d. d., iz Krškega.⁴

¹ Povzeto po: Mobilnost, transport in logistika – (ijs.si), dostop: 25. 5. 2024

² Povzeto po: Mobilnost 2023 – Mobilnost 2023 (dpc.si), dostop: 25. 5. 2024

³ Povzeto po: Trajnosten mobilnost v Mestni občini Celje, dostop: 27. 5. 2024

⁴ Povzeto po: <https://moc.celje.si/projekti/4666-celostna-prometna-strategija-mestne-obcine-celje>, dostopno: 24. 5. 2024

Celostna prometna strategija Mestne občine Celje je temeljila na analizi obstoječega stanja, in konstruktivnega vključevanja vseh deležnikov, ki oblikujejo mestno mobilnost. Javnost je bila v izvedbo strategije vključena preko javnih debat, delavnic, intervjujev in anket. Strategija zajema več vidikov delovanja Mestnega središča Celja: od ključnih vplivov na zdravje prebivalcev do prometne varnosti. Strategija vključuje več različnih scenarijev, ki predvidevajo trend rasti cestnega prometa, povečano količino pešačenja in kolesarjenja, dajo večji poudarek na uporabo in investicije v javni potniški promet, ter upoštevajo ravnovesje trajnostnega prometa. V Mestni občini Celje so se tako na podlagi možnih scenarijev odločili za celostne pristop k urejanju mobilnosti prebivalcev. V to je vključeno pet prometnih področij: hoja, kolesarjenje, javni potniški promet, optimizacija motornega prometa ter trajnostno načrtovanje in ozaveščanje.

Prav prvo od petih področij (hoja), je ključno za mobilnost slepih in slabovidnih. Po navedbah podatkov iz Celostne prometne strategije Mestne občine Celje je kar 16 % Celjanov invalidov, kamor prištevamo tudi slepe in slabovidne osebe. Celje naj bi s pomočjo izvedbe izboljšav obstoječe infrastrukture predvsem povečalo varnost pešcev, zlasti v smislu povečanja dostopnosti za gibalno ovirane osebe ter povečanja površin za pešce. Tako z vidika številčnosti kot tudi ustreznosti peš površin.⁵

3 SLEPI IN SLABOVIDNI

Slepota in slabovidnost predstavljata kompleksen in raznolik niz stanj, katera lahko močno vplivajo na delovanje posameznika, saj naj bi človek z vidom v živo dojel okoli 80 % vseh informacij. Nista zgolj fizični stanji, ampak imata tudi globok družbeni in psihološki vpliv na posameznika ter okolico. Posamezniki, ki se soočajo s temi problemi oz. izzivi, se soočajo s številnimi ovirami in omejitvami, ki vplivajo na njegovo sposobnost za samostojno življenje, izobraževanje, zaposlitev in socialno vključenost. Prav tako so v šolskem učnem procesu informacije posredovane vizualno. Po vseh podatkih Svetovne zdravstvene organizacije je po svetu več kot 285 milijonov ljudi, ki trpijo zaradi oblike slabovidnosti ali slepote.⁶

Glede na ovire s katerimi se slepi in slabovidni srečujejo vsakodnevno, je bistvenega pomena, da tem osebam omogočimo lažje vključevanje v vsakodnevno življenje, katerega pomemben vidik je tudi mobilnost. Slepí in slabovidni ljudje so posamezniki, ki imajo težave z vidom, ki lahko vplivajo na njihovo sposobnost normalnega delovanja v vsakdanjem življenju. Razlika med slepoto in slabovidnostjo je lahko stopnja in vrsta okvare vida. Svetovna zdravstvena organizacija podaja naslednjo definicijo slepote in slabovidnosti, ki velja prav tako v Sloveniji:

SLABOVIDNOST:

1. kategorija: osebe, ki imajo na boljšem očesu s korekcijo ali brez nje od 6/18 do 6/60, vidne ostrine oziroma ostanka vida;

⁵ Povzeto po: https://moc.celje.si/images/Projekti_v_teku/CPS/publikacija-CPS-CE-low-res.pdf, dostopno: 23. 5. 2024

⁶ Povzeto po: Drago Žagar, Ljubljana 2012, Drugačni učenci

2. kategorija: osebe, ki imajo na boljšem očesu s korekcijo ali brez nje od 6/60 do 3/60, vidne ostrine oziroma ostanka vida.

SLEPOTA:

3. kategorija: vidna ostrina manj od 0,05 (prsti na 3 metre) do 0,02 (prsti na 1,5 metra) ali zoženo vidno polje okrog fiksacijske točke na 5 – 10 stopinj, ne glede na ostrino vida;

4. kategorija: vidna ostrina manj od 0,02 (prsti 1,5 na metra) od zaznavanja svetlobe ali zoženost vidnega polja okrog fiksacijske točke do 5 stopinj, ne glede na ostrino vida;

5. kategorija: slepota.

Slabovidna je tudi oseba, ki ima na boljšem očesu zoženo vidno polje okrog fiksacijske točke od 20 do 5 stopinj, ne glede na ostanek ostrine vida. Slep pa je tudi oseba, ki ima na boljšem očesu zoženo vidno polje okrog fiksacijske točke 5 stopinj in manj, ne glede na ostanek ostrine vida. Vendar pa je pomembno opozoriti, da se definicije slepote in slabovidnosti lahko razlikujejo med državami in organizacijami. Nekateri države imajo določene standarde ali kriterije za opredelitev slepote in slabovidnosti glede na vidno ostrino ali druge klinične parametre.

4 ŠTUDIJA PRIMERA

Za lažje razumevanje mobilnosti slepih in slabovidnih smo se odločili izvesti študijo primera, kje smo s slabovidno osebo opravili mobilnost po Mestni občini Celje. Za pomoč pri izvedbi študije primera smo prosili profesorja Valentina Punčoha, ki je na šoli zaposlen kot pomočnik ravnateljice, drugače je profesor nemškega jezika. Mobilnost smo izvedli, 26. 10. 2023. Ob 8. uri smo se s profesorjem sestali na dvorišču šole. Odpravili smo se na krožni obhod Mestne občine Celje, kjer smo kljub temu, da naš sprehod ni bil zelo obsežen, opazili kar nekaj težav.

Pot smo začeli pred šolo (lokacija Ljubljanska cesta 17), kjer je pred odhodom najprej sestavil svojo belo palico, ki mu pomaga pri zaznavanju okolice. Povedal je, da mu drugače pri hoji po mestu pomagata žena ali njegov asistent, ampak ker je zbolel, se je tisti dan zanašal samo na belo palico. Že po nekaj metrih hoje je naletel na prvo oviro. Ta se je nahajala pri večstanovanjski hiši. Ob pločniku raste živa meja in okrasno grmičevje, ki pa ni bilo dobro obrezano in so veje segale nad pločnik, kar je za njega predstavljalo oviro, ki je ni videl, zato se je vanjo zaletel. Pot smo nadaljevali po pločniku Ljubljanske ceste proti baru Vrtnica do prehoda za pešce, kjer nam je razložil, da mu je v pomoč pri



zaznavanju okolice klančina za kolesarje, po kateri se orientira. Pri prečkanju ceste mu je v veliko pomoč naprava, ki oddaja zvočni signal. Na njej se nahaja gumb, na katerem je vgravirana puščica, ki mu pove smer prehoda. Nadaljevali smo naravnost po Gregorčičevi ulici do zdravstvenega doma. Tam nam je omenil, da mu težavo predstavljajo tudi komunalni jaški oziroma njihovi pokrovi saj so velikokrat hrpavi ali malce dvignjeni ali slabo nameščeni, kar povzroči, da se palica zatakne.

Slika 1: Prehod za pešce.

Vir: Lasten.

Slika 2: Komunalen jašek.

Vir: Lasten.

Slika 3: Zvočna signalizacija.

Vir: Lasten

Na poti smo se ustavili tudi v zdravstvenem domu, da bi preverili kako je dostopen. Ugotovili smo, da tam ni imel večjih težav, vendar so bili zaposleni nepripravljeni, ko jih je zaprosil za pomoč.

Po Levstikovi ulici smo prišli do prehoda za pešce, ki je obarvan modro, kar mu kot slabovidni osebi pomaga, saj to barvo lahko vidi. Malo naprej pa je prehod, ki je črna točka za slepe, ker nima nobene svetlobne ali zvočne signalizacije in je za slepe osebe neprehoden oziroma ga lahko prečkajo samo s spremljevalcem.



Slika 4: Barvno označen prehod za pešce.

Vir: Lasten



Slika 5: Barvno neoznačen prehod za pešce.

Vir: Lasten

Prišli smo do glavne avtobusne postaje v Celju. Najprej smo opazili, da če bi potoval sam, bi to zanj zagotovo predstavljalo težavo, saj na avtobusni postaji ni nobene oznake, ki bi mu bila v pomoč. Na prodajnem okencu smo se pozanimali, če nudijo pomoč slepi osebi (ali jo pospremijo do postajališča in ji pomagajo vstopiti na avtobus). Prodajalka na prodajnem okencu je bila zelo prijazna, povedala nam je željene informacije in nam ponudila pomoč, da nas pospremi do avtobusa. Tudi voznik avtobusa je bil prijazen. Povedal nam je, kam pelje avtobus in ponudil pomoč pri vstopu. Zahvalili smo se za sodelovanje in odšli naprej.

Od avtobusne postaje po Aškerčevi ulici do železniške postaje so prehodi urejeni zato ni nobenih ovir. Železniška postaja je prilagojena za slepe, saj ima taktilne oznake, po katerih se orientirajo, da pridejo do željenega perona. Prav tako so prilagojeni tudi vlaki, ki imajo zvočne signale, kateri obvestijo potnike, da se približujejo postaji in kdaj naj izstopijo oziroma vstopijo v vlak. Ugotovili smo, da je aparat za nakup vozovnic za slepe neuporaben, saj nima brajeve pisave ali zvočne komunikacije.



Slika 6: Oznake na železniški postaji.

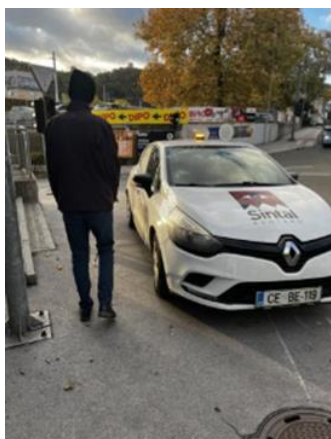
Vir: Lasten



Slika 7: Kartomat na železniški postaji.

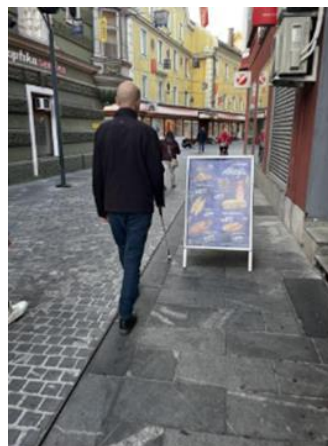
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Od železniške postaje smo prečkali cesto do Krekovega trga in se po mestnem centru sprehodili do trga Celjskih knezov. Tu je bilo kar nekaj ovir. Najprej nas je opozoril na tlakovan pod iz granitnih kock, ki ni raven in gladek, zato se palica večkrat zatakne. Zelo moteče so tudi reklamne table, katere trgovci ali gostinci postavijo na pločnike oziroma pred vhode. Opozoril nas je tudi na ne najvišjo kulturno raven ostalih pešcev, ki se ne umaknejo, ko pride do njih. V samem centru večkrat naleti na kakšen avto, ki tam ne bi smel biti parkiran, ker je to cona za pešce.



Slika 8: Nepravilno parkirano vozilo.

Vir: Lasten



Slika 9: Neprimerno postavljena reklamna tabla.

Vir: Lasten

Počasi smo se bližali koncu našega sprehoda. Proti šoli smo se vračali po Ljubljanski ulici, do bara Vrtnica in po Malgajevi ulici vse do šole. Razen manjših lukenj na pločniku ni bilo večjih težav, dokler se ni na Malgajevi ulici skoraj zaletel v prometni znak, ki je bil ob robu pločnika, postavljen prenizko.

Študija primera je pokazala, da je infrastruktura katero uporabljajo slepi in slabovidni na splošno urejena, vendar pa je še veliko manjših detajlov, ki bi jih bilo treba izboljšati in katere bi zelo olajšale gibanje slepim. Profesor je najbolj izpostavil prehod za pešce na Levstikovi ulici, ki ni signaliziran in zanj predstavlja veliko oviro. Prav tako je poudaril, da bi lahko uredili pločnike, saj so nekateri v slabem stanju, zelo moteče pa so tudi reklamne table pred lokali.

5 ZAKLJUČEK

Mobilnost je dejavnost, ki zelo vpliva na naša življenja. Omogoča nam opravljanje osnovnih nalog, kot so izobraževanje, delo, obisk kulturnih ustanov in aktivno sodelovanje v športu. Žal so slepi in slabovidni osebe, ki imajo težave z vidom in to vpliva na njihova vsakodnevna opravila. Ključna pa je njihova nezmožnost vida, kar vpliva na sodelovanje v prometu. Za osebo, ki je slepa in slabovidna predstavlja dejstvo, da se počuti varno in samozavestno v prostoru eden izmed dejavnikov, ki ji omogoča kvalitetno življenje, ki ga ostali jemljemo za samoumevno. Obstajajo enostavne rešitve, ki lahko slepi ali slabovidni osebi znatno olajšajo mobilnost, tako z vidika hoje kot tudi pri uporabi javnega potniškega prometa.

Študija primera je izpostavila kar nekaj neprilagojenih področij infrastrukture, kjer imajo slepi in slabovidni težave. Kot najbolj ključne, bi izpostavili pomankanje zvočnih signalov pri prehodih za pešce in neenotne talne površine (predstavlja osebi z belo palico velik izziv, saj se palica zatika in s tem oseba ne prepozna ali gre za oviro ali zgolj za spremembo podlage).

Pridobljeni podatki iz raziskave so pokazali, da je Mestna občina Celje slabo prilagojena potrebam slepih in slabovidnih v prometu. Torej tudi pri uporabi mobilnosti, na katero se zadnje čase v občini Celje daje velik poudarek. Zagotovo ni v celoti varna in ustrezna na vseh področjih. V prispevku smo prišli do spoznanja, da bi z enostavnimi rešitvami, kot so opremljenost prehodov za pešce z zvočnimi signali, obarvanje prehodov za pešce, odstranitev ali dodatna označba gostilniških miz ter stolov, odstranitev nepravilno parkiranih vozil, dodatkom taktilnih oznak na določenih mestih, znatno izboljšale mobilnost slepih in slabovidnih. To so rešitve, ki ne predstavljajo obremenjujočih posegov v celotno mobilnost mestnega središča Celja, saj ni potrebno v času popravil zapreti nobene ulice ali preurediti promet, bi pa znatno olajšali samo izkušnjo mobilnosti slepi in slabovidni osebi. Prav tako bi se le ta počutila varnejše in zagotovo bi ji s tovrstnimi dejavniki izboljšali samo kvaliteto življenja. Upamo, da bodo spoznanja vključene pri izboljšavi cestne infrastrukture znotraj Mestne občine Celje.

6 VIRI IN LITERATURA

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MOBILITY IN THE MUNICIPALITY OF CELJE

SUMMARY

In the Municipality of Celje, since 2018, mobility has been carried out according to the principles of sustainable mobility. The municipality has developed a comprehensive transport strategy, which introduced sustainable passenger transport in the municipality, the possibility of renting public bicycles and put pedestrians and cyclists first in micro-mobility. In addition to sustainable mobility, the municipality boasts the title "Disabled-friendly municipality", which we want to verify with a case study. We know several types of disabilities; the article focuses on the blind and partially sighted groups.

Keywords: mobility, Municipality of Celje, disabled people.

1 INTRODUCTION

City centers are key to ensuring the basic activities of individuals. We go to the city when we need a doctor, when we arrange matters at the administrative unit, want to borrow a book from the library, visit a museum and many other things. City centers must be accessible to all individuals, regardless of the mobility barriers they have. There are more and more individuals who have certain needs or problems with mobility. Are they provided with an alternative to access the city center, can they travel sustainably, is the city infrastructure adapted to such people? All these issues are crucial in ensuring the mobility of the blind and partially sighted.

2 MOBILITY

Mobility represents meeting the needs of individuals to perform basic, everyday tasks, where it is necessary to overcome distances. The key goal of mobility is to enable the transport of people and goods with the help of logistics, thereby ensuring greater reliability, safety and flexibility. Being aware of the problem that the mobility of individuals and goods causes to the environment, we must focus on sustainable mobility, the purpose of which is to reduce carbon emissions and the consumption of fossil fuels. We are aware that the number of people increases over the years, which means that there will always be a desire and a need to increase the entire infrastructure. For this to be

effective and functional, we will have to keep in mind modern, sustainable and more efficient systems for transporting goods and passengers, in addition to the architecture of houses and other buildings.⁷

Mobility is constantly evolving, but this does not only mean a change in transport to find a more environmentally friendly alternative to reduce pollution, such as the use of alternative fuels, alternative drives, the initiative to purchase electric means of transport and so on, but also in the thinking of individuals.⁸

2. 1 SUSTAINABLE MOBILITY IN THE DESTINATION

We are aware that global warming has become a major problem in the environment in which we live. We want to find sustainable solutions that would ensure as little interference with nature as possible. When we talk about greenhouse gas emissions, we first think of traffic. It is from this point of view that it is necessary to act in a sustainable manner. In Celje, we are aware of the problem of environmental pollution, but the change includes not only the possibility of access to sustainable mobility, but also a change in the travel habits of individuals. In practice, this means that, if possible, we go to events on foot, by public transport, by bicycle or other alternative forms of sustainable mobility.

In Celje, they took a big step forward permanent mobility, with various projects in the field of sustainable mobility. Key among the projects is the preparation of the Integrated Transport Strategy of the Municipality of Celje, which defines urban mobility and emphasizes the aspect of sustainability. With this, they ensured a healthier, more pleasant and better environment for living and working. Sustainable mobility measures include the public bicycle rental system - kolesCE, the introduction of urban passenger transport powered by compressed natural gas (methane) - CELEBUS, and an increased number of electric charging stations.

The municipality of Celje holds the European Mobility Week between September 16 and 22 every year. During this time, the center is closed to everything except for deliveries, and various workshops are held on the main square to raise awareness of the problems of pollution caused by traffic and climate change. In addition to all activities, the use of public urban transport is promoted during the week of sustainable mobility. For this purpose, a free CELEBUS ride is possible.⁹

2.2 COMPREHENSIVE TRANSPORT STRATEGY OF THE CITY MUNICIPALITY OF CELJE

The Ministry of Infrastructure plays a key role in co-financing the Integrated Transport Strategies of individual municipalities. In 2016, the Municipality of Celje received a decision on the selection and approval of co-financing funds from the Ministry of Infrastructure. This was followed by the creation

⁷ Taken from: Mobility, transport and logistics - (ijs.si), access: 25/05/2024

⁸ Taken from: Mobility 2023 – Mobility 2023 (dpc.si), dostop: 25. 5. 2024

⁹ Taken from: Sustainable mobility in the Municipality of Celje, access: 27. 5. 2024

of the entire transport strategy of the Municipality of Celje, which was carried out by the company Savaprojekt, d. d., from Krško.¹⁰

The integrated transport strategy of the Municipality of Celje was based on the analysis of the existing situation and the constructive involvement of all stakeholders who shape urban mobility. The public was involved in the implementation of the strategy through public debates, workshops, interviews and surveys. The strategy covers several aspects of the operation of the City Center of Celje: from key impacts on the health of residents to traffic safety. The strategy includes several different scenarios that foresee the growth trend of road traffic, increased amount of walking and cycling, place greater emphasis on the use and investments in public passenger transport and take into account the balance of sustainable transport. In the Municipality of Celje, based on possible scenarios, they decided on an integrated approach to regulating the mobility of residents. This includes five transport areas: walking, cycling, public passenger transport, motor traffic optimization and sustainable planning and awareness.

The first of the five areas (walking) is the key to the mobility of the blind and partially sighted. According to data from the Integrated Transport Strategy of the Municipality of Celje, as many as 16% of Celje residents are disabled, including blind and partially sighted people. With the help of improvements to the existing infrastructure, Celje should primarily increase the safety of pedestrians, especially in the sense of increasing accessibility for people with reduced mobility and increasing areas for pedestrians. Both in terms of the number and suitability of pedestrian areas.¹¹

3 BLIND AND VISUALLY IMPAIRED

Blindness and low vision represent a complex and diverse set of conditions that can have a strong impact on an individual's functioning, as a person with sight should perceive around 80% of all information. They are not only physical conditions, but also have a deep social and psychological impact on the individual and the environment. Individuals facing these problems or challenges, they face many obstacles and limitations that affect their ability to live independently, study, find employment and social inclusion. Also, in the school learning process, information is conveyed visually. According to all data from the World Health Organization, there are more than 285 million people worldwide who suffer from some form of low vision or blindness.

Given the obstacles that the blind and partially sighted face daily, it is essential to enable these people to integrate more easily into everyday life, an important aspect of which is mobility. Blind and partially sighted people are individuals who have vision problems that may affect their ability to function normally in everyday life. The difference between blindness and low vision can be the degree and type of visual impairment. The World Health Organization provides the following definition of blindness and low vision, which is also valid in Slovenia:

¹⁰ Retrieved from: <https://moc.celje.si/projekti/4666-celostna-prometna-strategija-mestne-obcine-celje>, accessed: 24 May 2024

¹¹ Adapted from: Drago Žagar, Ljubljana 2012, Different students.

PAIR OF VISION:

1st category: persons who have visual acuity or residual vision in the better eye with or without correction from 6/18 to 6/60;

2nd category: people who have visual acuity or residual vision in the better eye with or without correction from 6/60 to 3/60.

BLINDNESS:

3rd category: visual acuity less than 0.05 (fingers at 3 meters) to 0.02 (fingers at 1.5 meters) or narrowed field of vision around the fixation point to 5-10 degrees, regardless of visual acuity;

4th category: visual acuity less than 0.02 (fingers 1.5 per meter) from light detection or narrowing of the field of vision around the fixation point up to 5 degrees, regardless of visual acuity;

5th category: blindness.

A person who has a narrowed field of vision around the fixation point from 20 to 5 degrees in the better eye is also low-sighted, regardless of the residual visual acuity. A person who has a narrowed field of vision around the fixation point of 5 degrees or less in the better eye is also blind, regardless of residual visual acuity. However, it is important to note that definitions of blindness and low vision can vary between countries and organizations. Some countries have specific standards or criteria for defining blindness and low vision based on visual acuity or other clinical parameters.

4 CASE STUDY

To better understand the mobility of blind and partially sighted people, we decided to conduct a case study where we carried out mobility with a visually impaired person in the Municipality of Celje. For help in carrying out the case study, we asked Professor Valentin Punčoh, who is employed at the school as an assistant to the headmistress, otherwise he is a professor of the German language. We carried out the mobility on October 26, 2023. At 8 o'clock, we and the professor met in the school yard. We went on a circular tour of the Municipality of Celje, where even though our walk was not very extensive, we noticed quite a few problems.

We started the journey in front of the school (location Ljubljanska cesta 17), where before leaving, he first assembled his white stick, which helps him perceive his surroundings. He said that his wife or his assistant used to help him walk around the city, but because his assistant got sick that day he relied only on a white cane. After only a few meters of walking, he encountered the first obstacle. It was located at an apartment building. There is a hedge and ornamental shrubs growing along the sidewalk, but they were not well trimmed, and the branches were reaching over the sidewalk, which for him was an obstacle that he did not see, so he crashed into it. We continued along the sidewalk of Ljubljanska road towards the Vrtnica bar to the pedestrian crossing, where he explained to us that the ramp for cyclists, which he uses to orientate himself, helps him perceive the surroundings. When crossing the road, a device that emits a sound signal is of great help to him. It has a button with an engraved arrow that tells him the direction of the crossing. We continued straight along Gregorčičeva

Street to the health center. There, he mentioned to us that communal shaft or their covers are also a problem for him, as they are often rough or slightly raised or badly installed, which causes the white stick to get stuck.



Picture 1: Pedestrian crossing.

Source: Own.



Picture 2: Utility shaft.

Source: Own.



Picture 3: Sound signaling.

Source: Own.

On the way, we also stopped at the health center to check how accessible it is. We found that he had no major problems there, but the employees were unprepared when he asked them for help.

Along Levstikova Street, we reached the pedestrian crossing, which is coloured blue, which helps him as a visually impaired person, because he can see this colour. A little further on is the crossing, which is a black spot for the blind because it has no light or sound signalling and is impassable for blind people or they can only cross it with a companion.



Picture 4: Color-coded pedestrian crossing. color.

Source: Own.



Figure 5: Pedestrian crossing not marked in

Source: Own.

We arrived at the main bus station in Celje. First, we noticed that if he was traveling alone, this would be a problem for him, as there is no sign at the bus station to help him. We asked at the sales counter if they offer help to a blind person (or escort them to the bus stop and help them get on the bus). The saleswoman at the sales window was very friendly, she told us the information we wanted and offered to help us by escorting us to the bus. The bus driver was also friendly. He told us where the bus was going and offered to help us get on. We thanked them for their cooperation and moved on.

From the bus station along Aškerčeva Street to the railway station, the crossings are organized, so there are no obstacles. The railway station is adapted for the blind, as it has tactile markings to guide them to the desired platform. Trains that have sound signals that inform passengers that they are approaching the station and when to get off or get on the train are also adapted. We found that the ticketing machine for the blind is unusable as it does not have Braille or audio communication.



Picture: 6: Signs at the railway station.

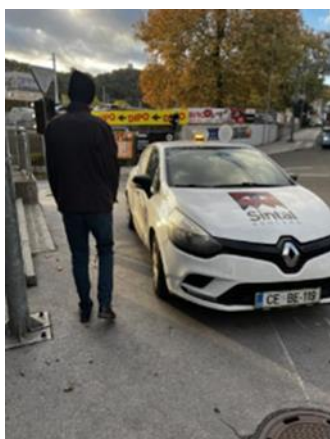
Source: Own.



Picture 7: Card machine at the train station.

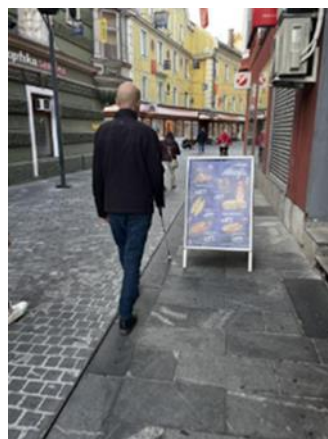
Source: Own.

From the railway station, we crossed the road to Krekov square and walked through the city center to Celjski knezov square. There were quite a few obstacles here. First, he warned us about the paved floor made of granite blocks, which is not level and smooth, therefore the white stick gets jammed repeatedly. Advertising boards placed by merchants or restaurateurs on sidewalks or in front of entrances are also very annoying. He also warned us about the lack of cultural of the other pedestrians, who do not retreat when he comes to them. In the center itself, he often encounters a car that should not be parked there, because it is a pedestrian zone.



Picture 8: Illegally parked vehicle.

Source: Own



Picture 9: Inappropriately placed advertising board.

Source: Own.

We were slowly approaching the end of our walk. We walked back to the school along Ljubljanska Street, to the Vrtnica bar and along Malgajeva Street all the way to the school. Apart from minor holes in the pavement, there were no major problems until he almost ran into a traffic sign on Malgajeva Street, which was placed too low at the edge of the pavement.

The case study showed that the infrastructure used by the blind and partially sighted is generally well organized, but there are still many small details that should be improved and that would greatly facilitate the movement of the blind. The professor singled out the pedestrian crossing on Levstikova Street, which is not signalized and represents a major obstacle for him. He also emphasized that the sidewalks could be improved, as some of them are in poor condition, and the advertising boards in front of the bars are also very disturbing.

5 CONCLUSION

Mobility is an activity that greatly affects our lives. It enables us to carry out basic tasks such as education, work, visiting cultural institutions and participation in sports. Unfortunately, there are blind and partially sighted people who have vision problems, and this affects their daily tasks. The key, however, is their inability to see, which affects participation in traffic. For a person who is blind and partially sighted, the fact that he feels safe and confident in the space is one of the factors that enables him to have a quality of life that the rest of us take for granted. There are simple solutions that can significantly facilitate the mobility of a blind or partially sighted person, both in terms of walking and when using public passenger transport.

The case study highlighted quite a few non-adapted areas of the infrastructure where the blind and partially sighted have problems. As the most important, we would point out the lack of sound signals at pedestrian crossings and uneven floor surfaces (it represents a great challenge for a person with a white stick, as the stick gets stuck and thus the person does not recognize whether it is an obstacle or just a change in the ground).

The data obtained from the case study showed that the Municipality of Celje is poorly adapted to the needs of the blind and partially sighted in traffic. So also, in the use of mobility, which has recently

been given great emphasis in the municipality of Celje. It is not completely safe and suitable in all areas. In the paper, we came to the realization that with simple solutions, such as equipping pedestrian crossings with sound signals, colouring pedestrian crossings, removing or additional marking of restaurant tables and chairs, removing improperly parked vehicles, adding tactile markings in certain places, would significantly improve the mobility of the blind and visually impaired. These are solutions that do not represent burdensome interventions in the overall mobility of the city center of Celje, as it is not necessary to close any streets or rearrange traffic during the repairs, but they would significantly facilitate the mobility experience of blind and partially sighted people. Also, only they would feel safer, and with such factors, their quality of life would certainly be improved. We hope that the findings will be included in the improvement of the road infrastructure within the Municipality of Celje.

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АВТОСООБРАКАЕН УЧИЛИШЕН ЦЕНТАР

“Боро Петрушевски” – на град Скопје



XIV Меѓународен симпозиум на тема:

INTERDISCIPLINARNOST NA LOGISTIKATA I SOOBRAKAJOT

03-5 октомври 2024

**-ВОЗАЧОТ ПРОФЕСИОНАЛЕЦ КАКО ДЕЛ ОД
ОБРАЗОВНИОТ СИСТЕМ ВО ЗЕМЈАТА И СТРАНСТВО-**

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Скопје, 2024

ВОВЕД

Причината од која се одлучивме да истражуваме за да ја пишувам и презентирам а со цел случувањата во ЕУ токму оваа тема е поради мојата почит и доверба во она што се нарекува систем – образовен систем. Можеби ќе звучам патетично со оглед на свесноста за нелогичности и деструкции во разни видови системи во државата и регионот, но имам оптимизам дека вистински решенија од областа на сообраќајот можат да стабилизираат системи (не мислам преабициозно на големите политички или државни системи, туку на оние помалите: семејство како систем во образованието, училиштето како систем за образование, државата како систем дел од образованието, меѓународна соработка со колегите како систем на взаемно почитување и професионална соработка).

Се поинтезивниот развој на побарувачката на пазарот на трудот е многу голема за занимањето ВОЗАЧ НА МОТОРНО ВОЗИЛО. Затоа голем дел од транспортните компании како во нашата држава така и надвор во земјите членки на ЕУ побарувачката е драстично зголемена за занимањето ВОЗАЧ НА МОТОРНО ВОЗИЛО. Само да споменам некоја бројка која што ја истраживме дека во Република Северна Македонија од 1880 транспортни претпријатија кои се занимаваат со меѓународен транспорт 20% до 30 % секојдневно имаат потреба од нови возачи.

Недостатокот е тоа што голем дел од возачите заминуваат во земјите членки на ЕУ за да ја обавуваат истата професија за подобри европски дневници. Истиот проблем се јавува и во соседните земји како и земјите на екс ЈУ просторите. Затоа во комуникација со почитуваните колеги од соседна Р Србија, Р Хрватска Р Црна Гора и во нивните земји се соочуваат со истиот проблем од недостаток на Возачи.

Зошто е тоа така?

Од разните законски регулативи според законот за превоз во патниот сообраќај, за да еден возач да учествува во меѓународен транспорт на стоки и патници треба да поседува стручна компетентност, за учество на возачите во меѓународен транспорт на стоки и патници (СПК) или во ЕУ се нарекува COD 95. Според програмата која е застапена во СПК и COD 95 е дел од наставната програма за занимањето ВОЗАЧ НА МОТОРНО ВОЗИЛО, дури и поблиску до програмата за добивање на COD 95. На пример во една држава како што е Германија еден приоритетен услов за добивање на COD 95 е да има завршено занимање ВОЗАЧ НА МОТОРНО ВОЗИЛО, каде со свидетелство – диплома петте модули предвидени за посетување на семинар му се признаени и веднаш добива соодветна компетентност. Која е целта на истражувањето на овој труд.

Цел на истражувањето

Во периодот од февруари, март, април, мај, јуни и јули извршени се низа истражувања истражувања по пат на анкета (анкетно ливче) и по пат на телефонско јавување, интервју за работа во неколку транспортни компании како дел од членовите за прием на нови возачи.

Анкетата има опфатено три групи на анкетирани учесници.

- Прва група учесници од кои имаат важечка возачка дозвола до една година (без работно искуство) и оние кои имаат старосна граница а немаат возачка дозвола
- Втора група на учесници кои имаат важечка возачка дозвола до 10 години и работно искуство повеќе од 5 години во транспортни компании како возач
- Третата група се анкетирани лица кои се веќе работоспособни кои имаат важечка возачка дозвола повеќе од 10 години и не постари од 60 години возраст

Откога учесниците - испитаници ќе одговореа на поставеното прашање следувахе второ анкетно прашање дали би се гледале во иднина како возач на автобус или камиот.

Истражувањето беше спроведено на територијата на Република Македонија во неколку градови и неколку транспортни компании околу 400 учесника.

На анкетното прашање зошто имаат положено возачки испит за возач на товарно возило или автобус, во 6 градови во источна македонија и градот Скопје на анкетните ливчиња од 120 испитаници 95 имаа одговорено дека сакаат возачи да бидат на товарни возила бидејќи има голема заработувачка, а само 25 одговорија дека сакаат да бидат возачи на автобус. На второто анкетно прашање кога беше поставено колку имаат возачко искуство и познавање од меѓународните прописи од истиот број на испитаници само еден имаше одговорено дека делумно ги познава. Останатите не ги познаваат. (кои транспортни компании возачи би вработиле со нула знаење)

Втората група на возачи учесници кои имаат важечка возачка дозвола до 10 години и работно искуство повеќе од 5 години во транспортни компании како возач на истите анкетни прашања од 180 испитаници или кандидати за возачи како професионална дејност, на првото прашање одговорија исто заради финансиските средства, а и на второто прашање одговорија дека со тек на време ги учат и познаваат меѓународните прописи.

Само по себе се наметна и прашањето **зошто е тоа така? (во однос на првата група).**

Од овде можеме да заклучиме дека не е лесно да создадеш возач професионалец, кој професионално и одговорно ќе ги извршува работните обврски.

И третата група се анкетирани лица кои се веќе работоспособни кои имаат важечка возачка дозвола повеќе од 10 години, работно искуство повеќе од 10 години и не постари од 60 години возраст и од разни причини сакаат да ја променат транспортната компанија (финансиски средства, релации, извозени километри, човечки фактор-колегијалност) наведени како дел од причините.

Од 100 испитаници работоспособни кои имаат важечка возачка дозвола повеќе од 10 години, работно искуство повеќе од 10 години и не постари од 60 години возраст на првото прашање 89 одговорија дека работеле како возач на товарно возило и дека ќе продолжат до завршеток на својот работен век, 11 одговорија дека сакаат да продолжат како возач на автобус. На второто анкетно прашање одговорија дека потполно ги познаваат сите најнови меѓународни прописи за превоз на стока и патници и дека се во тек со сите збиднувања, а на едно усно дополнително прашање, дали познаваат еден од двата странски јазици (англиски или германски, одговорија дека со тек на време се се учи и може да се снајдат и разберат).

Сега прашањето е зошто, зошто и зошто? Имаат искуство, знаат се имаат професионална желба за извршување на работата а сепак одат на интервју за работа во нова транспортна компанија.

Од една страна се бара работа и тешко се наоѓа, а од друга страна транспортните компании имаат недостаток на работоспособни возачи и тешко можат да најдат кои можат да ја извршуваат професионално задачата.

Можеме да дискутираме многу време, можеме многу објаснувања да дадеме, ама сепак се чувствува недостаток на возачи професионалци ширум државата а и пошироко.

Само по себе можеме да кажеме дека масовно ширум регионот се иселуваат и дека се чувствува недостаток на работна сила, како во нашата држава така и во регионот.

Можеме да набројуваме многу, како едно најбитно е можноста за барање егзистенција за подобар живот. Секој млад човек сонува за иднина во странство, во некоја далечна држава. Семејството да биде заедно, образованието да го продолжат во некоја друга држава. Тоа се само мал број на претпоставки.

Од друга страна ако една транспортна компанија вложила десетици милиони евра за возен парк во последните 5 години, а колку вложила за образование на кадри од нивната област?

Колку финансиски средства издвоиле?

Колку вложили за образование и едукација на нивните вработени? Можеби

ние не сме тие што треба да напоменеме.

Можеби треба државата да даде одговор?

За овие неколку наканаречени самопосебе дадени прашања анкетиравме 20 транспортни компании кои 16 усно одговорија зошто да издвојуваме финансиски средства, а 4 одговорија дека издвоиле мал дел за одредени обуки кои подоцна во текот на работењето ги одбиваат од плата од самата заработувачка на вработениот.

Да напоменам дека во Република Македонија во текот на 2023/24 година беа набавени околу 980 нови товарни возила во вредност од околу 120 милиони евра, и 20 автобуси од околу 15 милиони евра.

Во Република Србија само во последните 6 месеци има побарувачка од 200 нови автобуси од марката МАН и Мерцедес со вредност од околу 80 милиони евра.

Овие транспортни компании колку вложиле во образование на млади возачи?

Проблемот е ЗАЕДНИЧКИ. Ние како директен дел од образовниот процес, а и стопанските транспортни компаниите како примарен дел.

Како би го решиле овој 20 годишен проблем.

Од денес за вчера не би можеле. Немаме магично стапче. А и од денес до утре како би го решиле.

Ние како наставници професионалци, како дел од образовниот систем ќе се осврнеме на неколку точки: (пак ќе се навратам во минатото, како потсетување)

1. Сообраќајно техничката култура е на многу ниско ниво речиси 0
2. На учениците од основно образование не им е јасно што е всушност сообраќајот
3. Натпреварите по сообраќај односно возење велосипед не се одржуваат од разни причини кои некогаш претставуваа едукација и забава
4. Активности по сообраќај речиси во ни едно основно училиште не се реализираат на ниво што би им врежале дека сепак професија возач би ја запознале и засакале.

Во разговор со раководителите на основните училишта односно директорите и наставниците кои се директно вклучени во образовниот процес со наставните програми Сообраќајна култура како предмет не ни постои само постои неколку минимални часа на крајот од годината.



Сето ова има доведено до ова денес што сме тука дека професија возач на моторно возило изумира односно исчезнува и не случајно има недостаток на работоспособни возачи што сакаат да егзистираат од ова професија.



Тука и битен момент поврзано со законот за безбедност во сообраќајот.

Треба да чекам една година од Б категорија за да полагам за Ц категорија, 21 година за Ц категорија, 23 години за Д категорија, дали ќе положам, дали ќе најдам работа.

Тоа се серија на прашања кај младата популација.

Од оваа анкета лесно можеше да се воочи дека образовниот систем си го направи своето. Сите законски и регулативи допринесоа денес сето ова што се случува.

Недостаток на работна сила **ВОЗАЧ НА МОТОРНО ВОЗИЛО**, Возач на камион, а што е актуелно во сите земји присутен е недостаток на возачи во јавните градски претпријатија што ги опслужуваат граѓаните односно ВОЗАЧИ НА АВТОБУСИ ВО ЈАВНИОТ ГРАДСКИ ПРЕВОЗ.

Зошто е тоа така и како ќе се справиме со овој проблем?

1. Знаеме дека секоја професија за понатаму се подготвува кај индивидуата уште од мали нозе
2. Знаеме дека возач на моторно возило е нешто што не може секој да се занимава
3. Постои соодветна програма за полагање на возачки испит од одредена категорија, регулирана со Законот за безбедност во сообраќајот
4. За да бидеш добар возач професионално да си ја извршуваш обврската потребно е добро да ги познаваш законските прописи од областа на сообраќајот
5. Да имаш извршено обука и положено испит за соодветна категорија на возила Сега

од сите овие прашања можеме да се осврнеме на следното

Во идниот период за да не замре професијата возач на моторно возило да не се соочуваме со недостаток на кадар од овој профил на работоспособни луѓе, да не бараме по светот да донесеме кадар од други земји потребно е да се направат низа измени во образовниот систем и тоа:

- Воведување предмет познавање на сообраќајни правила и прописи редовно во основното образование
- Разни секции и активности во текот на учебната година
- Спроведување редовни активности со учениците
- Организирање редовни натпревари од сообраќајот
- Соработка со институциите задолжени за сообраќајот во државата
- Одржување на редовни активности поврзани со сообраќајот

И уште многу други образовни и едукативни активности за сообраќајот.

Кога сето ова би се спровело голем дел од учениците уште од рана возраст би знаеле за што би се определиле што би работеле и како би се образовале за понатаму.



ЗАКЛУЧОК

Се надевам дека ќе можеме да ги усогласиме и заеднички да настапиме и дејствуваме во создавањето на кадри од ова област со тоа што ќе имаме за нашиот пазар на труд и надвор од нашите држави да понудиме соодветен стручен и добро обучен кадар **ВОЗАЧ НА МОТОРНО ВОЗИЛО**.

БИДИ И ТИ ДЕЛ ОД ОБРАЗОВНИОТ СИСТЕМ НА ЕВРОПСКОТО СЕМЕЈСТВО НА ВОЗАЧИ



TRAFFIC SCHOOL CENTRE

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XIV International symposium on the topic:

INTERDISCIPLINARNOST NA LOGISTIKATA I SOOBRAKAJOT

03-5 Oktober 2024

**- THE PROFESSIONAL DRIVER AS PART OF THE EDUCATION
SYSTEM IN THE COUNTRY AND ABROAD -**

Made by:

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Skopje, 2024

INTRODUCTION

The reason why we decided to research in order to write and present and with the purpose of developments in the EU this very topic is because of my respect and trust in what is called the system - the education system. I may sound pathetic given the awareness of illogicalities and destruction in various types of systems in the country and the region, but I am optimistic that real solutions in the field of traffic can stabilize systems (I am not thinking too ambitiously of large political or state systems, but of smaller ones : family as a system in education, the school as a system for education, the state as a system part of education, international cooperation with colleagues as a system of mutual respect and professional cooperation).

The increasingly intensive development of demand on the labor market is very great for the occupation of MOTOR VEHICLE DRIVER. That's why a large part of the transport companies, both in our country and outside in the EU member states, the demand has increased drastically for the occupation of MOTOR VEHICLE DRIVER. Let me just mention some number that we have researched that in the Republic of North Macedonia out of 1880 transport companies that deal with international transport, 20% to 30% need new drivers every day. The disadvantage is that a large number of drivers go to EU member states to do the same profession for better European wages. The same problem occurs in the neighboring countries as well as the countries of the ex-EU areas. Therefore, in communication with respected colleagues from the neighboring Republic of Serbia, Republic of Croatia, Republic of Montenegro and in their countries they are facing the same problem of lack of drivers.

Why is that so?

From the various legal regulations according to the road transport law, in order for a driver to participate in the international transport of goods and passengers, he must possess professional competence, for the participation of drivers in the international transport of goods and passengers (SPK) or in the EU it is called COD

95. According to the program represented in SPK and COD 95 is part of the curriculum for the occupation DRIVER OF A MOTOR VEHICLE, even closer to the program for obtaining COD 95. For example in a country such as Germany a priority condition for obtaining of COD 95 is to have completed the occupation of MOTOR VEHICLE DRIVER, where with a certificate - diploma the five modules provided for attending the seminar are recognized and he immediately receives the appropriate competence. What is the research objective of this paper.

Aim of the research

In the period of February, March, April, May, June and July, a series of researches were carried out by means of a survey (survey sheet) and by means of telephone calls, job interviews in several transport companies as part of the members for the reception of new drivers .

The survey included three groups of surveyed participants.

- First group of participants who have a valid driver's license for up to one year (without work experience) and those who have an age limit and do not have a driver's license
- Second group of participants who have a valid driver's license for up to 10 years and work experience of more than 5 years in transport companies as a driver
- The third group is surveyed persons who are still able to work, who have a valid driver's license for more than 10 years and are not older than 60 years of age

After the participants - respondents answered the question, a second survey question followed, whether they would see themselves as a bus driver or a cab driver in the future.

The research was carried out on the territory of the Republic of Macedonia in several cities and several transport companies with around 400 participants.

To the survey question why they have passed the driving test for a truck or bus driver, in 6 cities in eastern Macedonia and the city of Skopje, on the survey sheets out of 120 respondents, 95 answered that they want to be truck drivers because there is a high income, and only 25 they answered that they wanted to be bus drivers. On the second survey question, when it was asked how much driving experience they have and knowledge of international regulations, only one of the same number of respondents answered that they partially knew them.

The others do not know them. (which trucking companies would hire drivers with zero knowledge)

The second group of driver participants who have a valid driver's license for up to 10 years and work experience of more than 5 years in transport companies as a driver answered the same survey questions from 180 respondents or candidates for drivers as a professional activity, answered the first question in the same way because of financial means, and and to the second question they answered that they learn and know the international regulations over time.

By itself, the question arose, why is that so? (in relation to the first group).

From here we can conclude that it is not easy to create a professional driver who will perform his duties professionally and responsibly.

And the third group are surveyed people who are still able to work, who have a valid driver's license for more than 10 years, work experience for more than 10 years and not older than 60 years of age and for various reasons they want to change the transport company (financial assets, relations, exported kilometers, human factor- collegiality) cited as part of the reasons.

Out of 100 able-bodied respondents who have a valid driver's license for more than 10 years, work experience for more than 10 years and no older than 60 years of age to the first question, 89 answered that they worked as a truck driver and that they will continue until the end of their working life. 11 answered that they want to continue as a bus driver. To the second survey question, they answered that they are fully aware of all the latest international regulations for the transportation of goods and passengers and that they are up to date with all agreements, and to an additional oral question, whether they know one of the two foreign languages (English or German, they answered that with over time everything is learned and they can manage and understand).

Now the question is why, why and why? They have experience, they know everything, they have a professional desire to perform the work, and yet they go to a job interview in a new transport company.

On the one hand, work is sought and difficult to find, and on the other hand, transport companies have a shortage of capable drivers and can hardly find those who can perform the task professionally.

We can discuss for a long time, we can give many explanations, but still there is a lack of professional drivers throughout the country and beyond.

By itself, we can say that people are emigrating massively throughout the region and that there is a lack of labor force, both in our country and in the region.

1. We can list many, as one of the most important is the possibility of seeking livelihood for a better life. Every young person dreams of a future abroad, in a distant country. The family should be together, they should continue their education in another country. These are just a few assumptions.
2. On the other hand, if a transport company has invested tens of millions of euros for a vehicle fleet in the last 5 years, how much has it invested in the education of personnel from their field?
3. How much financial resources have they allocated?
4. How much have they invested in education and training of their employees?
5. Perhaps we are not the ones to mention.
6. Maybe the state should give an answer?

7. For these few so-called self-specific questions, we surveyed 20 transport companies, 16 of which verbally answered why we should set aside financial resources, and 4 answered that they set aside a small portion for certain trainings, which later in the course of operation are deducted from the employee's salary.
 8. I should mention that in the Republic of Macedonia during the year 2023/24, about 980 new trucks worth about 120 million euros, and 20 buses worth about 15 million euros, were purchased.
 9. In the Republic of Serbia, in the last 6 months alone, there has been a demand for 200 new MAN and Mercedes buses with a value of around 80 million euros.
 10. How much have these transport companies invested in the education of young drivers?
 11. The problem is COMMON. We as a direct part of the educational process, and the commercial transport companies as a primary part.
 12. How would you solve this 20 year old problem?
 13. From today to yesterday, we could not. We don't have a magic wand. And from today to tomorrow, how would you solve it?
 14. As professional teachers, as part of the educational system, we will refer to several points: (I will go back to the past, as a reminder)
 - 15.1. Traffic technical culture is at a very low level, almost 0
 - 16.2. Elementary school students do not understand what traffic actually is
 17. 3. Competitions in traffic or cycling are not held for various reasons, which once represented education and entertainment
- activities related to traffic are not implemented in almost any primary school at a level that would impress upon them that they would still know and love the profession of driver.
- In a conversation with the principals of primary schools, that is, principals and teachers who are directly involved in the educational process with the curricula, Traffic culture as a subject does not even exist, it only exists for a few minimal



hours at the end of the year.

If this has led to the fact that we are here today, that the profession of motor vehicle driver is dying out, that is, it is disappearing and it is no coincidence that there is a lack of able-bodied drivers who want to make a living from this profession.



Here is an important moment related to the traffic safety law.

I have to wait one year from B category to take the C category, 21 years for the C category, 23 years for the D category, will I pass, will I find a job.

These are a series of questions among the young population.

From this survey, it was easy to see that the education system had done its job. All legal changes and regulations have contributed to all that is happening today.

Lack of manpower MOTOR VEHICLE DRIVER, Truck Driver, and what is current in all countries is the lack of drivers in public city enterprises that serve the citizens, ie BUS DRIVERS IN PUBLIC CITY TRANSPORT.

Why is this so and how will we deal with this problem?

- 1. We know that every profession is prepared for the future in the individual from an early age**
- 2. We know that motorcycle driving is something that not everyone can do**
- 3. There is an appropriate program for passing a driving test of a certain category, regulated by the Traffic Safety Law**
- 4. In order to be a good driver and perform your duty professionally, you need to know the legal regulations in the field of traffic.**
- 5. To have completed training and passed an exam for the appropriate category of vehicles**

Now from all these questions we can address the following

In the future period, so that the profession of motor vehicle driver does not die out, so that we do not face a lack of staff from this profile of able-bodied people, so that we do not look around the world to bring staff from other countries, it is necessary to make a series of changes in the educational system and that :

- Introducing the subject of knowledge of traffic rules and regulations regularly in primary education**
- Various sections and activities during the school year**
- Carrying out regular activities with students**
- Organizing regular traffic competitions**
- Cooperation with the institutions in charge of traffic in the country**
- Maintenance of regular activities related to traffic**

And many other educational and educational activities about traffic.

f all this were implemented, a large part of the students would know from an early age what they would decide on, what they would work for and how they would be

educated for the future.



CONCLUSION

I hope that we will be able to harmonize them and jointly perform and act in the creation of personnel from this area by having for our labor market and outside our countries to offer appropriate professional and well-trained staff MOTOR VEHICLE DRIVER.

BE A PART OF THE EDUCATION SYSTEM OF THE EUROPEAN FAMILY OF DRIVERS





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RAZVOJ ŽELJEZNIČKOG PROMETNOG SUSTAVA – IZGRADNJA NOVE NIZINSKE PRUGE ZAGREB - RIJEKA

SAŽETAK

U ovom radu analizirana je važnost modernizacije željezničkog prometa posebice rekonstrukcija pruge Rijeka – Zagreb i željezničkog čvorišta Rijeka posebice za razvoj riječke luke.

Najvažniji projekt vezan uz riječki željeznički promet koji do sada nije na odgovarajućoj razini je upravo izgradnja nove nizinske pruge Rijeka – Zagreb.

Nakon ulaska Hrvatske u Europsku uniju sve veći je interes na modernizaciji željeznice ponajviše na pruzi M202 Zagreb Glavni kolodvor – Karlovac – Rijeka koja je ujedno dio dionice Rijeka – Zagreb – Budimpešta na Mediteranskom koridoru.

Željeznički prometni pravac Državna granica – Botovo – Zagreb – Rijeka glavni je željeznički pravac važan u povezivanju središnje, gorske i primorske Hrvatske, ali je istodobno važan i u realizaciji europskih regionalnih integracija u smislu povezivanja regija Alpe – Jadran, Mediteran – Podunavlje. Ovaj pravac povezuje najveću i najznačajniju hrvatsku luku Rijeka s unutrašnjošću Republike Hrvatske, a preko nje i sa zemljama srednje Europe koje gravitiraju riječkoj luci. Za servisiranje luke s kopnene strane željeznički prijevoz je nezamjenjiv i prioritetan.

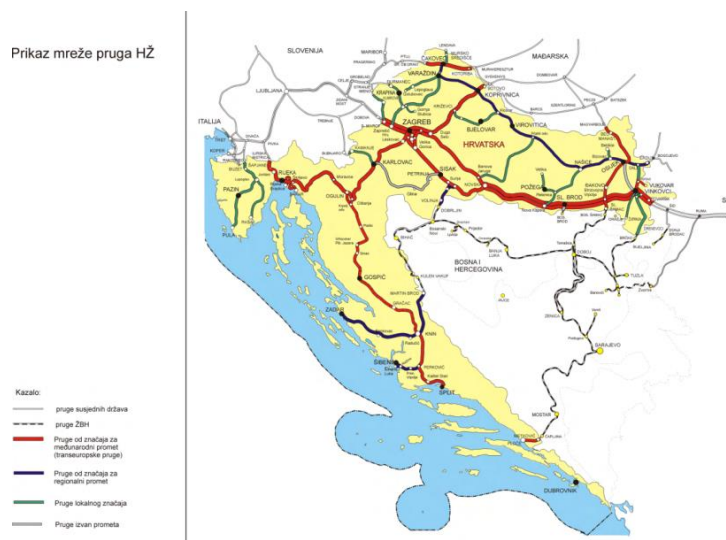
Plan je da se na navedenoj relaciji osiguraju uvjeti dvokolosiječnosti te da se poveća brzina vožnje na 160km/h, odnosno da se skрати postojeća pruga te da se smanji vrijeme putovanja i poveća kapacitet prijevoza.

U tu svrhu izrđene su i studijske varijante te je odabrana varijanta izgradnja nove dvokolosiječne pruge Skradnik – Krasica – Tijani uz zadržavanje postojeće jednokolsiječne pruge Oštarije – Škrlevo.

Ključne riječi: prometni koridori, nizinska pruga, rekonstrukcija i modernizacija pruge, usko grlo, željezničko čvorište Rijeka, varijante rješenja, tehnički parametri

1. MREŽA ŽELJEZNIČKIH PRUGA HŽ-a

U Hrvatskoj je danas izgrađeno 2 989 km željezničkih pruga. Prva pruga na području današnjeg državnog područja Republike Hrvatske izgrađena je 1860. godine na području Međimurja.



Izvor: Izvor: Ministarstvo mora, prometa i infrastrukture

Željezničke pruge u Hrvatskoj dijelimo na:

1. pruge od važnosti za međunarodni promet - tri su međunarodna željeznička koridora koji se nalaze na bivšim paneuropskim prometnim koridorima;
 - a. RH1 – Koridor X (DG Dobova-Savski Marof-Zagreb-Dugo Selo-Novska-Vinkovci-Tovarnik-DG)
 - b. RH2 – Koridor Vb (DG Botovo-Koprivnica-Dugo Selo-Zagreb-Karlovac-Rijeka-Šapjane-DG)
 - c. RH3 –Koridor Vc (DG Beli Manastir-Osijek-Slavonski Šamac-DG -Sarajevo- DG-Metković-Ploče)
2. pruge od važnosti za regionalni promet
3. pruge od važnosti za lokalni promet

2. ŽELJEZNIČKA PRUGA M202; ZAGREB – RIJEKA

Željeznička pruga Zagreb-Rijeka sagrađena je 1873. godine. Duljina pruge je 229 km i dio je paneuropskog Koridora Vb. Na prugu je povezano nekoliko kratkih ogranka pruga. U Rijeci uključujući pruge Škrlevo-Bakar, Sušak Pećine-Brajdica i Rijeka Brajdica-Rijeka.

Pruga je u cijelosti elektrificirana naponom od 25kV i 50 Hz i na cijeloj dionici je jednokolosiječna.

Pružnu trasu karakteriziraju premali polumjeri i preveliki usponi ($R=275m$; uspon je 28 ‰) što ograničava prosječnu voznu brzinu od 60 km/h, a na nekim dijelovima i brzinu od 40 km/h pa i manje. Vrijeme putovanja putničkih vlakova je 4 sata, a teretnih više od 8 sati.

Pruga je na cijeloj svojoj duljini osposobljena za opterećenje od 22,5 t/os i ima karakteristike kategorije D4 što je vidljivo iz tabelarnog prikaza:

Kategorije pruge	Najveće opterećenje po osovini	Najveće opterećenje po duljinskom metru
A	16 t	5,0 t/m
B ₁	18 t	5,0 t/m
B ₂	18 t	6,4 t/m
C ₂	20 t	6,4 t/m
C ₃	20 t	7,2 t/m
C ₄	20 t	8,0 t/m
D ₂	22,5 t	6,4 t/m
D ₃	22,5 t	7,2 t/m
D ₄	22,5 t	8,0 t/m
E ₄	25 t	8,0 t/m
E ₅	25 t	8,8 t/m

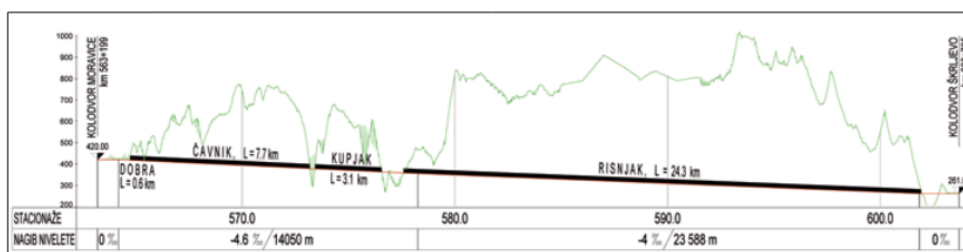
Izvor: HŽ Cargo – Smjernice za utovar

Prilikom izgradnje pruge trasa je nepotrebno produljena iz razloga kako bi se izbjegla gradnja dugačkih tunela i skupih vijadukata. S obzirom da trasa prolazi vrlo nestabilnim i nepovoljnim terenom to ugrožava sigurnost odvijanja prometa. Također pruga iziskuje konstantno skupo održavanje.

Pruga se sastoji od tri karakteristične dionice:

1. Rijeka-Lokve (nagib 26 mm/m)
2. Lokve-Moravice (nagib 17 mm/m)
3. Moravice-Zagreb (nagib 8 mm/m)

Dionica od Moravica do Rijeke kao najzahtjevnija dionica pruge ima značajke teške planinske pruge; tu se nalaze strmi nagibi nivelete (tunel Sleme 836,40 m.n.m i kolodvor Drivenik 816,15 m.n.m, između njih je i kolodvor Fužine 728 m.n.m.), dominira minimalni polumjer luka, utjecaj nepovoljnih vremenskih uvjeta (velike količine snijega, snježni nanosi, udari bure).



Uzdugi profil pruge na dionici Moravice – Škrlevo

Izvor: Stručni časopis hrvatskog društva željezničkih inženjera: Željeznice 21

Sve navedene karakteristike ograničavaju prijevoznu i propusnu moć postojeće pruge te povećavaju troškove njezine eksploatacije.

3. MODERNIZACIJA ŽELJEZNIČKE PRUGE M202 ZAGREB-RIJEKA

Ideja o izgradnji nove željezničke pruge postoji već 60 godina. S obzirom na navedene probleme i negativne tehničke karakteristike pruge već duži period razmatra se lokacija i plan rekonstrukcije i modernizacije pruge Zagreb-Rijeka.

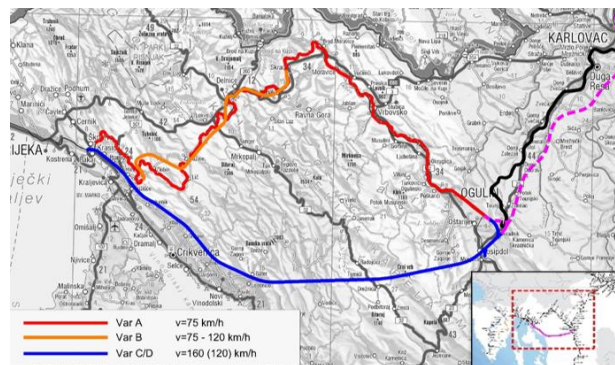
4. RAZRADA PROJEKTA REKONSTRUKCIJE PRUGE

Prilikom izradbe studijske dokumentacije izrađene su četiri moguće varijante rješenja modernizacije pruge.

Izrađene su sljedeće varijante:

1. VARIJANTA A – nadogradnja drugog kolosijeka uz postojeću prugu duž cijele postojeće dionice Oštarije-Škrlevo uz modernizaciju i obnovu postojeće pruge.
2. VARIJANTA B – dogradnja drugog kolosijeka uz postojeći na dionicama Oštarije-Skrad i Plase-Škrlevo, izgradnja nove dvokolosiječne pruge na dionici Skrad-Plase.
3. VARIJANTA C – izgradnja nove dvokolosiječne pruge Skradnik-Krasica-Tijani, uz analizu potrebe zadržavanja postojeće jednokolosiječne pruge Oštarije-Škrlevo
4. VARIJANTA D – izgradnja nove jednokolosiječne pruge Skradnik-Krasica-Tijani uz zadržavanje postojeće jednokolosiječne pruge Oštarije-Škrlevo

U listopadu 2021.godine Studijom izvodljivosti odabrana je Varijanta C – izgradnja nove dvokolosiječne pruge Skradnik-Krasica-Tijani, uz analizu potrebe zadržavanja postojeće jednokolosiječne pruge Oštarije-Škrlevo.



Izvor: Ministarstvo mora, prometa i infrastrukture

Nova dionica pruge najvećim dijelom će prolaziti nenaseljenim ili slabo naseljenim područjem, veliki dio biti će u tunelima i na vijaduktima čime će biti izbjegnuta česta zaustavljanja vlakova.

Što se tiče putničkog prijevoza ono je predviđeno samo u kolodvorima Zagreb, Karlovac, Skradnik i Rijeka.

5. CILJEVI IZGRADNJE NOVE DIONICE PRUGE ZAGREB-RIJEKA DUŽ MEDITERANSKOG KORIDORA

Glavni ciljevi učinkovitijeg i konkurentnijeg željezničkog prometa duž mediteranskog koridora su:

- ❖ eliminacija „uskog grla“ mediteranskog koridora
- ❖ povezivanje osnovne mreže s transeuropskim mrežama
- ❖ poboljšanje željezničke usluge za teretni i putnički promet
- ❖ smanjenje vremena putovanja i duljine trase
- ❖ poboljšanje konkurentnosti i sigurnosti željezničkog prometa
- ❖ stvaranje jedinstvenog željezničkog prometnog pravca na dionici Budimpešta-Zagreb-Rijeka
- ❖ modernizacija svih podsustava željezničke infrastrukture
- ❖ povećanje brzine (sa 75 km/h na 120 km/h-160 km/h)
- ❖ uspostava tehničkih elemenata prema TSI standardima
- ❖ premošćivanje izrazito nepovoljnih terenskih uvjeta i geološki nepovoljnog tla
- ❖ smanjenje troškova održavanja donjeg ustroja postojeće pruge (klizišta, odroni) – česti zatvori pruge i smanjenje brzine prometovanja
- ❖ razvoj energetske i ekološke učinkovitog sustava
- ❖ povezanost sustava lučkog prometa i željezničkog transporta

- ❖ stvaranje poveznice s ostalim željezničkim projektima u tijeku provedbe Škrlevo-Rijeka-Jurdani i Karlovac-Oštarije
- ❖ ostvarivanje mogućnosti za povezivanje budućih infrastrukturnih projekata Krasica-most Krk-Terminal Krk, Drežnica-Knin-Split i željeznički tunel Istra.

6. OSNOVNI TEHNIČKI PARAMETRI ŽELJEZNIČKE PRUGE M202 NA DIONICI OŠTARIJE-ŠKRLJEVO

U usporedbi s postojećom prugom izgradnja nove dionice pruge donosi poboljšanja u vidu tehničkih parametara pruge. Poboljšanja se očituju u sljedećem:

- ❖ dvokolosijčna elektrificirana željeznička pruga 25kV i 50Hz
- ❖ duljina dionice $L=72$ km
- ❖ brzina $v=120-160$ km/h
- ❖ max. nagib $i=12,5\%$
- ❖ model opterećenja D4 (22,5 t/m i 8 t/os)
- ❖ 4 nova kolodvora (Josipdol, Drežnica, Ledenice, Krasica) i rekonstrukcija 2 kolodvora (Josipdol i Ogulin)
- ❖ tehničke specifikacije za interoperabilnost TSI i prometovanje vlakova duljine 750 m
- ❖ najviša kota nivelete 488,4 m.n.m. tunel Kapela 2
- ❖ 11 tunela ukupne duljine 52,8 km
- ❖ 8 vijadukta ukupne duljine 4,5 km
- ❖ duljina zaustavnog puta 1 500 m (za brzine od 160 km/h)
- ❖ najmanja korisna duljina perona u kolodvorima za prijam daljinskih vlakova za prijevoz putnika 400 m



Izvor: Ministarstvo mora, prometa i infrastrukture

Za sve pruge na području Republike Hrvatske dan je prijedlog kategorija prema TSI-u. S obzirom na to da se pruge koriste za mješoviti prijevoz, koriste se oznake koje su kombinacija prometne oznake za putnički prijevoz i prometne oznake za teretni prijevoz. U tablicama prikazanima u nastavku navedeni su parametri, odnosno osnovni uvjeti koji su od ključne važnosti za interoperabilnost, te ih treba postići na moderniziranim, obnovljenim postojećim prugama te na novim prugama. Prikazani parametri jesu minimalne vrijednosti koje se mora zadovoljiti te je, naravno, moguće projektirati i graditi pruge većih profila, većih osovinskih opterećenja, većih brzina, s većim korisnim duljinama perona i s vlakovima duljima od onih navedenih.

Za pruge međunarodnog transporta predlaže se kategorija P4 (P5) F2 s minimalnim parametrima:

Prometna oznaka	Slobodni profil	Osovinsko opterećenje (t)	Brzina na pruzi (km/h)	Korisna duljina perona (m) za putnički prijevoz / duljina vlaka za teretni prijevoz
Minimalni parametri učinka za putnički prijevoz				
P4	GB	22,5	120 – 200	200 – 400
P5	GA	20	80 – 120	50 – 200
Minimalni parametri učinka za teretni prijevoz				
F2	GB	22,5	100 – 120	600 – 1050

Izvor: Stručni časopis hrvatskog društva željezničkih inženjera: Željeznice 21

Za pruge regionalni i lokalni transporta predlaže se kategorija P5 F3 s minimalnim parametrima:

Prometna oznaka	Slobodni profil	Osovinsko opterećenje (t)	Brzina na pruzi (km/h)	Korisna duljina perona (m) za putnički prijevoz / duljina vlaka za teretni prijevoz
Minimalni parametri učinka za putnički prijevoz				
P5	GA	20	80 – 120	50 – 200
Minimalni parametri učinka za teretni prijevoz				
F3	GA	20	60 – 100	500 – 1050

Izvor: Stručni časopis hrvatskog društva željezničkih inženjera: Željeznice 21

7. AKTIVNOSTI I STATUS PROJEKTA

Način financiranja izrade dokumentacije:

- Sporazum o dodjeli bespovratnih sredstava CINEA – HŽI (EuropeanClimate, Infrastructure and Environment Executive Agency – HŽ Infrastruktura)), trajanje provedbe 14.02.2017. – 31.10.2021. Vrijednost sporazuma 1,97 mil. € (bespovratna sredstva 85% 1,67 mil. €)

Aktivnosti :

1. upravljanje projektom, promidžba i vidljivost
 2. idejna rješenja i studija izvodljivosti (FS)
- Troškovi izrade Analize troškova i koristi i Studije utjecaja na okoliš u visini 0,5 mil. € neprihvatljiv trošak – potrebno financiranje iz proračuna
 - Sporazum o dodjeli bespovratnih sredstava CINEA – HŽI, trajanje provedbe 01.12.2023. – 30.11.2025. Vrijednost sporazuma 5,80 mil. € (bespovratna sredstva 85% 4,93 mil. €)

Aktivnosti :

1. upravljanje projektom, mjere javnosti i vidljivosti
2. idejni projekt i ishođenje LD

Status studijske dokumentacije:

- 15.05.2020. potpisan Ugovor br. 9/20-EU za izradu studijske dokumentacije (Idejna Rješenja, FS, CBA i SUO)

Izrađivači studije: Zajednica ponuditelja ŽPD d.d., Granova d.o.o., INSTITUT IGH d.d. Rijekaprojekt d.o.o. i IPZ d.o.o.

Trajanje Ugovora 15.05.2020. godine do 15.03.2024. godine

Vrijednost Ugovora: 2 379 000, 00 € bez PDV-a

- listopad 2021. izrađena Idejna rješenja, FS i CBA – prihvaćena od strane JASPERSa i HŽI
- travanj 2023. SUO izrađena i pokrenut Postupak PUO – rujan 2023. održana 1. sjednica Povjerenstva za PUO

Status projektne dokumentacije:

- 13.11.2023. pokrenut postupak Javne nabave za izradu idejnog projekta – prethodno savjetovanje u tijeku

8. DINAMIČKI PLAN

HŽ Infrastruktura d.o.o.		 HŽ INFRASTRUKTURA																															
"Modernizacija željezničke pruge M202 Zagreb GK – Rijeka, na dionici Oštarije - Škrijevo"																																	
R.br.	Aktivnost	2018				2019				2020				2021				2022				2023				2024				2025			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
1	Javna nabava - Studija																																
2	Idejna rješenja, FS i CBA																																
3	Studija utjecaja na okoliš																																
4	Javna nabava - Idejni projekt																																
5	Idejni projekt i LD																																

Izvor: Ministarstvo mora, prometa i infrastrukture

9. PROBLEMATIKA U PROVEDBI PROJEKTA

Problematika provedbe projekta nizinske pruge proteže se dugi niz godina iz dolje navedenih razloga:

- ❖ zahtjevna trasa u smislu polaganja geometrijskih i visinskih elemenata – značajan broj objekata; teren brdsko-planinskih karakteristika – dugačke tunelske dionice (Tunel Kapela 2, L=14472 m)
- ❖ područje zahvata unutar ekološki zaštićenog područja Natura 2000 – provedba dugotrajnih terenskih istraživanja u postupku izrade Glavne ocjene prihvatljivosti zahvata za okoliš
- ❖ hijerarhijski neusklađena prostorno-planska dokumentacija županijske i općinsko/gradske razine
- ❖ dugotrajni administrativni procesi u provedbi pojedinih aktivnosti npr. SUO (Potvrda o usklađenosti s prostorno-planskom dokumentacijom, postupak Procjene utjecaja na okoliš, ...)
- ❖ napuštanje velikog dijela trase dionice postojeće pruge od strane Upravitelja željezničke infrastrukture – potrebna odluka državne razine – strateški/političko/gospodarski/regionalno praćenje odluke i na ostalim popratnim poljima prometne politike
- ❖ uključivanje svih dionika i javnosti/transparentnost Projekta s visokim financijskim ulaganjem

10. VAŽNOSTI PROJEKTA IZGRADNJE NIZINSKE PRUGE

Jedan od najvažnijih argumenata za nizinsku prugu je povezivanje s Krkom i novom poslovnom zonom. Riječ je o lokaciji gdje su danas uz JANAF smještena i DINA petrokemija te LNG terminal i novi kontejnerski terminal riječke luke.

Prelaskom pruge na Krk omogućit će se prijevoz putnika iz zračne luke u Rijeku i obratno te će se cijela regija kvalitetno prometno povezati sa zračnim prometnim sustavom. Kolodvor Omišalj bit će početni kolodvor prema novoj nizinskoj pruzi Rijeka – Zagreb iz smjera Krka i novoga kontejnerskog terminala.

Omjer teretnog i putničkog prometa bio bi 70:30 ili 80:20 što bi značilo da bi 70 (80)% prometa otpadalo na teretni promet (što ovisi o budućim kapacitetima lučkog pomorskog prometa grada

Rijeke). Ostatak udjela od 20 (30)% putničkog prometa odnosio bi se samo na daljinski putnički promet jer nisu predviđeni lokalni i prigradski vlakovi.

O važnosti izgradnje nizinske pruge govori se ne samo u Hrvatskoj nego i u zemljama Europske unije što pokazuju osnovni podaci o geostrateškim prednostima Kvarnera kao najbržega i najkraćega pomorskog puta između Europe i dalekoistočnih gospodarskih sila Japana, Kine, Koreje i Indije.

Željeznica	Rijeka	Koper	Trst	Hamburg	Rostock
Budimpešta	592	634	626	1406	1166
Bratislava	602	650	639	1022	980
Prag	806	854	810	686	644
Beč	580	599	584	990	984
Linz	557	549	517	911	923

Izvor: Stručni časopis hrvatskog društva željezničkih inženjera: Željeznice 21

Nova nizinska pruga Rijeka – Zagreb završavala bi u kolodvoru Ivani, gdje bi se povezala s terminalom za rasute terete u Bakru, kontejnerskim terminalom na Brajdici i drugim terminalima u luci. Nakon izgradnje nove pruge kolodvori Ivani i Krasica poprimili bi novu funkciju te postali početni i krajnji dio pruge. Kolodvor Tijani bit će rasputnica za novu nizinsku prugu Rijeka – Zagreb i postojeću riječku prugu, a ujedno će predstavljati početnu točku buduće riječke obilaznice Tijani – Opatija-Matulji.



Izvor: Stručni časopis hrvatskog društva željezničkih inženjera: Željeznice 21

Riječko željezničko čvorište danas je još uvijek usko grlo riječke luke. Zato je u bliskoj budućnosti neophodno rekonstruirati riječki željeznički prometni sustav i izgraditi nove kvalitetne željezničke veze sa zaleđem koje će biti u skladu sa suvremenim spoznajama o tehnologiji željezničkog prometa i pratiti dugoročni razvoj riječkoga lučkog sustava.

LITERATURA

Izvor: <https://www.hzinfra.hr/izrada-tehnicke-dokumentacije-za-modernizaciju-zeljeznicke-dionice-ostarije-skrljevo/>

Izvor: <https://mmpi.gov.hr/>

Stručni časopis hrvatskog društva željezničkih inženjera: Željeznice 21

Uputa 52 – Uputa o tehničkim normativima i podacima za izradbu i provedbu voznog reda



Željeznička tehnička škola Moravice

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51325 Moravice

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Tanja Burić, mag.eng.traff
Svjetlana Glad, mag.eng. traff.

THE DEVELOPMENT OF THE RAILWAY TRAFFIC SYSTEM – THE CONSTRUCTION OF A NEW LOWLAND RAILROAD ZAGREB-RIJEKA

SUMMARY

This paper analyses the importance of railway traffic modernisation, especially of the reconstruction of Rijeka-Zagreb railroad as well as the railway hub Rijeka necessary for the functioning of Rijeka harbour.

The most important project connected to railway transport in Rijeka which has been substandard for many years is the construction of the new Rijeka – Zagreb lowland railroad.

After the Republic of Croatia's accession to the European Union there has been an increasing willingness to modernise railway transport, especially on the railroad M202 Zagreb Central Station – Karlovac – Rijeka which is, at the same time, a part of the section Rijeka – Zagreb – Budapest on the Mediterranean corridor.

The railway traffic route State border – Botovo – Zagreb – Rijeka is the main railway route vital for the connection of central, upland and coastal Croatia. It is also important for the implementation of European regional integration plans in terms of connecting of the Alps – The Adriatic, Mediterranean – The Danube regions. This route connects Croatian biggest and the most important harbour Rijeka with the Republic of Croatia's inland and, in this way, with the countries in Central Europe which gravitate towards the Rijeka harbour. The railway transport is irreplaceable and a high priority factor of servicing the harbour from the inland side.

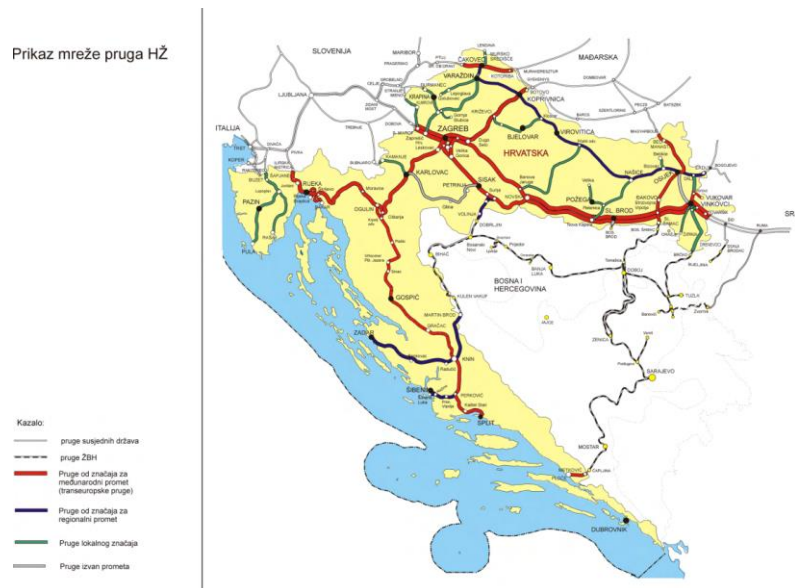
The plan comprises the ensuring of the double-track transport and increasing the speed to 160 km/h, that is, shortening the existent railroad and the length of the trip, and the increase of transport capacity.

With this purpose some study variants have been created and a variant of a new two-track railroad Skradin – Krasica -Tijani has been chosen as a solution. The existent one-track railroad Oštarije-Škrljevo has been retained.

Key words: *traffic routes, lowland railway, the reconstruction and modernisation of the railroad, bottleneck, railway hub Rijeka, various solutions, technical parametres*

1. THE HŽ RAILWAY NETWORK

There are 2989 km of railroads in Croatia at the moment. The first railroad on the present state territory was built in 1860 in Međimurje region.



Source: Ministarstvo mora, prometa i infrastrukture

Railroads in Croatia are grouped into following categories:

1. railroads important for the international traffic - there are three international railway corridors which are situated on the former Paneuropean traffic corridors;
 - a. RH1 – Corridor X (DG Dobova – Savski Marof – Zagreb – Dugo Selo – Novska – Vinkovci – Tovarnik – DG)
 - b. RH2 – Corridor Vb (DG Botovo – Koprivnica – Dugo Selo – Zagreb – Karlovac – Rijeka – Šapjane – DG)
 - c. RH3 – Corridor Vc (DG Beli Manastir – Osijek – Slavonski Šamac – DG – Sarajevo – DG – Metković - Ploče)
2. railroads important for the regional traffic
3. railroads important for the local traffic.

2. THE RAILROAD M202; ZAGREB – RIJEKA

The railroad Zagreb – Rijeka was finished in 1873. Its length is 229 km and the railroad constitutes a part of the Paneuropean Corridor Vb. It connects with a few shorter branches. In Rijeka it is joined by the railroads Škrlevo – Bakar, Sušak Pećine – Brajdica and Rijeka – Brajdica – Rijeka.

The railroad is completely electrified under 25kV and 50 Hz voltage and it is one-track line along the whole section.

The railway alignment is characterised by too small radii and too steep elevations ($R=275m$; the elevation is 28%) which limits the average speed to 60 km/h and sometimes to 40 km/h or even less. The passenger train takes 4, and freight trains 8 hours to travel this route.

The railroad is capable of maintaining a 22,5 t load along its whole length and it has characteristics of the D4 category which can be seen in the following chart:

Kategorije pruge	Najveće opterećenje po osovini	Najveće opterećenje po duljinskom metru
A	16 t	5,0 t/m
B ₁ B ₂	18 t 18 t	5,0 t/m 6,4 t/m
C ₂ C ₃ C ₄	20 t 20 t 20 t	6,4 t/m 7,2 t/m 8,0 t/m
D ₂ D ₃ D ₄	22,5 t 22,5 t 22,5 t	6,4 t/m 7,2 t/m 8,0 t/m
E ₄ E ₅	25 t 25 t	8,0 t/m 8,8 t/m

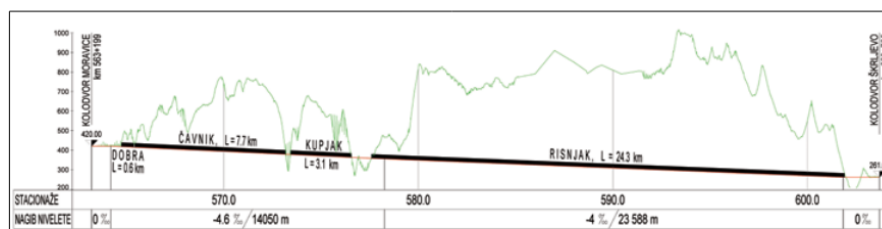
Source: HŽ Cargo – Loading guidelines

During its construction the route was unnecessarily lengthened to avoid long tunnels and expensive viaducts. The safety of traffic operation is impaired by the fact that the route goes through a very unstable and difficult terrain. What is more, this railroad requires constant and expensive maintenance.

There are three distinctive sections on the railroad:

1. Rijeka – Lokve (gradient 26 mm/m)
2. Lokve-Moravice (gradient 17 mm/m)
3. Moravice-Zagreb (gradient 8 mm/m)

The section from Moravice to Rijeka as the most demanding section of the railroad has the characteristics of a difficult mountain railroad: there are steep gradient elevations (the tunnel Sleme 836,40 m. n. m. and the Drivenik railway station 816,15 m. n. m. and between them the railway station Fužine 728 m. n. m.) It is dominated by a minimal radius and the influence of some unfavourable weather conditions (huge quantity of snow, snow drifts, gusts of north wind).



Slika 3. Uzdužni profil pruge na dionici Moravice – Škrjevo

Sources: The trade journal of Croatian society of traffic engineers : Željeznice 21

All of those features described above limit transport ability and capacity of the existent railroad and increase the cost of its exploitation.

3. MODERNISATION OF THE RAILROAD M202 ZAGREB-RIJEKA A

The idea of a new railroad has existed for almost 60 years. Considering the above listed problems and the negative features of the railroad, the location and the reconstruction as well as modernisation of the railroad Zagreb – Rijeka have been considered for a long time.

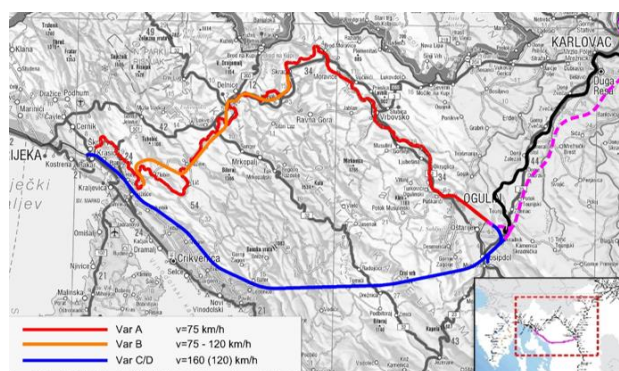
4. THE RECONSTRUCTION OF THE RAILROAD PROJECT ELABORATION PROCESS

During the development of the study documentation there appeared four possible variants of the solution for the modernisation of the railroad

The following variants have been suggested:

1. VARIANT A – the addition of one more track running along the existent railroad section Oštarije-Škrljevo with the modernisation and reconstruction of the existent track.
2. VARIANT B – the addition of the second track next to the existent one on the sections Oštarije-Skrad and Plase-Škrljevo, the construction of a new two-track railway on the section Skrad-Plase.
3. VARIANT C – the construction of a new two-track railway Skradnik-Krasnica-Tijani and the analysis of the necessity to retain the existent one-track railway Oštarije-Škrljevo.
4. VARIANT D – the construction of a new one-track railway Skradnik-Krasnica-Tijani with the retaining of the existent one-track railway Oštarije-Škrljevo.

By The Study of Feasibility issued in October 2021 the Variant C has been decided on – the construction of a new two-track railway Skradnik-Krasica-Tijani, with the analysis of the necessity to retain the existent one-track railway Oštarije-Škrljevo.



Source: Ministarstvo mora, prometa i infrastrukture

A new section of the railroad will mostly go through uninhabited or scarcely inhabited regions, with numerous tunnels and viaducts which will be the way to avoid frequent stopping of the trains.

As for passenger transport, it has been provided only on the terminals in Zagreb, Karlovac, Skradnik and Rijeka.

5. THE GOALS OF A NEW SECTION OF THE ZAGREB-RIJEKA RAILROAD ALONG THE MEDITERRANEAN CORRIDOR CONSTRUCTION

The main goals of a more efficient and competitive railway traffic along the Mediterranean corridor are:

- ❖ the elimination of the 'bottleneck' of the Mediterranean corridor,
- ❖ the connection of the basic network with Transeuropean networks,
- ❖ the improvement of railway services in freight and passenger transport,
- ❖ the shortening of travel time and the length of the section,
- ❖ the improvement of competitiveness and safety of railway transport,
- ❖ the creation of a single railway route on the Budapest-Zagreb-Rijeka section,
- ❖ the modernisation of all the subsystems of the railway infrastructure,
- ❖ the speed increase (from 75 km/h to 120 km/h-160 km-h),
- ❖ the introduction of technical elements according to TSI standards,
- ❖ the bridging of some distinctly unfavourable terrain conditions and geologically inconvenient ground,

- ❖ the cutting of costs of lower architecture of the existent railroad maintenance (landslides, rock slides) – frequent closing and reductions of the travel speed,
- ❖ the development of energy and eco-efficient system,
- ❖ the connection of harbour transport with railway transport
- ❖ the creation of a link with other railway projects in the period of Škrljevo-Rijeka-Jurdani i Karlovac-Oštarije section construction,
- ❖ achieving possibilities for connecting some future infrastructure projects such as Krasica-most Krk-Terminal Krk, Drežnica-Knin-Split and railway tunnel Istra.

6. THE BASIC TECHNICAL PARAMETERS OF THE RAILROAD M202 ON THE ROUTE OŠTARIJE-ŠKRLJEVO

Comparing to the existent railroad the building of a new section brings the improvement in terms of technical parameters of the railroad. The improvements are manifested in the following:

- ❖ two-track electrified railroad of 25kV and 50 Hz,
- ❖ the length of the section $L=72$ km
- ❖ speed $v=120-160$ km/h
- ❖ max. gradient $i=12,5\%$
- ❖ the load model D4 (22,5 t/m i 8 t/ax)
- ❖ 4 new stations (Josipdol, Drežnica, Ledenice, Krasica) and the reconstruction of two stations (Josipdol i Ogulin)
- ❖ technical specifications for interoperability TSI and circulation of trains 750 m long,
- ❖ the highest elevation point is 488,4 m.n.m. tunnel Kapela 2
- ❖ 11 tunnels of 52,8 km in total
- ❖ 8 viaducts 4,5 km in total,
- ❖ the length of stopping distance is 1 500 m (for speeds of 160 km/h)
- ❖ the minimal useful length of the platform in the stations for the reception of long-distance passenger trains is 400 m



Source: Ministarstvo mora, prometa i infrastrukture

For all the railroads on the territory of The Republic of Croatia a proposal of categories according to TSI has been given. Considering the fact that railroads are used for mixed transport, there are labels that are combination of transport codes for passenger transport and freight transport. In the charts that follow there are parameters, that is, basic conditions which are vital for interoperability, and they should be achieved on the modernised, reconstructed existent railroads, as well as on new railroads. Listed parameters are minimal values which should be met and it is, of course, possible to construct the railroads with bigger profiles, bigger axle loads, bigger speeds, and bigger useful lengths of the platforms with trains that are longer than those previously mentioned.

For the railroads of international transport the category P4 (P5) F2 with minimal parameters has been proposed:

Prometna oznaka	Slobodni profil	Osovinsko opterećenje (t)	Brzina na pruzi (km/h)	Korisna duljina perona (m) za putnički prijevoz / duljina vlaka za teretni prijevoz
Minimalni parametri učinka za putnički prijevoz				
P4	GB	22,5	120 – 200	200 – 400
P5	GA	20	80 – 120	50 – 200
Minimalni parametri učinka za teretni prijevoz				
F2	GB	22,5	100 – 120	600 – 1050

Source: The trade journal of Croatian society of traffic engineers : Željeznice 21

For the railroads of regional and local transport the category P5 F3 with minimal parameters has been proposed:

Prometna oznaka	Slobodni profil	Osovinsko opterećenje (t)	Brzina na pruzi (km/h)	Korisna duljina perona (m) za putnički prijevoz / duljina vlaka za teretni prijevoz
Minimalni parametri učinka za putnički prijevoz				
P5	GA	20	80 – 120	50 – 200
Minimalni parametri učinka za teretni prijevoz				
F3	GA	20	60 – 100	500 – 1050

Source: The trade journal of Croatian society of traffic engineers : Željeznice 21

7. ACTIVITIES AND THE STATUS OF THE PROJECT

The way of funding documentation development:

- The agreement about the allocation of grants CINEA – HŽI (European Climate, Infrastructure and Environment Executive Agency – HŽ Infrastruktura), the duration of implementation 14 Feb 2017. – 31 Oct 2021. The value of the agreement 1,97 mil. € (grants 85% 1,67 mil. €)

Activities:

1. the management of the project, promotion and visibility
 2. concept design and feasibility study (FS)
- The cost of development; The analysis of costs and benefits and The environmental impact studies up to € 0,5 mil. unacceptable cost – funding from the state budget necessary
 - The agreement on grants allocation CINEA – HŽI, the duration of implementation 01 Dec 2023. – 30 Nov 2025. The worth of the agreement € 5,80 mil. € (grants 85% 4,93 mil. €)

Activities:

1. the management of the project, transparency and visibility measures,
2. concept design and obtaining LD

The status of study documentation:

- 15 May 2020. The agreement No. 9/20-EU on creating study documentation signed (Concept designs, FS, CBA i SUO)

The creators of the study: The bidders' community: ŽPD d.d., Granova Ltd, INSTITUT IGH d.d. Rijekaprojekt Ltd., i IPZ Ltd.

The duration of the agreement from 15 May 2020. to 15 March 2024.

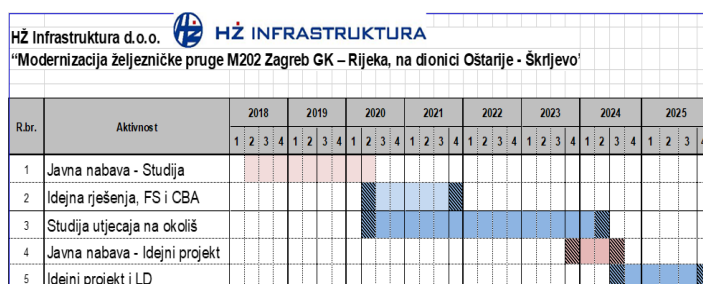
The value of the agreement: € 2 379 000, 00 without VAT.

- October 2021 Concept design, FS i CBA created – accepted by JASPERs and HŽI
- April 2023 SUO was created and The Procedure PUO launched – September 2023 1. session of the Committee for PUO

The status of the project documentation:

- 13 November 2023 Procurement procedure for Concept design creation launched – preliminary consultations in progress

8. DYNAMIC PLAN



Source: Ministarstvo mora, prometa i infrastrukture

9. CONCERNS CONNECTED TO THE PROJECT IMPLEMENTATION

Problems connected to the implementation of lowland railway project have existed for a long time because of the following reasons:

- ❖ demanding route in terms of geometric and high altitude elements laying – a considerable number of facilities: the terrain has mountain area features – long tunnel sections (The Kapela tunnel 2, L=14472 m).
- ❖ the scope of the project inside the environmentally protected area Natura 2000 – the execution of long-lasting terrain research during the Main assessment for the environmental acceptability creation procedure.
- ❖ Hierarchically uncoordinated documentation for spatial-planning between county and municipality/town level
- ❖ long-lasting administration processes for implementation of particular activities, e.g. SUO (Certificate of compliance with spatial-planning documentation, the procedure of Evaluation of the environmental impact, ...)
- ❖ abandoning the major part of the route section of the existent railway by the Managers of the railway infrastructure – the decision on a state level necessary – additional strategical/political/economical/regional monitoring of the decision on some other accompanying fields of traffic policy,
- ❖ introducing all the participants and general public/transparency of the Project with high financial investment.

10. THE IMPORTANCE OF THE PROJECT OF LOWLAND RAILWAY CONSTRUCTION

One of the vital arguments in favour of lowland railroad is the connection of Krk with a new industrial zone. It is about the location where, apart from JANAF, DINA petrochemicals is situated together with LNG terminal and a new container terminal of the harbour of Rijeka.

By crossing onto the island of Krk, the railroad will enable passenger transport from the airport to Rijeka and vice versa, and the whole region will be efficiently connected with the air transport system.

The station Omišalj will be the initial station on the lowland railroad Rijeka-Zagreb from the direction of Krk and a new container terminal.

The ratio between freight and passenger transport will be 70:30 or 80:20 which would mean that 70 (80)% will be dedicated to freight transport (which depends on the future capacity of the port, coastal traffic of Rijeka). The remaining percentage of 20 (30)% would relate only to long-distance passenger transport because local and suburban trains have not been taken into account.

The importance of lowland railroad construction has been discussed not only in Croatia, but also in other countries inside European Union because the basic data about geostrategical advantages of Kvarner show it is the fastest and the shortest naval route between Europe and Far East industrial giants Japan, China Korea and India

Željeznica	Rijeka	Koper	Trst	Hamburg	Rostock
Budimpešta	592	634	626	1406	1166
Bratislava	602	650	639	1022	980
Prag	806	854	810	686	644
Beč	580	599	584	990	984
Linz	557	549	517	911	923

Source: The trade journal of Croatian society of traffic engineers : Željeznice 21

A new lowland railroad Rijeka-Zagreb would end on the station Ivani, where it would be connected to the bulk terminal in Bakar, container terminal in Brajdica and some other terminals in the port. After the construction of the new railroad, the station Ivani and Krasica would take over a new function and become initial and final parts of the railroad. The station of Tijani will be a cross point for the new lowland railroad Rijeka -Zagreb and the existent Rijeka railroad and, at the same time, it will represent the initial point of the future Rijeka bypass Tijani-Opatija-Matulji.



Source: The trade journal of Croatian society of traffic engineers : Željeznice 21

Rijeka railway hub is still a bottleneck of Rijeka harbour. That's why the reconstruction of Rijeka railway system and creating of some new functional railway connections with the hinterland which will be in accordance with new insights into the railway transport technology and follow long-term development of Rijeka harbour system are of vital importance.

SOURCES

Source: <https://www.hzinfra.hr/izrada-tehnicke-dokumentacije-za-modernizaciju-zeljeznice-dionice-ostarije-skrljevo/>

Source: <https://mmpi.gov.hr/>

The trade journal of Croatian society of traffic engineers : Željeznice 21

Reference 52 – The reference about technical standards and the data for creating and implementation of the timetable

Eko dostava poštanskih pošiljaka

Jelena Miljanić, Buto Abdović
JU SSŠ "Ivan Uskoković" – Podgorica

Sadržaj:

U ovom radu je predstavljena ideja eko dostave, pod kojom se podrazumijeva primjena električnih bicikala u procesu dostave poštanskih pošiljaka. U kratkim crtama predstavljena je kompleksnost organizacije dostavnih reona, sa posebnim osvrtom na dostavne reone Pošte Crne Gore AD. U rad je opisana biciklistička infrastruktura Podgorice koja predstavlja jednu od bitnih osnova za buduću primjenu bicikala u dostavi. Takođe osvrnuli smo se na implementaciju električnih bicikla u dostavi u kompaniji "Hrvatske pošte".

Ključne riječi:

dostava, dostavno područje, dostavni reon, električno biciklo, biciklistička infrastruktura

Content:

This work presents the idea of eco-delivery, which implies the use of electric bicycles in the process of delivering postal items. The complexity of the organization of delivery areas is briefly presented, with a special focus on the delivery areas of the Post of Montenegro AD. The work describes the bicycle infrastructure of Podgorica, which represents one of the essential bases for the future use of bicycles in delivery. We also referred to the implementation of electric bicycles in delivery at the "Croatian Post" company.

Keywords:

delivery, delivery area, delivery region, electric bicycle, bicycle infrastructure

1. Uvod

Danas je svijet sve više suočen sa problemom zagađenja životne sredine i globalnim zagrijavanjem, što je dovelo do povećanja svijesti o ekologiji i u samom poštanskom sektoru.

Kako bi na adekvatan način odgovorio na novonastali problem i pokušao da ga što efikasnije riješi, Svjetski poštanski savez, ali i ostala kontinentalna, regionalna poštanska udruženja pa i sami poštanski operatori pojedinačno sprovode brojne strategije i projekte u cilju zaštite životne sredine.

Posebno je razumljiv ovakav način razmišljanja u poštanskom sektoru ako uzmemo u obzir da poštanska vozila prelaze milione kilometara dok sakupljaju i dostavljaju pošiljke i na taj način značajno povećavaju količinu štetnih gasova u atmosferi, što direktno utiče na tzv. efekat „staklene bašte“. Lepeza ekološki prihvatljivih ideja koje se danas sprovode u poštanskom sektoru širom svijeta je veoma široka, i takve ideje su zastupljene u svim fazama tehnološkog procesa prenosa poštanskih pošiljaka.

I u Podgorici kao i u većini većih gradova regiona saobraćaj u dnevnim gradskim uslovima danas karakterišu česte gužve i opterećenje mreže, što naravno negativno utiče na njegovo funkcionisanje kao i na samu životnu sredinu. Danas se dostava pošiljaka najviše obavlja motornim vozilima kao što su kamioni, kombi vozila, automobile, motociklima.

U ovom radu posvetiti ćemo se ideji eko dostave koja se već u našem region i pruža kroz manje kurirske službe a koja bi se veoma lako mogla primjeniti i u Podgorici kroz djelovanje kompanije Pošta Crne Gore AD.

2. Organizacija dostave poštanskih pošiljaka (dostavno područje i dostavni reon)

Dostava poštanskih pošiljaka predstavlja završnu fazu u procesu prenosa poštanskih pošiljaka, u kojoj se zahtjeva najveći obim uloženog rada i ostvaruje najintenzivniji kontakt sa korisnicima usluga. Pod dostavnim područjem podrazumijeva se područje na kojem se obavlja dostava poštanskih pošiljaka, i ono obuhvata prostornu cjelinu ograničenu jasnim geografskim oblastima ili građevinskim oblastima.

Dostavno područje organizuje se na osnovi posebne Odluke donesene po Uputstva za organizaciju dostavnog područja. Uputstvo sadrži kriterijume za organizovanje dostavnih područja i dimenzionisanje dostavnih reona. Dostavno područje ne mora striktno da prati administrativnu podjelu i uglavnom dostavno područje je identično sa područjem pošte.

Prema mjestu vršenja dostave razlikujemo:

- Urbano (gradsko) područje – karakteriše ga veće količina pošiljaka za dostavu,
- Ruralno (seosko) područje – karakteriše ga duži pređeni put u dostavi.

Prema tipu gradnje na samom dostavnom području možemo razlikovati:

- Područje sa visokogradnjom - podrazumjeva da na dostavnom reonu preovlađuju zgrade sa spratnošću preko četiri sprata.
- Područje sa niskogradnjom – podrazumjeva da na dostavnom reonu preovlađuju prizemni objekti (kuće) ili zgrade sa spratnošću do dva sprata.
- Područje sa mješovitom gradnjom - podrazumjeva da na dostavnom reonu preovlađuju zgrade sa spratnošću od dva do četiri sprata ili da se reon sastoji od kombinacije prizemnih objekata i zgrada sa spratnošću preko četiri sprata.

Različiti tipovi gradnje naselja različito deluju na parametre koji karakterišu dostavni reon. Tako na primjer visokogradnja bitno smanjuje zastupljenost pređenog puta kao parametra radnog angažovanja, a uvećava količinu pošiljaka na dostavi.

Prema konfiguraciji terena dostavnog područja razlikujemo:

- Ravničarski
- Brdovit
- Brdsko-planinski
- Planinski

Konfiguracija terena u dobroj mjeri može da ograniči pređeni put koji dostavljač prelazi za vrijeme vršenja dostave. Prirodne prepreke i nagib terena mogu ograničiti ili potpuno spriječiti prohodnost na nekim dostavnim područjima.

Prema organizaciji dostave razlikujemo

- Centralizovana dostava - svi dostavni reoni jednog dostavnog područja uključeni su u jednu jedinicu poštanske mreže (dostavnu poštu).
- Decentralizovana dostava - dostavno područje, jednog ili više naseljenih mjesta ili većih gradova dijeli na više dostavnih područja, odnosno više jedinica poštanske mreže (dostavnih pošta).

2.1. Dostavni reon

Dostavno područje pošte dijeli se na dostavne reone. Dostavni reon podrazumijeva područje na kojem poštomoša obavlja dostavu pošiljaka tokom jednog radnog dana. Organizacija dostavnih reona je složen proces kojim se želi postići ujednačavanje opterećenosti poštara, kvalitet dostave poštanskih pošiljaka i optimizacija troškova. Primjećeno je da utvrđivanje opštih kriterijuma za organizaciju dostavnih reona ne predstavlja adekvatan model za svako dostavno područje.

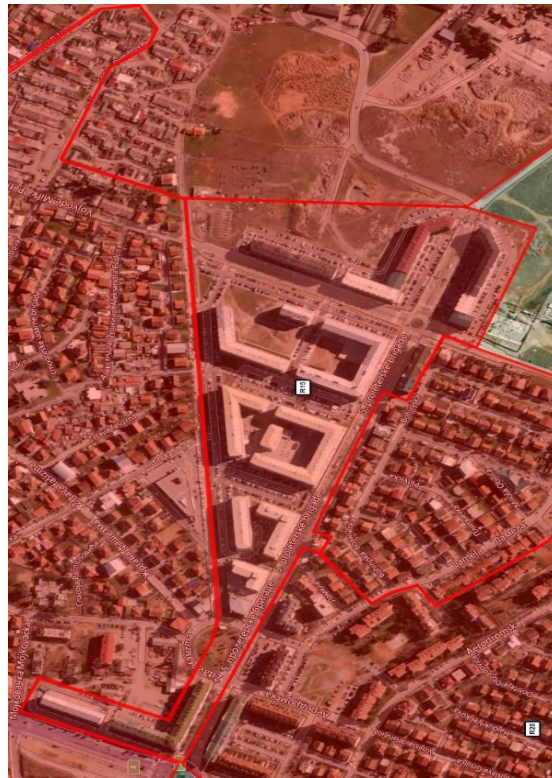
Dostavni reoni mogu biti: uži, širi, najširi i kombinovani. Pošta je obavezna da:

- na užem dostavnom području obavlja dostavu pošiljaka najmanje svaki radni dan, od ponedjeljka do petka,
- na širem dostavnom području obavlja dostavu poštanskih pošiljaka najmanje tri puta nedjeljno,
- na najširem dostavnom području obavlja dostavu poštanskih pošiljaka najmanje jedanput nedjeljno.

Dostavni reon je područje ili dio dostavnog područja gde se izvršavaju usluge dostave i prijema na kućnoj adresi. Prilikom organizovanja dostave u ruralnom i urbanom području potrebno je sagledati sledeće parametre:

- količinu pošiljaka za dostavu,
- gustinu domaćinstava,
- strukturu korisnika koji se opslužuju,
- topografiju terena,
- stanje puteva i staza,
- mogućnost korišćenja prevoznih sredstava,
- mogućnost uvođenja dostavnih depoa,
- mogućnost uvođenja zbirnih poštanskih, poštanskih i kućnih kovčežića.

Već ovakvo posmatranje reona može dati djelimičnu sliku o izgledu dobro ili loše organizovanog dostavnog područja. Međutim potpuno dobro organizovano područje mora da sadrži i dodatane analize koje će isključiti moguće greške pri ovakvom sagledavanju dostavnog područja.



Slika 1. Mapa dostavnog područja, za reon 15, 81000 Podgorica

2.2. Dostavni reoni Pošte Crne Gore

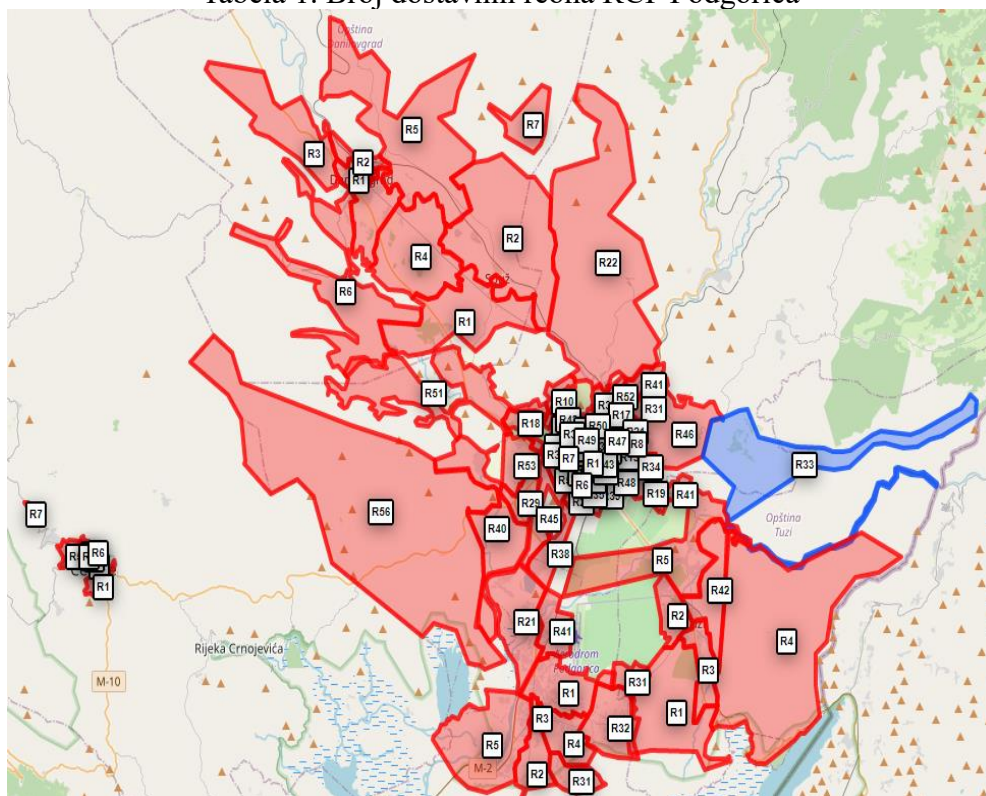
Pošta Crne Gore ima ukupno 271 dostavnih reona, koji se definišu na osnovu propisanih kriterijuma kao uža, šira, najšira i kombinovana. Od navedenih 271 dostavnih reona Pošte Crne Gore 134 su užeg tipa, 64 šireg, 12 najšireg i 60 kombinovanog tipa.

U sledećoj tabeli je prikazan broj reona na području Regionalnog poštanskog centra Podgorica, koji pokriva područja opština Podgorica, Golubovci, Tuzi, Danilovgrad i Cetinje.

RPC PODGORICA			
Broj pošte	Dostavne pošte	Opština	broj dostavnih reona
81000	Podgorica	PODGORICA	55
81304	Golubovci	ZETA	5
81206	Tuzi	TUZI	4
81410	Danilovgrad	DANILOVGRAD	5
81412	Spuž		2
81250	Cetinje	CETINJE	5

UKUPNO	76

Tabela 1. Broj dostavnih reona RCP Podgorica



Slika 2. Mapa dostavnih reona RCP Podgorica

Dostavni reon se u potpunosti definiše Putnim listom poštunoše. U Putnom listu poštunoše se unose slijedeći podaci:

- naziv Regionalnog Centra i dostavne pošte,
- broj reona i oznaka dostavnog područja,
- vrijeme polaska / povratka poštara-dostavljača u poštu,
- redosljed kretanja poštara-dostavljača,
- naziv naselja / ulice kroz koja prolazi poštar-dostavljač (opsezi ulica, sela, grupe kuća)
- rastojanje u kilometrima između / po naselju,
- koliko puta nedeljno se vrši dostava,
- dnevno pređeni put,
- obavljanje dostave pješke ili vozilom.

Poštar-dostavljač može imati samo jedan Putni list poštunoše. Putnim listom poštunoše definišu se sva dostavna područja koja obilazi u toku radne nedelje.

PUTNI LIST POŠTONOŠE REON 5

Vrijeme polaska iz pošte 9 časova										Vrijeme povratka u poštu 14 časova			
Redosled kretanja poštunoše po naselju-ulici		OPSEG		Ind. Opsega	PREĐENI PUT (KM)						Dani u kojima se vrši dostava	Dostavno područje	NAPOMENA
		od bi.	do bi.		Između naselja (dnevno)		Po naselju (dnevno)		Ukupno (Σ) (nedeljno)		<u>Legenda:</u> 1.svaki radni dan, 2.ponedjeljak, 3.utorak, 4.srijeda, 5.četvrtak, 6.petak, 7.subota	<u>Legenda:</u> 1.uže, 2.šire, 3.najšire	
					moped	pješke	moped	pješke	moped	pješke			
1		2	3	4	5	6	7	8	9	10	11	12	13
1	Od Pošte do Reona	/	/	/			1.30		7.85				
2	Marka Miljanova	4	70	2				1.14		6.84	1	1	
3	Vuka Karadžića	8 21	16 37	5				0.31		1.89	1	1	
4	Obala Ribnice	2 1	10 9	0				0.64		3.89	1	1	
5	Omladinskih brigade	2 1	18 7	0				0.40		2.45	1	1	
6	4 Proleterska	2 1	168 35	0				1.13		6.78	1	1	
7	Bul. Ivana Crnojevića	1	67	3				0.67		4.03	1	1	
8	Novaka Miloševa	403 7	62 45	5				0.42		2.54	1	1	
9	Hercegovačka (100)	/	/	4				0.13		0.79	1	1	
10	Od Reona do Pošte	/	/	/			1.40		8.45				
Σ							2.70	4.84	16.30	29.21			
Ukupno km 41.47 nedeljno svaga: pješke km 29.21 (nedeljno) x 100 % = 29.21 km (nedeljno). Moped km 16.30 (nedeljno) x 20% = 3.26 km (nedeljno)													
Ukupno km 6.91 dnevno Dodatak za pređeni put po zgradama i kućama 1.50 km (dnevno) x6 =9 km (nedeljno)													
Napomena: kolonu 4 Indikator opsega popunjavati sa sledećim indikatorima: 0- cijela ulica, 1- cijela neparna ulica, 2- cijela parna ulica, 3- dio neparne strane, 4- dio parne strane, 5- dio parne i neparne strane.													

Slika 3. Obrazac - Putni list poštunoše, za reon 5, 81000 Podgorica

Na poledini Putnog lista poštunoše unosi se Karta dostavnog područja reona sa ucrtanim granicama reona, hodogramom i površinom reona.

SPECIFIKACIJE CARGO E-prime bicikla	
Cijena	1 860 e
Ram	Aluminijum L veličina
Motor	Geared 250W
Displej	LCD u boji sa USB priključkom
Prednja suspenzija	Suntour XCR
Sedište	Komfort, crno
Točkov	prednji 26', zadnji 20'
Kočioni sistem	Shimano MT 400, diskovi 180mm
Menjač	Shimano Alivio M4000, 9 brzina
Pedale	ProWheel Pioneer
Baterija	Lithium-ion 48V, 700Wh
Sertifikat	EN 15194
Punjač	Inverterski 6A
Vreme punjenja potpuno prazne baterije	2,5 sata
Maksimalni domet	120 km
Maksimalna limitrana brzina	25 km/h
DODATNE OPCIJE: GPS sa sopstvenom baterijom, alarm, retrovizori (par), tektro - kočnice E530 sa ručnom kočnicom, bisage LxBxH 450x80x180mm, pizza-kutija 490x490x415mm (unutrašnje mere), baterija 930Wh, baterija 1200Wh, diskovi 203mm	

Tabela 2. Specifikacija CARGO E-prime bicikla



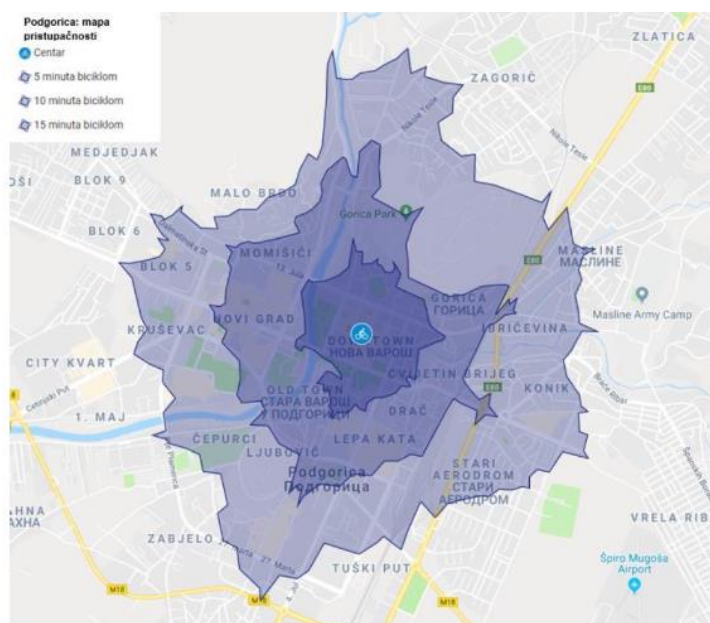
Slika 5. CARGO E- prime biciklo

Istraživači sa Univerziteta u Vestminsteru su GPS podatke da uporede rute koje voze teretni bicikli u Londonu sa rutama kojima bi kombiji morali da idu da bi dostavili iste pakete. Istraživanje je vršeno u saradnji sa logističkom kompanijom Pedal Me. U centralnom Londonu, teretni bicikli imaju veću prosječnu brzinu od kombija, dostavljajući skoro sedam paketa na sat u poređenju sa četiri za kombije. Rezultati pokazuju da su usluge koje pružaju teretni bicikli u Londonu 1,61 puta brže od usluga kombija. Ovi bicikli takođe smanjuju emisiju ugljenika za 90% u poređenju sa dizel kombijima i 33% u poređenju sa električnim kombijima. Kao rezultat toga, teretni bicikli mogu da služe kupcima efikasnije od kombija bez stvaranja mnogih negativnih efekata na klimu koje proizvodi gradski teretni transport.

3.1. Biciklistička infrastruktura u Podgorici

Biciklo je sve zastupljeniji vid transporta i u Podgorici, a tome je, pored promocije, nesumnjivo doprinijela biciklistička infrastruktura, koja je svoje obrise počela da dobija 2015. godine kada su izgrađene prve biciklističke staze. Od tada pa do danas stvorena je mreža biciklističkih saobraćajnica, koja omogućava stanovnicima i posjetiocima da voze biciklo po površinama namijenjenim isključivo ovom vidu mobilnosti.

Podgorica zbog svog ravnog reljefa i povoljnih klimatskih uslova predstavlja povoljno okruženje za upotrebu bicikla. Pored toga, Podgorica je zahvaljujući gustini naseljenosti relativno kompaktan grad, u kojem se gradska naselja šire ravnomjerno od centra prema obodima grada. To grad čini dodatno povoljnim mjestom za upotrebu bicikla, jer gotovo nijedno naselje u Podgorici nije udaljeno od centra grada više od 5 kilometara. Prema istraživanju koje je 2019. godine sproveo nevladino udruženje Biciklo.me, velika većina naselja u Podgorici udaljena je najviše 15 minuta vožnje biciklom od centra grada.



Slika 6: Mapa udaljenosti različitih djelova grada 5, 10 i 15 minuta biciklom

Danas Podgorica ima biciklističku mrežu koja iznosi ukupno 33,2 kilometara, računajući oba smjera kretanja.

Biciklističku mrežu Podgorice obuhvataju:

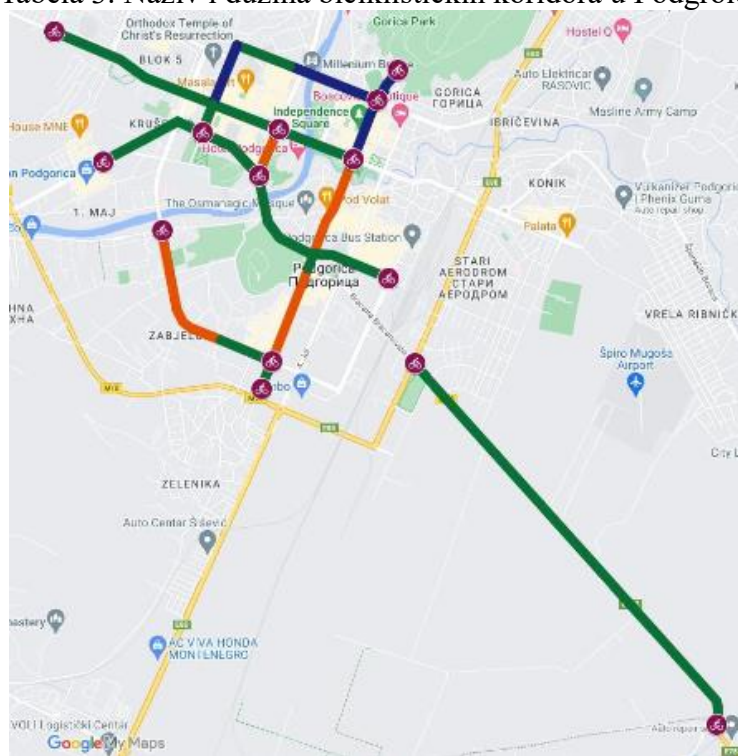
- Biciklističke staze - saobraćajnice namijenjene za kretanje bicikla i bicikla sa motorom, sa izgrađenom i uređenom kolovoznom konstrukcijom izvan profila puta i obilježene propisanom saobraćajnom signalizacijom. Biciklistička staza može biti izvedena kao jednosmjerna ili dvosmjerna, visinski ili na drugi način odvojena od kolovoza uz odgovarajuću širinu zaštitnog pojasa u odnosu na motorni saobraćaj.
- Biciklističke trake - su dio kolovoza namijenjen za saobraćaj bicikla i bicikla sa motorom, obilježena propisanom saobraćajnom signalizacijom. Biciklistička traka je od saobraćajne trake odvojena razdjelnom linijom.
- Biciklističko-pješačke staze – su dio saobraćajne površine namijenjen za kretanje biciklista i pješaka, izgrađena odvojeno od kolovoza obilježena propisanom saobraćajnom signalizacijom
- Puteva za mješoviti saobraćaj – su dio saobraćajne površine po kojoj se zajednički odvija biciklistički i motorni saobraćaj. Ove dionice puta u skladu obilježavaju se saobraćajnim

znakovima i oznakama na kolovozu kojima se vozači motornih vozila upozoravaju na pojavu biciklista u saobraćaju.

Izgradnja biciklističke mreže u Podgorici počela je 2015. godine, kada je izrađen prvi biciklistički koridor u gradu (Hotel Hilton – Bulevar Mihaila Lalića). Od tada je izgrađeno ukupno 7 biciklističkih koridora koji sada čine gradsku biciklističku mrežu.

Naziv koridora	Dužina u km
Ulica Kralja Nikole – Brdo Gorica	5,8 km
Hotel Hilton – Bulevar Mihaila Lalića	5,6 km
Sportski centar Morača – Bulevar Svetog Petra Cetinjskog	0,8 km
Bulevar Save Komavačevića – Delta City	6,4 km
Bulevar Ivana Crnojevića – Moskovska ulica	3,6 km
Ulica Ilije Plamenca – Ulica Kralja Nikole	3,2 km
Tuški put – Kanjon Cijevne	7,8 km
UKUPNO	33,2 km

Tabela 3. Naziv i dužina biciklističkih koridora u Podgorici



Slika 7. Mapa biciklističkih koridora u Podgorici

4. Regionalni primjer eko dostave - Hrvatske pošte

U cilju povećanja energetske efikasnosti u saobraćaju, Hrvatska pošta podnijela je prijavu na Javni poziv "Fonda za zaštitu okoliša i energetske učinkovitost" svojim projektom "Poboljšanje energetske učinkovitosti uvođenjem električnih bicikala u poštanski promet". Taj je projekt prepoznao Fond te je odobreno sufinanciranje nabavke 180 električnih bicikala. Vrijednost ulaganja u nabavku bicikala iznosi 492 000 eura od čega su opravdani troškovi u iznosu od 301 091 euro, a "Fond za zaštitu okoliša i energetske učinkovitost" sufinancirao je iznos od 150 000 eura. Prije uvođenja e bicikala u svoj vozni park Hrvatske pošte su učestvovala u projektu "PRO E-BIKE" koji je vodio Institut Hrvoje Požar, gdje su testirani električni bicikli i ustanovljena je opravdanost ulaganja u njihovu kupovinu.

Pokazatelj	prosj.mj.
Broj dana rada e-bicikla	21

Broj dostavljenih pošiljaka	12092
Prosječni broj pošiljaka po dostavnoj točki	1,8
Prosje. udaljenost u km prijeđena po dostavljenoj pošiljci	0,02
Ukupni prijeđeni broj km	351
Broj dostavnih točaka	9019
Broj punjenja baterije	19
Prosječno vrijeme punjenja po danu (h)	6
Prosječno prijeđeno km po danu	17
Prosječno vrijeme trajanja rada po danu (h)	5,7
Prosječna brzina vožnje (km/h)	16,2
Prosječna masa pošiljaka za dostavu po danu (kg)	30
Prosječni volumen pošiljaka za dostavu po danu (m3)	0,4
Prosječna udaljenost praznog hoda po danu (km)	1,9

Tabela 4. Testni podaci Hrvatskih pošta za e-biciklo FreeDuck2

Nakon sprovedene analize i vrlo dobrih rezultata – smanjenje CO₂, financijske uštede, pozitivne reakcije poštara i dobrih logistički pokazatelji – odlučeno je pokrenuti nabavku 180 električnih bicikala. Procjena godišnje uštede (jedan električni bicikl zamijenit će jedan benzinski moped) iznosi oko 900 eura po vozilu. Nakon zamjene 180 mopeda sa 180 električnih bicikala procjena ukupne uštede u troškovima iznosi 86,52%. Ekološka prednost je u tome što će se zamjenom smanjiti emisija CO₂ za 100,31 tonu godišnje.

Električni bicikli FreeDuck 2 nastali su saradnjom kompanija Ducati komponenti d.o.o. i slovenskog proizvođača bicikala Krpan. FreeDuck 2 ima Ducatijev motor snage 250 W i postiže maksimalnu brzinu od 25 km/h. Baterija je litij-ionska i s jednim punjenjem može preći minimalno 60 kilometara. Za punjenje baterije potrebna su tri sata, a bicikli će se puniti u poštama širom Hrvatske u koje su raspoređeni. Nosivost bicikla (vozač i teret) je 200 kilograma. Električni bicikli ovih performansi zamijenit će bez problema mopede na reonima do 35 kilometara. Uporedno s isporukom bicikala, kompanija Ducati komponenti d.o.o. vršila je i obuku poštara na terenu kako bi znali što bolje iskoristiti sve pogodnosti električnog bicikla.



Slika 8. E biciklo Hrvatske Pošte, FreeDuck 2

5. Zaključak

Danas se svijet suočava sa sve većim izazovima u pogledu klime, zdravlja i upotrebe resursa, biciklo predstavlja važan instrument u poboljšanju kvaliteta života u urbanim sredinama. Kako se radi o

zdravom, pristupačnom, ekološkom i efikasnom vidu transporta, biciklo postaje sve popularnije prevozno sredstvo u gradovima zahvaljujući brojnim prednostima koje pruža.

Kada je riječ o primjeni bicikala i električnih bicikala u dostavi poštanskih pošiljaka postoji mnogo uspješnih primjera njihove primjene u svijetu ali i kod nas u regionu. Naravno nije jednostavno uspješne primjere iz svijeta i okruženja primjeniti i kod nas po sistemu copy/paste, već treba uvažiti i specifičnosti samog područja na kojem se organizuje koncept eko dostave poštanskih pošiljaka. Zbog toga je u radu i predstavljena kompleksnost organizacije dostavnih reona, što predstavlja poseban problem u urbanizovanim sredinama koje se svakodnevno šire i naseljavaju.

Takođe u radu posebno smo se osvrnuli na Podgoricu koja od 2015 godine, značajno ulaže u svoju biciklističku infrastrukturu koja predstavlja značajnu osnovu za dalji razvoj koncepta eko dostave poštanskih pošiljaka. Pored infrastrukture kada je riječ o električnim biciklima na tržištu ima veoma veliki broj tehničkih rješenja koji se lako mogu prilagoditi potrebama poštanskog operatora.

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- <https://e-prime.com/cargo>

Eco delivery of postal items

Jelena Miljanić, Buto Abdović
JU SSS "Ivan Uskoković" – Podgorica

Content:

This work presents the idea of eco-delivery, which implies the use of electric bicycles in the process of delivering postal items. The complexity of the organization of delivery areas is briefly presented, with a special focus on the delivery areas of the Post of Montenegro AD. The work describes the bicycle infrastructure of Podgorica, which represents one of the essential bases for the future use of bicycles in delivery. We also referred to the implementation of electric bicycles in delivery at the "Croatian Post" company.

Keywords:

delivery, delivery area, delivery district, electric bicycle, bicycle infrastructure

1. Introduction

Today, the world is increasingly faced with the problem of environmental pollution and global warming, which has led to an increase in environmental awareness in the postal sector itself.

In order to adequately respond to the emerging problem and try to solve it as efficiently as possible, the Universal Postal Union, as well as other continental and regional postal associations and the postal operators themselves individually implement numerous strategies and projects aimed at environmental protection. This way of thinking is particularly understandable in the postal sector if we take into account that postal vehicles cover millions of kilometers while collecting and delivering parcels and thus significantly increase the amount of harmful gases in the atmosphere, which directly affects the so-called "greenhouse" effect. The range of environmentally friendly ideas that are implemented today in the postal sector around the world is very wide, and such ideas are represented in all stages of the technological process of the transfer of postal items.

In Podgorica, as well as in most of the larger cities of the region, traffic in daily city conditions is characterized by frequent congestion and network load, which of course has a negative effect on its functioning as well as on the environment itself. Today, shipments are mostly delivered by motor vehicles such as trucks, vans, cars, and motorcycles.

In this work, we will devote ourselves to the idea of eco-delivery, which is already provided in our region through smaller courier services, and which could very easily be applied in Podgorica through the activities of the company Pošta Crne Gore AD.

2. Organization of delivery of postal items (delivery area and delivery district)

The delivery of postal items represents the final stage in the process of transferring postal items, in which the greatest amount of work is required and the most intensive contact with service users is achieved.

The delivery area means the area where postal items are delivered, and it includes a spatial unit limited by clear geographical areas or construction areas.

The delivery area is organized on the basis of a special Decision made according to the Instructions for the organization of the delivery area. The instructions contain criteria for organizing delivery areas and sizing delivery areas. The delivery area does not have to strictly follow the administrative division and for the most part the delivery area is identical to the postal area.

According to the place of delivery, we differentiate:

- Urban (city) area - it is characterized by a larger amount of items for delivery,
- Rural (village) area - it is characterized by a longer delivery route.

According to the type of construction in the delivery area itself, we can differentiate:

- Area with high-rise buildings - implies that the delivery area is dominated by buildings with a height of more than four floors.
- Area with low-rise construction - implies that the delivery area is dominated by single-story buildings (houses) or buildings with a height of up to two floors.
- Area with mixed construction - implies that the delivery area is dominated by buildings with a height of two to four floors or that the area consists of a combination of single-story buildings and buildings with a height of more than four floors.

Different types of settlement construction have different effects on the parameters that characterize the delivery area. Thus, for example, high-rise construction significantly reduces the representation of distance traveled as a parameter of work engagement, and increases the amount of shipments on delivery.

According to the terrain configuration of the delivery area, we differentiate:

- Plains,
- Hilly,
- Hilly and mountainous,
- Mountainous.

The configuration of the terrain can to a good extent limit the distance covered by the delivery person during the delivery. Natural obstacles and the slope of the terrain can limit or completely prevent passability in some delivery areas.

We differentiate according to the delivery organization

- Centralized delivery - all delivery areas of one delivery area are included in one unit of the postal network (delivery post),
- Decentralized delivery - the delivery area of one or more populated places or larger cities is divided into several delivery areas, i.e. several units of the postal network (delivery post offices).

b. Dostavni reon

The postal delivery area is divided into delivery district. The delivery district means the area where the postman delivers parcels during one working day. The organization of delivery district is a complex process aimed at equalizing the workload of postmen, the quality of delivery of postal items and cost optimization. It was noticed that the establishment of general criteria for the organization of delivery region does not represent an adequate model for every delivery region. Delivery district can be: narrow, wider, widest and combined. The post office is obliged to:

- in the narrow delivery district, delivers postal items at least every working day, from Monday to Friday,
- delivers postal items at least three times a week in the wider delivery district,
- delivers postal items at least once a week in the widest delivery district.

The delivery district is the area or part of the delivery area where delivery and reception services are performed at the home address. When organizing delivery in rural and urban areas, it is necessary to consider the following parameters:

- quantity of items to be delivered,
- household density,

- the structure of users served,
- terrain topography,
- condition of roads and trails,
- the possibility of using means of transport,
- the possibility of introducing delivery depots,
- the possibility of introducing collective postal, postal and household boxes.

Even this observation of the district can give a partial picture of the appearance of a well or poorly organized delivery district. However, a completely well-organized area must also contain additional analyzes that will exclude possible errors in such a case overview of the delivery area.

Figure 1. Map of the delivery area, for district 15, 81000 Podgorica



c. Delivery district of the Post of Montenegro

Post of Montenegro has a total of 271 delivery district, which are defined on the basis of prescribed criteria as narrow, wider, widest and combined. Of the mentioned 271 delivery district of the Post of Montenegro, 134 are of the narrow type, 64 of the wider type, 12 of the widest type and 60 of the combined type.

The following table shows the number of districts in the area of the Podgorica Regional Postal Center, which covers the areas of the municipalities of Podgorica, Golubovci, Tuzi, Danilovgrad and Cetinje.

RPC PODGORICA			
Post office number	Delivery post office	Municipality	Number of delivery areas
81000	Podgorica	PODGORICA	55
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81206	Tuzi	TUZI	4
81410	Danilovgrad	DANILOVGRAD	5
81412	Spuž		2
81250	Cetinje	CETINJE	5

UKUPNO	76

Table 1. Number of delivery district of RCP Podgorica

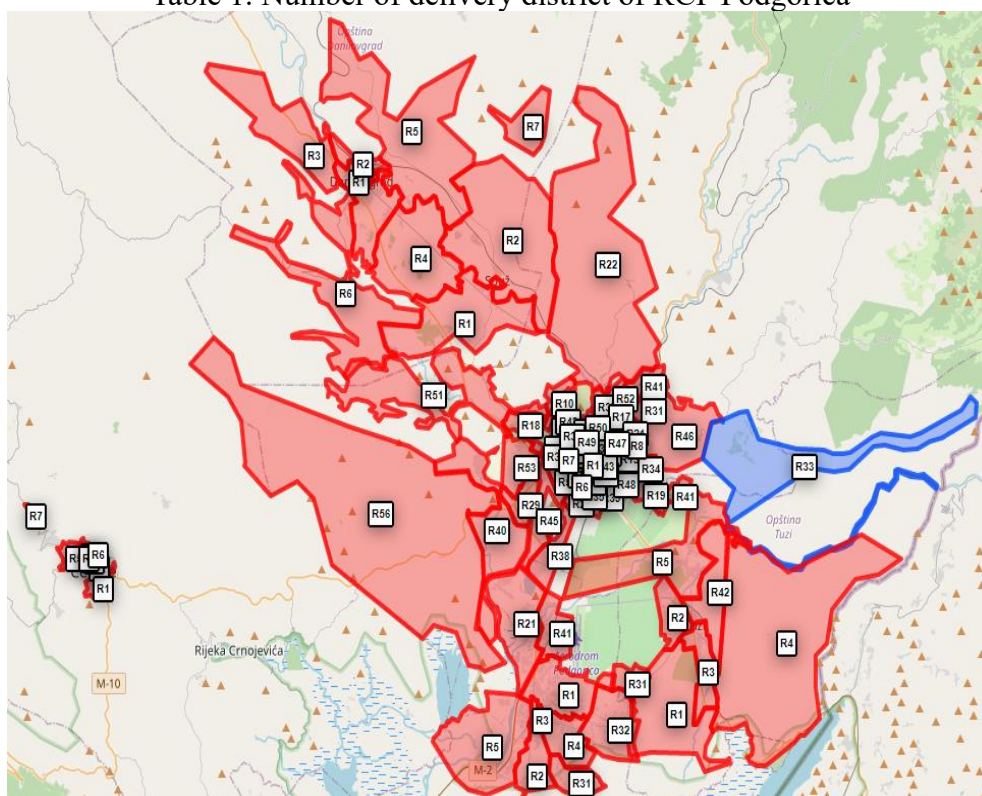


Figure 2. Map of delivery district of RCP Podgorica

The delivery district is fully defined by the Postman's travel card. The following information is entered in the postman's waybill:

- the name of the Regional Center and delivery post office,
- region number and delivery area code,
- time of departure / return of the postman-deliverer to the post office,
- order of movement of the postman-deliverer,
- the name of the settlement / street through which the postman-deliveryman passes (areas of streets, villages, groups of houses)
- distance in kilometers between / per settlement,
- how many times a week are deliveries made,
- daily distance covered,
- delivery on foot or by vehicle.

A postman-deliverer can have only one Postman's Travel Card. The postman's travel list defines all the delivery district he visits during the working week.

PUTNI LIST POŠTONOŠE REON 5

Vrijeme polaska iz pošte 9 časova				Vrijeme povratka u poštu 14 časova									
Redosled kretanja poštunoše po naselju-ulici	OPSEG		Ind. Opsega	PREĐENI PUT (KM)						Dani u kojima se vrši dostava	Dostavno područje	NAPOMENA	
	od bi.	do bi.		Između naselja (dnevno)	Po naselju (dnevno)		Ukupno (Σ) (nedeljno)						
					moped	pješke	moped	pješke	moped				pješke
1	2	3	4	5	6	7	8	9	10	11	12	13	
1 Od Pošte do Reona	/	/	/			1.30		7.85					
2 Marka Miljanova	4	70	2				1.14		6.84	1	1		
3 Vuka Karadžića	8 21	16 37	5				0.31		1.89	1	1		
4 Obala Ribnice	2 1	10 9	0				0.64		3.89	1	1		
5 Omladinskih brigade	2 1	18 7	0				0.40		2.45	1	1		
6 4 Proleterska	2 1	168 35	0				1.13		6.78	1	1		
7 Bul. Ivana Crnojevića	1	67	3				0.67		4.03	1	1		
8 Novaka Miloševa	403 7	62 45	5				0.42		2.54	1	1		
9 Hercegovačka (100)	/	/	4				0.13		0.79	1	1		
10 Od Reona do Pošte	/	/	/			1.40		8.45					
Σ						2.70	4.84	16.30	29.21				
Ukupno km 41.47 nedeljno svaga: pješke km 29.21 (nedeljno) x 100 % = 29.21 km (nedeljno). Ukupno km 6.91 dnevno Moped km 16.30 (nedeljno) x 20% = 3.26 km (nedeljno) Dodatak za pređeni put po zgradama i kućama 1.50 km (dnevno) x6 =9 km (nedeljno)													
Napomena: kolonu 4 Indikator opsega popunjavati sa sledećim indikatorima: 0- cijela ulica, 1- cijela neparna ulica, 2- cijela parna ulica, 3- dio neparne strane, 4- dio parne strane, 5- dio parne i neparne strane.													

Picture 3. Form - Postman's travel card, for district 5, 81000 Podgorica
Na poledini Putnog lista poštunoše unosi se Karta dostavnog područja reona sa ucrtanim granicama reona, hodogramom i površinom reona.



Površina reona 5 = 0,215km²

Figure 4. Map of the delivery district, for district 5, 81000 Podgorica

3. Delivery of parcels by bicycle

Freight transport around the world contributes significantly to climate change. City freight transport is one of the key aspects of every city's economy. In urban areas, delivery vehicles contribute to the deterioration of the quality of public space, air quality and the safety of other road users. Modern cities need solutions to reduce external costs such as congestion, pollution and others, which have increased in the last few years, especially due to the increase in the supply of goods.

The challenges described above led to the formulation of the concept of "green logistics". This idea intends to replace currently used vehicles with SUS technologies with zero emission such as electric vehicles, cargo bikes, hybrid vehicles, etc.

The current situation in delivery traffic in the interior of cities is such that more than 90% of goods are transported with motorized means of transport, ranging from motorcycles and cars to smaller trucks. One of the biggest problems is that small packages and light goods are transported by trucks, completely ignoring the fact that every other trip in urban areas is less than five kilometers and can easily be done by bicycle. If we take into account the length of the trip and the possibility of a chain of trips, there is still the possibility of switching 25% of all trips from motor vehicles to bicycle solutions.

Using bicycles as a new way of transporting goods in urban areas implies a reduction in energy consumption (petroleum derivatives) and a complete reduction in the emission of harmful gases.

The basic goals that will be achieved by using bicycles in delivery are:

- Lower energy consumption
- Reduction of traffic jams in cities
- Noise reduction
- Reduction of harmful gas emissions
- Maximum use of bicycle paths
- Increasing green areas and space for citizens to move around
- Overall increase in the quality of life in urban areas

SPECIFICATIONS of the CARGO E-prime bike	
Price	1 860 e
Frame	Aluminum L size
Motor	Geared 250W
Display	Color LCD display with USB port
Front suspension	Suntour XCR
Seat	Comfort, black
Wheel	Front 26', rear 20'
Brake system	Shimano MT 400, discs 180mm
Gearbox	Shimano Alivio M4000, 9 speeds
Pedals	ProWheel Pioneer
Battery	Lithium-ion 48V, 700Wh
Certificate	EN 15194
Charger	Inverter 6A
Charging time for a completely empty battery	2,5 h
Maximum range	120 km
Maximum limited speed	25 km/h
ADDITIONAL OPTIONS: GPS with its own battery, alarm, mirrors (pair), tektro brakes E530 with manual brake, saddlebags LxWxH 450x80x180mm, pizza box 490x490x415mm (internal dimensions), battery 930Wh, battery 1200Wh, discs 203mm	

Table 2. Specification of the CARGO E-prime bicycle



Slika 5. CARGO E- prime biciklo

Researchers from the University of Westminster used GPS data to compare the routes taken by cargo bikes in London with the routes vans would have to take to deliver the same packages. The research was carried out in cooperation with the logistics company Pedal Me. In Central London, cargo bikes have a higher average speed than vans, delivering almost seven parcels an hour compared to four for vans. The results show that cargo bike services in London are 1.61 times faster than van services. These bikes also reduce carbon emissions by 90% compared to diesel vans and 33% compared to electric vans. As a result, cargo bikes can serve customers more efficiently than vans without creating many of the negative effects on the climate that urban freight transport produces.

a. Bicycle infrastructure in Podgorica

Bicycling is an increasingly common mode of transport in Podgorica, and this, in addition to promotion, was undoubtedly contributed by the cycling infrastructure, which began to take shape in 2015, when the first cycling paths were built. From then until today, a network of bicycle roads has been created, which enables residents and visitors to ride bicycles on surfaces intended exclusively for this type of mobility.

Due to its flat relief and favorable climatic conditions, Podgorica is a favorable environment for the use of bicycles. In addition, due to the population density, Podgorica is a relatively compact city, in which urban settlements spread evenly from the center to the outskirts of the city. This makes the city an additional favorable place for using a bicycle, because almost no settlement in Podgorica is more than 5 kilometers away from the city center. According to research conducted in 2019 by the non-governmental association Biciklo.me, the vast majority of settlements in Podgorica are at most 15 minutes away by bike from the city center.

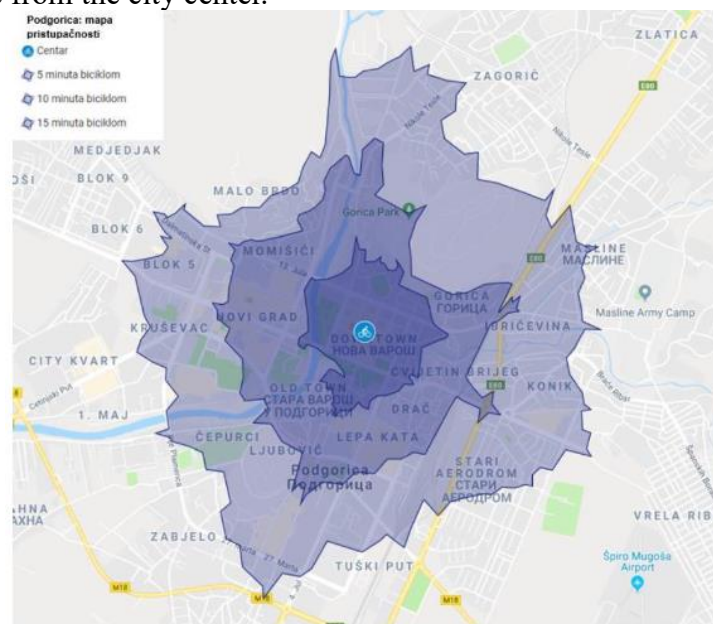


Figure 6: Map of distances of different parts of the city 5, 10 and 15 minutes by bike
Today, Podgorica has a bicycle network totaling 33.2 kilometers, counting both directions of movement.

The cycling network of Podgorica includes:

- Bicycle paths - roads intended for the movement of bicycles and bicycles with a motor, with a built and arranged pavement structure outside the road profile and marked with prescribed traffic signals. The bicycle path can be designed as one-way or two-way, separated from the road in height or in some other way with the appropriate width of the protective belt in relation to motor traffic.
- Bicycle lanes - are the part of the road intended for the traffic of bicycles and motorized bicycles, marked with prescribed traffic signals. The bicycle lane is separated from the traffic lane by a dividing line.
- Bicycle and pedestrian paths - are part of the traffic surface intended for the movement of cyclists and pedestrians, built separately from the road and marked with prescribed traffic signals
- Roads for mixed traffic - are a part of the traffic surface on which bicycle and motor traffic take place together. These sections of the road are accordingly marked with traffic signs and

markings on the carriageway, which warn motor vehicle drivers about the appearance of cyclists in traffic.

The construction of the cycling network in Podgorica began in 2015, when the first cycling network was built corridor in the city (Hotel Hilton – Bulevar Mihaila Lalića). Since then, a total of 7 bicycle corridors have been built, which now make up the city's bicycle network.

Corridor name	Length in km
Kralja Nikole Street - Brdo Gorica	5,8 km
Hotel Hilton – Bulevar Mihaila Lalića	5,6 km
Morača Sports Center - St. Peter Cetinjsko Boulevard	0,8 km
Bulevar Save Kovačevića – Delta City	6,4 km
Ivan Crnojević Boulevard - Moskovska Street	3,6 km
Ilije Plamenca Street - Kralja Nikola Street	3,2 km
Tuški road - Cijevna Canyon	7,8 km
UKUPNO	33,2 km

Table 3. Name and length of bicycle corridors in Podgorica

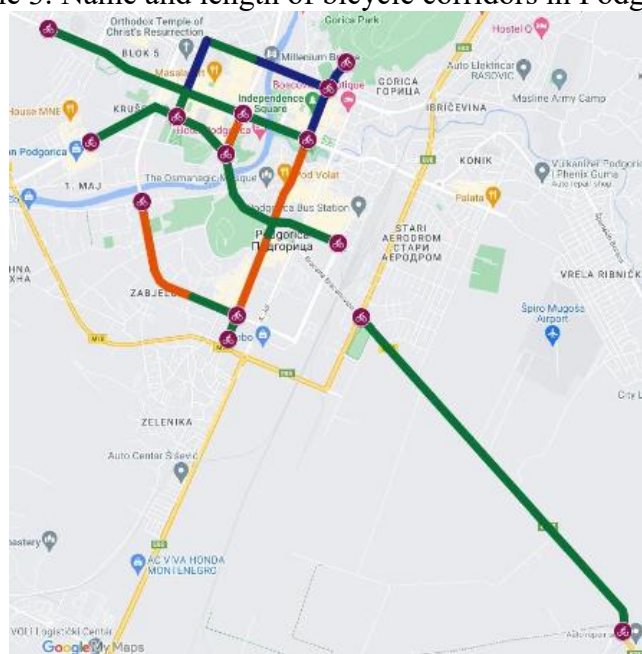


Figure 7. Map of the bicycle corridors in Podgorica

4. Regional example of eco-delivery - Croatian Post

In order to increase energy efficiency in traffic, Croatian Post submitted an application to the Public Call of the "Environmental Protection and Energy Efficiency Fund" with its project "Improving energy efficiency by introducing electric bicycles in postal traffic". This project was recognized by the Fund and co-financing of the purchase of 180 electric bicycles was approved. The value of the investment in the purchase of bicycles is 492,000 euros, of which 301,091 euros are justified expenses, and the "Environmental Protection and Energy Efficiency Fund" co-financed the amount of 150,000 euros. Before the introduction of e-bikes into its vehicle fleet, Hrvatske pošte participated in the "PRO E-BIKE" project led by the Hrvoje Požar Institute, where electric bikes were tested and the justification of investing in their purchase was established.

Indicator	average month
Number of days of e-bike operation	21

Number of delivered items	12092
Average number of shipments per delivery point	1,8
Avg. distance in km traveled per delivered shipment	0,02
The total number of km traveled	351
Number of delivery points	9019
Number of battery charges	19
Average charging time per day (h)	6
Average km traveled per day	17
Average duration of work per day (h)	5,7
Average driving speed (km/h)	16,2
Average mass of shipments for delivery per day (kg)	30
Average volume of shipments for delivery per day (m3)	0,4
Average idling distance per day (km)	1,9

Table 4. Test data of the Croatian Post Office for the FreeDuck2 e-bike

After the analysis and very good results - reduction of CO₂, financial savings, positive reactions of postmen and good logistics indicators - it was decided to start the procurement of 180 electric bicycles. Estimated annual savings (one electric bicycle will replace one gasoline moped) is around 900 euros per vehicle. After replacing 180 mopeds with 180 electric bicycles, the estimate of total cost savings is 86.52%. The environmental advantage is that the replacement will reduce CO₂ emissions by 100.31 tons per year.

The FreeDuck 2 electric bikes were created in collaboration with Ducati components d.o.o. and Slovenian bicycle manufacturer Krpan. The FreeDuck 2 has a 250 W Ducati motor and reaches a maximum speed of 25 km/h. The battery is lithium-ion and can travel at least 60 kilometers with one charge. It takes three hours to charge the battery, and the bikes will be charged at the post offices around Croatia where they are assigned. The bicycle's carrying capacity (rider and load) is 200 kilograms. Electric bicycles of this performance will easily replace mopeds on distances of up to 35 kilometers. In parallel with the delivery of bicycles, the company Ducati components d.o.o. she also trained postmen in the field so that they know how to make the best use of all the advantages of the electric bicycle.



Figure 8. E-bike of Croatian Post, FreeDuck 2

5. Conclusion

Today, the world is facing increasing challenges in terms of climate, health and the use of resources, the bicycle is an important instrument in improving the quality of life in urban areas. As it is a healthy,

accessible, ecological and efficient form of transport, the bicycle is becoming an increasingly popular means of transport in cities thanks to the many advantages it provides.

When it comes to the use of bicycles and electric bicycles in the delivery of postal items, there are many successful examples of their use in the world, but also in our region. Of course, it is not easy to apply successful examples from the world and the environment in our country using the copy/paste system, but the specifics of the area itself, where the concept of eco-delivery of postal items is organized, should also be taken into account. For this reason, the paper also presents the complexity of the organization of delivery areas, which represents a special problem in urbanized environments that are expanding and being populated every day.

Also in the paper, we specifically referred to Podgorica, which since 2015 has been investing significantly in its cycling infrastructure, which represents a significant basis for the further development of the concept of eco-delivery of postal items. In addition to the infrastructure, when it comes to electric bicycles, there is a very large number of technical solutions on the market that can easily be adapted to the needs of the postal operator.

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- <https://eihp.hr/en/seminar-o-mogucnostima-koristenja-elektricnih-bicikla-i-skutera-za-dostavu-roba-i-usluga/>
- <https://e-prime.com/cargo>

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POLNJENJE ELEKTRIČNIH VOZIL



XIV. MEĐUNARODNI SIMPOZIJUM

„INTERDISCIPLINARNOST LOGISTIKE I SAOBRAĆAJA“

03. – 04. oktobar 2024.godine
SARAJEVO, BOSNA I HERCEGOVINA



ORGANIZATOR SIMPOZIJUMA:

JU SREDNJA ŠKOLA ZA SAOBRAĆAJ I KOMUNIKACIJE SARAJEVO
Velešići br.2, 71000 Sarajevo, BiH

POVZETEK

V prispevku so prikazani najbolj pogosti standardizirani načini polnjenja električnih vozil. Največ standardizacije je dosežene na področju osebnih vozil. Na področju tovornih vozil pa se standardizacija in načini polnjenja, šele razvijajo in pripravljajo. Pomen standardizacije in poenotenje polnjenja električnih vozil je v pocenitvi in poenostavitvi polnjenja električnih vozil, ki naj bi v prihodnosti prevladala na naših cestah. Prikazani so načini polnjenja, oprema za polnjenje in vrste polnilnih postaj. Namen prispevka je pomoč in edukacija bližajoči se elektrifikaciji in spodbuda k širitvi sheme polnilnih postaj.

KLJUČNE BESEDE

EV – električno vozilo, polnilnica, električni priključek, polnilne postaje, kabli, vtikači, pametna polnilnica.

1. UVOD

Evropski parlament je februarja 2023 potrdil prepoved prodaje avtomobilov in lahkih gospodarskih vozil z bencinskim ali dizelskim motorjem od leta 2035. S tem zakonom se vsakodnevno povečuje količina EV. Prav tako pa narašča potreba po polnjenju električnih vozil. Ponekod že primanjkuje ustrezne polnilne infrastrukture za električna vozila, predvsem vzdolž cestnih omrežij, kar predstavlja omejitev v večini držav EU že danes. Po podatkih Evropskega združenja proizvajalcev avtomobilov (ACEA), 6 držav EU nima niti enega polnilnega mesta na 100 km ceste. 17 držav ima manj kot 5 polnilnih mest na 100 km ceste, le 5 pa jih ima več kot 10 polnilnic na vsakih 100 km cest. Prav tako je velika razlika med državami z največ polnilnicami na 100 km ceste in tistimi z najmanj. Na Nizozemskem je na primer ena polnilnica na vsakih 1,5 km ceste, medtem ko ima Poljska, ki je osemkrat večja, samo eno polnilnico na vsakih 150 km. Slovenija ima 3,3 polnilnice na 100 km ceste.

1. VRSTE EV

Vrste električnih avtomobilov (EV)

Električne avtomobile oziroma električna vozila predstavljajo avtomobili, avtobusi, štirikolesniki, motocikli, mopedi, skuterji ali tricikli in druga električna vozila, ki so po svoji funkciji namenjeni vožnji po javnih cestah ali drugih javnih površinah.

Razlikujejo se po načinu pogona:

- **Popolnoma električna vozila**, katerih pogonski sklop je elektromotor. Baterije se polnijo iz zunanjega omrežja in z regeneracijo energije ob zaviranju.
- **Hibridna vozila**, katerih pogonski sklop je elektromotor (serijska hibridna vozila) ali elektromotor in motor z notranjim izgorevanjem (paralelna hibridna vozila). Baterije se polnijo iz alternatorja, gnanega z motorjem z notranjim izgorevanjem in z regeneracijo energije ob zaviranju.

- **Priključna hibridna vozila**, pri katerih je pogonski sklop enak kot pri hibridnih vozilih, le da je polnjenje baterij možno tudi iz zunanjega omrežja.
- **Električna vozila s pogonom na gorivne celice**, pri katerih je pogonski sklop elektromotor. Baterije se polnijo iz gorivnih celic in z regeneracijo energije ob zaviranju.

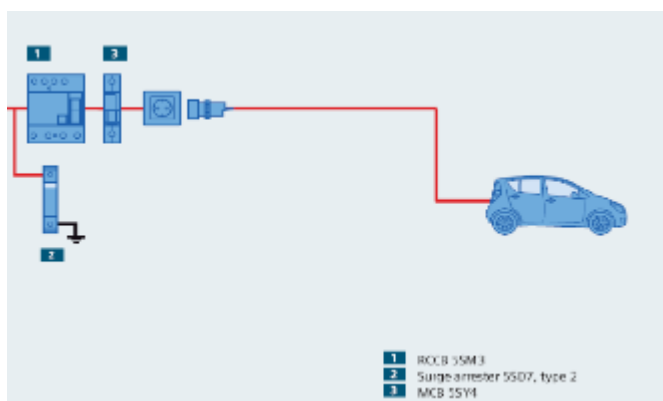
2. NAČINI POLNJENJA EV

Polnjenje akumulatorja električnega vozila se največkrat izvaja neposredno iz omrežja.

V Evropi se uporablja standard »IEC 62196 Plugs, socket-outlets, vehicle couplers and vehicle inlets – Conductive charging of electric vehicles«, opredeljuje več načinov polnjenja.

2.1 Počasno polnjenje, primerno za manjša e-vozila

Polnjenje z izmeničnim (AC) tokom preko eno- ali trifaznih vtičnic, podobnih hišnim vtičnicam, najvišji tok (3 x) 16 A, z maksimalno močjo polnjenja 3,7 kW (11 kW pri trifaznem napajanju) – npr. šuko, industrijska vtičnica. Usmernik vgrajen v vozilo, ki pretvarja izmenično napetost v enosmerno. Čas polnjenja: 11-12 ur



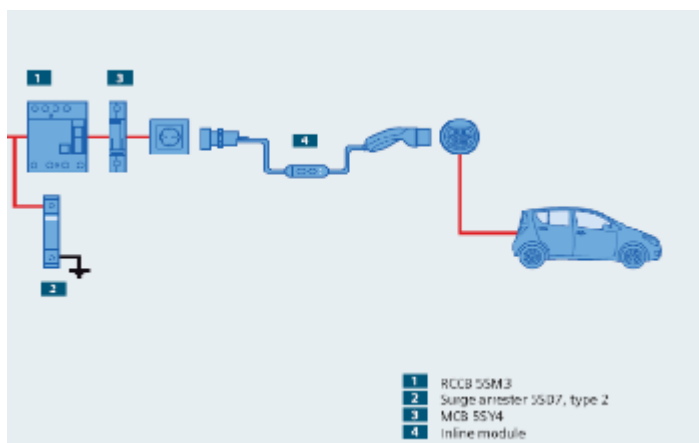
Slika 23: Počasno polnjenje z izmeničnim tokom

Vir: <https://www.polnilne-postaje.si/vrste-polnilnic-prikljuckov-in-polnjenja-in-elektricnih-avtomobilov>

2.2 Počasno polnjenje, primerno za večja e-vozila

Polnjenje z izmeničnim (AC) tokom preko eno- ali trifaznih vtičnic, podobnih hišnim vtičnicam, najvišji tok (3 x) 32 A, z maksimalno močjo polnjenja 7,4 kW

(22 kW pri trifaznem napajanju) – npr. industrijska vtičnica. Usmernik, ki pretvarja izmenično napetost v enosmerno, je vgrajen v vozilo. Čas polnjenja: 3-8 ur

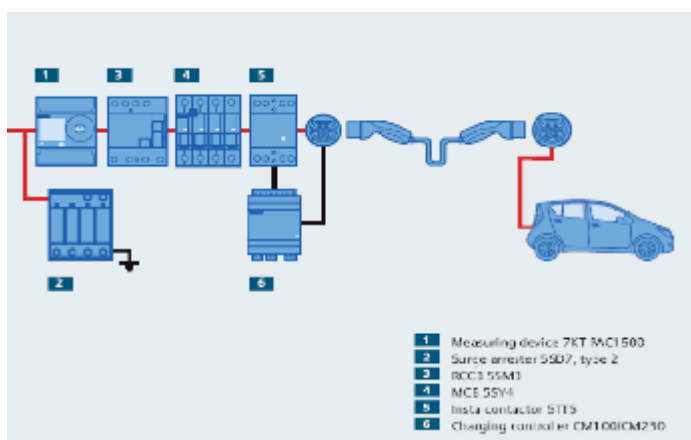


Slika 24: Počasno polnjenje preko trifazne vtičnice

<https://www.polnilne-postaje.si/vrste-polnilnic-prikljuckov-in-polnjenja-in-elektricnih-avtomobilov>

2.3 Srednje hitro polnjenje

Polnjenje z izmeničnim (AC) tokom preko posebnih eno- ali trifaznih vtičnic, najvišji tok 32 A, (dovoljene so tudi višje vrednosti), polnilna postaja in električno vozilo sta povezana s krmilnim vodom, ki omogoča krmiljenje moči polnjenja, maksimalna moč polnjenja 7,4 kW (22 kW pri trifaznem napajanju) – npr. tip 1, tip 2, tip 3. Usmernik, ki pretvarja izmenično napetost v enosmerno, je vgrajen v vozilu. Ta način se večinoma uporablja za polnjenje baterijskih EV na javnih polnilnih mestih.



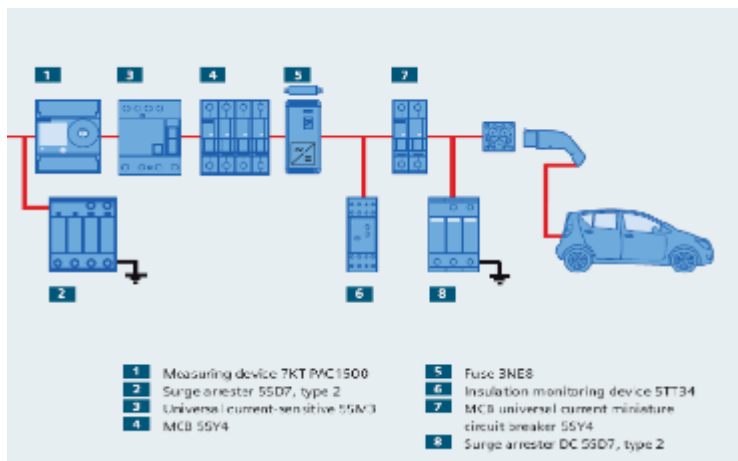
Slika 25: Srednje hitro polnjenje

<https://www.polnilne-postaje.si/vrste-polnilnic-prikljuckov-in-polnjenja-in-elektricnih-avtomobilov>

2.4 Hitro polnjenje

Polnjenje z enosmernim (DC) tokom preko posebnih vtičnic, najvišji tok 400 A, napetost do 250 V, tipična moč polnjenja med 20 kW in 150 kW. Polnilna postaja in električno vozilo sta povezana s krmilnim vodom, ki omogoča krmiljenje moči polnjenja – npr. CHAdeMO, CCS, Tesla supercharger. Usmernik je v polnilni postaji, moči polnjenja pa so visoke, zato so polnilne postaje

za polnjenje v DC načinu tudi večje in primerne za vzpostavitev večje polnilne infrastrukture (poslovna in javna polnilna mesta). Čas polnjenja: 10 – 20 minut (približno 50% napolnjena baterij)



Slika 26: Hitro polnjenje

Vir: <https://www.polnilne-postaje.si/vrste-polnilnic-prikljuckov-in-polnjenja-in-elektricnih-avtomobilov>

Opomba:

V Direktivi 2014/94/EU se uporabljajo naslednje opredelitve pojmov:

- Običajno polnilno mesto – pomeni polnilno mesto, ki omogoča prenos električne energije na električno vozilo z močjo, ki je manjša ali enaka 22 kW, razen naprav z močjo manjšo ali enako 3,7 kW, ki so nameščene v zasebnih gospodinjstvih ali katerih prvotni namen ni polnjenje električnih vozil ter ki niso dostopne javnosti.
- Polnilno mesto visoke moči – pomeni polnilno mesto, ki omogoča prenos električne energije na električno vozilo z močjo, večjo od 22 kW.

Alternativa polnjenju je menjava izpraznjene baterije z napolnjeno (pri tem pa je problematična standardizacija baterij in njihove namestitve pri vseh avtomobilskih proizvajalcih, menjava baterij pa predstavlja tudi višjo ekološko obremenitev).

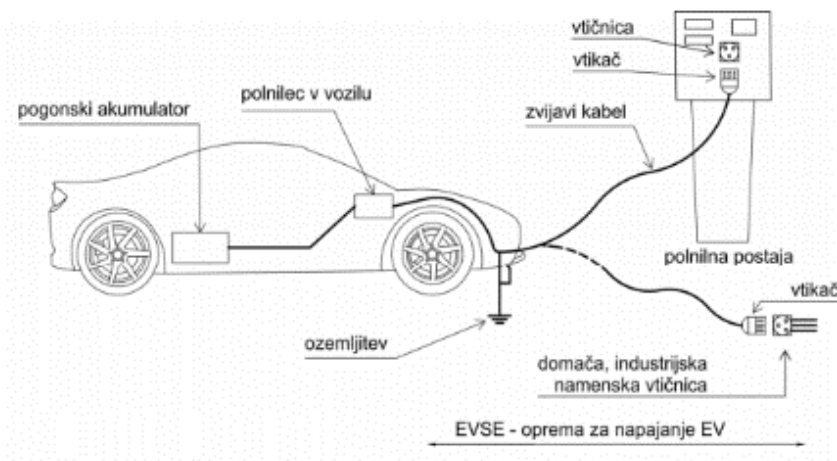
2.5 Primeri povezav EV z uporabo kablov in vtikačev

Povezavo EV z uporabo kablov lahko izvedemo na več različnih načinov.

2.5.1 Povezava EV na AC napajalno omrežje z uporabo napajalnega kabla in vtikača, trajno pritrjenega na vozilo.

Primer 1: polnilni kabel je priključen na domačo ali industrijsko vtičnico

Primer 2: polnilni kabel je priključen na posebno polnilno postajo



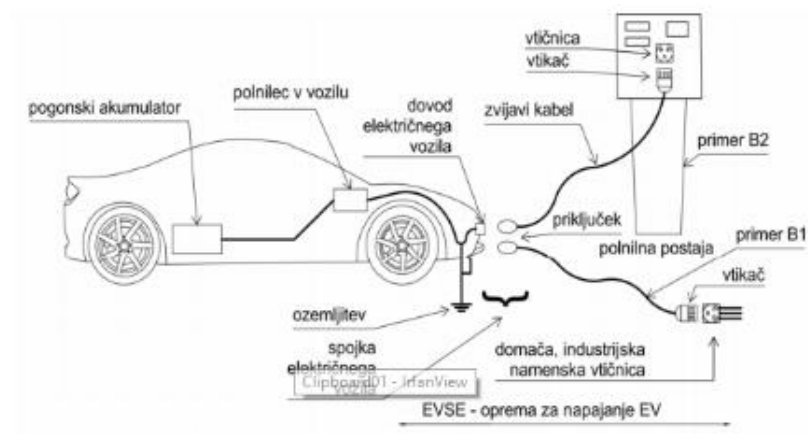
Slika 27: Polnilni kabel priključen na vtičnico ali polnilno postajo

Vir: <https://www.izs.si/assets/media/izsnovo/2019/MSE/Navodila-MSE-nap-sistemi-polnilne-postaje-el-avtomobili-koncna-jan-15.pdf>

2.5.2 Povezava EV na AC napajalno omrežje z uporabo snemljivega napajalnega kabla, sestavljenega s priključkom vozila in AC napajalne opreme.

Primer 1: ustreza povezavi na stensko montirano vtičnico

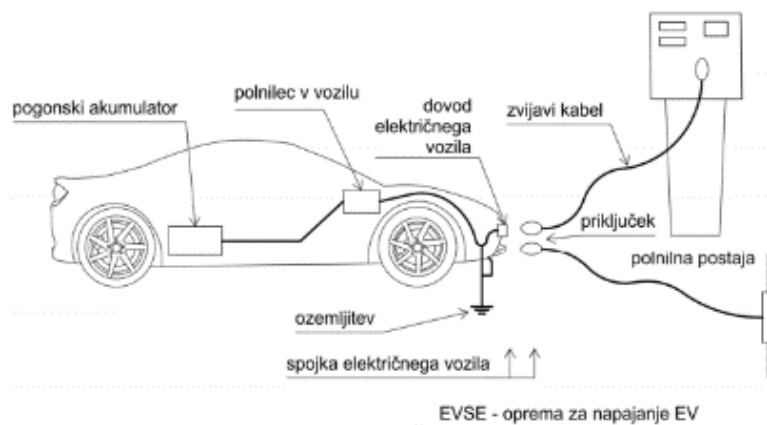
Primer 2: ustreza povezavi na posebno polnilno postajo



Slika 28: Snemljivi polnilni kabel

Vir: <https://www.izs.si/assets/media/izsnovo/2019/MSE/Navodila-MSE-nap-sistemi-polnilne-postaje-el-avtomobili-koncna-jan-15.pdf>

2.5.3 Povezava EV na AC napajalno omrežje z uporabo napajalnega kabla in priključka vozila, trajno pritrjenega na napajalno opremo.



Slika 29: Fiksni polnilni kabel

Vir: <https://www.izs.si/assets/media/izsnovo/2019/MSE/Navodila-MSE-nap-sistemi-polnilne-postaje-el-avtomobili-končna-jan-15.pdf>

Kabelski podaljšek ali drug kabel ne sme biti uporabljen dodatno v kablu za povezovanje EV na EVSE. Kabel mora imeti takšno konstrukcijo, da ga ni mogoče uporabiti kot podaljšek.

Prav tako se za povezovanje priključka vozila na dovod vozila ne smejo uporabljati adapterji, razen če so skladni z zahtevami SIST EN 61851-1:2011, IEC 60884-2-5, SIST EN 62196-1 in z drugimi ustreznimi standardi, ki urejajo vtikač ali vtičnico kot del adapterja.

2.6 Vtičnice in vtikači za polnjenje električnih vozil

Polnilne postaje se med seboj razlikujejo tudi po vtičnicah in vtikačih, ki so na strani polnilne postaje. Večina sodobnih vtičnic je opremljena s podatkovnimi in krmilnimi vodi, ki se med seboj razlikujejo po številu faz (1 ali 3) in po vrsti polnilnega toka (enosmerni ali izmenični).

Komunikacija z avtomobilom omogoča, da postaja zazna, kdaj je akumulator napolnjen in tako preneha s polnjenjem. Omogoča tudi zaklep kabla in s tem prepreči krajo ali izključitev kabla. E-mobilna vtičnica in vtikač za izmenični enofazni priklop imenovana Tip 1 ali Yazaki (SAE J1772-2009)



Slika 30: E mobilna vtičnica Tip1 (Yazaki)

Vir: <https://www.yazaki-europe.com/about-us/news-press/detail/show/simpler-and-safer-charging-combined-with-an-individual-design>

E-mobilna vtičnica in vtikač za izmenični trifazni priklop tudi Tip 2 ali Mennekes (IEC 62196-2) Tip 2 je standardiziran polnilni sistem za EU.



Slika 31: E mobilna vtičnica Tip 2 (Mennekes)

Vir: <https://www.digitec.ch/en/s1/product/mennekes-amtron-compact-20s-type-2-11-kw-16-a-type-2-ev-chargers-21468672>

Vtikač za priklop na enosmerni tok imenovan CHAdeMO (Tip 3)



Slika 32: Vtikač Tip 3 (CHAdeMO)

Vir: <https://www.midapower.com/sl/200a-250a-chademo-ev-charger-plug-dc-fast-charging-connector-product/>

Kombinirana vtičnica - imenovana Combo 2, ki integrira enofazni in trifazni izmenični priklop in enosmerni priklop v enem samem sklopu vtičnic na strani vozila (IEC 62196-3). Tip 2 je standardiziran polnilni sistem za EU



Slika 33: kombinirana vtičnica (Combo 2)

Vir: <https://www.midapower.com/sl/250a-ccs2-ev-charging-cable-combo-2-dc-fast-ev-charging-plug-ccs2-ev-charging-connector-product/>

3. ZAKLJUČEK

Polnjenje električnih vozil (EV) predstavlja ključen element prehoda na trajnostno mobilnost. Napredek tehnologije baterij in polnilne infrastrukture omogoča hitrejše in bolj učinkovito polnjenje, kar izboljšuje uporabniško izkušnjo. Kljub temu ostaja izziv razširitev dostopne polnilne mreže, zlasti v manj razvitih regijah. Uspeh električnih vozil pa ni odvisen le od infrastrukture, temveč tudi od

virov električne energije. Prehod na obnovljive vire energije je nujen za zmanjšanje okoljskega odtisa EV.

Standardizacija polnilnih sistemov bo igrala ključno vlogo pri pospeševanju sprejemanja EV, saj bo odpravila ovire, ki jih povzročajo različni standardi. Sodelovanje med javnim in zasebnim sektorjem, skupaj z ozaveščanjem javnosti, bo ključno za uresničitev vizije trajnostne mobilnosti, ki je prijazna tako do uporabnikov kot do okolja.

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<https://www.izs.si/assets/media/izsnovo/2019/MSE/Navodila-MSE-nap-sistemi-polnilne-postaje-el-avtomobili-koncnaj-an-15.pdf>

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CHARGING ELECTRIC VEHICLES



XIV. MEĐUNARODNI SIMPOZIJUM

„INTERDISCIPLINARNOST LOGISTIKE I SAOBRAĆAJA“

03. – 04. oktobar 2024.godine
SARAJEVO, BOSNA I HERCEGOVINA



ORGANIZATOR SIMPOZIJUMA:

JU SREDNJA ŠKOLA ZA SAOBRAĆAJ I KOMUNIKACIJE SARAJEVO
Velešići br.2, 71000 Sarajevo, BiH

SUMMARY

The article shows the most common standardized methods of charging electric vehicles. Most standardization is achieved in the field of passenger vehicles. In the field of trucks, standardization and charging methods are still being developed and prepared. The importance of standardization and unification of electric vehicle charging lies in the cheapening and simplification of electric vehicle charging, which should prevail on our roads in the future. Charging methods, charging equipment and types of charging stations are shown. The purpose of the contribution is to help and educate the approaching electrification and encourage the expansion of the charging station scheme.

KEY WORDS

EV - electric vehicle, charging station, electrical connection, charging stations, cables, plugs, smart charging station.

1. INTRODUCTION

In February 2023, the European Parliament approved a ban on the sale of cars and light commercial vehicles with gasoline or diesel engines from 2035. This law increases the number of EVs every day. The need to charge electric vehicles is also growing. In some places, there is already a lack of adequate charging infrastructure for electric vehicles, especially along road networks, which is already a limitation in most EU countries today. According to the European Automobile Manufacturers Association (ACEA), 6 EU countries do not have a single charging point per 100 km of road. 17 countries have less than 5 charging stations per 100 km of road, and only 5 have more than 10 charging stations per 100 km of road. There is also a big difference between the countries with the most charging stations per 100 km of road and those with the fewest. In the Netherlands, for example, there is one charging station for every 1.5 km of road, while Poland, which is eight times the size, has only one charging station for every 150 km. Slovenia has 3.3 charging stations per 100 km of road.

1. TYPES OF EV

Types of Electric Cars (EVs)

Electric cars or electric vehicles are represented by cars, buses, four-wheelers, motorcycles, mopeds, scooters or tricycles and other electric vehicles, which by their function are intended for driving on public roads or other public areas.

They differ in the way they are driven:

- Fully electric vehicles, the drive unit of which is an electric motor. The batteries are charged from the external network and by energy regeneration during braking.
- Hybrid vehicles, the drive unit of which is an electric motor (serial hybrid vehicles) or an electric motor and an internal combustion engine (parallel hybrid vehicles). The batteries are charged from an alternator driven by an internal combustion engine and regenerative braking.

- Plug-in hybrid vehicles, in which the drivetrain is the same as in hybrid vehicles, except that the batteries can also be charged from an external network.
- Electric vehicles powered by fuel cells, in which the drive train is an electric motor. The batteries are charged from fuel cells and by energy regeneration during braking.

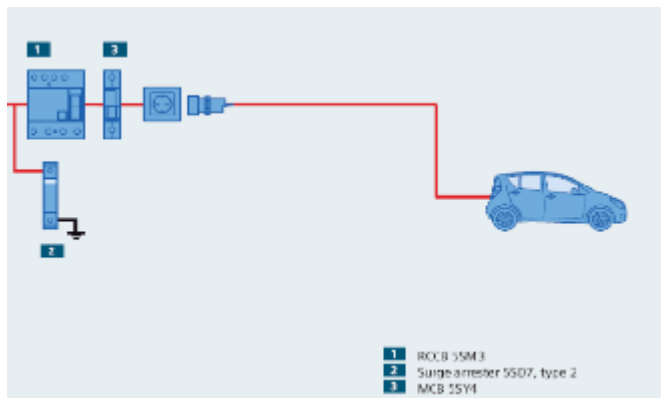
2. METHODS OF CHARGING EV

The battery of an electric vehicle is most often charged directly from the network.

The "IEC 62196 Plugs, socket-outlets, vehicle couplers and vehicle inlets – Conductive charging of electric vehicles" standard is used in Europe and defines several charging methods.

2.1 Slow charging, suitable for smaller e-vehicles

Charging with alternating current (AC) via single- or three-phase sockets similar to household sockets, maximum current (3 x) 16 A, with a maximum charging power of 3.7 kW (11 kW with three-phase supply) - e.g. shuko, industrial socket. A rectifier installed in a vehicle that converts alternating voltage into direct current. Charging time: 11-12 hours.

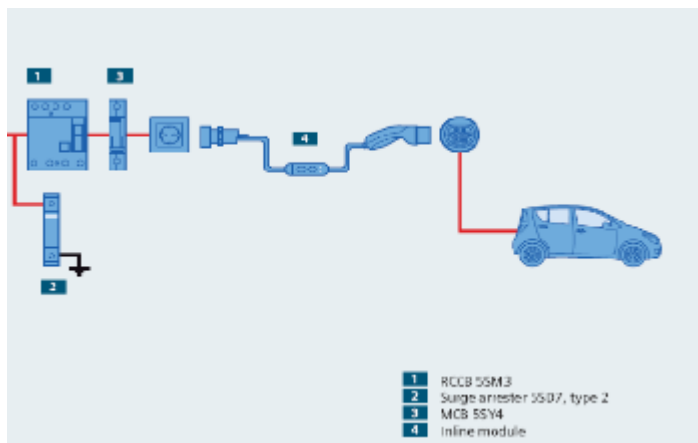


Picture 34: Slow AC charging

Source: <https://www.polnilne-postaje.si/vrste-polnilnic-prikljuckov-in-polnjenja-in-elektricnih-avtomobilov>

2.2 Slow charging, suitable for larger e-vehicles

Charging with alternating current (AC) via single- or three-phase sockets similar to household sockets, maximum current (3 x) 32 A, with a maximum charging power of 7.4 kW (22 kW with three-phase power supply) – e.g. industrial socket. The rectifier, which converts alternating voltage into direct current, is built into the vehicle. Charging time: 3-8 hours.

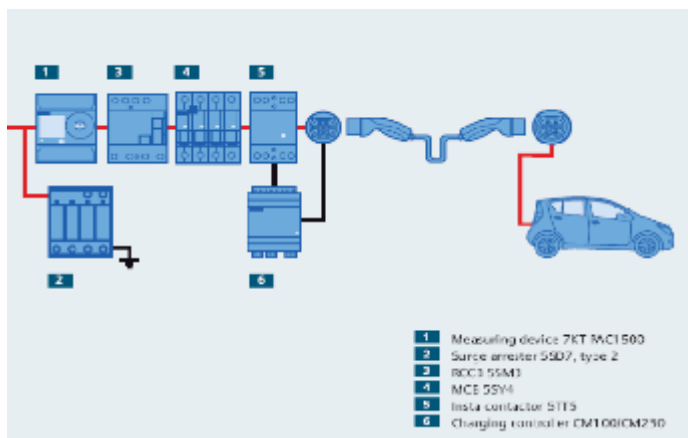


Picture 35: Slow charging via a three-phase socket

Source: <https://www.polnilne-postaje.si/vrste-polnilnic-prikljuckov-in-polnjenja-in-elektricnih-avtomobilov>

2.3 Medium fast charging

Charging with alternating current (AC) via special single- or three-phase sockets, maximum current 32 A, (higher values are also allowed), the charging station and the electric vehicle are connected by a control line that allows control of the charging power, maximum charging power 7,4 kW (22 kW with three-phase supply) - e.g. type 1, type 2, type 3. The rectifier, which converts alternating voltage into direct current, is installed in the vehicle. This mode is mostly used to charge battery EVs at public charging points.



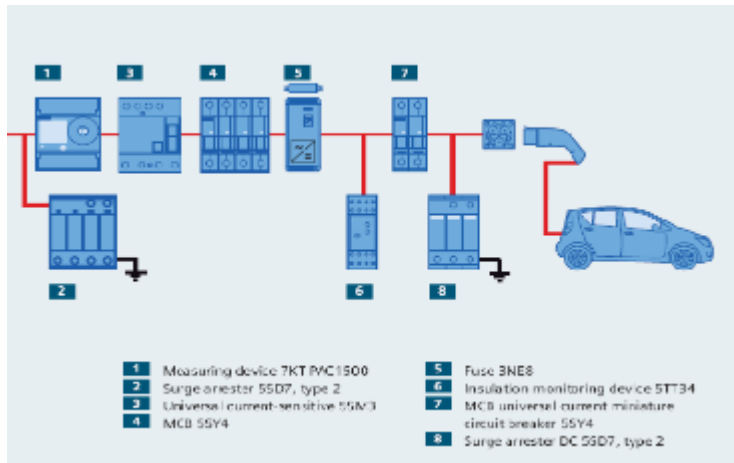
Slika 36: Medium fast charging

<https://www.polnilne-postaje.si/vrste-polnilnic-prikljuckov-in-polnjenja-in-elektricnih-avtomobilov>

2.4 Fast charging

Direct current (DC) charging via special sockets, maximum current 400 A, voltage up to 250 V, typical charging power between 20 kW and 150 kW. The charging station and the electric vehicle are

connected by a control line that enables control of the charging power - e.g. CHAdeMO, CCS, Tesla supercharger. The rectifier is in the charging station, and the charging powers are high, so charging stations for charging in DC mode are also larger and suitable for establishing a larger charging infrastructure (business and public charging points). Charging time: 10 – 20 minutes (approximately 50% charged batteries).



Slika 37: Fast charging

Source: <https://www.polnilne-postaje.si/vrste-polnilnic-prikljuckov-in-polnjenja-in-elektricnih-avtomobilov>

The following definitions are used in Directive 2014/94/EU:

- Normal charging point - means a charging point that enables the transfer of electricity to an electric vehicle with a power of less than or equal to 22 kW, excluding devices with a power of less than or equal to 3.7 kW, which are installed in private households or whose original purpose no charging of electric vehicles and which are not accessible to the public.
- High-power charging point – means a charging point that enables the transfer of electricity to an electric vehicle with a power greater than 22 kW.

An alternative to charging is to replace a discharged battery with a charged one (in this case, the standardization of batteries and their installation by all car manufacturers is problematic, and battery replacement also represents a higher ecological burden).

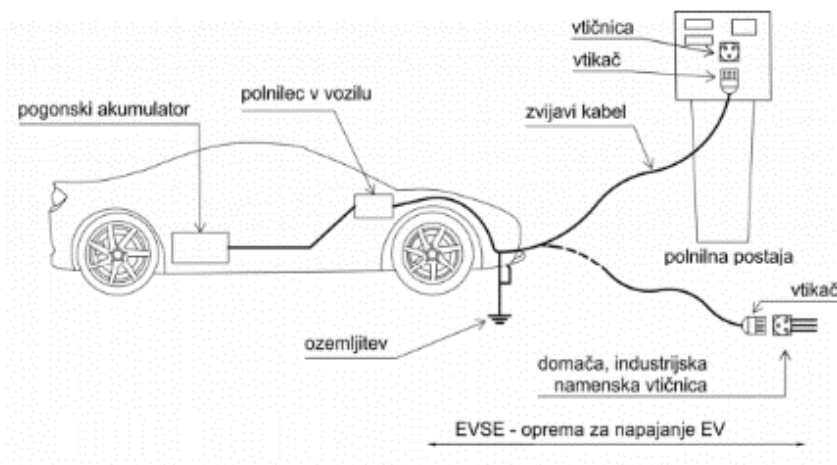
2.5 Examples of EV connections using cables and plugs

EV connection using cables can be done in several different ways.

2.5.1 Connecting the EV to the AC power grid using a power cable and plug permanently attached to the vehicle.

Example 1: The charging cable is connected to a domestic or industrial socket

Example 2: The charging cable is connected to a special charging station



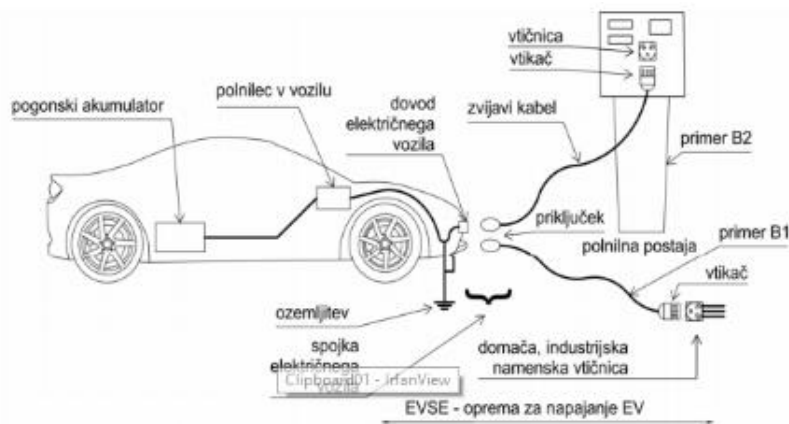
Picture 38: Charging cable connected to an outlet or charging station

Source: <https://www.izs.si/assets/media/izsnovo/2019/MSE/Navodila-MSE-nap-sistemi-polnilne-postaje-el-avtomobili-koncna-jan-15.pdf>

2.5.2 Connecting the EV to the AC power grid using a detachable power cable assembled with a vehicle connector and AC power equipment.

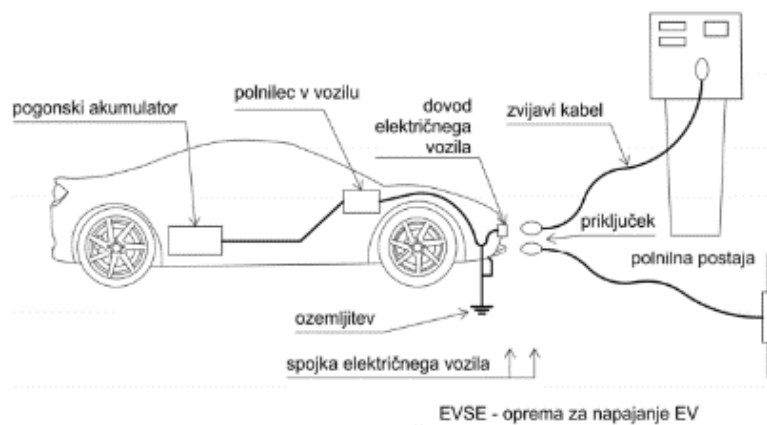
Example 1: corresponds to connection to a wall-mounted socket

Example 2: corresponds to a connection to a special charging station



Picture 39: Detachable charging cableSource: <https://www.izs.si/assets/media/izsnovo/2019/MSE/Navodila-MSE-nap-sistemi-polnilne-postaje-el-avtomobili-koncna-jan-15.pdf>

2.5.3 Connecting the EV to the AC power grid using the power cable and vehicle connector permanently attached to the power supply equipment.



Slika 40: Fiksni polnilni kabel

Source: <https://www.izs.si/assets/media/izsnovo/2019/MSE/Navodila-MSE-nap-sistemi-polnilne-postaje-el-avtomobili-koncna-jan-15.pdf>

A cable extension or other cable must not be used additionally in the cable to connect the EV to the EVSE. The cable must have such a construction that it cannot be used as an extension.

Likewise, adapters may not be used to connect the vehicle connector to the vehicle's power supply, unless they comply with the requirements of SIST EN 61851-1:2011, IEC 60884-2-5, SIST EN 62196-1 and other relevant standards governing the plug or socket as part of an adapter.

2.6 Sockets and plugs for charging electric vehicles

Charging stations also differ from each other in the sockets and plugs on the side of the charging station. Most modern sockets are equipped with data and control lines, which differ from each other in the number of phases (1 or 3) and the type of charging current (DC or AC). Communication with the car allows the station to detect when the battery is full and thus stop charging. It also allows you to lock the cable to prevent theft or disconnection of the cable. E-mobile socket and plug for alternating single-phase connection called Type 1 or Yazaki (SAE J1772-2009).



Slika 41: E mobilna vtičnica Tip1 (Yazaki)

Source: <https://www.yazaki-europe.com/about-us/news-press/detail/show/simpler-and-safer-charging-combined-with-an-individual-design>

E-mobile socket and plug for alternating three-phase connection also Type 2 or Mennekes (IEC 62196-2) Type 2 is a standardized charging system for the EU.



Slika 42: E mobilna vtičnica Tip 2 (Mennekes)

Source: <https://www.digitec.ch/en/s1/product/mennekes-amtron-compact-20s-type-2-11-kw-16-a-type-2-ev-chargers-21468672>

63 / 5.000

Direct current plug called CHAdeMO (Type 3)



Slika 43: Vtlikač Tip 3 (CHAdeMO)

Source: <https://www.midapower.com/sl/200a-250a-chademo-ev-charger-plug-dc-fast-charging-connector-product/>

Combination socket - called Combo 2, which integrates single-phase and three-phase alternating connection and direct connection in a single set of vehicle-side sockets (IEC 62196-3). Type 2 is a standardized charging system for the EU.



Slika 44: kombinirana vtičnica (Combo 2)

Source: <https://www.midapower.com/sl/250a-ccs2-ev-charging-cable-combo-2-dc-fast-ev-charging-plug-ccs2-ev-charging-connector-product/>

4. CONCLUSION

Electric vehicle (EV) charging is a key element of the transition to sustainable mobility. Advances in battery technology and charging infrastructure enable faster and more efficient charging,

improving the user experience. Nevertheless, expanding an accessible charging network remains a challenge, especially in less developed regions. The success of electric vehicles depends not only on the infrastructure, but also on the sources of electricity. The transition to renewable energy sources is necessary to reduce the environmental footprint of EVs. Standardization of charging systems will play a key role in accelerating the adoption of EVs by removing barriers caused by different standards. Cooperation between the public and private sectors, together with public awareness, will be key to realizing the vision of sustainable mobility that is both user-friendly and environment-friendly.

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LOGISTIKA NA POKLICNI MATURI IZ ANGLEŠČINE (3. PREDMET)

Povzetek

Prispevek predstavi poklicno maturo kot državni zaključni izpit v programu logistični tehnik. Natančneje seznani z izvedbo izpita iz angleščine (tretji in izbirni predmet) in z deležem logistične stroke v ustnem delu izpita. Vključuje tudi razmišljanja in zadovoljstvo dijakov z obsegom strokovnih vsebin iz področja logistike pri pouku angleščine in na poklicni maturi iz angleščine.

Ključne besede: logistični tehnik, poklicna matura, jezik stroke, logistika, angleščina

Uvod

Danes si poslovnega sveta, tudi sveta logistike, ne moremo predstavljati brez angleškega jezika. Z njim razumemo prometna obvestila po radiu, prometne znake, navodila na letalu... Znanje angleščine olajša nadaljevanje izobraževanja, izboljšuje zaposlitvene možnosti in možnosti napredovanja v vsakem poklicu. Pri tem je ključno znanje splošne in strokovne angleščine. Jezik stroke je specifičen in zahteven. Učitelji imamo tako odgovorno nalogo dijake pripraviti na to, da bodo sposobni učinkovito komunicirati pri študiju ali delu.

Cilj tega prispevka je prikazati, kako poklicna matura iz angleščine usmerja učitelje in spodbuja dijake usvojiti ustrezna znanja, ki jim bodo omogočala pri študiju ali delu opravljati naloge v angleščini, in v kolikšni meri ter na kakšen način je v ta zaključni izpit vključen jezik logistične stroke.

Poklicna matura

Zaključni izpit na koncu štiriletnega šolanja je za vse strokovne programe poklicna matura. Če jo dijaki uspešno opravijo, pridobijo srednjo strokovno izobrazbo in s tem dokaz, da so dosegli standarde znanj, ki so določeni s cilji izobraževalnega programa, ter da so usposobljeni za visokošolski študij.

<https://www.ric.si/poklicna-matura/splosne-informacije/>

Sestavljena je iz štirih predmetov. Dva sta splošnoizobraževalna, to sta prvi predmet, ki je skupni oziroma enotni, in tretji predmet, ki je izbirni. Drugi in četrti predmet temeljita na strokovnem znanju. Za dijake, ki na naši šoli zaključujejo program logistični tehnik, je sestavljena iz naslednjih štirih predmetov:

1. PREDMET: slovenščina
2. PREDMET: logistika
3. PREDMET: angleščina ali matematika
4. PREDMET: izdelek oziroma storitev in zagovor

https://www.ric.si/mma/MIK_PM_2024_popravljen_2023.pdf/2023071012292391/?m=1688984963

Tretji predmet je izbirni. Izberejo lahko angleščino ali matematiko. To šolsko leto smo v 4. letniku imeli 33 dijakov. 27 izmed njih je za tretji predmet izbralo angleščino, kar je 82%.

Tretji predmet - angleščina

Izpit iz angleščine je sestavljen iz pisnega in ustnega dela.

Pisni del

Enoten je za vse programe. Traja 120 minut in obsega tri pole, ki jih pripravi državna predmetna komisija za poklicno maturo za angleščino. Izpitna pola 1 preverja bralno razumevanje, izpitna pola 2 slušno razumevanje (kar je novost letošnjega šolskega leta), izpitna pola 3 pa zmožnosti pisnega sporočanja, saj morajo dijaki napisati dva sestavka, krajšega in daljšega. Na pisnem izpitu je možno zbrati 70 točk.

Ustni del

Opravlja se pred šolsko izpitno komisijo, ki ga tudi točkuje na predlog izpraševalca. Ta je praviloma učitelj, ki je poučeval kandidata v zaključnem letniku. Za ustni izpit so pripravljeni listki z vprašanji. Kandidat ima pravico do 15-minutne priprave na odgovore. Ustni izpit traja največ 20 minut. Možno je zbrati 30 točk.

https://www.ric.si/mma/MIK_PM_2024_popravljen_2023.pdf/2023071012292391/?m=1688984963

Naloge za ustni izpit pripravimo učitelji angleščine oziroma aktiv učiteljev angleščine na šoli, na kateri kandidat opravlja izpit. Ta mora biti zastavljen tako, da preverja govorno in slušno zmožnost pri sporazumevanju v vsakdanjem življenju, pa tudi zmožnost sporazumevanja v jeziku stroke oziroma v poklicnem življenju. **Dve nalogi od treh pri ustnem izpitu morata preverjati zmožnost govornega sporazumevanja in sporočanja s kandidatovega strokovnega področja.** Vrstni red nalog ni predpisan.

<https://www.ric.si/poklicna-matura/predmeti/tretji-predmet/anglescina/>

Na izpitnih lističih so torej tri naloge različnih tipov, ki vključujejo eno splošno in dve strokovni temi. S tema preverjamo znanje jezika stroke, in sicer strokovno besedišče, razumevanje strokovnih besedil in zmožnost sporazumevanja na poklicnem področju. Na izbiro so teme, ki smo jih obravnavali pri pouku, in splošne strokovne teme, ki so navedene v katalogu.

Izpitni lističi vsebujejo tri izmed nalog, kot so igra vlog, pogovor na podlagi besedilne iztočnice (npr. kratka besedila do 100 besed, reklamni oglasi, izhodiščna vprašanja) ali vizualne/grafične iztočnice (npr. slike, preglednice, grafi), interpretacija avtentičnega strokovnega (npr. opis naprave, postopka, navodila) ali splošnega besedila (npr. pregovori, naslovi, izreki, šale) do 100 besed, napisanega v angleščini ali slovenščini, in razgovor o njem.

Kandidati se s temami in tipi nalog seznanijo med poukom angleščine oziroma med pripravami na izpit. Ker je število šolskih ur omejeno, se priporoča, da tudi zunaj šolskega pouka berejo in poslušajo različne vrste besedil v angleščini, Pomagajo si lahko s časopisi, revijami in zvočnimi zapisi ter s strokovno periodiko, tiskanim gradivom in drugimi besedili, ki se nanašajo na njihovo strokovno področje. Pri kandidatih razvijamo zanimanje za: spremljanje radijskih in televizijskih programov v angleškem jeziku, branje, poslušanje in gledanje vsebin na spletu o aktualnih, splošnih in strokovnih temah, dopisovanje in pogovori z znanci iz tujine, ki jih srečajo na šolskih izmenjavah v tujino, iskanje podatkov v različnih virih s splošnega in strokovnega področja ...

Pri poteku pogovora mora biti dijak sposoben ustrezno uporabiti naslednje komunikacijske funkcije: začetek, ohranitev, prekinitev pogovora, vključitev v pogovor in zaključek pogovora;

Pri pridobivanju in prenašanju informacij mora med drugim znati: poizvedovati, se identificirati in poimenovati ter opisovati osebe, predmete, okoliščine, kraje, stroje, orodja in druga delovna sredstva

iz posamezne stroke, delovno mesto, opravila v zvezi s poklicnim delom, poročati o dogodkih v zvezi s posamezno stroko (poslovna srečanja in sestanki, obiski razstav in sejmov, obiski partnerskih podjetij in tovarn), o prebrnem (splošna in strokovna besedila) in mnenjih/stališčih koga drugega ...

Naloge morajo biti avtentične (podobne tistim iz resničnih življenjskih okoliščin, tudi poklicnih), smiselne (izvirnost, problemskost, celovitost, različne perspektive) in komunikacijsko zastavljene.

Poklicna/strokovna tematska področja obsegajo osnovno strokovno izrazoslovje na posameznem strokovnem področju (materiali, naprave, orodje, oprema, pripomočki in navodila) in opis poklicnih dejavnosti in delovnih postopkov, osnovno znanje iz poslovne komunikacije, informacijsko in komunikacijsko tehnologijo (oprema, naprave, odgovorna raba medmrežja), varovanje okolja, varnost na delovnem mestu (zaščitna sredstva, nevarne snovi, prva pomoč, varstvo pri delu), razvoj znanosti in tehnologije na posameznih strokovnih področjih (znane osebnosti, tehnološki dosežki, izumi).

Govorne dejavnosti so izbrane tako, da omogočajo prikaz kandidatovega funkcionalnega jezikovnega znanja in zmožnosti: predstavitvene/opisovalne zmožnosti, opis dejstev, predstavitev, primerjanje, izražanje navodil, povzemanje; zmožnosti vrednotenja (izražanje in utemeljevanje mnenja, predlaganje, izražanje želja, poizvedovanje, povpraševanje po mnenju, strinjanje, nestrinjanje, pojasnjevanje); interakcijske zmožnosti (sodelovanje v razgovoru, obvladovanje dialoga, obvladovanje poteka pogovora: znati začeti in končati pogovor, prepustiti besedo, prevzeti besedo); zmožnosti prilagajanja (preverjanje/ugotavljanje pravilnosti razumevanja, prilagajanje, pogajanje, usklajevanje s sogovornikom). Med govornim sporazumevanjem kandidati pokažejo tudi obvladovanje in širino besedišča ter raven in širino jezikovnega znanja nasploh, tekočnost govora in ustrezne komunikacijske strategije.

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Logistična stroka v nalogah izpitnih lističev ustnega dela izpita

V naloge vključimo strokovne teme, ki smo jih obravnavali pri pouku. Dijaki so z njimi seznanjeni.

V izpitnih lističih naše šole so tako vključene naslednje teme:

- Logistika – definicija, primeri ...
- Delovna mesta v logistiki
- Načini potovanja in prevozna sredstva
- Javni potniški prevoz
- Potnik in prtljaga
- Prevoz blaga
- Cestno prometni predpisi
- Prometne nesreče
- Organizacija in načrtovanje dogodkov
- Skladiščenje in vodenje zalog
- Oskrbovalna veriga
- Varnost pri delu
- Naročanje

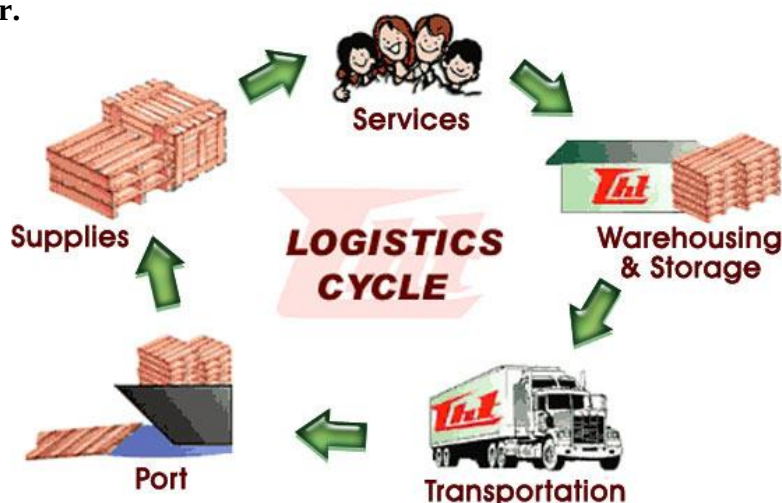
Pri sestavljanju izpitnih lističev upoštevamo osnovne smernice. To so:

1. Oblikovanje takšnih nalog za preverjanje sporazumevalnih zmožnosti, s katerimi bomo dobili kar se da veljaven in zanesljiv vzorec kandidatovih jezikovnih zmožnosti.
2. Pestrost – vsaka naloga je zastavljena drugače in temelji na drugačni izhodiščni temi.
3. Zaporedje nalog je poljubno.

Primer izpitnega lističa in izvedbe izpita

POKLICNA MATURA – ustni del

1. Oglejte si sliko in razmislite o kratkem opisu ali komentarju. Slika je tudi osnova za razgovor.



https://www.google.si/search?hl=sl&site=img&tbm=isch&source=hp&biw=1366&bih=643&q=logistics&oq=logistics&gs_l=img_3_0j0i2419_2029_4785_0_5744_9_7_0_2_2_0_136_813_0j7_7_0_...0_.1ac.1.46.img_0_9.826.bq6qH2Wtcvw#facrc=&imgdii=&imgre=KisleL-zq1fQM%253A%3B-18UJTyP23UJgM%3Bhttp%253A%252F%252Fawyer24h.net%252Fwp-content%252Fuploads%252F2014%252F04%252Flogistic1.jpg%3Bhttp%253A%252F%252Fawyer24h.net%252Fstart-logistics-business-vietnam%252F%3B586%3B399

2. Preberite besedilo in razmislite o kratkem povzetku. Besedilo je zgolj pobuda za razgovor, ki se bo odvijal med vami in izpraševalcem.

Money talks. It tells people who you are, it influences people, it speaks so, you don't have to.

3. Igra vlog

Si na letališču, kjer čakaš na prtljago, ki je ni in ni. Končno greš do zadolženega uradnika in povprašaš, kako in kaj. Poveš, da si imel/-a dva kosa prtljage: usnjen, rjav kovček srednje velikosti in zeleno torbo iz blaga. Uradnik zahteva, da izpolniš formular. Vljudno poveš, da nimaš časa, saj se ti mudi na konferenco. Prtljago nujno potrebuje, ker je v kovčku, razen tvojih oblačil in osebnih stvari, tudi referat, ki ga nameravaš prebrati na srečanju. Zahtevaš, da takoj poiščejo izgubljeno.

Izpraševalci si pripravimo okvirna vprašanja. Pri 1. nalogi bi na primer kandidata pozvali, naj na kratko opiše sliko, pojasni izraz logistika, kje in kako je prisotna v vsakdanjem življenju (na primer na šoli), naj navede logistične procese in jih opiše in izrazi svoje mnenje o vlogi posameznih procesov.

Pri 3. nalogi bi se dijak moral vživeti v opisano situacijo, ki se odvija na letališču v uradu za izgubljene predmete. Postaviti bi moral navedena vprašanja in odgovarjati na postavljena, na primer opisati svojo prtljago in tako odigrati svojo vlogo v dialogu.

Izpitni listič vsebuje slikovno in besedilno iztočnico (2. naloga) ter igro vlog. Tako je pestrost zagotovljena.

Še nekaj drugih primerov strokovnih iztočnic s področja logistike

- **Slikovni iztočnici:**

A)



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Pri tej slikovni iztočnici kandidat predvidoma našteje in opiše prevozna sredstva za prevoz ljudi in blaga, prednosti in slabosti le-teh, jih primerja, pripoveduje o osebni izkušnji z različnimi prevoznimi sredstvi. V nadaljevanju lahko izbere ustrezno cestno prevozno sredstvo glede na predlagane pogoje za prevoz blaga. Pogovor se lahko usmeri v izkušnjo z vožnjo avtomobila, znamkah, prednostih in slabostih posedovanja avtomobila, vzdrževanju, izbiri pogona (bencinski/električni ...) in njihovih prednostih in slabostih ...

B)



https://www.google.si/search?q=traffic+accidents&espv=2&biw=1366&bih=643&source=lnms&tbn=isch&sa=X&ved=0ahUKEwiPoNnk86LNAhWHSBQKH6vCSwQ_AUIBigB#imgsrc=MawqnUAATSAXEM%3A

Kandidat bi v tem primeru opisal, kaj prikazuje slika. Vprašali bi ga, ali je že sam bil kdaj udeležen v kakšni nesreči kot sopotnik ali voznik, kakšne vrste nesreč se lahko zgodijo in kaj so najpogostejši vzroki. Vprašali bi še, kako ukrepati ob prometni nesreči in kako bi lahko izboljšali prometno varnost oziroma zmanjšali število in posledice prometnih nesreč.

- **Besedilni iztočnici:**

A) Rules of the road are the general practices and procedures that road users follow, especially motorists and cyclists. They govern interactions with other vehicles and pedestrians ... As a general rule, a driver is expected to avoid hitting other vehicles, pedestrians, etc. regardless of whether or not the applicable rules of the road allow them to be where they happen to be.

Pri tej besedilni iztočnici imamo izpraševalci pripravljena naslednja vprašanja: o čem govori besedilo, katere cestno prometne predpise pozna, zakaj jih je nujno upoštevati, zakaj jih nekateri kršijo in kakšne so posledice neupoštevanja predpisov. Kandidata bi spodbudili k razmišljanju o lastnem odnosu do vožnje in upoštevanja predpisov.

B) A warehouse provides a central location for receiving, storing and distributing products. As each inbound shipment arrives, responsibility for the goods transfers to warehouse personnel, products are identified, sorted and dispatched to their temporary storage location. Storage isn't a static "thing" but rather a process that includes security measures and maintaining an environment that preserves the integrity and usefulness of the items.

<http://smallbusiness.chron.com/importance-warehousing-logistics-system-74825.html>

To besedilo bi bilo osnova za pogovor o skladiščih, opremi v njih, shrambi različnih vrst blaga, sistemu za upravljanje skladišča, ključnih nalogah v povezavi s skladiščenjem. Kandidata bi vprašali o njegovih delovnih izkušnjah v skladišču, kako je bilo delo organizirano, kakšne izboljšave bi bile možne na tem področju oziroma, kakšni bi bili njegovi predlogi za npr. učinkovitejše upravljanje zaloge, zmanjšanje izgubljenih izdelkov, večjo natančnost pri naročanju, izboljšanje hitrosti in učinkovitosti izvajanja nalog ter boljšo sledljivost in nadzor nad skladiščnimi operacijami.

- **Igri vlog:**

Pri igrah vlog udeleženci igrajo vlogo po določenem scenariju in skladno z danimi opisi v nalogi. Predstavljati si morajo glavne značilnosti okolja, v katerem poteka pogovor in si izmisliti ključna dejstva. Delno si med 15-minutno pripravo na pogovor zamislijo ustrezni govor, delno pa med dialogom improvizirajo.

A) Si uradnik na železniški postaji. Nek tujec (izpraševalec), ki ni prav domač v angleščini, kupuje karto. Vprašaj ga vse, kar moraš vedeti, da bi mu prodal ustrezno vozovnico (na primer: vrsta vozovnice - enosmerna ali povratna; prostor ob oknu ali pri vratih; razred; kdaj želi potovati; ali ima kaj prtljage, ker je treba zanj plačati dodatek; koliko kart želi; poveš mu tudi, s katerega perona odide vlak...).

B) Dobil si nalogo, da organiziraš izlet za skupino srednješolcev. Pokliči njihovega predstavnika (izpraševalca) in ga povprašaj o informacijah (čas prihoda, število udeležencev, katere znamenitosti bi si radi ogledali, hrana, itd.), ki bi ti koristile pri načrtovanju izleta. Trenutno veš le, da bi si radi ogledali Celje.

Mnenje dijakov programa logistični tehnik

Dijake zaključnih letnikov v šolskem letu 2023/2024 sem vprašala po mnenju o obsegu jezika stroke s področja logistike na poklicni maturi iz angleščine in pri pouku angleščine, pri katerem se na poklicno maturo pripravljamo. 18 dijakov je odgovorilo na naslednja vprašanja:

1. Ali je bilo po tvojem mnenju pri pouku angleščine dovolj poudarka na jeziku stroke?
2. Če bi želel več, katere strokovne teme bi vključil?
3. Ali bi v ustni del poklicne mature iz angleščine vključil več strokovnih vsebin (npr. da bi se namesto dveh vse tri iztočnice navezoval na stroko)?
4. Ali bi v pisni del poklicne mature iz angleščine vključil stroko: DA/NE?

Na prvo vprašanje je večina dijakov (78%) odgovorila pritrdilno. Bili so mnenja, da je bilo pri pouku angleščine dovolj poudarka na jeziku stroke, in da so bile pri pouku in pri ocenjevanju zelo pogosto prisotne strokovne vsebine.

V odgovorih na drugo vprašanje so predlagali naslednje vsebine, ki bi jih vključili v pouk oziroma bi jih obravnavali podrobneje: carina, špedicija, razne krajsave, izpolnjevanje obrazcev, letalski promet, transport, skladiščenje in poslovni jezik. Tretjina dijakov obsega strokovnih tem ne bi širila.

Pri tretjem vprašanju, ki se je navezovalo na obseg logistike na poklicni maturi iz angleščine, je velika večina dijakov izrazila mnenje, da je strokovnih tem dovolj. V ustni del tako kar 83% dijakov ne bi vključilo več stroke in ne bi želelo, da se vse tri iztočnice (namesto dveh) navezujejo na stroko. Nekateri so odgovor utemeljili z dejstvom, da se nekaj dijakov po končani srednji šoli preusmeri in nadaljuje izobraževanje v drugih strokah.

Enako je bilo pri četrtem vprašanju 83% dijakov mnenja, da v pisni del poklicne mature ne bi vključevali stroke, saj ocenjujejo, da je namen poklicne mature iz angleščine dokazovanje znanja iz angleščine in ne dokazovanje znanja iz logistike.

Zaključek

Na poklicni maturi iz angleščine jezik stroke s področja logistike obsega le 20% vrednosti celotnega izpita. Toda dejstvo je, da sta splošna angleščina in strokovna angleščina neločljivo povezani. Dobro znanje splošnega tujega jezika je nepogrešljiva osnova za nadaljnje izgrajevanje znanja tujega jezika stroke. Obvladovanje splošne in strokovne angleščine dijakom/odraslim kandidatom omogoča pridobivanje znanj za nadaljnje izobraževanje ter vseživljenjsko učenje, daje jim bogatejšo izkušnjo in samozavest, ki ju potrebujejo pri študiju, na delovnem mestu in v vsakdanjem življenju.

Angleščina je evropska in svetovna „lingua franca“. Je jezik znanosti, tehnologije, letalskega prometa, (mednarodnega) poslovanja, omogoča komunikacijo z ljudmi drugih narodnosti ... Danes se v praksi na splošno uporablja kot delovni jezik, kar pomeni, da je tudi na področju logistike vsekakor nujno obvladovanje jezika stroke. To znanje pomembno prispeva k učinkovitejšemu pristopu poslovanja in dela, zmanjšanju jezikovnih preprek in izboljšanju učinkovitosti in kakovosti storitev.

Uspešno opravljena poklicna matura iz angleščine je tako dokaz znanja, ki bo dijakom prav gotovo odskočna deska pri študiju ali delu.

Viri:

<https://www.ric.si/poklicna-matura/splosne-informacije/>

https://www.ric.si/mma/MIK_PM_2024_popravljen_2023.pdf/2023071012292391/?m=1688984963

<https://www.ric.si/poklicna-matura/predmeti/tretji-predmet/anglescina/>

https://www.ric.si/mma/PIK_ANG_2024-novi.pdf/2022111709281391/?m=1668673693

<http://smallbusiness.chron.com/importance-warehousing-logistics-system-74825.html>

LOGISTICS IN THE VOCATIONAL MATURA ENGLISH EXAM (3RD SUBJECT)

Abstract

The paper presents the Vocational Matura as a national final exam in the logistics technician programme. In more detail, it deals with the implementation of the English exam (the so-called 'third' subject which is optional) and with the share of the logistics topics in the oral part of the exam. It also includes students' reflections and satisfaction with the range of professional content in the field of logistics at English lessons and at the Vocational Matura English exam.

Key words: logistics technician, Vocational Matura, logistics, English

Introduction

Today's business world, including the world of logistics, is unimaginable without the English language. It helps us to understand traffic announcements on the radio, traffic signs, instructions on planes ... The knowledge of English makes it easier to continue our education, improve our job opportunities and progress in any profession. Proficiency in general and professional English is essential. The language for specific purposes is clearly defined and demanding. As teachers, we have a responsible task to prepare students to be able to communicate effectively in their studies or work.

The aim of this paper is to show how the Vocational Matura English exam guides teachers and encourages students to acquire the appropriate skills to be able to perform tasks in English in their studies or work, and to what extent and in what ways the language of the logistics profession is included in this final exam.

Vocational matura exam

A school-leaving exam at the end of all the four-year vocational programmes is the vocational matura exam. If students pass it successfully, they are provided with upper secondary vocational qualification, which proves that they have reached the knowledge standards set by the aims of the education programme and that they are qualified for higher education.

<https://www.ric.si/poklicna-matura/splosne-informacije/>

It consists of four subjects. Two of them are general education subjects, the first is a common or compulsory subject and the third is an optional subject. Second and fourth subjects are vocational knowledge-based. For the students completing the Logistics Technician programme at our school, it consists of the following four subjects:

1ST SUBJECT: Slovenian Language (the mother tongue)

2ND SUBJECT: Logistics

3RD SUBJECT: English Language or Mathematics

4TH SUBJECT: Product or Service with Oral Defence

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The third subject is optional. Students can choose English or Mathematics. This school year, 33 students attended the 4th grade. 27 of them chose English as their third subject, which is 82%.

Third subject – English

The English exam consists of a written and an oral part.

A written part

It is the same for all programmes. It lasts 120 minutes and consists of three parts (the question papers), which are set by the National Exam Committee for the Vocational Matura Exam in English. Part 1 tests reading comprehension, Part 2 tests listening comprehension (which is new this school year) and Part 3 tests written communication skills, requiring students to write two compositions, a shorter and a longer one. The written exam can be taken with a score of 70 points.

An oral part

It is taken in front of a school examination committee, which also scores it on the basis of a suggestion from the examiner. This is usually the teacher who taught the candidate in the final year. For the oral exam, question papers are prepared. The candidate has the right to have 15 minutes to prepare the answers. The oral examination shall last no longer than 20 minutes. A score of 30 points is achievable.

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The oral exam papers are set by the English teachers or English teachers' group at the school where the candidate is taking the exam. They should be tailored in a way that tests speaking and listening skills in everyday communication, as well as the ability to communicate in the language for specific purposes or in professional life. **Two of the three tasks in the oral examination are required to test the oral communication skills on topics related to the candidate's professional field.** The order of the tasks is not prescribed.

<https://www.ric.si/poklicna-matura/predmeti/tretji-predmet/angleščina/>

The exam papers therefore contain three different types of tasks, covering one general and two professional topics. These tasks test the knowledge of the language for specific purposes, namely vocational terminology, the comprehension of professional texts and the ability to communicate in a professional field. The topics to choose from are those covered in class and the general professional topics listed in the catalogue.

The exam papers contain three of the tasks, such as a role-play, a conversation based on a textual prompt (e.g. short texts of up to 100 words, advertisements, baseline questions) or a visual/graphical prompt (e.g. pictures, tables, graphs), an interpretation of an authentic professional (e.g. a description of a device, a procedure, an instruction manual) or a general text (e.g. a proverb, a title, a saying, an anecdote, a joke) of up to 100 words, written in English or Slovene, and a discussion of the text.

Candidates are familiarised with the topics and types of tasks during their English lessons or in preparation for the exam. As school lessons are limited, it is recommended that they read and listen to a variety of texts in English outside school lessons. They may also use newspapers, magazines and audio recordings, as well as professional periodicals, printed material and other texts relevant to their professional field. They are encouraged to: follow radio and television programmes in English; read, listen to and watch online content on current, general and professional topics; correspond and talk to

foreign acquaintances they meet on school exchanges abroad; search for information in a variety of sources on general and professional topics ...

In the course of a conversation, the student has to be able to make appropriate use of the following communicative functions: initiating, continuing, interrupting, joining and ending a conversation; When acquiring and conveying information, the student has to be able to, inter alia: make enquiries, identify and name himself/herself and describe people, objects, circumstances, places, machines, tools and other means of work in a specific profession, the workplace, tasks related to the professional work, report on events related to a specific profession (business meetings and appointments, visits to exhibitions and fairs, visits to partner companies and factories), on what he/she has read (general and professional texts) and on the opinions/ viewpoints of others ...

Tasks must be authentic (similar to real-life situations, including professional ones), meaningful (originality, problem-orientation, comprehensiveness, different perspectives) and communicative.

The vocational/professional subject areas include basic vocabulary in each professional field (materials, devices, tools, equipment, utensils and instructions) and a description of professional activities and work procedures, basic knowledge of business communication, information and communication technology (equipment, devices, responsible use of the internet), environmental protection, safety at the workplace (protective equipment, hazardous substances, first aid, occupational health and safety at work), developments in science and technology in the specific professional fields (celebrities, technological achievements, inventions).

The speaking activities are chosen to demonstrate the candidate's functional language skills and abilities: presentation/description skills, describing facts, introducing, comparing, giving instructions, summarising; evaluation skills (expressing and justifying an opinion, suggesting, expressing preferences, enquiring, asking for opinions, agreeing, disagreeing, explaining); interaction skills (taking part in an interview, mastering a dialogue, mastering the flow of a conversation: knowing how to start and end a conversation, give the floor, take the floor); adaptive skills (checking/confirming correct understanding, adapting, negotiating, coordinating with the other speaker). In the course of oral communication, candidates also demonstrate mastery and range of vocabulary, as well as the level and extent of linguistic knowledge in general, fluency of speech and appropriate communication strategies.

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Logistics topics in the tasks of the oral part of the examination papers

The assignments include the professional topics covered in class. Students are familiar with them.

The following topics are included in our school's exam papers:

- Logistics - definition, examples ...
- Jobs in logistics
- Modes of travel and means of transport
- Public passenger transport
- Passenger and luggage
- Carriage of goods
- Road traffic regulations
- Road accidents
- Organisation and planning of events

- Warehousing and stock management
- Supply chain
- Safety at work
- Procurement

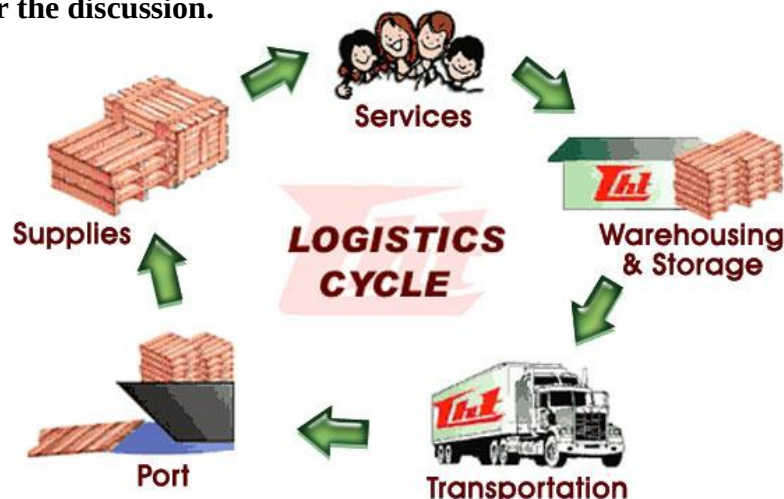
We follow basic guidelines when creating the exam papers. These are:

1. Designing tasks for assessing communicative abilities that provide the most valid and reliable sample of the candidate's language skills.
2. Variety - each task is set in a different way and is based on a different starting topic.
3. The sequence of the tasks is optional.

Example of an exam paper and conducting an exam

VOCATIONAL MATURA EXAM – oral part

4. Look at the picture and consider a brief description or comment. The picture is also the basis for the discussion.



https://www.google.si/search?hl=sl&site=imghp&tbm=isch&source=hp&biw=1366&bih=643&q=logistics&oq=logistics&gs_l=img_3..0j0i24i9.2029.4785.0.5744.9.7.0.2.2.0.136.813.0j7.7.0...0..1ac.1.46.img..0.9.826.bq6qH2WTcvw#facrc=&imgdii=&imgcr=KisleI--zq1fQM%253A%3B-18UJTyP23UJgM%3Bhttp%253A%252F%252Fflawyer24h.net%252Fwp-content%252Fuploads%252F2014%252F04%252Flogistic1.jpg%3Bhttp%253A%252F%252Fflawyer24h.net%252Fstart-logistics-business-vietnam%252F%3B586%3B399

5. Read the text and consider a brief summary. The text serves merely as a prompt for the discussion that will take place between you and the examiner."

Money talks. It tells people who you are, it influences people, it speaks so, you don't have to.

6. Role play

You are at the airport waiting for your luggage, which still hasn't arrived. Finally, you go to the responsible clerk and inquire about the situation. You explain that you had two pieces of luggage: a medium-sized brown leather suitcase and a green fabric bag. The clerk asks you to fill out a form. You politely explain that you don't have time because you are in a hurry to get to a conference. You urgently need the luggage because, in addition to your clothes and personal items, it also contains a paper you intend to present at the meeting. You insist that they immediately search for the lost items.

Examiner's questions/notes are prepared as a framework. For task 1, for example, we might ask the candidate to briefly describe the picture, explain the term "logistics," and discuss where and how it is present in everyday life (such as in schools). The candidate should also list and describe logistics processes and express their opinion on the role of each process.

In task 3, the student would need to put themselves in the described situation taking place at the airport's lost property office. He/she should ask and answer the questions given, for example describing his/her luggage, thus playing his/her part in the dialogue.

The exam paper includes a picture and text prompt (Task 2) and a role-play. Thus, variety of tasks is ensured.

Here are some other examples of professional prompts in the field of logistics:

- **Picture prompts:**

A)



https://www.google.si/search?hl=sl&site=img&tpb=isch&source=hp&biw=1366&bih=643&q=travelling&oq=travelling&gs_l=img_3..014j0i3016.1544.3565.0.3999.10.8.0.2.2.0.161.807.2j5.7.0....0...1ac.1.64.img..1.9.829.X72HMOz_Zxg#hl=sl&tpb=isch&q=logistics&imgcr=NQespmYzMhXGLM%3A

In this picture prompt, the candidate is expected to list and describe the means of transport for transporting people and goods, their advantages and disadvantages, compare them, and talk about personal experiences with different means of transport. He/she can then choose the appropriate road transportation vehicle according to the suggested conditions for the transport of goods. The discussion may focus on the experience of driving a car, various car brands, advantages and disadvantages of owning a car, maintenance, choice of drive (petrol/electric, etc.) and their benefits and drawbacks, etc.

B)



https://www.google.si/search?q=traffic+accidents&espv=2&biw=1366&bih=643&source=lnms&tbn=isch&sa=X&ved=0ahUKEwiPoNnk86LNAhWHSBQKH6vCSwQ_AUIBigB#imgrc=MawqnUAATSAXEM%3A

In this case, the candidate would describe what the image depicts. They would be asked if they have ever been involved in an accident as a passenger or driver, what types of accidents can occur, and what the most common causes are. Additionally, they would be asked what to do in the event of a road accident and how traffic safety could be improved or how the number and consequences of traffic accidents could be reduced.

- **Text prompts:**

C) Rules of the road are the general practices and procedures that road users follow, especially motorists and cyclists. They govern interactions with other vehicles and pedestrians ... As a general rule, a driver is expected to avoid hitting other vehicles, pedestrians, etc. regardless of whether or not the applicable rules of the road allow them to be where they happen to be.

For this text prompt, the examiners have prepared the following questions: what is the text about, which road traffic rules do you know, why is it necessary to follow them, why do some people break them and what are the consequences of not following them. We would encourage the candidate to think about his/her own attitude to driving and to obeying the rules.

D) A warehouse provides a central location for receiving, storing and distributing products. As each inbound shipment arrives, responsibility for the goods transfers to warehouse personnel, products are identified, sorted and dispatched to their temporary storage location. Storage isn't a static "thing" but rather a process that includes security measures and maintaining an environment that preserves the integrity and usefulness of the items.

<http://smallbusiness.chron.com/importance-warehousing-logistics-system-74825.html>

This text would be a basis for a discussion on warehouses, their equipment, the storage of different types of goods, the warehouse management system, the key tasks related to warehousing. The candidate would be asked about his/her experience of working in a warehouse, how the work was organised, what improvements could be made in this area, or what suggestions he/she would have for e.g. more efficient stock management, reduction of lost products, greater accuracy in ordering, improved speed and efficiency of tasks, and better traceability and control of warehouse operations.

- **Role plays:**

In role-plays, participants play a role according to a given scenario and the descriptions given in the task. They have to imagine the main features of the setting in which the conversation takes place and invent key facts. During the 15-minute preparation period before the conversation, they partially prepare their speech and partially improvise during the dialogue.

- C) You're a clerk at a railway station. A foreigner (examiner), who is not very proficient in English, is buying a ticket. Ask them everything you need to know in order to sell them the appropriate ticket (for example: type of ticket - single or return; window seat or aisle seat; class; when they want to travel; if they have any luggage, because they have to pay extra for it; how many tickets they want; also tell them which platform the train departs from ...).*
- D) You have been tasked with organizing a trip for a group of secondary school students. Call their representative (examiner) and ask for information (arrival time, number of participants, which sights they would like to see, food, etc.) that would help you plan the trip. Currently, you only know that they would like to visit Celje.*

Opinions of Students in the Logistics Technician Programme

I asked the final year students in the 2023/2024 school year for their opinions on the scope of the language for specific purposes in the field of logistics in the Vocational Matura English Exam and in the English lessons which prepare students for the Vocational Matura English Exam. 18 students answered the following questions:

1. Do you think there was enough emphasis on the professional language in the English lessons?
2. If you wanted more, which professional topics would you include?
3. Would you include more professional content in the oral part of the Vocational Matura English Exam (e.g., having all three prompts related to the profession instead of just two)?
4. Would you include professional topics in the written part of the Vocational Matura English Exam: YES/NO?

The majority of students (78%) answered the first question affirmatively. They believed that there was enough emphasis on professional language in English classes and that professional content was very often present in both the lessons and the assessments.

In their answers to the second question, they suggested the following topics to be included or covered in more detail: customs, freight forwarding, various abbreviations, filling in forms, air transport, transport, warehousing and business language. A third of students would not expand the range of professional topics.

In the third question, referring to the scope of logistics in the Vocational Matura English Exam, the vast majority of students expressed the opinion that there are enough professional topics. Thus, 83% of the students would not include more professional content in the oral part and would not want all three prompts (instead of two) to be related to the profession. Some justified their response by stating that some students switch fields and continue their education in other professions after finishing secondary school.

Similarly, in question 4, 83% of students thought that professional topics should not be included in the written part of the Vocational Matura English Exam, as they considered that the purpose of the

Vocational Matura English Exam was to prove knowledge of English, not to prove knowledge of logistics.

Conclusion

In the Vocational Matura English Exam, the language of the logistics field covers only 20% of the exam. However, the fact is that general English and professional English are inseparably connected. A good knowledge of general foreign language is an indispensable foundation for further development of the knowledge of the professional foreign language. Mastering both general and professional English enables students/adult candidates to acquire knowledge for further education and lifelong learning, providing them with a richer experience and the confidence they need for studying, in the workplace, and in everyday life.

English is the European and global "lingua franca". It is the language of science, technology, aviation, (international) business, it enables communication with people of other nationalities ... Today, it is widely used as a working language, which means that mastering the professional language is certainly essential in the field of logistics as well. This knowledge significantly contributes to a more efficient approach to business and work, reducing language barriers and improving efficiency and quality of service.

Successfully passing the Vocational Matura English Exam is therefore evidence of knowledge that will undoubtedly serve as a launching pad for students in their studies or work.

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<http://smallbusiness.chron.com/importance-warehousing-logistics-system-74825.html>

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VARNOST V PROMETU

POVZETEK

Varnost je eden od najpomembnejših vidikov, ki vplivajo na človekovo počutje. V zadnjem času, ko smo uspešno prebrodili zdravstveno krizo v povezavi z epidemijo covida-19, smo se v družbi začeli zavedati, kako je ravnanje posameznika pomembno za varnost celotne skupnosti. Obsežne strukturne in epidemiološke spremembe so prinesle nove načine prevoza, ki jih še pred nekaj leti ni bilo (avtonomna vozila, električna vozila, e-kolesa, e-skiroji, druga lahka motorna vozila), ter tehnološki napredek na področju povezljivosti in avtomatizacije. Z upoštevanjem teh sprememb v načinu potovanja se mora spremeniti način razumevanja varnosti v cestnem prometu in razmišljanja o njej.

Varnost prometnega sistema in njegovo delovanje je lahko ponazoriti s sistemom voznik -vozilo-okolje. Ugotavljamo prepletenost in soodvisnost posameznega elementa, kjer lahko država s svojimi nadzornimi in regulatorskimi ukrepi, kot upravitelj s sistemskimi ukrepi na področju infrastrukture in urejanja okolja pripomore k večji varnosti. Prav tako je pomemben delež odgovornosti tudi na proizvajalcih vozil, da z raziskavami in uvajanjem novih tehnoloških rešitev v nova vozila pripomorejo k večji varnosti v prometu. Navkljub napredku v tehnologiji vozil in razvoju cestne infrastrukture je pri zagotavljanju prometne varnosti nemogoče izključiti človeške dejavnike. V večini primerov je vzrok za prometno nesrečo prepletenost in soodvisnost različnih dejavnikov, kjer je kot primarni vzrok v večini primerov človeški dejavnik.

Namen prispevka je poudariti tista področja, kjer se s sistemskimi rešitvami lahko bistveno prispeva k izboljšanju stanja na področju prometne varnosti.

KLJUČNE BESEDE: prometna varnost, prednostne naloge, strategije EU, prevoz

1. Prometna varnost na področju EU

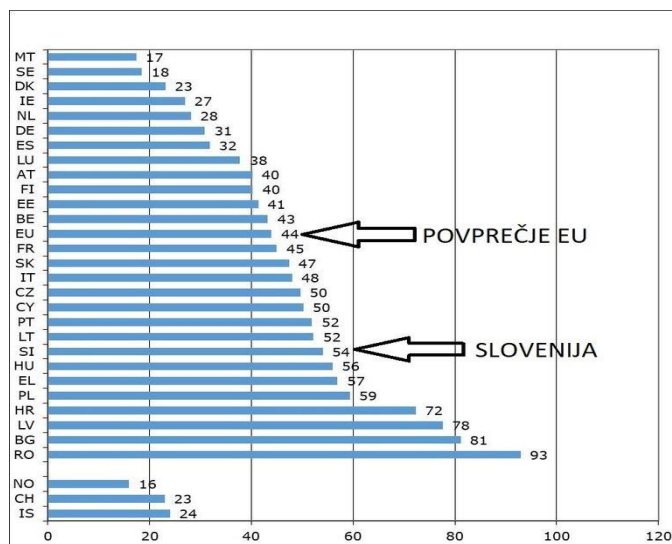
Promet je ključnega pomena za naše gospodarstvo in družbo. Mobilnost je bistvena za notranji trg in kakovost življenja državljanov, ki lahko prosto potujejo. Promet omogoča gospodarsko rast in ustvarjanje delovnih mest, zato mora biti trajnosten v luči novih izzivov, s katerimi se soočamo. Promet se odvija na svetovni ravni, zato je za učinkovito ukrepanje potrebno tesno mednarodno sodelovanje.

Evropska komisija je pred kratkim objavila podatke o številu smrtnih žrtev v cestnem prometu za leto 2022. Lani, ko se je obseg prometa po pandemiji vrnil na običajno raven, je v prometnih nesrečah umrlo okoli 20 600 ljudi, kar je 3 % več kot leta 2021. V primerjavi z letom pred pandemijo 2019 to pomeni 2 tisoč manj smrtnih žrtev (–10 %). Cilj Unije in Združenih narodov je do leta 2030 prepoloviti število smrtnih žrtev v cestnem prometu.

Pri pregledu teh podatkov je zanimivo, da se zasledijo nasprotujoči si trendi med državami članicami

Po vsej EU se je število smrtnih žrtev v cestnem prometu v letu 2022 povečalo za 3 % glede na prejšnje leto, med drugim tudi zato, ker se je obseg prometa po pandemiji povečal. Pomembno je, da se je znaten napredek, dosežen v obdobju pandemije COVID-19 (tudi 17 % manj smrtnih žrtev med letoma 2019 in 2020), obdržal. V primerjavi z letom 2019 se je število smrti v letu 2022 zmanjšalo za 10 %.

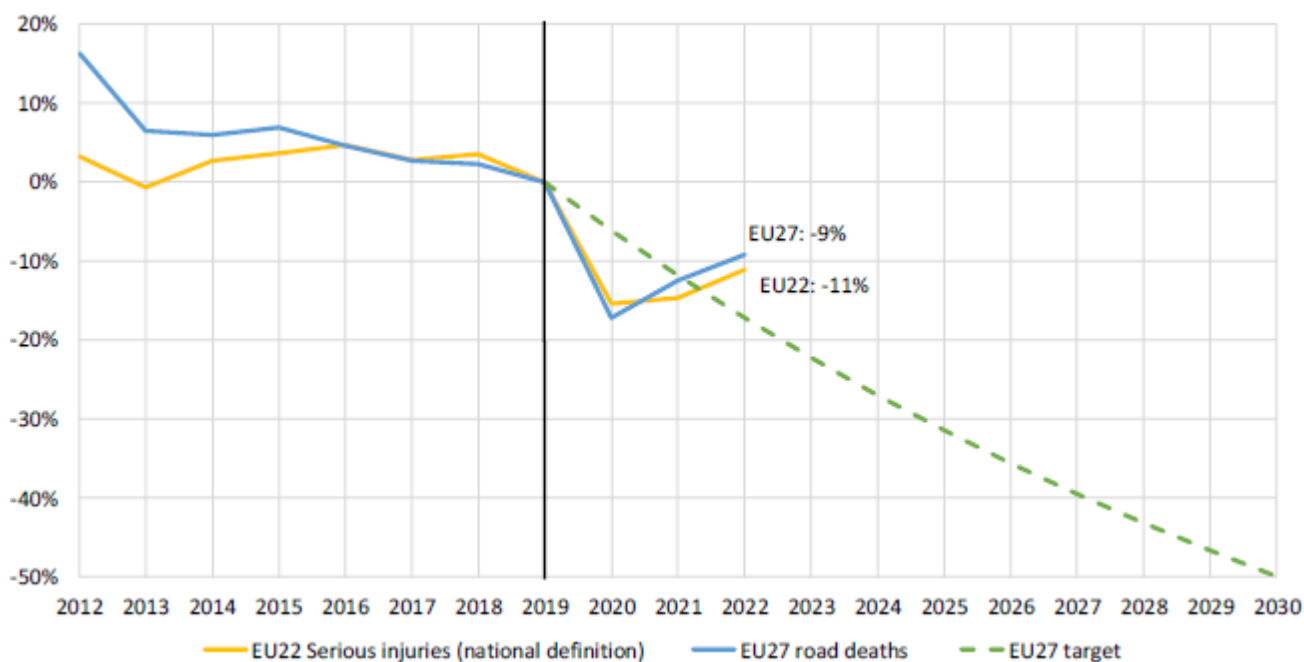
Vendar je bil napredek med državami članicami zelo neenakomeren. O največjem upadu števila smrtnih žrtev, celo za več kot 30 %, so poročali v Litvi in na Poljskem, na Danskem pa je bil zabeležen 23-odstotni upad. Nasprotno pa je v zadnjih treh letih število smrtnih žrtev v cestnem prometu na Irskem, v Španiji, Franciji, Italiji, na Nizozemskem in Švedskem, ostalo razmeroma stabilno ali se je povečalo.



Slika 1: Število smrtnih žrtev v cestnem prometu na milijon prebivalcev

Vir: <https://avto-magazin>

Splošna razvrstitev stopenj smrtnih žrtev po državah se od obdobja pred pandemijo ni bistveno spremenila: leta 2022 so bile ceste najvarnejše na Švedskem (21 smrtnih žrtev na milijon prebivalcev) in na Danskem (26 na milijon), Romunija (86 na milijon) in Bolgarija (78 na milijon) pa sta poročali o najvišjem številu žrtev. Povprečje v EU je znašalo 46 smrtnih žrtev na milijon prebivalcev.



Slika 2.: Sprememba števila smrtnih žrtev na cestah v EU-27 od leta 2012 v primerjavi s ciljem EU za 2030 in spremembo števila hudih poškodb v cestnem prometu v EU22 na podlagi nacionalnih državdefinicije. EU22: EU27 brez FI, NL in SE zaradi pomanjkanja posodobljenih podatkov ter LT in IE zaradi nedoslednosti podatkov o trendu. Vir: CARE

2. Število smrtnih žrtev v cestnem prometu za leto 2022 za regijo zahodni Balkan

Podatki za leto 2022 kažejo povečanje števila smrtnih žrtev v primerjavi z letom 2021, zaradi česar so vprašanja varnosti v cestnem prometu v regiji zelo zaskrbljujoča.

Tabela 1 prikazuje, da se je stopnja smrtnih žrtev na milijon od leta 2019 do leta 2020 zmanjšala. To je regionalne partnerje približalo doseganju ciljev prejšnjega desetletja 2011-2020. Vendar pa leti 2021 in 2022 kažeta, da se trend v številnih regionalnih partnerjih izjemno povečuje. Albanija je edina regionalna partnerska država, v kateri se kaže zmanjšanje števila smrtnih žrtev v primerjavi z letom 2021, in sicer za 17 %. Medtem se povečanje števila smrtnih žrtev pri drugih regionalnih partnerjih giblje med 3% in 33%, kar je največ v Črni gori.

Tabela 1: Število umrlih na milijon prebivalcev za obdobje 2019-2022

Regional Partner	Fatalities per million 2019	Fatalities per million 2020	Fatalities per million 2021	Fatalities per million 2022
Albania	80	63	69	
Bosnia and Herzegovina	74	69	74	
Montenegro	76	77	88	
North Macedonia	63	60	56	
Serbia	77	71	75	
Western Balkans	73	66	70	

Tabela 2: Število smrtnih žrtev za 2019–2022 in sprememba v odstotkih za 2021/2022

Regional Partner	Year 2019	Year 2020	Year 2021	Year 2022	% change 2021/2020
Albania	227	181	197	164	-
Bosnia and Herzegovina	261	244	263	i	
Montenegro	47	48	55	73 ⁱⁱ	
North Macedonia	132	125	116	120 ⁱⁱ	
Serbia	534	492	521	553	
Western Balkans	1314	1171	1255		

3. Prednostne naloge varnosti v cestnem prometu za EU 2024–2029

Evropski pristop k reševanju varnosti v cestnem prometu je v težavah. EU in njene države članice so se dogovorile o ciljih zmanjšanja števila smrtnih žrtev na cestah za polovico v desetletju do leta 2030. Toda glede na trenutni trend naj bi se število smrtnih žrtev zmanjšalo le za četrtno. Lani je bilo v EU 20.400 smrtnih žrtev na cestah – le 1 % manj kot leto prej. Medtem ko je to 10-odstotno zmanjšanje od leta 2019, kar je izhodišče za cilj do leta 2030, se je trend upadanja v več državah članicah umiril, v drugih pa povečal.

Marca je Evropsko računsko sodišče izdalo svoje prvo poročilo o varnosti v cestnem prometu, v katerem je zapisano, da bodo morale EU in njene države članice „pospešiti svoja prizadevanja“, da bodo dosegle cilje do leta 2030.¹

Evropski parlament je v svojem poročilu o varnosti v cestnem prometu za leto 2021 pozval k „močnemu vodstvu EU, da bi zagotovili, da bo varnost v cestnem prometu ostala prednostna naloga v cestnem prometu, da bi zmanjšali vrzel v varnosti v cestnem prometu med državami članicami in zagotovili, da EU ostane vodilna v svetu na tem področju.

Evropska unija ni izključno odgovorna za to slabo uspešnost, države članice imajo vodilno vlogo pri večini vidikov varnosti v cestnem prometu in pregled njihovih strategij za varnost v cestnem prometu je v teku.

Ne glede na vlogo držav članic ne smemo podcenjevati pomena zakonodaje Evropske unije in pobud za varnost v cestnem prometu. Na žalost nedavni napredek ni bil tak, kot bi moral biti.

Med trenutnim mandatom Evropske komisije in parlamenta 2019–2024 so ambicioznost nove uredbe EU o varnosti vozil spodbujale šibke tehnične zahteve za nekatere ključne tehnologije. To bo povzročilo manj rešenih življenj.

Sveženj Evropske komisije o varnosti v cestnem prometu (marec 2023), vodilna pobuda o varnosti v cestnem prometu prejšnjega mandata, vključuje reforme vozniških dovoljenj in čezmejnega pregona. Na žalost bodo nekatere najpomembnejše načrtovane spremembe vozniških dovoljenj, vključno z dovoljevanjem 16-letnikom vožnje avtomobilov in 17-letnikom vožnje tovornjakov, varnost v cestnem prometu verjetno poslabšale, ne pa izboljšale. Ločen predlog za spremembo predpisov o masi in dimenzijah tovornjakov bo verjetno privedel do velikega povečanja števila „megatovornjakov“ na cestah EU brez dodatnih zahtev glede usposabljanja voznikov. Ta daljša in težka vozila bodo sprožila tudi kup težav na cestni infrastrukturi, ki ni bila zasnovana zanje – s potencialno uničujočimi posledicami.

Na evropski ravni sta nujno potrebna močno vodstvo in ukrepanje na področju varnosti v cestnem prometu, da se stvari vrnejo na pravo pot. Evropska komisija bo morala bo določiti prednostne naloge pred začetkom novega mandata. Ključnega pomena je, da na novo imenovani nosilci odločanja v Evropskem parlamentu in Komisiji hitro začnejo delovati in opredelijo področja za ukrepanje.

Takšno ukrepanje se bo obrestovalo v rešenih življenjih, pa tudi v ekonomskem smislu. Evropski svet za varnost v prometu (ETSC) ocenjuje, da je skupna vrednost človeških izgub, ki so se jim izognili z zmanjšanjem števila smrtnih žrtev na cestah v letih 2013–2022, okoli 104 milijard evrov, pri čemer je potrebno pretehtati stroške in koristi konkurenčnih politik, ki jih je treba plačati z omejenimi viri. ETSC se zavzema za ukrepe, ki so stroškovno učinkoviti in rešujejo življenja.

Financiranje na nacionalni ravni je bistveno tudi za ustvarjanje in vzdrževanje varnih prometnih sistemov, ki ščitijo življenja, spodbujajo gospodarsko blaginjo in izboljšujejo splošno kakovost življenja. Vlade morajo dodeliti in vložiti dovolj sredstev za učinkovito reševanje zapletenih izzivov varnosti v cestnem prometu.

Vsak teden na evropskih cestah umre približno 100 mladih (starih od 15 do 30 let). Veliki večini teh smrti bi se lahko izognili z ukrepi, ki so se že izkazali za učinkovite. ETSC poziva oblikovalce politik, naj končajo to epidemijo, začeni z novo zavezo k doseganju obstoječega cilja EU, da se do leta 2030 prepolovi število smrtnih žrtev na cestah. Cilj je dosegljiv, vendar bo zahteval nujnost in vodstvo.

4. Strategija EU za varnost v cestnem prometu 2021–2030

Okvir EU za varnost v cestnem prometu (2019) je vzpostavil nov način upravljanja in ukrepe za varnost infrastrukture, varnost vozil, varno uporabo cest (vključno s hitrostjo, alkoholom in drogami, odvrčanjem pozornosti in uporabo zaščitne opreme). Pri tem je pomembno, da mora Evropska komisija še naprej opravljati svojo ključno vlogo pri podpiranju in motiviranju držav članic EU za ukrepanje. To bi moralo vključevati učinkovito usklajevanje med različnimi direktorati Komisije s strani koordinatorja za varnost v cestnem prometu. Na ravni EU in nacionalni ravni je treba jasno poudariti, da je varnost v cestnem prometu medsektorsko vprašanje in ne v izključni odgovornosti uradnikov, ki delajo na področju prometa. To bi morala biti skrb za različne sektorje, vključno z zdravjem, izobraževanjem, urbanističnim načrtovanjem, kazenskim pregonom in varstvom okolja. Struktura okvira EU za varnost v cestnem prometu in koordinator za varnost v cestnem prometu bi morala podpirati tudi spremljanje izvajanja okvira, vključno s ključnimi rezultati drugih direktoratskih. Treba je razmisliti o preoblikovanju položaja koordinatorja za varnost v cestnem prometu v položaj odposlanca za varnost v cestnem prometu, ki bi poročal neposredno predsedniku Komisije.

Ob tem ETSC priporoča, da se v najkrajšem času, ko bo imenovana naslednja komisija, imenuje odposlanca za varnost v cestnem prometu..

Poročilo o izvajanju okvira EU za varnost v cestnem prometu je predvideno za leto 2025. V naslednjih poglavjih navajam nekaj ključnih komponent iz priporočil ETSC za izboljšanje prometne varnosti.

5. Ključni kazalniki uspešnosti

Okvir varnosti v cestnem prometu je predlagal osem novih ključnih kazalnikov uspešnosti za varnost v cestnem prometu z namenom, da se v drugi fazi določijo cilji rezultatov. V tej naslednji fazi je treba kazalnike uspešnosti prilagoditi napredku v različnih državah članicah EU. Prihajajoče poročilo v okviru projekta EU Trendline bo predlagalo načine za uporabo kazalnikov pri oblikovanju politik.

Ob tem ETSC priporoča, da se razmisli o razširitvi kazalnikov tudi na področja, ki bi vključevala varno infrastrukturo za pešce, kolesarje in motoriste.

Ob tem je potrebno uvesti in definirati kratkoročne in dolgoročne vseevropske cilje in spodbuditi države članice EU, da sprejmejo cilje na nacionalni ravni, ter jih vključijo v svoje razvojne načrte.

6. Agencija EU za varnost v cestnem prometu

Medtem, ko imajo drugi glavni načini prevoza v Evropi (letalski, pomorski in železniški) posebne agencije EU, odgovorne za varnost, takšne agencije za cestni promet ni. Zaradi novih tehnologij in trendov je potreba po Agenciji EU za varnost v cestnem prometu vedno bolj nujna.

Priporočilo ETSC glede tega je, da se ustanovi Evropska agencija za varnost v cestnem prometu z nalogo zbiranja in analiziranja podatkov, ki pomagajo pospešiti razvoj varnosti v cestnem prometu in omogočajo razviti metode za spremljanje in ocenjevanje nacionalnih strategij varnosti v cestnem prometu. Prav tako bi bilo potrebno urediti in nadzirati področje neodvisnih preiskav prometnih nesreč na način, ki je že v veljavi v ostalih prometnih sistemih (npr. letalstvo, pomorstvo).

Z uvajanjem novih tehnologij pri upravljanju vozil, ki so opremljena s sistemi za pomoč in avtomatizirano vožnjo je pomembno, da se pri preiskavi prometnih nesreč v katera so vpletena taka

vozila pooblasti neodvisen organ, ki bo preiskoval take nesreče. Na ravni EU je potrebno pooblastiti Agencijo EU za varnost, da nadzoruje varno uvedbo avtomatiziranih vozil z nadzorom in testiranjem v resničnem svetu preden bodo na trg dana vozila

7. Krepitev zmogljivosti in izmenjava najboljših praks

Evropska komisija mora še naprej izpolnjevati svojo ključno vlogo podpiranja najboljših praks varnosti v cestnem prometu v državah članicah EU ter si prizadevati za sprejetje nacionalnih ciljev in akcijskih načrtov za varnost v cestnem prometu.

Kot je razvidno iz dokumentov EU je v pripravi revizija 27 nacionalnih strategij varnosti cestnega prometa. To izvaja Evropski observatorij za varnost v cestnem prometu. Pregled bo najprej preučil podatke o smrtnih in resnih poškodbah ter ključne kazalnike varnosti. Druga faza bo obravnavala izvajanje na ključnih področjih politike. V zadnji fazi bo ocenjeno, v kolikšni meri politike vodijo k izboljšanju varnosti v cestnem prometu.

8. Komerčni prevoz

Do 40 % vseh smrtnih žrtev na cestah v EU je povezanih z delom. Dolžnost skrbnega ravnanja, varnost in zdravje pri delu (VZD) ter skladnost z varnostjo v cestnem prometu so zakonske zahteve za delodajalce v vseh državah članicah EU. Direktiva EU 89/391/EGS o zdravju in varnosti delavcev od vsakega delodajalca zahteva, da izvede oceno tveganja po načelu preprečevanja. Poleg tega so globalni cilji trajnostnega razvoja pripeljali do pobude za globalni indeks varnosti v cestnem prometu kot standardnega načina za primerjavo prizadevanj delodajalcev.

Nedavno predlagane spremembe direktive EU o voznških dovoljenjih o najnižji starosti za voznike tovornjakov, avtobusov in kombijev bodo verjetno negativno vplivale na varnost.

V trčenjih lahkih tovornih vozil (LGV) je samo leta 2018 v EU umrlo skupaj 2630 ljudi, kar predstavlja 11 % vseh smrtnih žrtev na cestah. Ta skupina si zasluži posebno pozornost. Uporaba kombijev v Evropi še naprej narašča zaradi povečanega povpraševanja po dostavah na dom. Zahteve za zakonodajo EU v zvezi z varnostjo za večje razrede poklicnih vozil je treba razširiti na dostavna vozila. Prav tako bi bilo potrebno razširiti sedanji zakonodajni okvir za poklicno usposabljanje voznikov na voznike kombijev.

K večji varnosti kombijev bi pripomogla tudi obveza po opremljenosti lahkih tovornih vozil (N1) z omejevalniki največje hitrosti, nastavljenimi na 130 km/h.

V zvezi z Uredbo (EU) 2020/1054 o minimalnih zahtevah glede najdaljšega dnevnega in tedenskega časa vožnje ETSC priporoča, dosledno uveljavljanja delovnega časa po vsej EU, saj so v praksi velike razlike v doslednosti izvajanja nadzora med posameznimi članicami EU.

9. Zaključek

Strategija EU za varnost v cestnem prometu obravnava prometno varnostno politiko v cestnem prometu in strokovno zahtevne ter varnostno najbolj transparentne težave na področju varnosti cestnega prometa v EU za obdobje od 2023 do 2030.

Izpostavlja prednostna področja, ki jih je treba izvesti za učinkovitejše zagotavljanje varnosti cestnega prometa. Primarni cilj programa je prizadevanje za zmanjšanje najhujših posledic prometnih nesreč v cestnem prometu (smrtne žrtve in hudo telesno poškodovani udeleženci), ki ga bomo dosegli z učinkovitim celostnim in integralnim pristopom, pri katerem bodo upoštevane sinergije ciljev politik na področjih prometa. Tematika je zelo obširna, zato sem v prispevku orisal samo nekaj področij, ki so zelo aktualna in jih lahko kot učitelji logistike integriramo v naše šolske programe.

Viri:

- <https://etsc.eu/>
- <https://www.avp-rs.si/>
- <https://www.ozs.si/>
- <https://unece.org/transport/road-traffic-safety-0>

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Ljubljana, 24.7.2024

TRAFFIC SAFETY

SUMMARY

Safety is one of the most important aspects affecting human well-being. Recently, when we successfully overcame the health crisis in connection with the covid-19 epidemic, we in society began to realize how important individual behavior is for the overall safety of the community. Extensive structural and epidemiological changes have brought about new modes of transport that did not exist a few years ago (autonomous vehicles, electric vehicles, e-bikes, e-skiroes, other light motor vehicles), as well as technological progress in the field of connectivity and automation. Changing these changes in this mode of travel must change the way we understand and think about road safety.

The safety of the transport system and its operation can be illustrated by the driver-vehicle-environment system. We note the intertwining and interdependence of individual elements, where the state can contribute to greater security with its supervisory and regulatory measures, as a manager with systemic measures in the field of infrastructure and environmental regulation. Vehicle manufacturers also have a significant share of responsibility to contribute to greater traffic safety through research and the introduction of new technological solutions in new vehicles. Despite advances in vehicle technology and the development of road infrastructure, it is impossible to exclude human factors in ensuring traffic safety. In most cases, the cause of a traffic accident is the intertwining and interdependence of various factors, where the primary cause in most cases is the human factor.

The purpose of the contribution is to emphasize those areas where system solutions can significantly contribute to improving the situation in the field of traffic safety.

KEY WORDS: traffic safety, priorities, EU strategies, transport

1. Traffic safety in the EU area

Transport is vital to our economy and society. Mobility is essential for the internal market and the quality of life of citizens who can travel freely. Transport enables economic growth and job creation, so it must be sustainable in light of the new challenges we face. Traffic takes place on a global scale, so effective action requires close international cooperation.

The European Commission recently published data on the number of road traffic fatalities for 2022. Last year, when traffic volume returned to normal levels after the pandemic, around 20,600 people died in traffic accidents, which is 3% more than in 2021. Compared to the year before the 2019 pandemic, this means 2,000 fewer deaths (-10%). The goal of the Union and the United Nations is to halve the number of road traffic fatalities by 2030.

When reviewing these data, it is interesting to see contrasting trends between the Member States

Across the EU, the number of road traffic fatalities in 2022 has increased by 3% compared to the previous year, partly because the volume of traffic has increased following the pandemic. Importantly, the significant progress made during the COVID-19 pandemic (including 17% fewer deaths between 2019 and 2020) has been sustained. Compared to 2019, the number of deaths in 2022 has decreased by 10%.

However, progress has been very uneven between Member States. The largest declines in deaths, even by more than 30%, were reported in Lithuania and Poland, while a 23% decline was recorded in Denmark. In contrast, over the past three years, the number of road deaths in Ireland, Spain, France, Italy, the Netherlands and Sweden has remained relatively stable or increased.

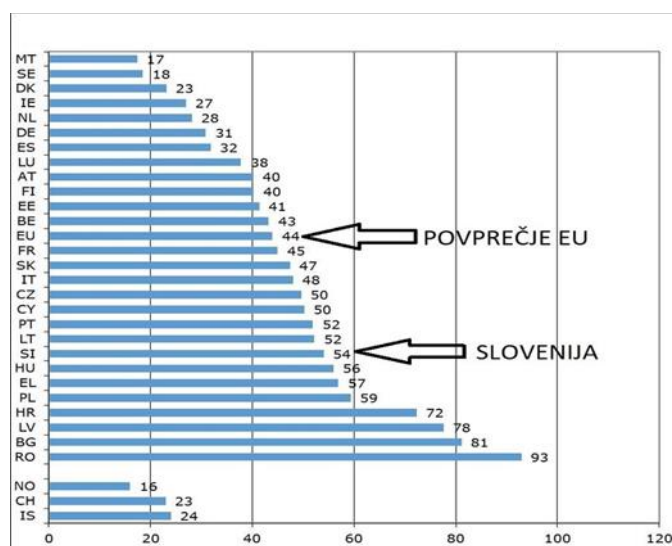


Figure 1: Number of road traffic fatalities per million inhabitants

Source: <https://avto-magazin>

The overall classification of fatality rates by country has not changed significantly since the pre-pandemic period: in 2022, the roads were safest in Sweden (21 deaths per million inhabitants) and Denmark (26 per million), Romania (86 per million) and Bulgaria (78 per million) reported the highest number of victims. The EU average was 46 deaths per million inhabitants.

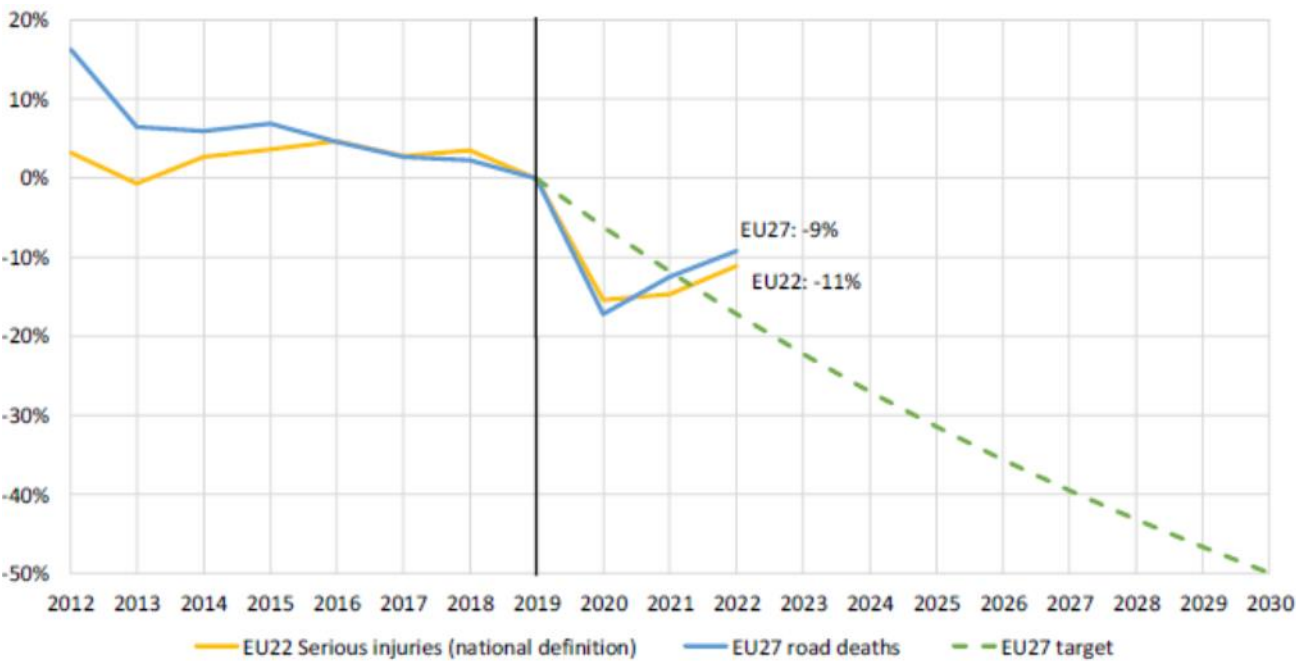


Figure 2. Change in the number of road deaths in the EU-27 since 2012 compared to the EU target for 2030 and the change in the number of serious road injuries in the EU22 based on national country definitions. EU22: EU27 excluding FI, NL and SE due to lack of updated data and LT and IE due to inconsistency in trend data. Source: CARE

2. Number of road traffic fatalities for the year 2022 for the Western Balkans region

Figures for 2022 show an increase in the number of fatalities compared to 2021, making road safety issues in the region a major concern.

Table 1 shows that the death rate per million decreased from 2019 to 2020. This brought the regional partners closer to achieving the goals of the previous decade 2011-2020. However, the years 2021 and 2022 show that the trend is increasing tremendously in many regional partners. Albania is the only regional partner country that shows a decrease in the number of deaths compared to 2021, by 17%. Meanwhile, the increase in the number of deaths in other regional partners varies between 3% and 33%, which is the highest in Montenegro.

Table 1: Number of deaths per million inhabitants for the period 2019-2022

Regional Partner	Fatalities per million 2019	Fatalities per million 2020	Fatalities per million 2021	Fatalities per million 2022
Albania	80	63	69	
Bosnia and Herzegovina	74	69	74	
Montenegro	76	77	88	
North Macedonia	63	60	56	
Serbia	77	71	75	
Western Balkans	73	66	70	

Table 2: Number of fatalities for 2019-2022 and percentage change for 2021/2022

Regional Partner	Year 2019	Year 2020	Year 2021	Year 2022	% change 2021/2020
Albania	227	181	197	164	-12%
Bosnia and Herzegovina	261	244	263	251	5%
Montenegro	47	48	55	73 ⁱ	32%
North Macedonia	132	125	116	120 ⁱ	4%
Serbia	534	492	521	553	6%
Western Balkans	1314	1171	1255	1255	7%

3. Road safety priorities for the EU 2024-2029

3. Road safety priorities for the EU 2024-2029

The European approach to solving road safety is in trouble. The EU and its member states have agreed targets to halve the number of road deaths in the decade to 2030. But on current trends, the number of deaths is only expected to fall by a quarter. Last year there were 20,400 in the EU of road fatalities – only 1% less than a year earlier. While this is a 10% reduction from 2019, which is the starting point for the 2030 target, the downward trend has moderated in several Member States and increased in others.

In March, the European Court of Auditors issued its first report on road safety, stating that the EU and its member states will need to "step up their efforts" to meet the 2030 targets.¹

In its Road Safety Report 2021, the European Parliament called for "strong EU leadership to ensure that road safety remains a priority in road transport to reduce the road safety gap between Member States and ensure that the EU remains a world leader in this field.

The European Union is not solely responsible for this poor performance, Member States have a leading role in most aspects of road safety and a review of their road safety strategies is ongoing.

Regardless of the role of the member states, the importance of European Union legislation and road safety initiatives should not be underestimated. Unfortunately, recent progress has not been what it should have been.

During the current 2019-2024 mandate of the European Commission and Parliament, the ambition of the new EU regulation on vehicle safety has been undermined by weak technical requirements for some key technologies. This will result in fewer lives saved.

The European Commission's road safety package (March 2023), the flagship road safety initiative of the previous mandate, includes reforms to driving licenses and cross-border enforcement. Unfortunately, some of the most significant planned changes to driver's licenses, including allowing 16-year-olds to drive cars and 17-year-olds to drive trucks, are likely to make road safety worse, not better. A separate proposal to change regulations on truck weights and dimensions is likely to lead to a large increase in the number of 'mega-trucks' on EU roads without additional driver training requirements. These longer and heavier vehicles will also create a host of problems on road infrastructure that was not designed for them – with potentially devastating consequences.

Strong leadership and action on road safety at European level is urgently needed to get things back on track. The European Commission will have to set priorities before the start of the new mandate. It is crucial that the newly appointed decision-makers in the European Parliament and the Commission start working quickly and identify areas for action.

Such action will pay off in saved lives, as well as in economic terms. The European Transport Safety Council (ETSC) estimates that the total value of human losses avoided by reducing road deaths in 2013-2022 is around €104 billion, weighing the costs and benefits of competing policies that must be paid for with limited resources. ETSC is committed to cost-effective and life-saving measures.

Funding at the national level is also essential to creating and maintaining safe transportation systems that protect lives, promote economic prosperity, and improve the overall quality of life. Governments must allocate and invest sufficient resources to effectively address the complex challenges of road safety.

Around 100 young people (aged 15 to 30) die on European roads every week. The vast majority of these deaths could be avoided with measures that have already been proven to be effective. ETSC is calling on policymakers to end this epidemic, starting with a new commitment to meet the existing EU target of halving road deaths by 2030. The goal is achievable, but it will require urgency and leadership.

4. EU Road Safety Strategy 2021-2029

The EU Road Safety Framework (2019) established new governance and measures for infrastructure safety, vehicle safety, safe road use (including speed, alcohol and drugs, distraction and use of protective equipment). It is important that the European Commission must continue to play its key role in supporting and motivating EU member states to take action. This should include effective coordination between the various Commission Directorates by the Road Safety Coordinator. It must be clearly emphasized at EU and national level that road safety is a cross-sectoral issue and not the sole responsibility of officials working in the field of transport. This should be a concern for various sectors, including health, education, urban planning, law enforcement and environmental protection.

The structure of the EU Road Safety Framework and the Road Safety Coordinator should also support the monitoring of the implementation of the framework, including key results from other Directorates. Consideration should be given to transforming the position of road safety coordinator into that of a road safety envoy who would report directly to the President of the Commission.

At the same time, the ETSC recommends that a road safety envoy be appointed as soon as the next commission is appointed.

The report on the implementation of the EU road safety framework is scheduled for 2025. In the following chapters, I list some of the key components from the ETSC recommendations for improving road safety.

5. Key performance indicators

The Road Safety Framework proposed eight new key performance indicators for road safety with the aim of setting outcome targets in the second phase. In this next phase, the performance indicators should be adjusted to the progress in the different EU Member States. A forthcoming report from the EU Trendline project will propose ways to use the indicators in policy making.

At the same time, ETSC recommends to consider expanding the indicators to include areas that would include safe infrastructure for pedestrians, cyclists and motorcyclists.

At the same time, it is necessary to introduce and define short-term and long-term pan-European goals and encourage EU member states to adopt goals at the national level and include them in their development plans.

6. EU Road Safety Agency

While the other main modes of transport in Europe (air, sea and rail) have specific EU agencies responsible for safety, there is no such agency for road transport. Due to new technologies and trends, the need for an EU Road Safety Agency is increasingly urgent.

The ETSC's recommendation in this regard is to establish a European Road Safety Agency with the task of collecting and analyzing data that helps accelerate the development of road safety and enables the development of methods for monitoring and evaluating national road safety strategies. It would also be necessary to regulate and control the field of independent investigations of traffic accidents in a way that is already in force in other transport systems (eg aviation, maritime).

With the introduction of new technologies in the management of vehicles that are equipped with assistance systems and automated driving, it is important that an independent authority is authorized to investigate such accidents when investigating traffic accidents in which such vehicles are involved. At EU level, the EU Safety Agency needs to be empowered to oversee the safe deployment of automated vehicles through real-world monitoring and testing before vehicles are placed on the market

7. Capacity building and sharing of best practices

The European Commission must continue to fulfill its key role of supporting best road safety practices in EU Member States and work towards the adoption of national road safety targets and action plans.

As can be seen from EU documents, a revision of 27 national road safety strategies is being prepared. This is carried out by the European Road Safety Observatory. The review will first look at data on deaths and serious injuries and key safety indicators. The second phase will address implementation in key policy areas. In the last phase, it will be assessed to what extent the policies lead to the improvement of road safety.

8. Commercial transport

Up to 40% of all road deaths in the EU are work-related. Duty of care, safety and health at work (OSH) and compliance with road safety are legal requirements for employers in all EU member states. EU Directive 89/391/EEC on the health and safety of workers requires every employer to carry out a risk assessment based on the principle of prevention. In addition, the global SDGs have led to the initiative for the Global Road Safety Index as a standard way to compare employers' efforts.

The recently proposed changes to the EU Driving Licensing Directive on the minimum age for truck, bus and van drivers are likely to have a negative impact on safety.

A total of 2,630 people died in light goods vehicle (LGV) collisions in the EU in 2018 alone, representing 11% of all road fatalities. This group deserves special attention. The use of vans in Europe continues to grow due to increased demand for home deliveries. EU safety legislation requirements for larger classes of commercial vehicles should be extended to delivery vehicles. It would also be necessary to extend the current legislative framework for professional driver training to cover van drivers.

An obligation to equip light trucks (N1) with maximum speed limiters set at 130 km/h would also help to increase the safety of vans.

In relation to Regulation (EU) 2020/1054 on minimum requirements regarding the maximum daily and weekly driving time, the ETSC recommends the consistent enforcement of working hours throughout the EU, as in practice there are large differences in the consistency of monitoring between individual EU member states.

9. Conclusion

The EU Road Safety Strategy deals with road safety policy and the most technically demanding and safety-transparent problems in the field of road safety in the EU for the period from 2023 to 2030.

It highlights priority areas that need to be implemented to ensure road traffic safety more effectively. The primary goal of the program is the effort to reduce the worst consequences of traffic accidents in

road traffic (deaths and seriously injured participants), which will be achieved with an effective holistic and integral approach, which will take into account the synergies of policy goals in the fields of transport. The topic is very extensive, so in the paper I have outlined only a few areas that are very relevant and that we as logistics teachers can integrate into our school programs.

Sources:

- <https://etsc.eu/>
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- <https://www.ozs.si/>
- <https://unece.org/transport/road-traffic-safety-0>

Lovorka Vidić, dipl. ing. – prof. savjetnik
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Erasmus+ KA2 projekt „Green Skills 4 VET“

Sažetak:

Škola za cestovni promet od studenog 2023. godine kao partner sudjeluje na Erasmus+ KA2 projektu „Green Skills 4 VET“, čiji je završetak predviđen za listopad 2025. godine.

Tehničke i strukovne škole te proizvodne tvrtke, zajedno sa stručnjacima za strateško savjetovanje, na ovom projektu rade na uvođenju tema o ekološkoj održivosti u škole, primjenjujući iskustveno učenje i učenje temeljeno na radu, na četiri europska strateška industrijska sektora: poljoprivredu, strojarstvo, tekstilnu industriju, te promet i logistiku. Koordinator projekta tvrtka Cisita Parma iz Italije zadužena je za osmišljavanje projektnih aktivnosti i evaluaciju ishoda učenja u sustavu strukovnog obrazovanja i osposobljavanja.

Ciljevi projekta su:

- prijenos stvarnih problema i izazova koji se tiču održivosti okoliša iz industrijskog i poslovnog okruženja u područje strukovnog obrazovanja i osposobljavanja kako bi se povezivanjem škola i tvrtki uskladile ponuda i potražnja;
- razvijanje i/ili podizanje kompetencija o održivosti okoliša kod nastavnika i učenika strukovnih škola;
- uvođenje novina u kurikulum strukovnog obrazovanja i osposobljavanja kako bi se približilo potrebama tržišta rada;
- uvođenje održivosti okoliša kao samostalnog predmeta u strukovni kurikulum ili kao teme koja se može obrađivati interdisciplinarno, pomoću novih programa učenja temeljenih na radu i problemima izrađenih na osnovu stvarnih poslovnih scenarija;
- razvijanje, na razini strukovnog obrazovanja i osposobljavanja, inkluzivnih metoda učenja usmjerenih kako bi uključili i motivirali učenike s invaliditetom, niskim postignućima, kulturnim i jezičnim barijerama i, iz tih razloga, izloženih riziku od prekida obučavanja/osposobljavanja.

Ključne riječi: održivost okoliša, kurikulum strukovnog obrazovanja i osposobljavanja, metoda „Obrnute učionice“

1. O projektu

Tehničke i strukovne škole te proizvodne tvrtke, zajedno sa stručnjacima za strateško savjetovanje na ovom projektu rade na uvođenju tema o ekološkoj održivosti u škole. Tijekom projektnog razdoblja primjenjuju iskustveno učenje i učenje temeljeno na radu na četiri europska strateška industrijska sektora: poljoprivredu, strojarstvo, tekstilnu industriju te promet i logistiku.

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Ovim projektom trebali bi biti ostvareni sljedeći rezultati:

- Sektorske studije, pitanja i problemi iz područja zaštite okoliša, s analizom i fokusom na najrelevantnije i hitne probleme održivosti okoliša unutar proizvodnje za svaki od proizvodnih sektora zastupljenih kod partnera na projektu
- Sudjelovanja tvrtke u projektu sastoje se od stručne, vođene učeničke posjete tvrtki i predavanja i prezentacije studije slučaja o održivosti okoliša tj. predstavljanja izazova učenicima
- Višejezične smjernice s oblikovanjem pojedinačnih studija slučaja u svrhu izrade identične studije
- Jednosektorsko i međusektorsko testiranje temeljeno na radu za rješavanje problema održivosti u proizvodnji i industriji
- Programi osposobljavanja za uključivanje održivosti okoliša kao nastavne discipline u strukovnim ustanovama.

Projekt „Green Skills 4 VET“ je započeo u studenom 2023. te je predviđen završetak 31. listopada 2025. godine.

2. Partneri na projektu

Partneri na projektu su strukovne škole i tvrtke: C. E. Gadda i Frigomeccanica SpA iz Italije (strojarstvo), Escola Profissional Agrícola Quinta da Lageosa i Associação de Agricultores para Produção Integrada de Frutos de Montanha iz Portugala (poljoprivreda), Strukovni izobraževalni

center Ljubljana i Dolejši Modni Gumbi iz Slovenije (tekstilna industrija), Škola za cestovni promet Zagreb i TOKIĆ d.o.o. iz Hrvatske (promet i logistika) i Prospektiker, Instituto Europeo de Prospectiva y Estrategia SA iz Španjolske (planiranje i diseminacija).

Tijekom projekta, nastavnici iz srednjih strukovnih škola i predstavnici tvrtki na virtualnim i sastancima u živo razmjenjuju iskustva iz svojih institucija, planiraju aktivnosti u okviru projekta, donose zaključke i smjernice za daljnji rad i usavršavanja kako bi se uvođenjem predmeta o održivosti okoliša u strukovni kurikulum približilo potrebama tržišta rada, povećala kvaliteta i obim znanja te, primjenjujući iskustveno učenje i učenje temeljeno na radu, strukovna zanimanja postala privlačnija mladima koji bi postali traženi na tržištu rada.

3. Projektne aktivnosti

Projektne aktivnosti započete u studenom 2023. trajat će do 31. listopada 2025. godine i podijeljene su u pet radnih paketa (Work Packages):

WP 1: Upravljanje projektima

Upravljanje projektima dvogodišnji je zadatak koordinatora, voditelja i ovlaštenih osoba koje predstavljaju obrazovne ustanove i tvrtke koji sudjeluju na projektu, a obuhvaća upravljanje i koordinaciju aktivnosti, plan kontrole kvalitete te promo-komunikacijsku strategiju.

WP 2: Sektorske studije o održivosti okoliša u proizvodnji i proizvodnim aktivnostima

Poslovni partneri (tvrtke) iz svake zemlje/proizvodnog sektora će školama osigurati članke, studije, dokumente o stajalištima i drugu odgovarajuću dokumentaciju za ilustraciju izazova održivosti okoliša koji trenutno utječu na proizvodne aktivnosti te upoznati učenike sa stvarnim problemima održivosti koji utječu na industrijske i proizvodne procese. Učenici će od tvrtke u svom sektoru dobiti „izazov održivosti“ – problemski zadatak na kojem će raditi u školi i tražiti njegov mogući prijedlog rješenja. U suradnji s nastavnicima, bit će osmišljen „case study“ – slučaj temeljen na radu i rješavanju konkretnih problema.

WP 3: Obrazovni program i testiranje na radnom mjestu o održivosti na razini jednog sektora

Projektne partneri, ustanove za strukovno obrazovanje i osposobljavanje, primijenit će laboratorijske, iskustvene programe temeljene na radu u školskom ili poslovnom okruženju. Učenici će raditi na problemu održivosti koji su dobili kao „izazov“ tijekom prethodnog WP2 na razini jednog sektora, odnosno na temi koja se odnosi na njihovo područje zanimanja. Kroz znanstvene eksperimente u laboratoriju, individualno istraživanje i timski rad, svaka će škola pokušati pronaći hipotezu rješenja ili poboljšani prijedlog industrijskog problema koji se proučava.

Tijekom rada na projektu koristit će se metoda „obrnute učionice“ („Flipped Classroom“) pri čemu se učenici prvo suočavaju s problemskim zadatkom kojeg treba riješiti, tj. „izazovom održivosti“ koji im postavlja tvrtka. Nakon toga slijedi faza laboratorijskih pokusa u timovima i individualnih istraživanja, praćenih i nadziranih od strane nastavnika, ali bez usmjeravajućih intervencija u pristupu i sadržaju. Na kraju eksperimenta slijede prezentacije i vraćanje radova učenicima, uz raspravu, komentar, ispravak i evaluaciju od strane nastavnika.

WP 4: Obrazovni program i testiranje na radnom mjestu o održivosti na međusektorskoj razini

Poslovni partneri (tvrtke) i ustanove za strukovno obrazovanje i osposobljavanje zajednički će osmisлити jedan ili više problema održivosti okoliša iz najmanje dva različita područja proizvodnje i obrazovanja, među onima u partnerstvu, s kojima će se baviti na međusektorskoj razini.

Tako bi npr. strojarska škola iz Italije surađivala s tvrtkom za promet i logistiku iz Hrvatske ili prometna škola iz Hrvatske s poljoprivrednom tvrtkom iz Portugala. Moguća je i suradnja svih zastupljenih sektora na tzv. artikuliranom izazovu održivosti, a svaki bi se rješavao kroz zasebne

testove na radionicama u svakoj partnerskoj ustanovi za strukovno obrazovanje i osposobljavanje. Peer-to-peer suradnja i nadzor tvrtke/učenika odvijat će se na daljinu, na virtualnim sastancima između učenika iz različitih škola i predstavnika tvrtke i nastavnika/učenika iz različitih zemalja/sektora u svrhu traženja pomoći, davanja smjernica, vrednovanja programa i testiranih rješenja.

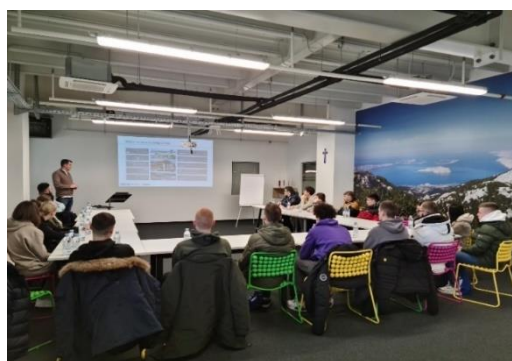
WP 5: Diseminacija događaja

U svakoj zemlji, partneru na projektu (Italiji, Španjolskoj, Portugalu, Sloveniji i Hrvatskoj), organizirat će se javna događanja kako bi se predstavile projektne aktivnosti i rezultati rada na projektu.

4. Tijek rada na problemskom zadatku „Prelazak s motornih na električna dostavna vozila u kapilarnoj distribuciji u tvrtki TOKIĆ d.o.o.“

Nastavnici Škole za cestovni promet iz Zagreba koji sudjeluju u radu na projektu „Green Skills 4 VET“ i voditelj projekta Zdravko Tokić u tvrtki TOKIĆ d.o.o. složili su se da bi problemski zadatak „Prelazak s motornih na električna dostavna vozila u kapilarnoj distribuciji u tvrtki TOKIĆ d.o.o.“ bio izvrsna tema za istraživanje metodom „obrnute učionice“ za naša 24 učenika 2.a razreda, zanimanje: tehničar cestovnog prometa.

Kako su se učenici upoznali sa zadanim izazovom i pripremali za njegovo rješavanje?



Dana 11. siječnja 2024. učenici 2.a razreda u pratnji nastavnika Brune Markovića i Lovorke Vidić posjetili su tvrtku TOKIĆ d.o.o. u Sesvetama – tvrtku partnera koji će zajedno s učenicima i nastavnicima Škole za cestovni promet raditi na analizi i rješavanju problema logističke studije na osnovu stvarnih poslovnih scenarija.

Voditelj projekta Zdravko Tokić održao je predavanje i prezentaciju o tvrtki TOKIĆ d.o.o. (djelatnost tvrtke, asortiman, poslovnice, logistički centri, vozni park), objasnio je načine distribucije i dostave robe do krajnjeg kupca, organizaciju međunarodnog prijevoza, govorio o upravljanju voznim parkom i vođenju evidencije voznog parka.

Na kraju izlaganja naglasio je neke od problema s kojima se suočavaju tijekom rada: veliki troškovi papirnate/kartonske ambalaže te distribucija robe u istočnoj Hrvatskoj.

Posjet smo završili razgledavanjem skladišta, ogromnog prostora s uredno poslaganom i obilježenom robom koju djelatnici preuzimaju, evidentiraju, pakiraju i distribuiraju kupcima.



Dana 8. travnja 2024. Zdravko Tokić posjetio je Školu za cestovni promet i održao predavanje za učenike 2.a razreda, o temi koju će razmatrati kao Case Study: „Prelazak s motornih na električna dostavna vozila u kapilarnoj distribuciji u tvrtki TOKIĆ d.o.o.“.



Učenici, ravnatelj i nastavnici koji sudjeluju u projektu su postavljali pitanja te se dogovarali na koji način pristupiti analiziranju i rješavanju postavljenog problema.

Nastavnik prometne skupine predmeta Karlo Evdjenić 11. travnja 2024. učenicima je održao predavanje na temu „Električna vozila“. Počevši od povijesnog razvoja električnih vozila i vrsta električnih vozila, uključio je učenike u raspravu o prednostima i nedostacima električnih vozila, njihovom utjecaju na okoliš, dostupnosti punionica, brzini/vremenu i dometu punjenja te troškovima pri kupnji električnog vozila.



Nastavnik prometne skupine predmeta Bruno Marković 20. svibnja 2024. učenicima je održao prezentaciju o edukativnim materijalima (priručnici, članci, video-uratci) kojima se mogu koristiti tijekom rada na projektnom zadatku.

Saznanja i informacije koje su učenici dobili na ovim predavanjima koristit će tijekom rješavanja projektnog zadatka „Prelazak s motornih na električna dostavna vozila u kapilarnoj distribuciji u tvrtki TOKIĆ d.o.o.“.



5. Sastanak partnera na međunarodnom skupu 6.-7. svibnja 2024. u Póvoa de Varzim, Portugal

O projektnim aktivnostima i radu učenika na problemskom zadatku redovito smo izvještavali partnere na virtualnim sastancima. Planirani sastanci uživo koji bi trebali biti realizirani do završetka projekta 2025. su u: Portugalu (održan), Italiji (siječanj, 2025.) i Hrvatskoj (listopad, 2025.)



U Etnografskom muzeju u mjestu Póvoa de Varzim u Portugalu 6. i 7. svibnja 2024. održan je prvi sastanak partnera na projektu „Green Skills 4 VET“ uživo. Nastavnici iz škola iz Portugala, Italije, Hrvatske i Slovenije prezentirali su dosadašnji rad na projektu detaljno objasnivši problemske zadatke koji su dodijeljeni učenicima, kako ih oni rješavaju, koji edukativni materijali su im na raspolaganju, kao i rezultate analize ankete u kojoj su učenici odgovarali na pitanja o održivom razvoju.



U Italiji, jedan od izazova održivosti koji je postavila tvrtka je smanjenje utjecaja rashladnih sredstava na okoliš. Učenici raspoređeni u grupe istražuju nove ekološke rashladne tekućine koje će biti sigurne i neće štetiti okolišu, analiziraju uštedu energije u rashladnim sustavima (povrat plina, izbjegavanje korištenja prevelike količine vode za hlađenje sustava) i traže rješenje kako smanjiti štetni utjecaj ugljika.

U Portugalu, kao izazov, postavljen je pronalazak novih načina za reorganizaciju agrarnih ekosustava i smanjenje primjene fitofarmaceutika. Neki se kukci mogu boriti protiv štetočina i potaknuti oprašivanje. Učenici grade živice, biljne pokrove i skloništa za kukce kako bi uzgajali kukce koji bi zamijenili pesticide.

U Sloveniji je izazov otpad koji nastaje tijekom proizvodnje dugmadi. Kako iz tog otpada stvoriti vrijednost? Kako taj otpad pretvoriti u koristan proizvod? Učenici će koristiti plastične granule kao punilo i već rade na prototipovima punjenih proizvoda koji bi se mogli staviti na tržište, kao što su uteg za vrata, podloga za miša, deka s utezima ili valjak za vježbanje.

U Hrvatskoj, izazov koji je postavila tvrtka je prelazak s vozila s motorima s unutrašnjim izgaranjem na električna vozila u kapilarnoj distribuciji. Učenici trebaju pronaći odgovarajuću zamjenu za postojeća vozila uzimajući u obzir tip vozila, nosivost te doseg prijeđenih kilometara s jednim punjenjem, utvrditi mogućnost postavljanja punionica za električna vozila te procijeniti troškove ulaganja i uštedu.

Predstavnici tvrtki dali su svoj osvrt na suradnju s učenicima i pohvalili njihovu zainteresiranost za rad na projektu.

Na sastanku je dogovoren plan rada nastavka projekta.

Domaćini su nakon radnog sastanka organizirali stručni razgled stalne postave izložaka u Etnografskom muzeju i znamenitosti gradića Póvoa de Varzima.



6. Rezultati rada na projektnom zadatku

Učenici 2.a razreda završili su s istraživanjem zamjene motornih vozila odgovarajućim električnim vozilima uzimajući u obzir tip vozila, nosivost te doseg prijeđenih kilometara u jednom punjenju. Za svako postojeće dostavno vozilo u tvrtki TOKIĆ d.o.o. pronašli su i predložili novo električno dostavno vozilo (prilog br. 1).

VOZILO	NOSIVOST	ZAPREMNINA PRTLJAŽNOG PROSTORA	CIJENA	DOMET BATERIJE *električna vozila	VRIJEME PUNJENJA *električna vozila
CITROEN Berlingo XL	634 kg	2,70m ³	24.030€	/	/
E - Berlingo XL	800kg	4m ³	33.000€	275 km	30 min do 80%
FIAT Doblo	453 kg	1.05 m ³	27.062€	/	/
E - Doblo	650 kg	4.6 m ³	29.700€	320 km	30 min do 80%
CITROEN Nemo	590 kg	2.8 m ³	24.900€	/	/
E - Berlingo	800 kg	4.0 m ³	33.315€	280 km	30 min do 80%
CITROEN Jumpy	1400 kg	6.6 m ³	35.835,16€	/	/
E-Jumpy furgon	1275 kg	6.6 m ³	26.925€	330 km	30 min do 80%
RENAULT Traffic	1092 kg	6.0 m ³	35.000€	/	/
Trafic van e - tech	1.1 t	8.9 m ³	43.155€	297 km	30 min do 80%
OPEL Combo	735 kg	4.4 m ³	28.737€	/	/
Combo - e Cargo	800 kg	4.4 m ³	21.250€	275 km	30 min do 80%
RENAULT Traffic	1017 kg	5.9 m ³	35.847,50€	/	/
OPEL Vivaro	1275 kg	6.6 m ³	31.192,20€	230 km	4 h i 45 min
CITROEN Jumper	1525kg	14 m ³	35.300€	/	/
VW E - crafter	1700 kg	11.3 m ³	58.000€	380 km	45 min do 80%
PEUGEOT Partner	768 kg	3.70 m ³	18.000€	/	/
PEUGEOT Partner	1000 kg	4.4 m ³	186.000€	274 km	40 min
RENAULT Clio	535kg	0.95 m ³	30.000€	/	/
RENAULT Clio	1750 kg	0.40 m ³	30.000€	900 km	45 min
PEUGEOT Expert	1160kg	6.0 m ³	24.900€	/	/
PEUGEOT Expert	1000kg	5.8 m ³	35.830€	230 km	30 min
FIAT Ducato	800kg	5.6 m ³	36.370€	/	/
FIAT Ducato	< 972kg	12.0 m ³	36.370€	420 km	55 min
VW Caddy	805kg	3.20 m ³	23.900€	/	/
VW Caddy	805kg	2.90 m ³	23.900€	120 km	45 min
RENAULT Express	611kg	3.30 m ³	18.625€	/	/

Raspoređeni u grupe, za dodijeljene im poslovnice tvrtke TOKIĆ d.o.o. na području republike Hrvatske, učenici su trebali istražiti ima li, i za koliko vozila, mjesta za punjenje električnih vozila (punionica) na određenim lokacijama. Nakon obilaska poslovnica na području grada Zagreba te koristeći se snimkama lokacija iz zraka za ostale gradove u Hrvatskoj (Google Maps), učenici su naveli broj potencijalnih mjesta za punionice.

Dobiveni rezultati prikazani su u tablici (prilog br. 2).

POSLOVNICA	BROJ PUNIONICA
1. ZAGREB, Zagrebačka 143a	2
2. ZAGREB, Slavonska 3	3
3. ZAGREB, Lj. Posavskog 17	6
4. ZAGREB, Av. Dubrava 145A	4
5. VARAŽDIN, Optujska 169a	3
6. DUGO SELO, J. Zorića 101	6
7. ZAGREB, Novi Zagreb, Av. V. Holjevca 39	1
8. LUČKO, F. Puškarića 12c	2
9. VELIKA GORICA, F. Vrančića 10	0
10. VRBOVEC, Zagrebačka 25c	3
11. BJELOVAR, Pakračka ul. 19	4
12. ČAKOVEC, Športska 6	2
13. ZLATAR BISTRICA, Grančarska 3	3
14. ZAPREŠIĆ, Nova ulica 2A	5
15. SVETI IVAN ZELINA, Toplička 9a	1
16. SAMOBOR, Ul. Lj. Gaja 44	3
17. KOPRIVNICA, Zagrebačka 82	3
18. KUTINA, Ul. Kneza Lj. Posavskog 37A	7
19. PULA, Valturska ul. 82	2
20. VIŠKOVO, Viškovo 138	23
21. RIJEKA, F. Belulovića 5	3
22. SLAVONSKI BROD, Trešnjića 1	34
23. SPLIT, 4. gardijske brigade 43	4
24. SPLIT, Ul. Salonitanskih mučenika 8	3
25. ŽUPANJA, Trg prof. M. Robotića 7	0
26. ZABOK, Prilaz dr. F. Tuđmana 3a	6
27. ĐAKOVO, P. Preradovića 225	10
28. OSIJEK, Sv. L. Mandića 111R	6
29. VINKOVCI, H. Vukčića Hrvatinčića 7	1
30. VUKOVAR, Županijska 102	1
31. VALPOVO, Bana J. Jelačića 69	1
32. SINJ, Bana Jelačića 11	0

Svi podatci, rezultati dosadašnjeg učeničkog rada na problemskom zadatku, proslijeđeni su voditelju Zdravku Tokiću. Početkom rujna 2024. u Školi za cestovni promet održat ćemo zajednički sastanak na kojem ćemo analizirati dobivene rezultate i ispraviti netočne podatke kako bi učenici mogli započeti sa završnim dijelom zadatka: izračunati cijenu investicije (nabava novih električnih vozila, izgradnja i postavljanje punionica) i saznati kolika bi, uvođenjem dostavnih električnih vozila, bila ušteda za tvrtku TOKIĆ d.o.o.

Tijekom ljetnih školskih praznika učenici će popunjavati Upitnik koji sadrži pitanja o razumijevanju problemskog zadatka, korištenim edukativnim materijalima, tvrtki TOKIĆ d.o.o.

Svoje odgovore će prezentirati u školi gdje će od nastavnika dobiti povratnu informaciju, komentare i dodatna objašnjenja kako bi se uklonile sve eventualne nejasnoće koje bi mogle dovesti do nezadovoljavajućeg rješenja problemskog zadatka.

7. ZAKLJUČAK

Budući da rad na projektu još traje i rezultati koje su učenici dobili nisu verificirani od strane voditelja projekta u tvrtki TOKIĆ d.o.o., ne možemo zaključiti jesu li učenici metodom „obrnute učionice“ uspjeli doći do kvalitetnog rješenja postavljenog problemskog zadatka.

Zadatak je djelomično riješen; učenici su istražili kojim električnim dostavnim vozilima bi se trebala zamijeniti postojeća dostavna vozila pogonjena Otto ili Diesel motorom te koliko je mjesta za punionice električnih vozila moguće postaviti na određene lokacije na području republike Hrvatske. Nakon provjere do sada dobivenih rezultata i ispravaka netočnih podataka (u rujnu), učenici će moći započeti s izračunom cijene investicije prelaska s postojećih na električna dostavna vozila u kapilarnoj distribuciji u tvrtki TOKIĆ d.o.o. te svojim broječanim pokazateljima argumentirati činjenicu postoji li i kolika je ušteda za tvrtku TOKIĆ d.o.o.

Osim što su tijekom rada na projektnom zadatku učenici samostalno istraživali i koristili predložene edukativne materijale, na ovaj način su se dodatno educirali o važnosti održivosti okoliša te razvijali svijest o potrebi zaštite okoliša. Većina učenika je u Upitniku za učenike koji su rješavali nakon uvodnih predavanja odgovorila da su ih prezentacije i izazovni zadatak potakli na razmišljanje o održivosti okoliša. Dakle, jedan od ciljeva ovog projekta je već ostvaren.

Daljnijim radom trebali bi se realizirati i ostali zadani ciljevi ovog „Zelenog projekta“.

Literatura i korišteni materijali

<https://www.scp.hr/green-skills-4-vet-288.html>

<https://www.greenskills4vet.com/>

<https://www.scp.hr/projekt-%E2%80%9Egreen-skills-4-vet%E2%80%9C-sastanak-u-p%C3%B3voa-de-varzim-porto-portugal-1608.html>

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ROAD TRAFFIC SCHOOL, ZAGREB

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EU project „Green Skills 4 VET“

Abstract:

Since November 2023, the Road Traffic School has been participating as a partner in the Erasmus+ KA2 project "Green Skills 4 VET", whose completion is scheduled for October 2025.

Technical and vocational schools and manufacturing companies, together with strategic consulting experts, are working on this project to introduce environmental sustainability topics in schools, applying experiential and work-based learning, to four European strategic industrial sectors: agriculture, engineering, textile industry, and transport and logistics.

The project coordinator, the company Cisita Parma from Italy, is in charge of designing project activities and evaluating learning outcomes in the vocational education and training system.

The goals of the project are:

- transfer of real problems and challenges related to environmental sustainability from the industrial and business environment to the field of vocational education and training in order to match supply and demand by connecting schools and companies;
- developing and/or increasing competences on environmental sustainability among teachers and students of vocational schools;
- innovating VET curricula, bringing them closer to the labour market
- introduction of environmental sustainability as an independent subject in the professional curriculum or as a topic that can be treated interdisciplinary, using new work-based and problem-based learning programs based on real business scenarios;
- developing, at the level of vocational education and training, inclusive learning methods aimed at including and motivating students with disabilities, low achievements, cultural and language barriers and, for these reasons, exposed to the risk of interruption of training.

Keywords: *environmental sustainability, vocational education and training curriculum, „flipped classroom“ method*

1. About the project

Technical and vocational schools and manufacturing companies, together with strategic consulting experts, are working on this project to introduce topics about environmental sustainability into schools. During the project period, they apply experiential and work-based learning to four European strategic industrial sectors: agriculture, engineering, textile industry and transport and logistics.

The project coordinator, the company Cisisa Parma from Italy, is in charge of designing project activities and evaluating learning outcomes in the vocational education and training system.

The goals of the project are:

- Transferring real problems and challenges related to environmental sustainability from the industrial and business environment to the field of vocational education and training in order to match supply and demand by connecting schools and companies;
- Developing and/or increasing competences on environmental sustainability among teachers and students of vocational schools;
- Introducing the news in the curriculum of vocational education and training in order to approach the needs of the labor market;
- Introducing environmental sustainability as an independent subject in the professional curriculum or as a topic that can be treated interdisciplinary, using new work-based and problem-based learning programs based on real business scenarios;
- Developing, at the level of vocational education and training, inclusive learning methods aimed at including and motivating students with disabilities, low achievements, cultural and language barriers and, for these reasons, exposed to the risk of interruption of education/training.

This project should achieve the following results:

- Sectoral studies, issues and problems in the field of environmental protection, with analysis and focus on the most relevant and urgent problems of environmental sustainability within production for each of the production sectors represented by the project partners
- The company's participation in the project consists of a professional, guided student visit to the company and a lecture and presentation of a case study on environmental sustainability, i.e. presenting challenges to students
- Multilingual guidelines with the design of individual case studies for the purpose of creating an identical study
- Work-based single-sector and cross-sector testing to address sustainability issues in manufacturing and industry
- Training programs for the inclusion of environmental sustainability as a teaching discipline in professional institutions

The "Green Skills 4 VET" project started in November 2023 and is scheduled to end on October 31, 2025.

2. Partners in the project

The project partners are vocational schools and companies: C.E. Gadda and Frigomeccanica SpA from Italy (mechanical engineering), Escola Profissional Agrícola Quinta da Lageosa and Associação de Agricultores para Produção Integrada de Frutos de Montanha from Portugal (agriculture), Vocational Education Center Ljubljana and Dolejši Modni Gumbi from Slovenia (textile industry), Road Traffic school Zagreb and TOKIĆ d.o.o. from Croatia (transport and logistics) and Prospektiker, Instituto Europeo de Prospectiva y Estrategia SA from Spain (planning and dissemination).

During the project, teachers from secondary vocational schools and company representatives at virtual and live meetings exchange experiences from their institutions, plan activities within the project, draw conclusions and guidelines for further work and training in order to bring the subject of environmental sustainability into the professional curriculum closer to the needs of the labor market. The quality and latitude of knowledge would increase and, by applying experiential learning and work-based learning, professional occupations became more attractive to young people who would become in demand on the labor market..

3. Project activities

Project activities started in November 2023 will last until October 31, 2025 and are divided into five work packages:

WP 1: Project management

Project management is a two-year task of coordinators, managers and authorized persons representing educational institutions and companies participating in the project, and includes management and coordination of activities, quality control plan and promotional-communication strategy.

WP 2: Sector studies on environmental sustainability in production and production activities

Business partners (companies) from each country/manufacturing sector will provide schools with articles, studies, position papers and other relevant documentation to illustrate environmental sustainability challenges currently affecting manufacturing activities and introduce students to real sustainability issues affecting industrial and manufacturing processes . Students will receive a "sustainability challenge" from a company in their sector - a problem task that they will work on at school and look for its possible solution proposal. In cooperation with teachers, a "case study" will be designed - a case based on work and solving concrete problems.

WP 3: Education program and workplace testing on sustainability at a sector level

Project partners, institutions for vocational education and training, will apply laboratory, experiential programs based on work in a school or business environment. Students will work on the sustainability problem they received as a "challenge" during the previous WP2 at the level of one sector, that is, on a topic related to their field of interest. Through scientific experiments in the laboratory, individual research and teamwork, each school will try to find a hypothesis for the solution or an improved proposal for the industrial problem under study.

During the work on the project, the "flipped classroom" method will be used, whereby the students first face a problematic task that needs to be solved, i.e. the "sustainability challenge" set by the company. Then follows a phase of laboratory experiments in teams and individual research, monitored and supervised by the teacher, but without guiding interventions in approach and content. At the end of the experiment, there are presentations and the return of the works to the students, with discussion, comment, correction and evaluation by the teacher.

WP 4: Cross-sectoral sustainability education program and workplace testing

Business partners (companies) and vocational education and training institutions will jointly design one or more environmental sustainability problems from at least two different fields of production and education, among those in the partnership, to be dealt with at the cross-sectoral level.

Thus, for example, an engineering school from Italy would cooperate with a transport and logistics company from Croatia, or the Road Traffic school from Croatia with an agricultural company from Portugal. It is also possible for all represented sectors to cooperate on the so-called articulated sustainability challenge, and each would be solved through separate tests at workshops in each partner vocational education and training institution. Peer-to-peer collaboration and company/student supervision will take place remotely, in virtual meetings between students from different schools and company representatives and teachers/students from different countries/sectors for the purpose of seeking help, providing guidance, evaluating programs and testing solutions.

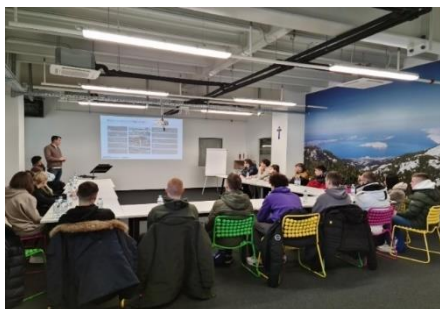
WP 5: Dissemination of events

In each country, a partner in the project (Italy, Spain, Portugal, Slovenia and Croatia), public events will be organized to present the project activities and the results of the work on the project.

4. Work on the problem task "Transition from motorized to electric delivery vehicles in capillary distribution in the company TOKIĆ d.o.o."

The teachers of the Road Traffic School from Zagreb who participate in the work on the project "Green Skills 4 VET" and the project manager Zdravko Tokić at the company TOKIĆ d.o.o. agreed that the problem task "Transition from motorized to electric delivery vehicles in capillary distribution in the company TOKIĆ d.o.o." would be an excellent topic for research using the "flipped classroom" method for our 24 students of the 2nd grade, profession: road traffic technician.

How did the students become familiar with the given challenge and prepare to solve it?



On January 11, 2024, 2nd grade students accompanied by teachers Bruno Marković and Lovorka Vidić visited the company TOKIĆ d.o.o. in Sesvete - a partner company that will work together with the students and teachers of the Road Traffic School on analyzing and solving the problems of the logistics study based on real business scenarios.

Project manager Zdravko Tokić held a lecture and presentation about the company TOKIĆ d.o.o. (the company's activities, assortment, branches, logistics centers, fleet), he explained the methods of distribution and delivery of goods to the final customer, the organization of international transport, talked about the management of the fleet and keeping records of the fleet.



At the end of the presentation, he emphasized some of the problems they face during their work: the high costs of paper/cardboard packaging and the distribution of goods in eastern Croatia.

We ended the visit with a tour of the warehouse, a huge space with neatly arranged and labeled goods that employees pick up, record, pack and distribute to customers.



On April 8, 2024, Zdravko Tokić visited the Road Traffic School and held a lecture for students of the 2nd grade, on the topic that will be considered as a Case Study: "Transition from motorized to electric delivery vehicles in capillary distribution in the company TOKIĆ d.o.o.".



The students, principal and teachers participating in the project asked questions and agreed on how to approach the analysis and solution of the problem.

On April 11, 2024, the teacher of the traffic group of the subject, Karlo Evdjenic, gave a lecture to the students on the topic "Electric vehicles". Starting with the historical development of electric vehicles and types of electric vehicles, he engaged students in a discussion about the advantages and disadvantages of electric vehicles, their impact on the environment, availability of charging stations, charging speed/time and range, and the costs of purchasing an electric vehicle.



On May 20, 2024, the teacher of the traffic group of the course Bruno Marković gave a presentation to the students about educational materials (manuals, articles, videos) that can be used while working on the project assignment.



The knowledge and information the students received at these lectures will be used when solving the project task "Transition from motorized to electric delivery vehicles in capillary distribution in the company TOKIĆ d.o.o.".

5. International partners meeting on May 6 and 7, 2024 in Póvoa de Varzim, Portugal

We regularly reported to our partners at virtual meetings about the project activities and the work of the students on the problem assignment. Planned live meetings that should be realized by the end of the project in 2025 are in: Portugal (held), Italy (January 2025) and Croatia (October 2025)

On May 6 and 7, 2024, the first live meeting of the partners of the "Green Skills 4 VET" project was held at the Ethnographic Museum in Póvoa de Varzim, Portugal. Teachers from schools from Portugal, Italy, Croatia and Slovenia presented their work on the project so far, explaining in detail the problem tasks that were assigned to the students, how they solved them, what educational materials were available to them, as well as the results of the analysis of the survey in which the students answered questions about sustainable development.



In Italy, one of the sustainability challenges set by the company is to reduce the environmental impact of refrigerants. Students divided into groups research new ecological coolants that will be safe and will not harm the environment, analyze energy savings in cooling systems (gas recovery, avoiding using too much water to cool the system) and look for a solution to reduce the harmful impact of carbon.

In Portugal, the challenge was to find new ways to reorganize agricultural ecosystems and reduce the use of phytopharmaceuticals. Some insects can fight pests and promote pollination. Students build hedges, plant covers and insect shelters to grow insects to replace pesticides.

In Slovenia, the challenge is the waste generated during the production of buttons. How to create value from this waste? How to turn this waste into a useful product? The students will use plastic granules as a filler and are already working on prototypes of stuffed products that could be brought to market, such as a door weight, a mouse pad, a weighted blanket or an exercise roller.

In Croatia, the challenge set by the company is the transition from vehicles with internal combustion engines to electric vehicles in capillary distribution. Students should find a suitable replacement for existing vehicles, taking into account the type of vehicle, load capacity and range of kilometers traveled with a single charge, determine the possibility of installing charging stations for electric vehicles, and estimate investment costs and savings.

The representatives of the companies gave their review of the cooperation with the students and praised their interest in working on the project.

The work plan for the continuation of the project was agreed at the meeting.



After the working meeting, the hosts organized an expert tour of the permanent exhibits in the Ethnographic Museum and the sights of the small town of Póvoa de Varzim.

6. Results of work on the project assignment

The students of the 2nd grade finished researching the replacement of motor vehicles with suitable electric vehicles, taking into account the type of vehicle, the load capacity and the range of kilometers traveled in one charge. For each existing delivery vehicle in the company TOKIĆ d.o.o. they found and proposed a new electric delivery vehicle (attachment no. 1).

VOZILO	NOSIVOST	ZAPREMNINA PRTLJAŽNOG PROSTORA	CIJENA	DOMET BATERIJE *električna vozila	VRJEME PUNJENJA *električna vozila
CITROEN Berlingo XL	634 kg	2,70m ³	24.030€	/	/
E - Berlingo XL	800kg	4m ³	33.000€	275 km	30 min do 80%
FIAT Doblo	453 kg	1.05 m ³	27.062€	/	/
E - Doblo	650 kg	4.6 m ³	29.700€	320 km	30 min do 80%
CITROEN Nemo	590 kg	2.8 m ³	24.900€	/	/
E - Berlingo	800 kg	4.0 m ³	33.315€	280 km	30 min do 80%
CITROEN Jumpy	1400 kg	6.6 m ³	35.835,16€	/	/
E-Jumpy furgon	1275 kg	6.6 m ³	26.925€	330 km	30 min do 80%
RENAULT Traffic	1092 kg	6.0 m ³	35.000€	/	/
Trafic van e - tech	1.1 t	8.9 m ³	43.155€	297 km	30 min do 80%

OPEL Combo	735 kg	4.4 m ³	28.737€	/	/
Combo - e Cargo	800 kg	4.4 m ³	21.250€	275 km	30 min do 80%
RENAULT Traffic	1017 kg	5.9 m ³	35.847,50€	/	/
OPEL Vivaro	1275 kg	6.6 m ³	31.192,20€	230 km	4 h i 45 min
CITROEN Jumper	1525kg	14 m ³	35.300€	/	/
VW E - crafter	1700 kg	11.3 m ³	58.000€	380 km	45 min do 80%
PEUGEOT Partner	768 kg	3.70 m ³	18.000€	/	/
PEUGEOT Partner	1000 kg	4.4 m ³	186.000€	274 km	40 min
RENAULT Clio	535kg	0.95 m ³	30.000€	/	/
RENAULT Clio	1750 kg	0.40 m ³	30.000€	900 km	45 min
PEUGEOT Expert	1160kg	6.0 m ³	24.900€	/	/
PEUGEOT Expert	1000kg	5.8 m ³	35.830€	230 km	30 min
FIAT Ducato	800kg	5.6 m ³	36.370€	/	/
FIAT Ducato	< 972kg	12.0 m ³	36.370€	420 km	55 min
VW Caddy	805kg	3.20 m ³	23.900€	/	/
VW Caddy	805kg	2.90 m ³	23.900€	120 km	45 min
RENAULT Express	611kg	3.30 m ³	18.625€	/	/

Distributed into groups, for the branches of the company TOKIĆ d.o.o. assigned to them, in the territory of the Republic of Croatia, the students were supposed to investigate whether there are, and for how many vehicles, places for charging electric vehicles (charging stations) in certain locations. After visiting branches in the city of Zagreb and using aerial photographs of locations for other cities in Croatia (Google Maps), the students listed the number of potential locations for charging stations.

The obtained results are shown in the table (attachment no. 2).

POSLOVNICA	BROJ PUNIONICA
1. ZAGREB, Zagrebačka 143a	2
2. ZAGREB, Slavonska 3	3
3. ZAGREB, Lj. Posavskog 17	6
4. ZAGREB, Ay. Dubrava 145A	4
5. VARAŽDIN, Optujska 169a	3
6. DUGO SELO, J. Zorića 101	6
7. ZAGREB, Novi Zagreb, Ay. V. Holjevca 39	1
8. LUČKO, F. Puškarića 12c	2
9. VELIKA GORICA, F. Vrančića 10	0
10. VRBOVEC, Zagrebačka 25c	3
11. BJELOVAR, Pakračka ul. 19	4
12. ČAKOVEC, Športska 6	2
13. ZLATAR BISTRICA, Grančarska 3	3
14. ZAPREŠIĆ, Nova ulica 2A	5
15. SVETI IVAN ZELINA, Toplička 9a	1
16. SAMOBOR, Ul. Lj. Gaja 44	3
17. KOPRIVNICA, Zagrebačka 82	3
18. KUTINA, Ul. Kneza Lj. Posavskog 37A	7
19. PULA, Valturska ul. 82	2
20. VIŠKOVO, Viškovo 138	23
21. RIJEKA, F. Beljlovića 5	3
22. SLAVONSKI BROD, Trešnjića 1	34
23. SPLIT, 4. gardijske brigade 43	4
24. SPLIT, Ul. Salonitanskih mučenika 8	3
25. ŽUPANJA, Trg prof. M. Robotića 7	0
26. ZABOK, Prilaz dr. F. Tuđmana 3a	6
27. ĐAKOVO, P. Preradovića 225	10
28. OSIJEK, Sv. L. Mandića 111R	6
29. VINKOVCI, H. Vukčića Hrvatinića 7	1
30. VUKOVAR, Županijska 102	1
31. VALPOVO, Bana J. Jelačića 69	1
32. SINJ, Bana Jelačića 11	0

All the data, the results of the student's work on the problem task, were forwarded to the leader Zdravko Tokić. At the beginning of September 2024, we will hold a joint meeting at the Road Traffic School where we will analyze the obtained results and correct incorrect data so that the students can start with the final part of the task: calculate the cost of the investment (purchase of new electric vehicles, construction and installation of charging stations) and find out how much would, with the introduction of electric delivery vehicles, be savings for the company TOKIĆ d.o.o.

During the summer school holidays, students will fill in a Questionnaire that contains questions about understanding the problem task, the educational materials used, the company TOKIĆ d.o.o., ... They

will present their answers at school, where they will receive feedback, comments and additional explanations from the teacher in order to remove all possible vaguenesses that could lead to an unsatisfactory solution to the problem task.

7. Conclusion

Since the work on the project is still running and the results obtained by the students have not been verified by the project manager at the company TOKIĆ d.o.o., we cannot conclude whether the students managed to come up with a quality solution to the problem task using the "flipped classroom" method.

The task is partially solved; the students researched which electric delivery vehicles should replace the existing delivery vehicles powered by an Otto or Diesel engine and how many places for charging stations for electric vehicles can be set up in certain locations in the Republic of Croatia.

After checking the results obtained so far and correcting incorrect data (in September), students will be able to start calculating the investment price of switching from existing to electric delivery vehicles in capillary distribution in the company TOKIĆ d.o.o. and using numerical indicators to argue the fact whether there is and how much savings there are for the company TOKIĆ d.o.o.

In addition to the fact that while working on the project assignment, the students independently researched and used the suggested educational materials, in this way they were additionally educated about the importance of environmental sustainability and developed awareness of the need to protect the environment. Most of the students responded in the Questionnaire for students, which they solved after the introductory lectures, that the presentations and the challenging task encouraged them to think about environmental sustainability. So, one of the goals of this project has already been achieved.

With further work, the other set goals of this "Green Project" should also be realized.

Literature and materials

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<https://www.scp.hr/projekt-%E2%80%9Egreen-skills-4-vet%E2%80%9C-sastanak-u-p%C3%B3voa-de-varzim-porto-portugal-1608.html>

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<https://www.scp.hr/projekt-green-skills-4-vet-1581.html>



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PRIREJENA VOZILA ZA PREVOZ VAROVANIH POŠILJK

VEHICLES ADAPTED FOR THE TRANSPORTATION OF SECURED SHIPMENTS

Povzetek:

Prevozi v cestnem prometu so velika podpora današnjemu načinu življenja. Dnevne migracije ljudi so ustvarile potrebe po različnih vrstah vozil. Z razvojem tehničnih prevoznih sredstev se je njihova uporabnost razširila v vse načine transporta. Danes se uporabljajo vozila za osebne potrebe migracij za dom, službo, rekreacijo, šolo,... Vozila so lahko v osebni lasti, javna ali pa v uporabi za službene namene. Varovane pošiljke so za prevoz predpisano varovane s Pravilnikom o načinu prevoza in varovanja gotovine ter drugih vrednostnih pošiljk. Ta pravilnik predpisuje minimalne standarde zaščite varovanih pošiljk. Za prevoz se uporabljajo specialna vozila prirejena za sprejem varovanih pošiljk in njihovo zaščito. Načrtovanje prevoza je odvisen od vrednosti varovane pošiljke, vse pošiljke se pa sledijo v varnostno-nadzornih centrih (VNC). Pri podjetjih zasebnega varovanja, ki so prevozniki se uporabljajo sodobne tehnične rešitve varovanja in nadzora prevoza. Prevozi varovanih pošiljk imajo sledenje vozila, kot tehnično varovanje cele dejavnosti

Ključne besede: specialna vozila, varovana pošiljka, VNC, sledenje vozila

Summary:

Transportation in road traffic is a great support to today's lifestyle. Daily migrations of people have created the need for various types of vehicles. With the development of technical means of transport, their usability has expanded to all modes of transport. Today, vehicles are used for personal migration needs for home, work, recreation, school, etc. Vehicles can be privately owned, public, or used for business purposes. Protected shipments are prescribed to be protected for transport by the Rules on the method of transport and protection of cash and other valuable shipments. This regulation prescribes minimum standards for the protection of protected shipments. Special vehicles adapted for the reception of protected shipments and their protection are used for transport. Transport planning depends on the value of the protected shipment, all shipments are followed in security control centers (VNC). In private security companies, which are carriers, modern technical solutions for protection and transport control are used. Transport of protected shipments has vehicle tracking as technical protection of the whole activity.

Key words: special vehicles, protected shipment, VNC, vehicle tracking

UVOD

V Sloveniji se opravljajo prevozi varovanih pošilk s podjetji, katerim je izdana licenca za opravljanje prevoza varovanih pošilk. Vrednostne pošilke niso same po sebi že za prevoz varovanih pošilk, kot ga poznamo v Sloveniji. Prevoz varovanih pošilk se ureja v Zakonu o zasebnem varovanju.

Zasebno varovanje se je v Sloveniji začelo razvijati po letu 1991. Takrat so se pojavile potrebe po zaščiti ljudi in premoženja na sodoben način. V Zakonu o zasebnem varovanju so določene pravice in obveznosti gospodarskih družb, samostojnih podjetnikov posameznikov, državnih organov, zavodov, javnih agencij ter drugih pravnih in fizičnih osebna področju varovanja, ki ga ne zagotavlja država. Zato se ta dejavnost imenuje »zasebno varovanje«. Ta zakon določa zasebno varovanje, oblike varovanja, pristojnosti, pogoje za opravljanje zasebnega varovanja, standarde, strokovno usposabljanje, ukrepe in dolžnosti varnostnikov, oznake in delovno obleko, pogoje za opravljanje varovanja tujih oseb, obvezno organiziranje varovanja ter dolžnosti subjektov, nadzor, evidence in kazenske določbe.

Potrebe po varovanju izven državne varnosti so danes zelo iskane. Zaradi specifičnosti dela in nevarnosti so oblike varovanja razdeljene na:

1. Varovanje ljudi in premoženja;
2. Varovanje oseb;
3. Prevoz in varovanje gotovine ter drugih vrednostnih pošilk;
4. Varovanje javnih zbiranj;
5. Varovanje prirediteljev v gostinskih lokalih;
6. Upravljanje z varnostno-nadzornim centrom;
7. Načrtovanje sistemov tehničnega varovanja;
8. Izvajanje sistemov tehničnega varovanja.

Podjetje, ki želi opravljati prevoze varovanih pošilk, mora pridobiti ustrezno licenco. Za pridobitev licence pa mora podjetje zasebnega varovanja izpolnjevati pogoje, ki so določeni v Zakonu o zasebnem varovanju in v Pravilniku o načinu prevoza in varovanja gotovine ter drugih vrednostnih pošilk. Prevozi varovanih pošilk so razdeljeni v pet vrednostnih razredov in za vsak vrednostni razred podjetje zasebnega varovanja mora pridobiti posebej licenco za opravljanje varovanih prevozov.

Razredi prenosa in prevoza varovane pošilke se določijo tako, da se sešteje vsa gotovina in vrednost drugih vrednostnih pošilk, ki se naenkrat prenašajo ali prevažajo v vozilu:

1. Razred prenosa in prevoza varovanih pošilk, katerega vrednost ne presega 50.000 eurov;
2. Razred prenosa in prevoza varovanih pošilk, katerega vrednost ne presega 200.000 eurov;
3. Razred prenosa in prevoza varovanih pošilk, katerega vrednost ne presega 1.500.000 eurov;
4. Razred prenosa in prevoza varovanih pošilk, katerega vrednost ne presega 4.000.000 eurov;
5. Razred prenosa in prevoza varovanih pošilk, katerega vrednost presega 4.000.000 eurov.

Za vsak razred mora podjetje zasebnega varovanja pridobiti licenco.



Slika 45: Certifikat prevoznika

Vir: [Sintal Fiva Licenca za prevoz in varovanje denarja ter drugih vrednostnih posiljk.pdf](#) (27.05.2024)

Podjetje ima dovoljenje za prevoz vseh razredov vrednostnih pošiljk. Nameni prevoza so tudi kriterij kateri vrednostni razred prevoza bomo izvajali. Pri dnevnem odvodu dnevnih izkupičkov naročnikov se opravljajo prevozi 1. in 2. vrednostnega razreda. Pri teh prevozih se izvaja prevoz do namenskih DNT-jev (dnevno nočnih trezorjev) oz. pologov na banko. Za prevoze 3., 4. in 5. vrednostnega razreda pa se opredeli kot bančni prevoz med bankami, oskrba bankomatov ter drugih vplačilno izplačilnih naprav.

Za prevoze se uporabljajo specialna vozila, ki so prirejena z namenom za prevoz gotovine ter drugih vrednostnih pošiljk, ki je opremljeno v skladu z veljavnimi tehničnimi predpisi in opremo glede na zahteve varovane pošiljke.

Prevozniki varovanih pošiljk morajo za vsako vozilo pridobiti potrdilo o izpolnjevanju pogojev za opravljanje prevozov in varovanja gotovine ter drugih vrednostnih pošiljk z vozilom, ki ga izda Ministrstvo za notranje zadeve.

Podjetje za prevoz varovanih pošiljk morajo izpolnjevati splošne pogoje za zasebno varovanje in pogoje iz pravilnika o načinu prevoza in varovanja gotovine ter drugih vrednostnih pošiljk.

PRIREJENA PREVOZNA SREDSTVA ZA PREVOZ VAROVANIH POŠILJK

Prirejeno vozilo je vozilo, namenjeno za prevoz gotovine ter drugih vrednostnih pošiljk, ki je opremljeno v skladu z veljavnimi tehničnimi predpisi in opremo glede na zahteve razreda varovane pošiljke:

- Vozila 1. in 2. vrednostnega razreda so brez protibalistične zaščite.

- Vozila 3., 4. in 5. vrednostnega razreda morajo ustrezati standardom SIST EN 1522:2000. Prirejena vozila se razlikujejo po nivoju protibalistične zaščite oziroma odpornosti proti strelnemu orožju, notranji razporeditvi prostorov in opremi.

Vozila 1. in 2. vrednostnega razreda morajo imeti dodatno opremo, ki zavaruje voznika, vozilo in pošiljko:

- fizično ločen potniški in tovorni del prirejenega vozila z odprtino za odlaganje varnostnih vsebnikov;
- trde stranice, ki onemogočajo vpogled v notranjost tovrnega dela;
- alarmno napravo, ki se sproži ob nasilnem vstopu;
- blokado motorja, ki preprečuje odvoz prirejenega vozila ter
- komunikacijski in nadzorni sistem.

Med prevozom se morajo varovane pošiljke nahajati v tovrnem delu vozila in v varnostnih vsebnikih s sistemom za nevtralizacijo gotovine, ki lahko izpolnjuje pogoje po IBNS in so med prevozom aktivirani. Varnostniki morajo ves čas izvajanja prevoza uporabljati zaščitne jopiče ali srajce najmanj nivoja IIIA po standardu NIJ in veljavnim rokom uporabe.

Vozila 3., 4. in 5. vrednostnega razreda morajo imeti dodatno opremo, ki zavaruje voznika, vozilo in pošiljko:

- ločen prostor za posadko in prostor za tovor;
- prostor za posadko, zaščiteno s protibalistično zaščito FB 3 skupine standardov SIST EN 1522 s prednje, zadnje in bočnih strani; prostor za posadko,
- za 5. razred zaščiteno s protibalistično zaščito FB 4 skupine standardov SIST EN 1522 s prednje, zadnje in bočnih strani;
- prostor za tovor brez stekel in vsa zunanja vrata dodatno zaklenjena;
- alarmna naprava;
- sistem za daljinsko blokiranje vozila oziroma motorja, z možnostjo aktiviranja iz VNC;
- sistem za vizualno spremljanje neposredne okolice prirejenega vozila, nameščen najmanj na zadnjem delu prirejenega vozila, z monitorjem v vozniški kabini;
- sistem za komunikacijo brez odpiranja vrat (domofon);
- komunikacijski in nadzorni sistem.

Vozila 5. vrednostnega razreda so dodatno balistično zaščitena in jih med prevozom spremlja dodatno vozilo oboroženih varnostnikov in policija.

SPREMLJANJE VOZIL ZA PREVOZ VAROVANIH POŠILJK

Za prevoze varovanih pošiljk s prirejenimi vozili se morajo pripraviti načrti prevoza v obliki delovnega naloga in se uporablja za prevoze 1., 2. in 3. vrednostnega razreda in predhodni načrti prevoza za 4. in 5. vrednostni razred. Pri delovnem nalogu se varnostnik spremljevalec neposredno seznani z vsebino, ki zajema: število in osebna imena varnostnikov, ki izvajajo prenos in prevoz, registrska številka prirejenega vozila, lokacija prevzema in oddaje varovane pošiljke, okvirna časovnica prevzema in oddaje varovane pošiljke ter osebno ime in podpis osebe, ki je odredila prenos in prevoz varovane pošiljke. Za prevoz varovane pošiljke 4. in 5. vrednostnega razreda pa predhodni načrt vsebuje: število varnostnikov, ki izvajajo prevoz, njihova osebna imena, oprema in oborožitev, registrska številka prirejenega vozila, način komunikacije z VNC – šifrant, lokacija prevzema in oddaje varovane pošiljke, okvirna časovnica prevzema in oddaje varovane pošiljke, osnovne in

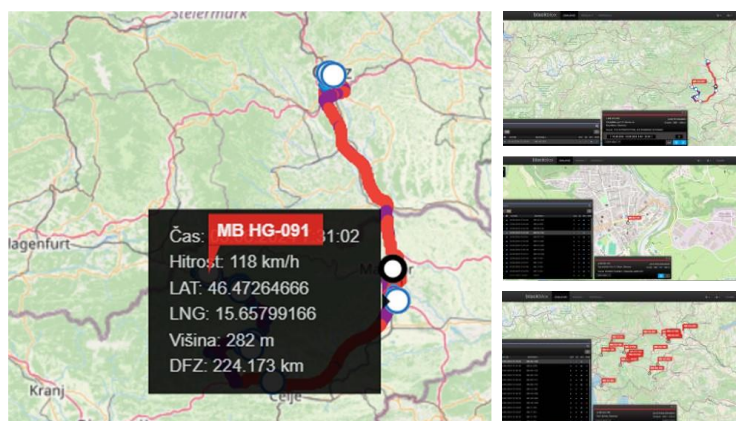
rezervne smeri vožnje, morebitne postanke, ravnanje in ukrepanje varnostnikov ob postankih, osebno ime in podpis osebe, ki je odredila prevoz varovane pošiljke.

V VNC se vozila spremljajo...

Na področju prevoza denarja in drugih vrednostnih pošiljk je sledenje vozilom obvezno. Glavni namen sledenja je izboljšati varnost ter s tem preprečiti kraje. Dandanes aplikacije in naprave za sledenje omogočajo zelo natančno sledenje, kar je na področju sledenja službenih vozil za prevoz denarja in vrednostnih pošiljk še posebej pomembno. Osebe, ki delo opravljajo v tovrstnih vozilih, morajo biti o tem dobro poučene in podpisati morajo pogodbo, kjer se s sledenjem tudi strinjajo. V nasprotnem primeru tega dela ne morejo opravljati. Podatke, pridobljene z GPS sledenjem se namreč šteje za osebne podatke. Za vse linije (prevoze iz točke a do točke b) se izdelava načrt varovanja. Vsak varnostnik mora biti z načrtom varovanja seznanjen, kar potrdi z lastnoročnim podpisom.

V varnostno nadzornem centru se sledi vozilom, ki so na terenu. Prav tako imajo dostop do sledenja tudi vodje varnostnikov, ki opravljajo delo prevoznikov.

Ena izmed možnih opcij za sledenje vozil je Blackblox, ki ga uporabljajo mnoga varnostna podjetja. Blackblox ima opcije dela: Osnovni vpogled vseh lokacij, za vsa službena vozila, določenega vozila.



Slika 46: Posnetki ekrana za sledenje vozila

Vir: lastni

Blackblox nam omogoča poleg spremljanja vozil tudi izdelavo poročil o: seznamu voznikov v vozilu, oddelane ure voznikov, postanki, senzorji vrat, alarmi,...in na koncu vso statistiko o vožnji.

ZAKLJUČEK

Na cestah se srečujemo z različnimi vozili in tudi z različnimi prevozi. Prevozi s prirejenimi vozili za prevoz varovanih pošiljk so izvedeni po strogo določenih pravilnikih za prevoze. V vozilu se nahajajo voznik in spremljevalec, ki sta tudi varnostnika in imata zaščitno obleko, varnostni jopič in sta oborožena. Za opravljanje dela podjetje pridobi tudi soglasje lokalne skupnosti, ki mu omogoča, da vozila med prevozi parkirajo bližje prevzemnim mestom.



Slika 47: Prezem varovane pošiljke
Vir: <https://www.prosignal.si/storitve/> (30.05.2024)

Poznavanje namena prevoza nam omogoči razumevanje različnih pristopov organizacije komercialnih prevozov po cestah.

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VEHICLES ADAPTED FOR THE TRANSPORTATION OF SECURED SHIPMENTS

Summary:

Transportation in road traffic is a great support to today's lifestyle. Daily migrations of people have created the need for various types of vehicles. With the development of technical means of transport, their usability has expanded to all modes of transport. Today, vehicles are used for personal migration needs for home, work, recreation, school, etc. Vehicles can be privately owned, public, or used for business purposes. Protected shipments are prescribed to be protected for transport by the Rules on the method of transport and protection of cash and other valuable shipments. This regulation prescribes minimum standards for the protection of protected shipments. Special vehicles adapted for the reception of protected shipments and their protection are used for transport. Transport planning depends on the value of the protected shipment, all shipments are followed in security control centers (VNC). In private security companies, which are carriers, modern technical solutions for protection and transport control are used. Transport of protected shipments has vehicle tracking as technical protection of the whole activity.

Key words: special vehicles, protected shipment, VNC, vehicle tracking

INTRODUCTION

In Slovenia, the transport of protected shipments is carried out by companies that have been issued a license to transport protected shipments. Valuable shipments are not in themselves already for the transport of protected shipments, as we know it in Slovenia. The transport of protected shipments is regulated in the Private Security Act. Private security began to develop in Slovenia after 1991. At that time, there was a need to protect people and property in a modern way. The Private Security Act sets out the rights and obligations of companies, individual entrepreneurs, state bodies, institutes, public agencies and other legal and natural persons in the field of protection that is not provided by the state. Therefore, this activity is called "private security". This law defines private security, forms of protection, competencies, conditions for performing private security, standards, professional training, measures and duties of security guards, markings and work clothes, conditions for performing the protection of foreign persons, mandatory organization of protection and duties of subjects, supervision, records and penal provisions. The need for protection outside of state security is very sought after today. Due to the specifics of the work and dangers, forms of protection are divided into:

1. Protection of people and property;
2. Personal protection;
3. Transport and protection of cash and other valuable shipments;
4. Protection of public gatherings;
5. Protection of events in catering establishments;
6. Management of the security control center;
7. Planning of technical protection systems;
8. Implementation of technical protection systems.

A company that wants to carry out the transport of protected shipments must obtain the appropriate license. To obtain a license, a private security company must meet the conditions set out in the Private Security Act and the Rules on the method of transport and protection of cash and other valuable shipments. Transports of protected shipments are divided into five value classes and for each value class, a private security company must obtain a separate license for carrying out protected transports.

The classes of transfer and transport of a protected shipment are determined by adding up all the cash and the value of other valuable shipments that are simultaneously transferred or transported in the vehicle:

1. Class of transfer and transport of protected shipments, whose value does not exceed 50,000 euros;
2. Class of transfer and transport of protected shipments, whose value does not exceed 200,000 euros;
3. Class of transfer and transport of protected shipments, whose value does not exceed 1,500,000 euros;
4. Class of transfer and transport of protected shipments, whose value does not exceed 4,000,000 euros;
5. Class of transfer and transport of protected shipments, whose value exceeds 4,000,000 euros.

For each class, a private security company must obtain a license."



Figure 48: Carrier's certificate

Source: [Sintal Fiva Licenca za- prevoz in varovanje denarja ter drugih vrednostnih posiljk.pdf](#) (27.05.2024)

The company has permission to transport all classes of valuable shipments. The purposes of transport are also a criterion for which class of transport we will carry out. During the daily withdrawal of daily proceeds from clients, transports of the 1st and 2nd value class are carried out. These transports involve transport to designated DNTs (day-night safes) or deposits at the bank. Transports of the 3rd, 4th, and 5th value class are defined as bank transport between banks, ATM supply, and other deposit and withdrawal devices.

Special vehicles, which are adapted for the purpose of transporting cash and other valuable shipments, are used for transports. These are equipped in accordance with applicable technical regulations and equipment according to the requirements of the protected shipment.

Carriers of protected shipments must obtain a certificate for each vehicle that meets the conditions for carrying out transports and protecting cash and other valuable shipments with the vehicle, issued by the Ministry of Internal Affairs.

Companies for the transport of protected shipments must meet the general conditions for private security and the conditions from the rules on the method of transport and protection of cash and other valuable shipments.

VEHICLES ADAPTED FOR THE TRANSPORTATION OF SECURED SHIPMENTS

An adapted vehicle is a vehicle intended for the transport of cash and other valuable shipments, which is equipped in accordance with applicable technical regulations and equipment according to the requirements of the class of protected shipment:

- Vehicles of the 1st and 2nd value class are without ballistic protection.
- Vehicles of the 3rd, 4th, and 5th value class must comply with the SIST EN 1522:2000 standards. Adapted vehicles differ in the level of ballistic protection or resistance to firearms, internal layout of spaces, and equipment.

Vehicles of the 1st and 2nd value class must have additional equipment that protects the driver, vehicle, and shipment:

- physically separate passenger and cargo part of the adapted vehicle with an opening for depositing security containers;
- hard sides that prevent insight into the interior of the cargo part;
- an alarm device that is triggered upon violent entry;
- engine block that prevents the adapted vehicle from being driven away;
- communication and control system.

During transport, protected shipments must be located in the cargo part of the vehicle and in security containers with a cash neutralization system, which can meet the conditions according to IBNS and are activated during transport. Security guards must use protective vests or shirts of at least level IIIA according to the NIJ standard and valid period of use throughout the transport. Vehicles of the 3rd, 4th, and 5th value class must have additional equipment that protects the driver, vehicle, and shipment:

- separate space for the crew and cargo space;
- crew space, protected with ballistic protection FB 3 group of SIST EN 1522 standards from the front, rear, and side; crew space,
- for the 5th class protected with ballistic protection FB 4 group of SIST EN 1522 standards from the front, rear, and side;
- cargo space without windows and all external doors additionally locked;
- alarm device;
- system for remote blocking of the vehicle or engine, with the possibility of activation from the VNC;
- system for visual monitoring of the immediate surroundings of the adapted vehicle, installed at least on the rear part of the adapted vehicle, with a monitor in the driver's cabin;
- communication system without opening doors (intercom);
- communication and control system.

Vehicles of the 5th value class are additionally ballistically protected and are accompanied by an additional vehicle of armed security guards and police during transport."

MONITORING OF VEHICLES FOR THE TRANSPORTATION OF SECURED SHIPMENTS

For the transport of protected shipments with adapted vehicles, transport plans must be prepared in the form of a work order and are used for transports of the 1st, 2nd, and 3rd value class and preliminary transport plans for the 4th and 5th value class. With the work order, the security guard escort is directly familiarized with the content, which includes: the number and personal names of security guards who carry out the transfer and transport, the registration number of the adapted vehicle, the location of pick-up and delivery of the protected shipment, the approximate timeline of pick-up and delivery of the protected shipment, and the personal name and signature of the person who ordered the transfer and transport of the protected shipment. For the transport of a protected shipment of the 4th and 5th value class, the preliminary plan contains: the number of security guards who carry out the transport, their personal names, equipment and armament, the registration number of the adapted vehicle, the method of communication with the VNC - cipher, the location of pick-up and delivery of the protected shipment, the approximate timeline of pick-up and delivery of the protected shipment, basic and reserve driving directions, possible stops, behavior and action of security guards at stops, the personal name and signature of the person who ordered the transport of the protected shipment.

In the VNC, vehicles are monitored...

In the field of transporting money and other valuable shipments, vehicle tracking is mandatory. The main purpose of tracking is to improve security and thus prevent thefts. Nowadays, tracking applications and devices allow very precise tracking, which is especially important in the field of tracking official vehicles for the transport of money and valuable shipments. People who work in such vehicles must be well informed about this and must sign a contract where they also agree with the tracking. Otherwise, they cannot perform this work. Data obtained with GPS tracking is considered personal data. A security plan is drawn up for all lines (transports from point a to point b). Every security guard must be familiar with the security plan, which he confirms with his own signature.

In the security control center, vehicles that are in the field are tracked. Also, the heads of security guards who work as carriers have access to tracking.

One of the possible options for vehicle tracking is Blackblox, which is used by many security companies. Blackblox has work options: Basic insight into all locations, for all official vehicles, a specific vehicle.

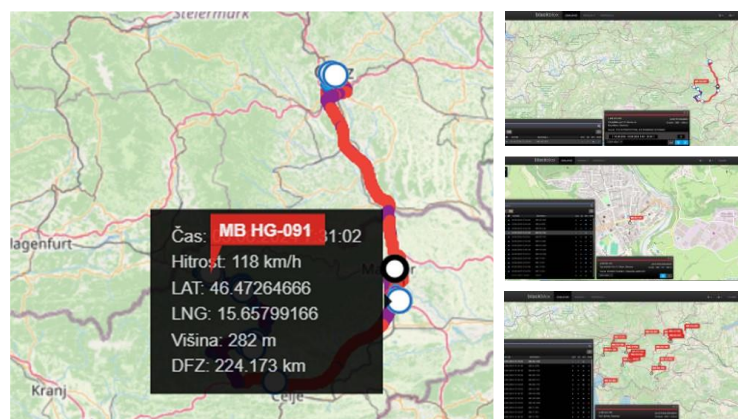


Figure 49: Vehicle tracking screenshots
Source: Own

Blackbox allows us, in addition to monitoring vehicles, also the creation of reports on: the list of drivers in the vehicle, hours worked by drivers, stops, door sensors, alarms,... and in the end, all the statistics about driving.”

CONCLUSION

On the roads, we encounter various vehicles and also various transports. Transports with adapted vehicles for the transport of protected shipments are carried out according to strictly defined regulations for transports. In the vehicle, there are a driver and an escort, who are also security guards and have protective clothing, a security vest, and are armed. For the performance of work, the company also obtains the consent of the local community, which allows it to park vehicles closer to the pick-up points during transports.”



Figure 50: Acceptance of secured shipment

Source: <https://www.prosignal.si/storitve/> (30.05.2024)

Understanding the purpose of transport allows us to understand different approaches to organizing commercial road transports.”

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PERCEPCIJA SREDNJOŠKOLACA BOSNE I HERCEGOVINE, HRVATSKE I SRBIJE O SIGURNOSTI DRUMSKOG SAOBRAĆAJA

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SAŽETAK RADA

U saobraćajnim nezgodama godišnje u svetu pogine približno 1,35 miliona ljudi, a bude povređeno više od 50 miliona ljudi. Najčešće su to mladi ljudi, kojima nije na vreme pokazano koji se sve problemi mogu dogoditi u saobraćaju i kako se može povećati bezbednost saobraćaja svih učesnika na putu i time smanjiti broj nezgoda, pogotovo sa smrtnim ishodom. U ovom radu smo uporedili percepciju saobraćajne bezbednosti adolescenata iz Srednje škole za saobraćaj i komunikacije u Sarajevu, Saobraćajno-tehničke škole u Zemunu te Škole za cestovni promet u Zagrebu. Ideja o ovom istraživanju nastala je na XIII Interdisciplinarnom simpoziju logistike i saobraćaja u septembru 2023. u Skopju.

Svi su ispitanici učenici drugog razreda srednje škole. Budući da se stavovi o bezbednosti saobraćaja osim u porodici usvajaju i u školama, željeli smo proveriti kakva je percepcija saobraćajne bezbednosti učenika u regionu, a kako bismo u budućnosti temeljem dobivenih podataka mogli pristupiti izradi adekvatnih preventivnih aktivnosti koje će za cilj imati povećanje saobraćajne bezbednosti među adolescentima.

Ključne riječi: *saobraćajna bezbednost, adolescenti, percepcija*

UVOD

Saobraćaj čini sastavni deo skoro svakog aspekta naših života. Svaki dan kada izlazimo iz kuće da bismo otišli do posla ili da obavimo neke druge aktivnosti, postajemo aktivni učesnici u saobraćaju. Svi mi se moramo ponašati na adekvatan način i svima nam mora biti obezbeđeno bezbedno kretanje. U tom smislu je važno ponašanje svakog pojedinog sudionika u prometu.

Ovim radom željeli smo porediti percepciju saobraćajne bezbednosti učenika saobraćajnih škola u regionu. U tom smislu smo proučili i nacionalne strategije bezbednosti saobraćaja u Bosni i Hercegovini, Srbiji i Hrvatskoj.

a. Nacionalna strategija bezbednosti saobraćaja Bosne i Hercegovine Okvirna strategija prometa za BiH do 2030. godine je razvijena uzimajući u obzir ustavne nadležnosti entiteta i Brčko distrikta, koji su sumirani.

Ona ima za cilj identifikaciju akcija potrebnih za razvoj prometnog sistema u BiH za svaki vid prometa, a zasniva se na četiri stuba prometnog sistema:

1. Infrastruktura (kapacitet, integracija između mreža)
2. Regulatorna (bezbednost, održivost)
3. Tehnologija (digitalizacija, optimizacija postojećih sredstava)
4. Usluge (održivost, intremodalnost, nivo i kvalitet usluge).

b. Nacionalna strategija bezbednosti saobraćaja Republike Srbije

Opšti cilj do 2030.godine je smanjen broj poginulih i teško povređenih lica za 50% kao i bez poginule dece u saobraćaju.

Do dostizanja opšteg cilja vodi pet posebnih ciljeva:

1. Funkcionalni sistem bezbednosti saobraćaja u kome su institucije i pojedinci povećeni ostvarivanju ciljeva, uspešno sarađuju i usaglašeno deluju
2. Planiranje i projektovanje, izgradnja i održavanje puteva, tako da se najmanje 75% putovanja obavlja putevima sa visokim standardima bezbednosti saobraćaja
3. Prosečna starost putničkih i komercijalnih motornih vozila u saobraćaju ispod 14 godina
4. Znanje, stavovi i ponašanje učesnika u saobraćaju na nivou vodećih zemalja Evrope u oblasti bezbednosti saobraćaja
5. Sistem spasavanja i zbrinjavanja koji maksimizira mogućnost preživljavanja i uspešnost medicinskog oporavka povređenih u saobraćajnim nezgodama.

Osnovni preduslov za uspešno sprovođenje i dostizanje postavljenih ciljeva strategije je Funkcionalni sistem upravljanja bezbednošću saobraćaja u Republici Srbiji. Funkcionalnost ovog sistema u najvećoj meri zavisi od sprovođenja mera i aktivnosti od strateškog, pravnog, institucionalnog i finansijskog okvira, kao i saradnje između ključnih subjekata.

c. Nacionalni plan sigurnosti cestovnog prometa Republike Hrvatske Prema navedenom u Nacionalnom planu sigurnosti cestovnog prometa Republike Hrvatske, u razdoblju do 2030.

godine planirano je preko 200 aktivnosti kategoriziranih u 13 područja djelovanja :

1. Sigurna brzina
2. Vožnja bez utjecaja alkohola, droga i lijekova
3. Sigurna vožnja
4. Prevencija distrakcije vozača
5. Sigurnost aktivnih oblika prometovanja
6. Sigurnost motociklista i mopedista
7. Sigurnost profesionalnih vozača
8. Zaštita u vozilu
9. Sigurna infrastruktura
10. Sigurna vozila
11. Brze i učinkovite hitne službe
12. Jačanje kapaciteta prometne policije i inspekcijskih službi
13. Baza podataka i prikupljanje podataka

CILJEVI I METODOLOGIJA ISTRAŽIVANJA

Cilj ovog istraživanja bio je ispitati percepciju saobraćajne sigurnosti kod učenika drugih razreda srednjih saobraćajnih škola u Bosni i Hercegovini, Srbiji i Hrvatskoj. U istraživanju je sudjelovalo 129 ispitanika i to 55 ispitanika iz Bosne i Hercegovine, 43 ispitanika iz Srbije i 32 ispitanika iz Hrvatske. Svi ispitanici bili su učenici 2. razreda srednje škole.

Ispitanicima je podijeljen link na upitnik koji su potom ispunjavali tijekom jednog nastavnog sata. Budući da je istraživanje rađeno u tri države u kojima se govore južnoslavenski jezici novoštokavskog dijalektalnog kontinuuma, ispitanicima su date dvije verzije upitnika – učenicima u Hrvatskoj upitnik je pisan hrvatskim jezikom, dok je učenicima u Bosni i Hercegovini i Srbiji upitnik pisan srpskim jezikom. Upitnik je kreiran putem Google obrasca te se sastoji od 15 dijelova koji sadrže sociodemografska pitanja poput spola, škole i razreda te seta pitanja kojima se ispituje percepcija ispitanika o čimbenicima koji utječu na sigurnost cestovnog prometa. Kako bi se izbjeglo postavljanje sugestivnih pitanja, napravljene su dvije skupine pitanja koje su međusobno rotirane – skupina pitanja u kojoj učenici procjenjuju visok utjecaj pojedinih čimbenika na sigurnost cestovnog prometa i skupina pitanja u kojoj učenici procjenjuju nizak utjecaj pojedinih čimbenika na sigurnost

cestovnog prometa. Nakon prikupljanja podataka, pristupili smo deskriptivnoj statistici, dok druge razine statistike poput određenih statističkih analiza tipa t-testa ili ANOVE ostavljamo za neka daljnja i složenija istraživanja.

REZULTATI

Rezultati deskriptivne statistike ove ankete koje ćemo ovdje izdvojiti su sljedeći: • Od ukupnog broja ispitanika (N=129) 42.6% ih pohađa Srednju školu za saobraćaj i komunikacije u Sarajevu; 32.6% Saobraćajno-tehničku školu u Zemunu i 24.8% Školu za cestovni promet u Zagrebu.

- 82,2% ispitanika je muškog spola, dok je njih 17,8% ženskog spola
- U najvećem broju pitanja učenici iz ove tri škole i države su usuglašeni u davanju svojih odgovora
- Kada je u pitanju utjecaj STANJA KOLNIKA na sigurnost cestovnog prometa, najveći broj ispitanika smatra da stanje kolnika ima veliki utjecaj na sigurnost cestovnog prometa (kako na razini čitavog uzorka, tako i na razini pojedinih škola/država).
- Kada je u pitanju utjecaja UREĐENJA PROSTORA PORED KOLNIKA na sigurnost cestovnog prometa, najveći broj ispitanika smatra da stanje kolnika ima veliki utjecaj na sigurnost cestovnog prometa no ovdje ispitanici među različitim školama nisu usuglašeni u svojim odgovorima. Točnije, najveći broj ispitanika iz Hrvatske i Bosne i Hercegovine smatra kako uređenje prostora pored kolnika ima veliki utjecaj na sigurnost cestovnog prometa. U Srbiji učenici također smatraju kako uređenje prostora pored kolnika ima visok utjecaj na sigurnost cestovnog prometa no pri tom važnost ovog čimbenika ne valoriziraju u istoj mjeri visoko kao i učenici iz Bosne i Hercegovine i Hrvatske.
- Svi učenici visoko valoriziraju utjecaj kvalitete horizontalne signalizacije, prometne kulture sudionika, adekvatnog osiguranja tereta na teretnim vozilima te povremenih prometnih kontrola na sigurnost cestovnog prometa (kako na razini čitavog uzorka, tako i na razini pojedinih škola/država)
- Kod KORIŠTENJA POKAZIVAČA SMJERA većina učenika cjelokupnog uzorka jednako valorizira utjecaj ovog čimbenika na sigurnost cestovnog prometa, no uočava se i da dio učenika iz Bosne i Hercegovine ne smatra da ovaj faktor ima podjednako značajan utjecaj na sigurnost cestovnog

prometa kao što to smatraju njihovi kolege iz Srbije i Hrvatske. Isto se odnosi i na čimbenik PROPISNOG PARKIRANJA, s time da se ovdje i kod učenika iz Srbije uočava slična tendencija u davanju odgovora te na čimbenik korištenja SIGURNOSNOG POJASA.

- Zabrinjava to što vožnji motocikla bez valjanih registarskih oznaka učenici (čitavog uzorka kao i na razini pojedinih škola) ne pridaju veliki utjecaj na sigurnost cestovnog prometa.

IMPLIKACIJE

Budući da dijelimo istu prošlost te samim time i pravnu stečevinu koja se odnosi na zakonske regulative iz područja prometa i prometne sigurnosti ali i na odgojno-obrazovni sustav, svakako je zanimljivo vidjeti u kojem se smjeru razvijaju pojedine države regiona kada je u pitanju sigurnost cestovnog prometa. Osim toga, dijelimo sličnu kulturu koja ima značajan utjecaj na stavove i percepciju sudionika u prometu, kako aktivnih tako i pasivnih sudionika. Iz ovog istraživanja vidljivo je kako se uzorci ispitanika koji su izjednačeni po osnovnim sociodemografskim osobinama (dob i obrazovanje) ne razlikuju značajno u davanju odgovora vezanih uz prometnu sigurnost i čimbenike koji istoj doprinose. Dapače, odgovori su im usklađeni u najvećem dijelu pitanja. Ovo istraživanje ima tendenciju razvijanja preventivnih aktivnosti unutar škola, ali i među školama pa i među državama u kojima bi se ovdje dobiveni podatci mogli koristiti za ciljanu prevenciju onih ponašanja koja u prometu smatramo rizičnima

i koja povećavaju vjerojatnost prometnih nezgoda i nesreća. U tom smislu bilo bi poželjno voditi računa o rezultatima koji si pokazali da određena ponašanja u prometu učenici ne smatraju jednako opasnim kao neka druga ponašanja. Tako primjerice jasno prepoznaju važnost adekvatnog osiguranja tereta na teretnim vozilima, no to ne vrijedi kada je u pitanju primjerice korištenje pokazivača smjera, propisno parkiranje, korištenje sigurnosnog pojasa te vožnja motocikla bez valjanih registarskih oznaka. U tom smislu, najveću ulogu smatramo da imaju zakonske regulative (ali i dosljedno provođenje zakonskih mjera) no isto tako i odgojno obrazovni sustav.

ZAKLJUČAK

Sve države našeg regiona rade na određenim Strategijama bezbednosti saobraćaja. Cilj nam je svima isti, da bude što manji broj saobraćajnih nezgoda pogotovo s poginulim licima. Uvažavajući globalne pravce i uspešne prakse u bezbednosti saobraćaja mi nastavnici možemo imati jako veliki uticaj na buduće vozače.

Rešenje ovog problema je svakako timski rad, jer samo udruženim zajedničkim snagama institucija i prevashodno celokupnog društva možemo prevazići sve prepreke i ostvariti zajednički cilj, a to je što manji broj saobraćajnih nezgoda i poginulih mladih u saobraćaju.

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THE PERCEPTION OF HIGH SCHOOL STUDENTS OF BOSNIA AND HERZEGOVINA, CROATIA AND SERBIA ON ROAD TRAFFIC SAFETY

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SUMMARY OF THE WORK

Approximately 1.35 million people die in traffic accidents worldwide every year, and more than 50 million people are injured. Most often, these are young people, who have not been shown in time what problems can occur in traffic and how the traffic safety of all participants on the road can be increased and thereby reduce the number of accidents, especially those with a fatal outcome. In this paper, we compared the perception of traffic safety among adolescents from the High School for Traffic and Communications in Sarajevo, the Traffic Technical School in Zemun, and the School for Road Traffic in Zagreb. The idea of this research was born at the XIII Interdisciplinary Symposium on Logistics and Traffic in September 2023 in Skopje. All respondents are students in the second year of high school. Since attitudes about traffic safety are adopted not only in the family but also in schools, we wanted to check what the perception of traffic safety is among students in the region, and so that in the future, based on the data obtained, we could approach the creation of adequate preventive activities aimed at increasing traffic safety among adolescents.

Key words: traffic safety, adolescents, perception

INTRODUCTION

Traffic is an integral part of almost every aspect of our lives. Every day when we leave the house to go to work or to do some other activity, we become active participants in traffic. We must all behave in an adequate manner and we must all be provided with safe movement. In this sense, the behavior of each individual traffic participant is important.

With this paper, we wanted to compare the perception of traffic safety among traffic school students in the region. In this sense, we also studied the national traffic safety strategies in Bosnia and Herzegovina, Serbia and Croatia.

a. National Traffic Safety Strategy of Bosnia and Herzegovina

The framework transport strategy for BiH until 2030 was developed taking into account the constitutional competences of the entity and Brčko District, which are summarized. It aims to identify actions necessary for the development of the transport system in BiH for each type of transport, and is based on four pillars of the transport system: 1. Infrastructure (capacity, integration between networks)

2. Regulation (safety, sustainability)

3. Technology (digitalization, optimization of existing assets)

4. Services (sustainability, intermodality, level and quality of service).

b. National traffic safety strategy of the Republic of Serbia

The general goal by 2030 is to reduce the number of dead and seriously injured persons by 50%, as well as to eliminate the number of children killed in traffic.

Five specific goals lead to the achievement of the general goal:

1. A functional traffic safety system in which institutions and individuals are encouraged to achieve their goals, cooperate successfully and act in harmony

2. Planning and design, construction and maintenance of roads, so that at least 75% of trips are made on roads with high traffic safety standards

3. The average age of passenger and commercial motor vehicles in traffic is under 14 years 4.

Knowledge, attitudes and behavior of traffic participants at the level of leading European countries in the field of traffic safety

5. A rescue and treatment system that maximizes the possibility of survival and the success of the medical recovery of those injured in traffic accidents.

The basic prerequisite for the successful implementation and achievement of the set goals of the strategy is a functional traffic safety management system in the Republic of Serbia. The functionality of this system largely depends on the implementation of measures and activities from the strategic, legal, institutional and financial framework, as well as cooperation between key entities.

c. National Road Traffic Safety Plan of the Republic of Croatia

According to the National Road Traffic Safety Plan of the Republic of Croatia, in the period until 2030, over 200 activities categorized into 13 areas of activity are planned:

1. Safe speed
2. Driving without the influence of alcohol, drugs and medicines
3. Safe driving
4. Prevention of driver distraction
5. Safety of active forms of transportation
6. Safety of motorcyclists and moped riders
7. Safety of professional drivers
8. Protection in the vehicle
9. Secure infrastructure
10. Safe vehicles
11. Fast and efficient emergency services
12. Strengthening the capacity of traffic police and inspection services
13. Database and data collection

OBJECTIVES AND RESEARCH METHODOLOGY

The aim of this research was to examine the perception of traffic safety among students of second grades of secondary traffic schools in Bosnia and Herzegovina, Serbia and Croatia. 129 respondents participated in the research, 55 respondents from Bosnia and Herzegovina, 43 respondents from Serbia and 32 respondents from Croatia. All respondents were 2nd grade high school students. The respondents were given a link to the questionnaire, which they then filled out during one lesson.

Since the research was conducted in three countries where the

South Slavic languages of the Novoštokavian dialectal continuum are spoken, the respondents were given two versions of the questionnaire - for students in Croatia, the questionnaire was written in Croatian, while for students in Bosnia and Herzegovina and Serbia, the questionnaire was written in Serbian. The questionnaire was created using a Google form and consists of 15 parts that contain sociodemographic questions such as gender, school and class, and a set of questions examining the respondent's perception of factors affecting road traffic safety. In order to avoid asking leading

questions, two groups of questions were created that were rotated among themselves - a group of questions in which students assess the high impact of certain factors on road traffic safety and a group of questions in which students assess the low impact of certain factors on road traffic safety. After collecting the data, we approached descriptive statistics, while we leave other levels of statistics such as certain statistical analyzes of the t-test type or ANOVA for some further and more complex research.

RESULTS

The results of the descriptive statistics of this survey, which we will highlight here, are as follows:

- Out of the total number of respondents (N=129), 42.6% attend the High School for Traffic and Communications in Sarajevo; 32.6% to the Traffic and Technical School in Zemun and 24.8% to the Road Traffic School in Zagreb.
- 82.2% of respondents are male, while 17.8% are female
- In the largest number of questions, students from these three schools and the country agreed in giving their answers
- When it comes to the influence of PAVEMENT CONDITION on road traffic safety, the largest number of respondents believe that the condition of the road has a great influence on road traffic safety (both at the level of the entire sample and at the level of individual schools/states).
- When it comes to the influence of the ARRANGEMENT OF SPACE NEXT TO THE ROADWAY on road traffic safety, the majority of respondents believe that the condition of the roadway has a great influence on road traffic safety, but here the respondents from different schools are not consistent in their answers. More precisely, the largest number of respondents from Croatia and Bosnia and Herzegovina believe that the arrangement of the space next to the roadway has a great impact on the safety of road traffic. In Serbia, students also believe that arranging the space next to the road has a high impact on road traffic safety, but they do not value the importance of this factor to the same extent as students from Bosnia and Herzegovina and Croatia.
- All students highly value the influence of the quality of horizontal signaling, the traffic culture of the participants, adequate securing of cargo on cargo vehicles, and occasional traffic controls on

road traffic safety (both at the level of the entire sample and at the level of individual schools/countries).

- In the case of USING DIRECTION INDICATORS, the majority of students in the entire sample equally value the impact of this factor on road traffic safety, but it is also observed that part of the students from Bosnia and Herzegovina do not consider this factor to have as significant an impact on road traffic safety as their colleagues from Serbia and Croatia. The same applies to the PROPER PARKING factor, with the fact that students from Serbia also have a similar tendency in giving answers, as well as to the SEAT BELT use factor.
- It is worrisome that driving a motorcycle without valid license plates is not seen by students (in the entire sample as well as at the level of individual schools) to have a major impact on road traffic safety.

IMPLICATIONS

Since we share the same past and, therefore, the legal acquis that refers to legal regulations in the field of traffic and traffic safety as well as the educational system, it is certainly interesting to see in which direction certain countries of the region are developing when it comes to road traffic safety. In addition, we share a similar culture that has a significant impact on the attitudes and perceptions of road users, both active and passive road users. From this research, it is evident that samples of respondents who are equal in terms of basic socio demographic characteristics (age and education) do not differ significantly in giving answers related to traffic safety and the factors that contribute to it. On the contrary, their answers are harmonized in most of the questions. This research has a tendency to develop preventive

activities within schools, but also between schools and even between countries where the data obtained here could be used for the targeted prevention of those behaviors that we consider risky in traffic and that increase the likelihood of traffic accidents and accidents. In this sense, it would be desirable to take into account the results that showed that students do not consider certain behaviors in traffic to be as dangerous as some other behaviors. For example, they clearly recognize the importance of adequate cargo insurance on cargo vehicles, but this does not apply when it comes to, for example, the use of direction indicators, proper parking, use of seat belts and driving

a motorcycle without valid license plates. In this sense, we believe that the greatest role is played by legal regulations (as well as the consistent implementation of legal measures), but also by the educational system.

CONCLUSION

All the countries of our region are working on specific traffic safety strategies. The goal is the same for all of us, to reduce the number of traffic accidents, especially with fatalities. By respecting global trends and successful practices in traffic safety, we teachers can have a very big influence on future drivers. The solution to this problem is definitely team work, because only with the joint forces of the institutions and primarily the entire society can we overcome all obstacles and achieve the common goal, which is to reduce the number of traffic accidents and young people killed in traffic.

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VARNO IN UČINKOVITO UPRAVLJANJE PROMETA IN TOKA VOZIL V PROSTORSKO OMEJENI INDUSTRIJSKI CONI

SAFE AND EFFICIENT MANAGEMENT OF TRAFFIC AND VEHICLE FLOW IN A
SPATIALLY LIMITED INDUSTRIAL ZONE

Povzetek:

V okviru hekatona podjetja Impol d.o.o. so študentje Višje strokovne šole L.I.V.E. razvijali rešitve za varno in učinkovito upravljanje prometa v industrijski coni. Glavni cilj je bil razviti stroškovno optimalne rešitve, ki zagotavljajo varno sožitje transportnih vozil in zaposlenih ter učinkovito upravljanje prometnih tokov. Analizirali so trenutne prometne tokove in ozka grla, podali predloge za izboljšanje prometnega toka in predstavili predloge za povečanje varnosti za vse udeležence prometa, zlasti za pešce. Skupina študentov se je osredotočila na iskanje rešitev za preglednejši sistem najave vozil in upravljanje s časovnimi okni, ki bi zmanjšale nepotrebno komunikacijo zaposlenih preko e-pošte in telefona, ter zagotovile rešitve za sistem shranjevanja fotografij natovorjenih vozil. Analiza je zajela sistem najave tovornih vozil, pregled obstoječega sistema natovarjanja in raztovarjanja tovornjakov, sledenje gibanja tovornjakov po industrijski coni, vključno s sistemom vstopa v industrijsko cono.

Ključne besede: optimizacija logističnih procesov, varnost industrijske cone, vodenje prometnega toka, WMS, SAP

Summary:

As part of the hackathon at Impol d.o.o., students from the Higher Vocational School L.I.V.E. developed solutions for safe and efficient traffic management in the industrial zone. The main goal was to develop cost-optimal solutions that ensure the safe coexistence of transport vehicles and employees and efficient management of traffic flows. They analyzed current traffic flows and bottlenecks, made suggestions for improving traffic flow, and presented proposals for increasing safety for all traffic participants, especially pedestrians. A group of students focused on finding solutions for a clearer vehicle announcement system and managing time windows, which would reduce unnecessary employee communication via email and phone, and provide solutions for a system for storing photos of loaded vehicles. The analysis covered the system of announcing trucks, reviewing the existing system of loading and unloading trucks, tracking the movement of trucks in the industrial zone, including the system of entering the industrial zone.

Keywords: optimization of logistic processes, industrial zone safety, traffic flow management, WMS: WMS, SAP

UVOD

Skupina Impol deluje v okviru krovne družbe Impol 2000, d. d. (v nadaljevanju: Impol), katere pretežna dejavnost je povezana s proizvodnjo izdelkov iz aluminija za različna gospodarska področja (transport, prehranska industrija, farmacija, gradbeništvo ipd.). Podjetje konstantno povečuje prodajo svojih izdelkov in je med prvimi petimi slovenskimi izvozniki. Njihova proizvodnja temelji na inovativnosti, raziskavah in razvoju, trajnostnem poslovanju, hkrati pa skrbijo za ohranjanje standardov kakovosti, s čimer si zagotavljajo sodelovanje tudi z najzahtevnejšimi kupci. Podjetje uspešno sodeluje z lokalno skupnostjo (sponzorstvo, donacije ipd.), veliko pozornosti pa namenjajo tako razvoju in izobraževanju zaposlenih kot tudi sodelovanju z izobraževalnimi ustanovami.



Slika 51: Impol obrat Slovenska Bistrica
Vir: <https://www.impol.si/kontakti/> (13.6.2024)

Upravljanje tovornih vozil v industrijski coni podjetja Impol predstavlja kompleksen logistični izziv, ki se sooča s številnimi težavami in izzivi. V tem projektu se bomo osredotočili na identifikacijo in analizo problemov, s katerimi se podjetje Impol srečuje pri upravljanju tovornih vozil v svoji industrijski coni, ter predlagali možne rešitve za izboljšanje učinkovitosti in konkurenčnosti.

Industrijska cona podjetja Impol je dinamično okolje, kjer se vsakodnevno izvaja veliko število logističnih operacij, povezanih s tovornimi vozili. Kljub temu se pojavljajo številni problemi, ki lahko negativno vplivajo na operativno delovanje in stroške podjetja. Nekateri od teh problemov vključujejo zastoje v industrijski coni, nepotrebne časovne zamude, dodatni stroški stojnin vozil, večjo porabo goriva in obrabo vozil ter negativen vpliv na okolje.

Zaradi teh izzivov se mora podjetje Impol nenehno prilagajati in iskati nove načine za izboljšanje upravljanja toka tovornih vozil v industrijski coni. Hkrati pa je treba upoštevati tudi trajnostno usmeritev, saj se zahteva vedno večja skrb za okolje in zmanjšanje vpliva na podnebne spremembe.

OPREDELITEV PROBLEMA IN CILJI

Prostorsko omejena industrijska cona Impol predstavlja velik izziv za učinkovito upravljanje prometa, ki ima ključen vpliv na nemoteno delovanje podjetja in varnost v njihovem okolju. Zamaški, neprilagojena infrastruktura, kritične točke ter poti za pešce so izzivi, s katerimi se sooča podjetje v tej industrijski coni.

Po tem postaja jasno, da je potrebno posvetiti posebno pozornost razvoju in implementaciji učinkovitih prometnih sistemov, ki bodo usklajeni z zahtevami prostorsko omejenega okolja. Z

namenom ohranjanja varnosti, povečanja učinkovitosti ter izboljšanja delovnega okolja se moramo osredotočiti na identifikacijo ključnih težav ter razvoj inovativnih rešitev.

V nadaljevanju bomo analizirali izzive, s katerimi se sooča industrijska cona glede upravljanja prometa, predstavili trenutno stanje in predlagali rešitve, ki bodo prispevale k izboljšanju prometnih tokov in varnosti v prostorsko omejenem industrijskem okolju.

Prav tako smo analizirali najbolj izpostavljene logistične izzive v podjetju Impol, ki zajemajo upravljanje toka kamionov v podjetju v procesu natovarjanja/raztovarjanja tovora. Zaradi neusklajene časovnice logističnih procesov, ki se še vedno dopolnjuje ročno in časovno zahteva precej usklajevanja med različnimi deležniki procesov v podjetju (komerciala, odpremni referenti, vodji skladišč), prihaja do težav, ki večkrat močno otežujejo pravočasno odpremo tovora. Predvideti je treba hitrejšo in učinkovito ureditev (nezaključenih) najav glede na časovne roke odpreme in razpoložljivost prevoznikov tako, da se omogoči čim hitrejšo in pravočasno natovarjanje tovora.

Namen projekta je bil analizirati obstoječe stanje prometa v industrijski coni Impol in podati predloge izboljšav, prav tako je bil namen podati predloge za učinkovito upravljanje toka tovornih vozil v industrijski coni podjetja Impol, s čimer bi znatno zmanjšali čakalne vrste kamionov in s tem izboljšali pretok oskrbovalnih verig.

Cilji izziva so bili naslednji:

- varno in učinkovito upravljanje prometa v prostorsko omejeni industrijski coni;
- Razviti stroškovno optimalne rešitve, ki zagotavljajo varno sožitje transportnih vozil in zaposlenih kot uporabnikov cone ter učinkovito upravljanje prometnih tokov v prostorsko omejeni industrijski coni;
- analizirati trenutne prometne tokove in ozka grla;
- predlogi za izboljšanje prometnega toka v coni Impol;
- predlogi za povečanje varnosti za vse udeležence prometa, zlasti za pešce;
- analizirati upravljanje toka kamionov v podjetju;
- preučiti kritične točke logističnih procesov (probleme čakalnih vrst tovornih vozil), odkriti vzroke zanje in posledice;
- predstaviti rešitve za izboljšanje logističnih procesov v podjetju;
- poudariti pomen učinkovitega načrtovanja in realizacije logističnih procesov za poslovanje podjetja.

ANALIZA STANJA V INDUSTRIJSKI CONI IMPOL

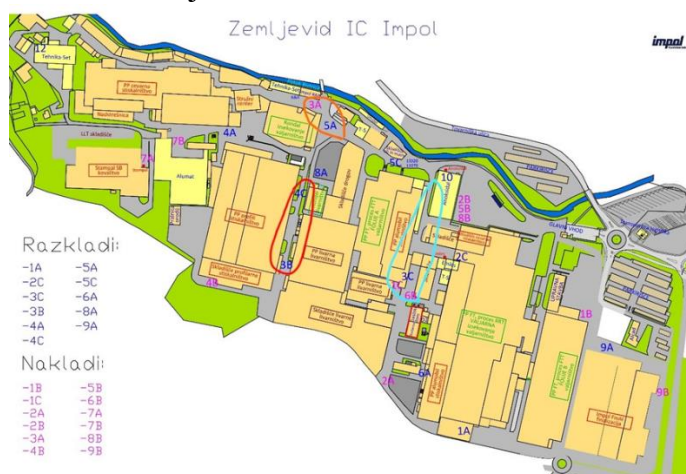
Analiza stanja temelji na pridobljenem gradivu s strani podjetja in neposrednem ogledu industrijske cone 7. 11. 2023.

Analiza stanja upravljanje prometa v prostorsko omejeni industrijski coni

Podjetje Impol se uveljavlja kot vodilni proizvajalec aluminija in aluminijastih izdelkov, a ključnega pomena za nemoteno delovanje podjetja je tudi ustrezna prometna ureditev okoli njihovih obratov. S premišljeno prometno infrastrukturo se ne le zagotavlja varnost zaposlenih in obiskovalcev, temveč tudi optimizira logistika ter olajša dostop do podjetja.

Z namenom boljšega razumevanja trenutnega stanja smo podrobno preučili prometno ureditev podjetja Impol. Analiza zajema oceno obstoječe prometne infrastrukture, identifikacijo morebitnih izzivov ter pregled trenutnih rešitev, ki so implementirane za obvladovanje prometnega toka v okolici podjetja. Naš cilj je bil pridobiti celovit vpogled v obstoječe stanje in predlagati izboljšave, ki bodo

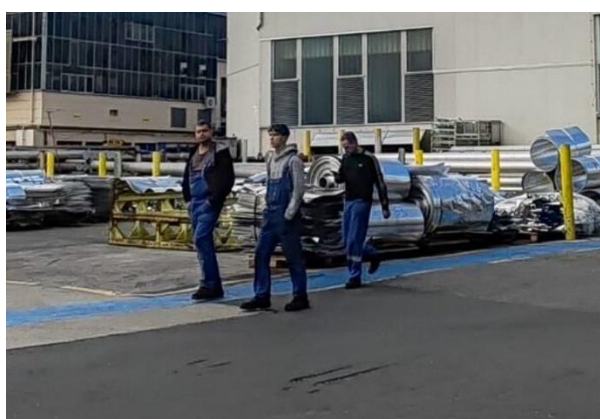
prispevale k učinkovitejšemu in varnejšemu prometnemu sistemu podjetja Impol. Zaradi obsežnosti problematike, smo izpostavili le nekaj kritičnih točk.



Slika 52: Zemljevid IC Impol
Vir: Lasten

Na sliki 2 so obkrožena območja katere smo opredelili, kot prometno najbolj težavne dele. Svetlo modro obarvan del je 1. cona. Oranžno barvan del je 2. cona. Rdečo obarvan del je 3. cona. Osebni avtomobili, ki se gibljejo po območju, ki ni namenjeno njihovi uporabi, ne le ovirajo logistične tokove, temveč tudi povečujejo tveganje za prometne zastoje, nepotreben stik z tovornimi vozili in viličarji ter poslabšanje varnostnih pogojev v samem obratu. Osebni avtomobili so bili parkirani na sredi ceste in zavzemali prostor na transportni poti. S ciljem optimizacije prometnih tokov smo preučili možnosti za omejitev vstopa osebnih avtomobilov in hkrati prepoznali alternative, ki bodo prispevale k boljši organizaciji prometa znotraj podjetja Impol.

Opazili smo, da delavci v industrijski coni nosijo temna oblačila, kar pa lahko predstavlja dodatno tveganje za njihovo varnost. Temna oblačila lahko namreč zmanjšajo njihovo vidljivost, kar je še posebej pomembno v industrijskem okolju, kjer se pogosto gibajo težka vozila in potekajo različne delovne dejavnosti. Kljub varnostnim opozorilom Impola in internim navodilom za voznike delavci vsaj izven hal v industrijski coni ne nosijo varnih jopičev.



Slika 53: Temna oblačila zaposlenih
Vir: Lasten

Opaženo je bilo tudi zanemarjanje upoštevanje dovoljene hitrosti saj so razni osebni avtomobili in viličarji dosegali hitrosti več kot 10km/h (kar je najvišja dovoljena hitrost glede na postavljeno prometno signalizacijo pri glavnem vhodu).

Pri zunanjem skladišču drogov smo opazili, da so shranjevali razne kose aluminija na paletah in droge v enem nivoju in s tem zasedajo velik prostor, ki bi lahko bil boljše izkoriščen. To skladišče se nahaja pri razkladu 5A in 8A.



Slika 54: Zunanje skladišče
Vir: Lasten

V 3. coni je bila opažena preozka cesta, ki je namenjena za razklade 4C, 3C in na koncu za naklad 4B. To pot je v času našega ogleda zavzemalo tudi komunalno vozilo, ki je bilo tam za čiščenje kanalizacije. Predvidevamo tudi, da je bilo tam začasno, a je vseeno predstavljalo takratni problem, saj so tovorna vozila morala del ceste uporabljati kot enopasovno pot in se je s tem ustvarjal prometni zamašek in nevarnost na cesti.

V coni 1 smo opazili, da prihaja do velikih zastojev, saj se srečujejo tovorna vozila, viličarji, vrši se natovarjanje glinice, na isti liniji je interna notranja tehničnica za viličarje, ne nazadnje je v tej coni tudi interni gasilski dom, ki mora imeti ob intervenciji čimbolj sproščeno pot.

Ob tehničnici nastaja še težava nabiranja viličarjev, saj čakajo na vrsto in s tem povzročajo zastoje na dvosmerni cesti.



Slika 55: Kritična točka zastojev v coni
Vir: Lasten

Eden izmed izrazitejših izzivov, ki vplivajo na učinkovito prometno ureditev v industrijski coni podjetja Impol, je pomanjkljiva prometna signalizacija. Nedvoumna in ustrezna prometna signalizacija je ključna za usmerjanje prometnih tokov, preprečevanje nesreč ter zagotavljanje splošne varnosti v industrijskem okolju. Naša analiza je razkrila, da obstajajo lokacije znotraj cone, kjer je signalizacija pomanjkljiva ali neustrezna, kar lahko vodi do zmede med vozniki in pešci.

Bila je opažena slaba prometna signalizacija cest, saj ni bilo označb ne prednostnih ne neprednostnih cest in je zaradi tega potekal promet nekoliko zmedeno. Opaženo je bilo tudi pomankanje prometnih ogledal na mestih, kjer so mrtvi koti.

Identificirali smo še en ključen izziv, ki izrazito vpliva na učinkovitost - neenoten in pomanjkljiv informacijski sistem vodenja prometnih tokov. Informacijski sistem igra ključno vlogo pri usmerjanju, nadzoru in optimizaciji prometa znotraj industrijske cone. Naša opažanja so, da trenutni sistem ni le neenoten, temveč tudi pomanjkljiv, kar lahko vodi do neskladij, zastojev in zmanjšane učinkovitosti logističnih procesov.

Analiza stanja - upravljanje toka tovornih vozil v prostorsko omejeni industrijski coni

Po ogledu zunanjih površin industrijske cone smo ugotovili, da je novo sprejemno parkirišče s tehniko in sprejemno pisarno odmaknjeno od vhoda v industrijsko cono. Tudi za tovorna vozila ta postavitev ni idealna zaradi krožnih križišč. Naslednje težave smo zaznali v coni 3, ker smo opazili veliko nepotrebnih parkirišč za osebne avtomobile. Zaznali smo tudi, da podjetje veliko podatkov še vedno vpisuje ročno, kljub temu da imajo aplikacijo, ki jim zajame del procesov upravljanja s tovorom. Prav tako smo ugotovili, da bi v coni potrebovali več prostora za učinkovito upravljanje toka tovornih vozil - obstoječe transportne poti niso zadostne.

Dogovori o terminu naklada potekajo med logistom transportne logistike in prevoznikom, in to večinoma ustno oz. pisno, vendar se ne vpisujejo takoj v program za skupno rabo. Termine prihodov tovornjakov določujejo prevozniki, zato prihaja do razlik med rezervacijo terminov pri odpremnikih skladišč in referentom-logistom. Torej, problem nastane v komunikaciji med vsemi udeleženci tega procesa in s tem podjetje izgubi veliko dragocenega časa.

Velika težava so tudi nenajavljeni prevozi, ker sistemsko niso urejeni, saj se vsak tovornjak ob prihodu vpisuje ročno. Zaradi neznanih točnih datumov prihoda podjetje prejema nenajavljeno blago, kar povzroča tudi težave v skladiščenju. Transportni odpremniki vpisujejo termine ročno, zato lahko hitro pride do prekrivanja terminov, saj program ni zasnovan, da bi opozoril na možna prekrivanja.

Omenjena opažanja vplivajo na učinkovito opravljanje toka kamionov in s tem posledično povzročajo motnje v oskrbovalni verigi.

PREDLAGANE REŠITVE

Na podlagi pridobljenih dokumentov o dejavnosti podjetja, ki zajema problematiko izziva, ogleda podjetja in njegovih logističnih procesov ter s tem neposrednega seznanjanja s kritičnimi točkami pri upravljanju prometa in toka tovornih vozil v podjetju Impol, smo predlagali nekaj rešitev, ki bi lahko izboljšale upravljanje omenjenih logističnih procesov:

1. Osebni avtomobili in parkirna mesta:
 - parkirani avtomobili ovirajo promet v industrijskih conah. Predlagana rešitev je omejitev osebnih avtomobilov in uporaba manjših, električnih vozil za boljšo mobilnost;
 - predlagana omejitev parkiranja osebnih vozil in spodbujanje trajnostnih oblik prevoza zaposlenih.
2. Varnost delavcev v industrijski coni:
 - za večjo varnost predlagamo, da vsi zaposleni in gostje nosijo odsevnike ali odsevne naramnice.
3. Ureditev cone 3:
 - razširitev ceste in nova pešpot – odstranitev zelenice in parkirnih mest za razširitev ceste in izboljšanje varnosti pešcev;

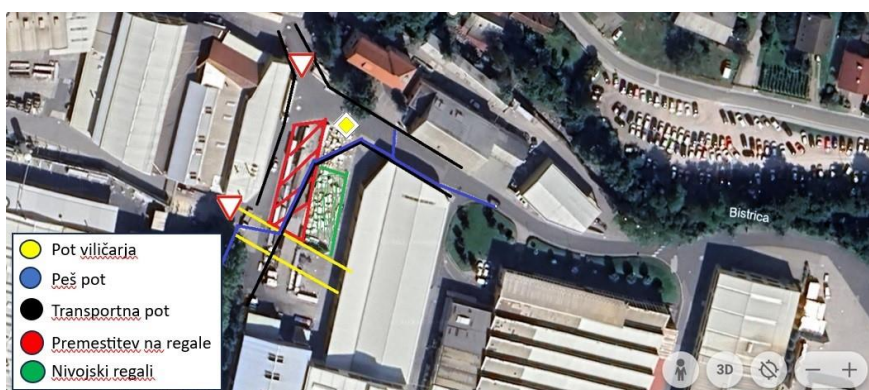


Slika 56: Barvane poti za pešce
Vir: Lasten

- povečanje transportnih poti - premik skladišča, namestitvev senzorjev, prometnih ogledal in GPS naprav za izboljšanje prometa in varnosti.
 - Izboljšanja razsvetljava - Ureditev razsvetljave za večjo varnost in zmanjšanje nesreč.
4. Cona 2 – zunanje skladiščenje drogov:
- Razširitev poti, reorganizacija skladišča in uvedba konzolnih regalov za izboljšanje logistike in varnosti.



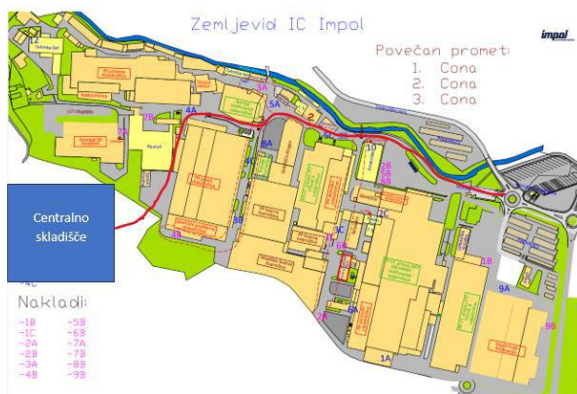
Slika 57: Postavitev paletnih regalov in konzolnih regalov
Vir: lasten



Slika 58: Končna rešitev cone 2
Vir: lasten

5. Prometni tokovi in gneča v coni 1:
- predlagana je enosmerna cesta v coni 1 za izboljšanje prometa in zmanjšanje zastojev.
6. Najava tovornih vozil:

- Predlagana je uvedba aplikacij za pravočasno najavo kamionov in vodenje voznikov po industrijski coni.
7. Dodatno nakladalno mesto:
- v skladišču 4B bi razširili transportne poti nakladalno mesto tako, da bi lahko nakladali dve tovorni vozili istočasno – gre za vzporedno nakladalno mesto.
8. Izgradnja centralnega skladišča:
- predlagana je izgradnja centralnega skladišča za izboljšanje logistike in učinkovitosti prevoza materiala.

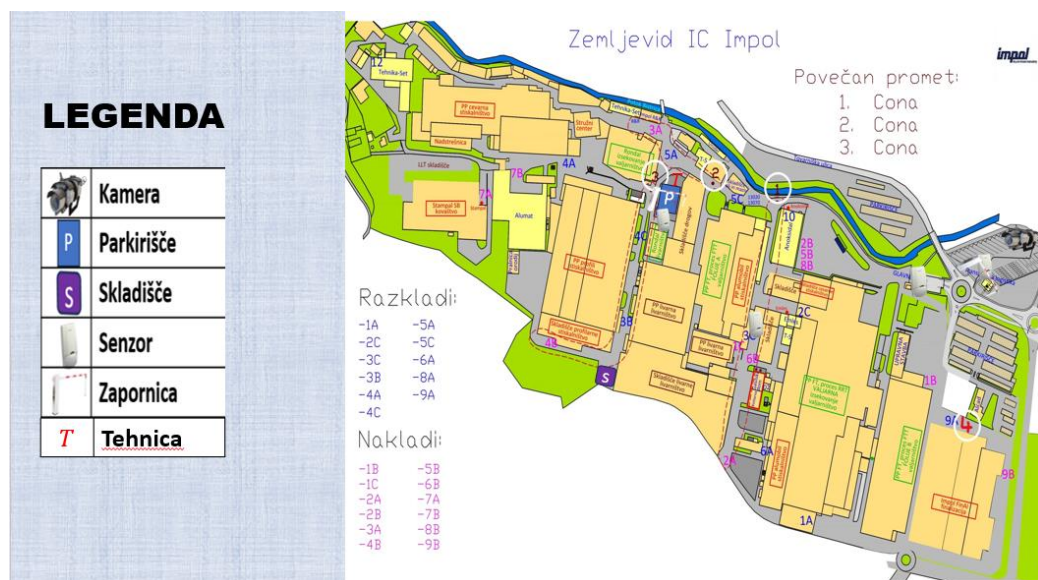


Slika 59: Pot do centralnega skladišča (rdeča črta)
Vir: Lasten



Slika 60: Centralno skladišče in pot do izhoda
Vir: Lasten

9. Združitev sistema in infrastrukture za harmonično delovanje:
- uvedba tehnologij za izboljšanje prometa, vključno s kamero, senzorji, zapornicami in integracijo z SAP sistemom.



Slika 61: Postavitev nove infrastrukture za delovanje z WMS
Vir: Lasten in Impol, 2023

ZAKLJUČEK

Analiza industrijske cone Impol, specializirane za proizvodnjo aluminija, je razkrila težave z gibanjem tovornih vozil zaradi omejenega prostora, povečane proizvodnje in števila tovornjakov. Glavni izzivi vključujejo postavitve sprejemnega parkirišča, pomanjkanje prostora za transportne poti, ročno vpisovanje podatkov ter komunikacijske in organizacijske težave. Nenajavljeni prevozi in neustrezna programska podpora so dodatne ovire za učinkovito upravljanje oskrbovalne verige. Na podlagi analize so bile predlagane izboljšave, kot so omejitve vstopa osebnih avtomobilov, uvedba varnostnih jop, preureditev con. Uvedba SAP Extended Warehouse Management sistema (SAP EWM) in spremembe v prometni infrastrukturi predstavljata ključne korake v optimizaciji logističnih operacij podjetja Impol. Sistem SAP EWM omogoča integracijo, avtomatizacijo in celovito upravljanje logističnih procesov. Poleg tega bo uporaba senzorjev za sledenje vozil in kamer za identifikacijo registrskih tablic omogočila avtomatizirano sledenje in nadzor trajanja operacij. Sprememba prometne infrastrukture, ki vključuje postavitve nadvoda, prebarvanje označenih poti in integracijo s prometno signalizacijo, bo povečala varnost in vidljivost v prometnih conah. To bo prispevalo k boljši organizaciji, preprečevanju morebitnih nesreč in izboljšanju prometnih tokov. Z uvajanjem SAP EWM sistema in spremembami v infrastrukturi bo Impol bolj pripravljen na dinamično poslovno okolje in bo bolj uspešen in učinkovit v svojem poslanstvu.

Predlagane rešitve bi izboljšale logistične procese, povečale učinkovitost in konkurenčnost podjetja.

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SAFE AND EFFICIENT MANAGEMENT OF TRAFFIC AND VEHICLE FLOW IN A SPATIALLY LIMITED INDUSTRIAL ZONE

Summary:

As part of the hackathon at Impol d.o.o., students from the Higher Vocational School L.I.V.E. developed solutions for safe and efficient traffic management in the industrial zone. The main goal was to develop cost-optimal solutions that ensure the safe coexistence of transport vehicles and employees and efficient management of traffic flows. They analyzed current traffic flows and bottlenecks, made suggestions for improving traffic flow, and presented proposals for increasing safety for all traffic participants, especially pedestrians. A group of students focused on finding solutions for a clearer vehicle announcement system and managing time windows, which would reduce unnecessary employee communication via email and phone, and provide solutions for a system for storing photos of loaded vehicles. The analysis covered the system of announcing trucks, reviewing the existing system of loading and unloading trucks, tracking the movement of trucks in the industrial zone, including the system of entering the industrial zone.

Keywords: optimization of logistic processes, industrial zone safety, traffic flow management, WMS: WMS, SAP

INTRODUCTION

The Impol Group operates under the umbrella company Impol 2000, d. d. (hereinafter: Impol), whose main activity is associated with the production of aluminum products for various economic sectors (transport, food industry, pharmaceuticals, construction, etc.). The company is constantly increasing the sales of its products and is among the top five Slovenian exporters. Their production is based on innovation, research and development, sustainable business, while they also maintain quality standards, ensuring cooperation with even the most demanding customers. The company successfully cooperates with the local community (sponsorship, donations, etc.), and pays great attention to the development and education of employees as well as cooperation with educational institutions.



Figure 62: Impol plant Slovenska Bistrica
Source: <https://www.impol.si/kontakti/> (13.6.2024)

Managing freight vehicles in the industrial zone of Impol company represents a complex logistical challenge, facing numerous problems and challenges. In this project, we will focus on identifying and analyzing the problems that Impol company encounters in managing freight vehicles in its industrial zone, and propose possible solutions to improve efficiency and competitiveness.

The industrial zone of the Impol company is a dynamic environment where a large number of logistical operations related to freight vehicles are carried out daily. Nevertheless, numerous problems arise that can negatively impact the operational functioning and costs of the company. Some of these problems include congestion in the industrial zone, unnecessary time delays, additional costs of vehicle demurrage, increased fuel consumption and vehicle wear, and a negative impact on the environment.

Due to these challenges, Impol company must constantly adapt and seek new ways to improve the management of freight traffic in the industrial zone. At the same time, sustainability must also be considered, as there is an increasing demand for greater care for the environment and reducing the impact on climate change.

DEFINITION OF THE PROBLEM AND OBJECTIVES

The spatially limited industrial zone of Impol presents a significant challenge for effective traffic management, which has a crucial impact on the smooth operation of the company and safety in their environment. Congestion, unadapted infrastructure, critical points, and pedestrian paths are challenges that the company faces in this industrial zone.

It becomes clear that special attention needs to be paid to the development and implementation of efficient traffic systems, which will be aligned with the requirements of a spatially limited environment. With the aim of maintaining safety, increasing efficiency, and improving the working environment, we must focus on identifying key problems and developing innovative solutions.

In the following, we will analyze the challenges faced by the industrial zone in terms of traffic management, present the current state, and propose solutions that will contribute to improving traffic flows and safety in a spatially limited industrial environment.

We also analyzed the most exposed logistical challenges in the Impol company, which include managing the flow of trucks in the company in the process of loading/unloading cargo. Due to the uncoordinated timetable of logistical processes, which is still being manually supplemented and requires considerable coordination between different stakeholders in the company (commercial, dispatch referents, warehouse managers), problems arise that often severely hinder timely dispatch of cargo. It is necessary to anticipate a faster and more efficient arrangement of (unfinished) announcements according to the deadlines for dispatch and the availability of carriers, so as to enable the fastest and timely loading of cargo.

The purpose of the project was to analyze the current state of traffic in the Impol industrial zone and to propose improvements, as well as to propose suggestions for effective management of the flow of freight vehicles in the industrial zone of the Impol company, which would significantly reduce the queues of trucks and thus improve the flow of supply chains.

The objectives of the challenge were as follows:

- Safe and efficient traffic management in a spatially limited industrial zone;
- Develop cost-optimal solutions that ensure safe coexistence of transport vehicles and employees as users of the zone and efficient management of traffic flows in a spatially limited industrial zone;
- Analyze current traffic flows and bottlenecks;
- Proposals to improve traffic flow in the Impol zone;
- Proposals to increase safety for all traffic participants, especially pedestrians;
- Analyze the management of the flow of trucks in the company;
- Examine the critical points of logistical processes (problems with queues of freight vehicles), identify their causes and consequences;
- Present solutions to improve logistical processes in the company;
- Emphasize the importance of effective planning and implementation of logistical processes for business operations.

ANALYSIS OF THE SITUATION IN THE IMPOL INDUSTRIAL ZONE

The analysis of the situation is based on the material obtained from the company and the direct inspection of the industrial zone on November 7, 2023.

Analysis of the state of traffic management in a spatially limited industrial zone

The Impol company is establishing itself as a leading manufacturer of aluminum and aluminum products, but the appropriate traffic arrangement around their plants is also crucial for the smooth operation of the company. With a thoughtful traffic infrastructure, not only is the safety of employees and visitors ensured, but logistics are also optimized and access to the company is facilitated.

In order to better understand the current situation, we have thoroughly studied the traffic arrangement of the Impol company. The analysis includes an assessment of the existing traffic infrastructure, identification of potential challenges, and a review of current solutions that are implemented to manage traffic flow in the vicinity of the company. Our goal was to gain a comprehensive insight into the existing situation and propose improvements that will contribute to a more efficient and safer traffic system of the Impol company. Due to the complexity of the issue, we have highlighted only a few critical points.

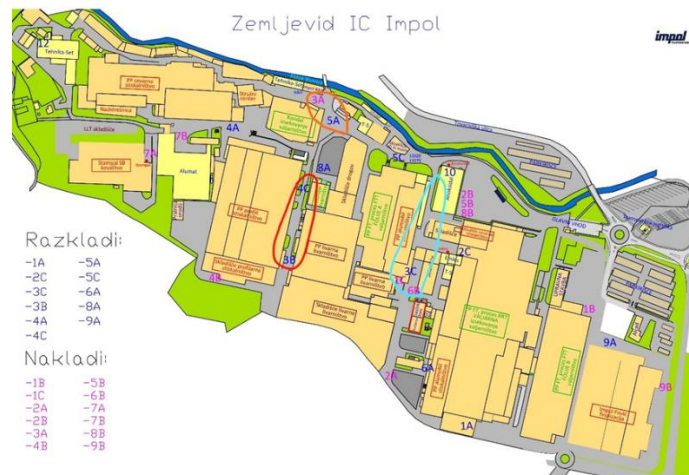


Figure 63: Map IC Impol
Source: Own

In Figure 2, the areas we have identified as the most problematic in terms of traffic are circled. The light blue colored part is Zone 1. The orange colored part is Zone 2. The red colored part is Zone 3. Personal cars, moving in areas not intended for their use, not only obstruct logistical flows but also increase the risk of traffic jams, unnecessary contact with trucks and forklifts, and a deterioration of safety conditions within the plant itself. Personal cars were parked in the middle of the road, taking up space on the transport path. With the aim of optimizing traffic flows, we have examined the possibilities of limiting the entry of personal cars and at the same time identified alternatives that will contribute to better traffic organization within the Impol company.

We noticed that workers in the industrial zone wear dark clothes, which can pose an additional risk to their safety. Dark clothes can indeed reduce their visibility, which is especially important in an industrial environment where heavy vehicles often move and various work activities take place. Despite Impol's safety warnings and internal instructions for drivers, workers do not wear safety vests at least outside the halls in the industrial zone.



*Slika 64: Temna oblačila zaposlenih
Vir: Lasten*

It was also observed that the allowed speed limit was being neglected as various personal cars and forklifts were reaching speeds of more than 10km/h (which is the highest allowed speed according to the traffic signage at the main entrance).

At the external warehouse for rods, we noticed that they were storing various pieces of aluminum on pallets and rods at one level, thus occupying a large space that could be better utilized. This warehouse is located at the unloading points 5A and 8A.



*Figure 65: External storage
Source: Own*

In Zone 3, a narrow road was observed, which is intended for unloading at 4C, 3C and finally for loading at 4B. During our visit, this road was also occupied by a municipal vehicle that was there for sewer cleaning. We assume that it was there temporarily, but it still represented a problem at the time, as trucks had to use part of the road as a one-way path, thus creating a traffic jam and danger on the road.

In Zone 1, we noticed that there are major traffic jams, as trucks, forklifts, and alumina loading are encountered, there is an internal forklift scale on the same line, and last but not least, there is an internal fire station in this zone, which must have the most relaxed path during an intervention.

There is also a problem with forklifts accumulating at the scale, as they wait their turn and thus cause traffic jams on the two-way road.



Figure 66: Critical point of congestion in the zone
Source: Own

One of the more pronounced challenges affecting effective traffic management in the industrial zone of the Impol company is the lack of traffic signage. Unambiguous and appropriate traffic signage is key to directing traffic flows, preventing accidents, and ensuring general safety in an industrial environment. Our analysis has revealed that there are locations within the zone where signage is lacking or inadequate, which can lead to confusion among drivers and pedestrians.

Poor road traffic signage was observed, as there were no markings for either priority or non-priority roads, resulting in somewhat confused traffic flow. A lack of traffic mirrors was also noted at locations where there are blind spots.

We identified another key challenge that significantly affects efficiency - an inconsistent and inadequate traffic flow management information system. The information system plays a crucial role in directing, controlling, and optimizing traffic within the industrial zone. Our observations are that the current system is not only inconsistent but also inadequate, which can lead to discrepancies, congestion, and reduced efficiency of logistical processes.

Management of freight vehicle flow in a spatially limited industrial zone

After inspecting the external areas of the industrial zone, we found that the new reception parking lot with a scale and reception office is located away from the entrance to the industrial zone. This setup is also not ideal for trucks due to roundabouts. We detected the next issues in zone 3, as we noticed a lot of unnecessary parking spaces for personal cars. We also detected that the company still manually enters a lot of data, even though they have an application that captures part of the cargo management processes. We also found that more space would be needed in the zone for effective management of truck flow - existing transport routes are not sufficient.

Agreements on the loading schedule are made between the transport logistics logistician and the carrier, mostly orally or in writing, but they are not immediately entered into the shared program. The arrival times of trucks are determined by the carriers, so there are differences between the reservation of terms at warehouse dispatchers and the logistics clerk. Therefore, the problem arises in communication between all participants in this process, and the company loses a lot of valuable time. Unannounced transports are also a big problem because they are not systematically arranged, as each truck is manually registered upon arrival. Due to unknown exact arrival dates, the company receives unannounced goods, which also causes storage problems. Transport dispatch logistics manually enter the terms, so overlaps can quickly occur, as the program is not designed to warn of possible overlaps. The mentioned observations affect the effective performance of the truck flow and consequently cause disruptions in the supply chain."

SUGGESTED SOLUTIONS

Based on the obtained documents about the company's activities, which cover the challenge's issues, the company's inspection and its logistic processes, and thus direct familiarization with the critical points in managing traffic and the flow of trucks in the Impol company, we proposed some solutions that could improve the management of these logistic processes:

1. Personal cars and parking spaces:
 - parked cars obstruct traffic in industrial zones. The proposed solution is to limit personal cars and use smaller, electric vehicles for better mobility;
 - proposed limitation of parking personal vehicles and promoting sustainable forms of employee transportation.
2. Worker safety in the industrial zone:
 - for greater safety, we propose that all employees and guests wear reflectors or reflective braces.
3. Arrangement of zone 3:
 - road expansion and a new pedestrian path - removal of the lawn and parking spaces for road expansion and improved pedestrian safety.



Figure 67: Barvane poti za pešce
Source: Own

- Increasing transport routes - moving the warehouse, installing sensors, traffic mirrors, and GPS devices to improve traffic and safety.
 - Lighting improvements - Arrangement of lighting for greater safety and accident reduction.
4. Zone 2 - external storage of poles:
 - Path expansion, warehouse reorganization, and introduction of cantilever racks for improved logistics and safety.



Figure 68: Installation of pallet racks and cantilever racks
Source: Own

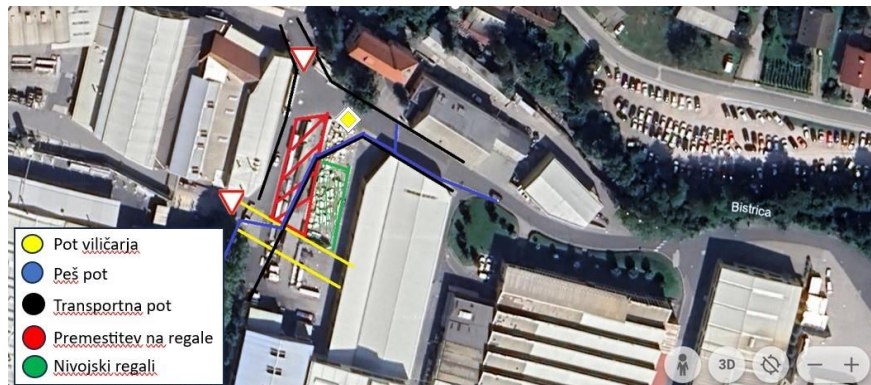


Figure 69: The final solution of Zone 2
Source: Own

5. Traffic flows and congestion in zone 1:
 - A one-way street in zone 1 is proposed to improve traffic and reduce congestion.
6. Announcement of trucks:
 - The introduction of applications for timely truck announcements and guiding drivers through the industrial zone is proposed.
7. Additional loading point:
 - In warehouse 4B, the transport routes would be expanded to the loading point so that two trucks could be loaded simultaneously - this is a parallel loading point.
8. Construction of a central warehouse:
 - The construction of a central warehouse is proposed to improve logistics and transport efficiency.

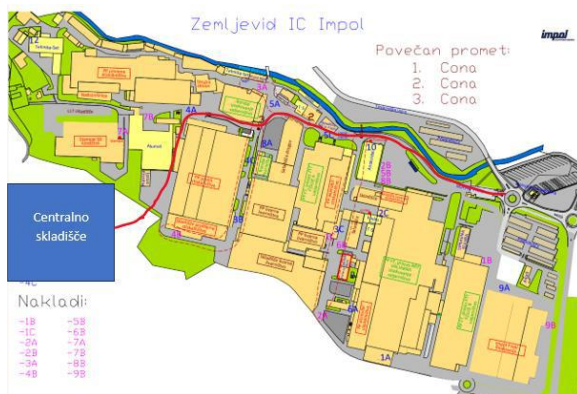


Figure 70: Route to the central warehouse (red line)

Source: Own



Source 71: Central warehouse and exit route

Source: Own

9. Integration of the system and infrastructure for harmonious operation:

- Introduction of technologies to improve traffic, including a camera, sensors, barriers, and integration with the SAP system.

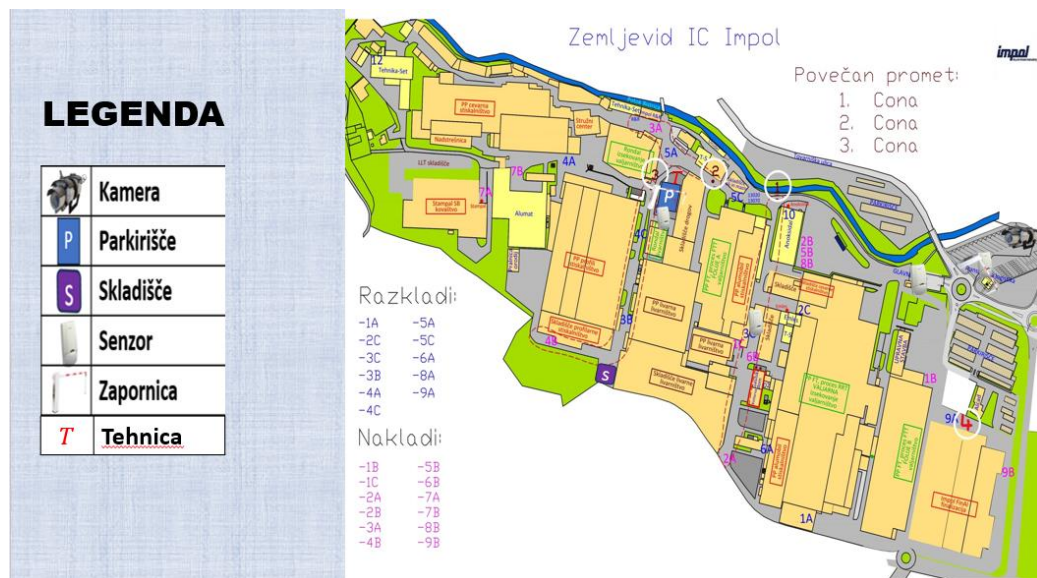


Figure 72: Setting up a new infrastructure to work with WMS

Source: Own and Impol, 2023

CONCLUSION

The analysis of the Impol industrial zone, specialized in aluminum production, revealed problems with the movement of trucks due to limited space, increased production, and the number of trucks. The main challenges include the placement of the reception parking lot, lack of space for transport routes, manual data entry, and communication and organizational issues. Unannounced transports and inadequate software support are additional obstacles to effective supply chain management. Based on the analysis, improvements were proposed, such as limiting the entry of personal cars, introducing safety vests, and reorganizing zones. The introduction of the SAP Extended Warehouse Management system (SAP EWM) and changes in traffic infrastructure represent key steps in optimizing Impol's logistics operations. The SAP EWM system enables integration, automation, and comprehensive management of logistics processes. In addition, the use of sensors for vehicle tracking and cameras for license plate identification will enable automated tracking and control of operation durations. A change in traffic infrastructure, which includes the placement of an overpass, repainting

marked paths, and integration with traffic signage, will increase safety and visibility in traffic zones. This will contribute to better organization, prevention of potential accidents, and improvement of traffic flows. With the introduction of the SAP EWM system and infrastructure changes, Impol will be better prepared for a dynamic business environment and will be more successful and efficient in its mission.

The proposed solutions would improve logistics processes, increase efficiency, and competitiveness of the company.

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JU SREDNJA ŠKOLA ZA SAOBRAĆAJ I KOMUNIKACIJE

TEMA: UNAPREĐENJE NASTAVNOG PROCESA KROZ UČESTVOVANJE U ERASMUS+ PROJEKTU

Kemal Jaganjac

Kenan Redžepagić

UVOD

Cilj ovog rada jeste da predstavi kako sudjelovanje u Erasmus+ projektu može pomoći kod unapređenja nastavnog procesa.

Naziv projekta u kojem smo mi kao škola učestvovali bio je „Izgradnja kapaciteta u zemljama Zapadnog Balkana“. Projekat je osmislio i napisao tim iz škole APRO (Alba-Italija). Naša škola je poziv za učestvovanje dobila od škole SIC Ljubljana.

Cilj projekta je bio da se zemlje zapadnog Balkana u ovom slučaju iz Bosne i Hercegovine crne Gore i Kosova upoznaju sa načinom organizacije mobilnosti Kako za učenike tako i za nastavno osoblje škola.

Takođe tu su bili još mnogobrojni weebinari kao i seminari koji su za cilj imali da članovi timova nauči kako pravilno i dobro napisati neki Erasmus projekat koji bi se mogao primijeniti u praksi. U nastavku rada upoznaćemo vas sa celokupnim odvijanjem projekta kao i ciljevima koji su postignuti.

Ideja projekta

- Projekti sa jednakim brojem partnera iz EU zemalja i iz zemalja Zapadnog Balkana, gdje je svaka škola imala svog partnera odnosno mentora iz EU.
- Podijeliti znanja i iskustva u stručnom obrazovanju, podrazumijevalo je da svi predstavimo obrazovni sistem naših zemalja i naših stručnih škola, te kroz tu razmjenu uvidjeti šta i na koji način možemo unaprijediti
- Posebno dijeljenje znanja u oblasti upravljanja projektima i međunarodne mobilnosti za studente i osoblje.
- Kreiranje zajedničkih nacрта o tome kako raditi zajedno u regionalnim i međunarodnim projektima u stručnom obrazovanju (EQF nivoi 4 i 5).

ERASMUS + projekat

- Projekat je finasiran sredstvima Evropske Unije
- Trajanje projekta: 3 godine (20.decembar 2020. do 20 decembra 2023. godine)
- Budžet za projekat: 999.930,20 €
- Školski centar Ljubljana je dao preporuku za JU Srednja škola za saobraćaj i komunikacije

Učesnici projekta:

1. Apro Formazione – Alba – Italija
2. Školski centar SEDU – Seinajoki – Finska
3. Školski centar Ljubljana – Slovenija
4. Gospodarska škola Čakovec – Hrvatska
5. Školski centar Noorderpoort – Groningen – Holandija
6. Srednja škola „Danilo Kiš” – Budva – Crna Gora
7. Centar za kompetencije – Ferizaj – Kosovo
8. Srednja škola „Ivan Uskoković” – Podgorica – Crna Gora
9. Trening centar Mitrovica – Kosovo
10. JU Srednja škola za saobraćaj i komunikacije Sarajevo

Realizacija projektnih aktivnosti

1. Faza – Priprema projekta (dogovaranje oko termina posjeta i web konferencija, upoznavanje sa nacionalnim VET programima za svaku školu, edukacija u vezi učešća u svim fazama projekta, posjete školama);
2. Faza – Mobilnost nastavnika (studijske i profesionalne posjete nastavnika školama u zemljama EU i nastavnika iz zemalja EU školama Zapadnog Balkana, stručne Konferencije u svakoj od zemalja učesnika u projektu, edukacija);
3. Faza – Mobilnost učenika (studijske posjete učenika školama u zemljama EU
 - kratka mobilnost (trajanje mjesec dana) – 4 učenika,
 - duga mobilnost (trajanje tri mjeseca) – 2 učenika maturanta);
4. Faza – Internacionalizacija i umrežavanje (Dijeljenje partnera i mreža partnera za saradnju, uspostavljanje lokalnih i regionalnih mreža škola, uspostavljanje međunarodnu mreže i saradnje srednjih stručnih škola);

Priprema za konferenciju u Sarajevu

Dana 18.05.2023. godine u Sarajevu održana je Međunarodna konferencija pod nazivom “VET to VET – Capacity Building in Western Balkans (V2V)” – Jačanje kapaciteta Zapadnog Balkana” koja je imala za cilj ojačati postojeće i izgraditi nove kapacitete vezane za srednje stručno obrazovanje.

Finalna observacijska misija

U okviru projekta "V2V - Izgradnja kapaciteta Zapadnog Balkana", u periodu od 27. do 30. novembra, u posjetu JU "Srednja škola za saobraćaj i komunikacije", došla je kolegica iz mentorske škole ROC Noorderpoort iz Groningena-Holandija sa ciljem da provede Finalnu opservacionu misiju.

Dana 29.11.2023. godine u prostorijama JU Srednje škole za saobraćaj i komunikacije održana je Završna konferencija projekta, na kojoj su prezentovane aktivnosti i rezultati koji su postignuti realizacijom projekta.

Konferenciji su prisutvovali: Ambasador Holandije, predstavnici ministarstava, prijatelji i partneri škole.

Partnerska škola je bila izuzetno zadovoljna angažmanom naših učenika i nastavnika kao i postignutim rezultatima tako da su odlučili da nagrade grupu naših učenika Studijskom posjetom Groningenu u trajanju od 14 dana.

Nastavak projekta V2V omogućio je posjetu 10 učenika naše škole u pratnji dva nastavnika učenicima studijsku posjetu Groningenu u period od 03 -17.02.2024. godine.

Finalna konferencija u Ljubljani

15.4. do 18.4.2024. godine, održana je završna konferencija u sklopu Erasmus Plus projekta “Vet to Vet Capacity Building in Western Balkans”, koja se održala u Ljubljani. Na njoj su prezentovani sljedeći rezultati:

Ishodi projekta za učenike:

- motivacija za bolji uspjeh u učenju;
- bolje prilike za zaposlenje i napredak u karijeri;
- više inicijativnosti i poduzetnosti;
- više samostalnosti i samopouzdanja;
- bolje znanje stranih jezika i bolje digitalne kompetencije;
- bolja međukulturna osviještenost;
- aktivnije sudjelovanje u društvu;
- pozitivnije interakcije s ljudima iz različitih sredina

Ishodi projekta za nastavnike:

- bolje kompetencije povezane s njihovim profilima zanimanja (podučavanje, osposobljavanje, rad s učenicima itd.);
- bolje razumijevanje prakse, politika i sistema u području obrazovanja, osposobljavanja ili rada s učenicima u raznim zemljama;
- povećana sposobnost za pokretanje promjena u smislu modernizacije i otvaranja njihovih obrazovnih organizacija međunarodnom tržištu;
- bolje razumijevanje veza između formalnog i neformalnog obrazovanja te između stručnog osposobljavanja i tržišta rada;
- bolji kvalitet njihovog rada i aktivnosti u korist učenika i polaznika obrazovanja odraslih;

Ishodi projekta za škole:

- Povećana sposobnost za rad na međunarodnom nivou
- Inovativan i poboljšan načina rada u korist ciljnih grupa
- modernije, dinamičnije, angažiranije i stručnije okruženje u organizaciji
- povezivanje sa školama iz zemalja članica EU i drugim partnerima.

IZAZOVI TOKOM REALIZACIJE PROJEKTA:

- Završetak projekta planiran za 20. decembar 2023. godine – projekat je produžen od strane EU fondova do 20.05.2024. godine.
- Zbog COVID-a realizacija nekih aktivnosti sukcesivno pomjerana.

- Sve planirane aktivnosti nisu realizovane u terminu koji je planiran za završetak projekta
- Donosi se odluka da se projekat produži do maja 2024. godine i da se za sredstva koja nisu utrošena organizuje studijska posjeta Holandiji u trajanju od 14 dana za 10 učenika i 2 nastavnika.

Rezultati projekta u BIH:

- 2 studenta duga mobilnost
- 4 učenika kratka mobilnost
- Razmjene iskustva nastavnika kroz webminare
- Stručne posjete i treninzi za nastavnike
- Studijska posjeta 10 učenika i 2 nastavnika Groningenu u trajanju od 14 dana
- Znanje/ iskustva/ zajedničke ideje/ razmišljanje
- Naši učenici i nastavnici su školu i našu zemlju predstavili u najboljem svjetlu je rezultiralo da se JU Srednja škola za saobraćaj i komunikacije pokazala kao najpouzadniji partner za naredne projekte.



Koraci za dalje.....

Održan je niz sastanaka sa našim partnerima iz Holandije ali i ostalim partnerima iz ovog projekta i odlučeno je da će se naša saradnja nastaviti i u buduće kroz nove projekte.

**IMPROVING THE TEACHING PROCESS THROUGH PARTICIPATION IN AN
ERASMUS+ PROJECT**

Kemal Jaganjac

Kenan Redžepagić

INTRODUCTION

The aim of this paper is to present how participation in the Erasmus+ project can help improve the educational process. The project we participated in as a school was titled “Capacity Building in the Western Balkans.” The project was designed and written by the team from the APRO school (Alba, Italy). Our school received the invitation to participate from the SIC Ljubljana school.

The goal of the project was to introduce the countries of the Western Balkans, specifically Bosnia and Herzegovina, Montenegro, and Kosovo, to the organization of mobility for both students and teaching staff. Additionally, there were numerous webinars and seminars aimed at teaching team members how to properly and effectively write an Erasmus project that could be applied in practice.

In the following sections, we will present the entire course of the project as well as the objectives that were achieved.

PROJECT IDEA

- Projects with an equal number of partners from EU countries and Western Balkan countries, where each school had its own partner or mentor from the EU.
- Sharing knowledge and experiences in vocational education meant that all partners presented the educational system of their countries and vocational schools, and through this exchange, we explored what and how we could improve.
- Special emphasis on knowledge sharing in the area of project management and international mobility for students and staff.
- Creation of joint frameworks on how to work together on regional and international vocational education projects (EQF levels 4 and 5).

ERASMUS+ PROJECT

- The project was funded by the European Union.
- Project duration: 3 years (December 20, 2020 – December 20, 2023).
- Project budget: 999,930.20 EUR.
- The School Center Ljubljana recommended the participation of JU Secondary School of Transport and Communications Sarajevo.

Project Participants:

1. Apro Formazione – Alba – Italy
2. School Center SEDU – Seinajoki – Finland
3. School Center Ljubljana – Slovenia
4. Vocational School Čakovec – Croatia
5. School Center Noorderpoort – Groningen – Netherlands
6. Secondary School “Danilo Kiš” – Budva – Montenegro
7. Competence Center – Ferizaj – Kosovo
8. Secondary School “Ivan Uskoković” – Podgorica – Montenegro
9. Training Center Mitrovica – Kosovo
10. JU Secondary School of Transport and Communications Sarajevo

Project Activity Implementation:

1. **Phase 1** – Project preparation (agreement on visit dates and webinars, familiarization with national VET programs for each school, training related to participation in all phases of the project, school visits).
2. **Phase 2** – Teacher mobility (study and professional visits of teachers to schools in EU countries and vice versa, professional conferences in each participating country, training).
3. **Phase 3** – Student mobility (study visits of students to schools in EU countries):
 - Short mobility (one-month duration) – 4 students,
 - Long mobility (three-month duration) – 2 graduating students.
4. **Phase 4** – Internationalization and networking (sharing partners and partner networks for cooperation, establishing local and regional networks of schools, creating an international network and cooperation among vocational schools).

Conference Preparation in Sarajevo

On May 18, 2023, the International Conference titled "VET to VET – Capacity Building in the Western Balkans (V2V)" was held in Sarajevo. The goal of the conference was to strengthen existing and build new capacities related to secondary vocational education.

Final Observational Mission

As part of the "V2V - Capacity Building in the Western Balkans" project, from November 27 to 30, a colleague from the mentor school ROC Noorderpoort from Groningen, Netherlands, visited the JU Secondary School of Transport and Communications in Sarajevo to conduct the final observational mission.

On November 29, 2023, the Final Conference of the project was held at the JU Secondary School of Transport and Communications, where the activities and results achieved through the project were presented. The conference was attended by the Ambassador of the Netherlands, representatives of ministries, and school partners.

The partner school was very satisfied with the engagement of our students and teachers, as well as the results achieved, and decided to reward our group of students with a study visit to Groningen for 14 days.

The continuation of the V2V project enabled the visit of 10 students from our school, accompanied by two teachers, to Groningen from February 3 to 17, 2024.

Final Conference in Ljubljana

From April 15 to 18, 2024, the final conference of the Erasmus+ project "VET to VET – Capacity Building in the Western Balkans" was held in Ljubljana. The following project outcomes were presented:

Outcomes for students:

- Motivation for better academic performance.
- Better opportunities for employment and career advancement.
- Increased initiative and entrepreneurship.
- Greater independence and self-confidence.
- Improved foreign language skills and better digital competence.
- Greater intercultural awareness.
- More active participation in society.
- Positive interactions with people from diverse backgrounds.

Outcomes for teachers:

- Improved competencies related to their professional profiles (teaching, training, working with students, etc.).
- Better understanding of practices, policies, and systems in education, training, and working with students across various countries.
- Enhanced ability to drive changes aimed at modernizing and opening their educational organizations to international markets.

- Improved understanding of the links between formal and non-formal education and between vocational training and the labor market.
- Better quality of their work and activities for the benefit of students and adult learners.

Outcomes for schools:

- Increased ability to work at the international level.
- Innovative and improved methods of working for target groups.
- More modern, dynamic, engaged, and professional environment within the organization.
- Stronger connections with schools from EU member states and other project partners.

CHALLENGES DURING PROJECT IMPLEMENTATION:

- The project was originally planned to finish on December 20, 2023, but it was extended by the EU funds until May 20, 2024.
- Due to COVID-19, some activities were postponed sequentially.
- Not all planned activities were completed within the original project timeline.
- A decision was made to extend the project until May 2024, with unspent funds being allocated for a study visit to the Netherlands for 10 students and 2 teachers for 14 days.

Project Results in Bosnia and Herzegovina:

- 2 students participated in long-term mobility.
 - 4 students participated in short-term mobility.
 - Teacher exchanges through webinars.
 - Professional visits and training for teachers.
 - A study visit for 10 students and 2 teachers to Groningen for 14 days.
 - Knowledge, experiences, joint ideas, and reflections.
 - Our students and teachers represented our school and country in the best possible way, which resulted in the JU Secondary School of Transport and Communications being recognized as the most reliable partner for future projects.
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Next Steps...

A series of meetings were held with our partners from the Netherlands and other project partners, and it was decided that our collaboration will continue through new projects in the future.