XII Međunarodni simpozijum
„Interdisciplinarnost logistike i saobraćaja“

XII International Symposium
“Interdisciplinarity of Logistics and Traffic“

Z B O R N I K
R A D O V A

Sponzor simpozijuma

Poslovno udruženje PUMT
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Beograd, 29. septembar – 01. oktobar 2022. godine
Hotel Putnik Inn

I UVODNI DEO

1.1. Opšte informacije

XII Međunarodni simpozijum „Interdisciplinarnost logistike i saobraćaja“ podržali su:

- Ministarstvo prosvete, nauke i tehnološkog razvoja
- Agencija za bezbednost saobraćaja,
- Vojna Akademija
- Studio B i
- Poslovno udruženje „Međunarodni transport“

Organizatori simpozijuma:

Zajednica saobraćajnih škola Republike Srbije
Cara Dušana 262, 11080 Beograd-Zemun

Zavod za unapređivanje obrazovanja i vaspitanja
Fabrisova 10/1 11040 Beograd-Savski venac

Mesto održavanja:

Hotel Putnik Inn
Palmira Toljatija 9, 11070 Beograd-Novi Beograd

Termin održavanja:

29. septembar – 01. oktobar 2022. godine

1.2. Ciljevi i teme simpozijuma

Ciljevi simpozijuma:

1. Povezivanje privrede i obrazovanja
2. Reforma sistema obrazovanja
3. Razmena iskustava i znanja u području tehnike i tehnologije u saobraćaju i logistici
4. Razmena iskustava u području bezbednosti saobraćaja na putevima

Teme simpozijuma:

1. Bezbednost saobraćaja
2. Zaštita životne sredine
3. Inteligentni logistički logistički
4. Prevoz, distribucija i logistika
5. Prevoz i logistička infrastruktura
6. Saobraćajno planiranje
7. Intermodalni transport
8. Inteligentni transportni sistemi
9. Tehnologija logističkih procesa
10. Obrazovni sistemi
11. Saobraćajna politika
12. Kvalitet prevoznih i logističkih procesa
13. IKT tehnologija

1.3. Programski odbor simpozijuma

- **Tomislav Kučina, dipl. ing. prometa**
  Škola za cestovni promet, Zagreb
- **mr. Srećko Kljajić**
  JU Srednja stručna škola „Ivan Uskoković“, Podgorica
- **mag. Roman Krajnc**
  Šolski centar Celje, Celje
- **Kemal Jaganjac dipl. inž. saob.**
  Srednja škola za saobraćaj i komunikacije, Sarajevo
- **Nemanja Radović, dipl. inž. saob., predsednik**
  Zavod za unapređivanje obrazovanja i vaspitanja, Beograd
- **Nikolče Spasovski, dipl. saob. inž.**
  ASUC – Boro Petruševski, Skopje

1.4. Organizacioni odbor simpozijuma

- **Tomislav Ćurković, dipl. ing. prometa**
  Škola za cestovni promet, Zagreb
- **mr. Srećko Kljajić**
  JU Srednja stručna škola „Ivan Uskoković“, Podgorica
- **mag. Andreja Jelen Mernik**
  Šolski center Celje, Celje
- **Sejad Mujezinović dipl. inž. maš.**
  Srednja škola za saobraćaj i komunikacije, Sarajevo
- **Srdjan Vidanović, dipl. inž. saob., sekretar**
  Tehnička škola GSP, Zajednica saobraćajnih škola, Beograd
- **Mimoza Gichevska, dipl. mas. inž.**
  ASUC – Boro Petruševski, Skopje

KO-PREDSEDAVAJUĆI ORGANIZACIONOG ODBORA:

- **Miroslav Macura**
  predsednik, Zajednica saobraćajnih škola Republike Srbije, Zemun
- **dr Zlatko Grušanović**
  direktor, Zavod za unapređivanje obrazovanja i vaspitanja, Beograd

1.5. Uvodna reč organizatora

Zajednica saobraćajnih škola Republike Srbije i Zavod za unapređivanje obrazovanja i vaspitanja zajednički su organizovali simpozijum saobraćajnih inženjera iz Republike Bosne i Hercegovine, Republike Crne Gore, Republike Hrvatske, Republike Severne Makedonije, Republike Slovenije i Republike Srbije u Beogradu. Razmatrali smo mogućnosti da simpozijum koji već jedanaest godina uspešno okuplja nastavnike i ostale stručnjake iz oblasti saobraćaja i logistike unapredimo, i zaključili da stručnost i kvalitet radova i prezentacija odgovaraju svrsi i ciljevima koji su godinama brižljivo čuvani zalaganjem članova programskog i organizacionog odbora. Odajući ovom prilikom priznanje svim organizacijama i pojedincima koji su dali doprinos stvaranju zavidne tradicije simpozijuma, odlučili smo da posebnu pažnju posvetimo unapređenju vizuelnog identiteta simpozijuma i pokušamo da stručnoj i široj javnosti približimo teme koje su od izuzetnog značaja za razvoj obrazovanja u oblasti saobraćaja i logistike. Programski i organizacioni odbor jednoglasno su podržali predloženo rešenje za logo simpozijuma. Namera da aktivnosti učesnika i raspoloživa znanja upisana u brojne stručne radove pripremljene za ovaj i prethodne simpozijume, postepeno se ostvaruje razvojem zvanične internet stranice www.ilt-symposium.org.

Zbornik radova XII Međunarodnog simpozijuma „Interdisciplinarnost logistike i saobraćaja“ stajaće u zbirci zbornika prethodnih simpozijuma u elektronskom formatu, čime želimo da omogućimo pristup značajnoj stručnoj i naučnoj građi koja je prethodnih godina sistematizovana. Tradicionalno dominantne teme iz bezbednosti saobraćaja, saobraćajnog planiranja, prevoza, distribucije i logistike, intermodalnog transporta i zaštite životne sredine, uz uvek prisutne stručne radove iz domena obrazovnih sistema i saobraćajne politike, dopunjavaju sve češće radovi o inteligentnim transportnim sistemima i IKT tehnologiji u saobraćaju.

Zbornik objedinjuje 29 stručnih radova podeljenih u pet tematskih celina:

- Savremeni trendovi u saobraćajnom obrazovanju,
- Unapređenje bezbednosti učesnika u saobraćaju,
- Unapređenje organizacije transporta i logistika,
- Saobraćajno planiranje i organizacija prevoza i
- Zaštita životne sredne i savremene tehnologije u saobraćaju i logistici.

II AGENDA SIMPOZIJUMA

Međunarodni simpozijum
„Interdisciplinarnost logistike i saobraćaja“
29. septembar – 01. oktobar 2022. godine

Datum	**29.09.2022. godine** (I dan)

09:00 – 09:45	**Registracija učesnika**
09:45 – 10:00	**Otvaranje I sesije**
10:00 – 11:40	**I sesija – *moderatori Mimoza Gichevska i Nemanja Radović***
10:00 – 10:20	*Implementacija projekata u nastavi - od razmjene dobre prakse do natjecanja učenika – projekt DESCO*, Tomislav Kučina, dipl. ing. prometa - prof. izvrsni savjetnik i Tomislav Ćurković, dipl. ing. prometa - prof. savjetnik
10:20 – 10:40	*Obrazovni sistemi (minato, segasnost, idnina)*, Zoki Stojmirov, dipl. soob. inž., Nora Bekiri, Aneta Pašoska
10:40 – 11:00	*Implementacija novih metod IKT tehnologije v času pandemijeCovida - 19v programih logistike*, Jernej Krenčan
11:00 – 11:20	*Primjena informacijskih sustava u školskoj vježbeničkoj tvrtki „LOGO-šped d.o.o.“*, Vlatka Slunjski Piskač, dipl. ing. prometa i Darinka Lončar Kočić, mag. ing. traff.
11:20 – 11:40	*Digitalizacija nastavnih procesa kao rezultat projekta „LOG-IN“*, Renata Heljić dipl. ing. - prof. mentor i Željka Turković dipl. oecc. – nastavnica strukovnih predmeta
11:40 – 12:00	**Pauza za osveženje** (kafa, čaj, sok, voda)
12:00 – 12:50	**Svečano otvaranje** - **Himna Republike Srbije** - **Miroslav Macura**, predsednik Zajednice saobraćajnih škola Republike Srbije - **dr Zlatko Grušanović**, direktor Zavoda za unapređivanje obrazovanja i vaspitanja - **predstavnici** Ministarstva prosvete, nauke i tehnološkog razvoja Republike Srbije - **Branko Stamatović**, direktor Agencije za bezbednost saobraćaja Republike Srbije - **pukovnik Srđan Ljubojević**, Vojna akademija, Katedra za saobraćaj i transport - **Neđo Mandić**, predsednik Poslovnog udruženja **„Međunarodni transport“**
13:00 – 14:00	**Ručak za goste i učesnike**

14:00 – 16:40	**II sesija – *moderatori Tomislav Ćurković i Nemanja Radović***
14:00 – 14:20	*Rad po pozivu Agencija za bezbednost saobraćaja Republike Srbije*, predstavnik ABS
14:20 – 14:40	*Preventivna aktivnost Poletje bo, zato z glavo na e-skiro!*, mag. Roman Krajnc i mag. ElvisAlojzij Herbaj
14:40 – 15:00	*Sigurnost prometa na semaforiziranom raskrižju s vizualnim indikatorima trajanja pojedinih faza*, Andreja Koščak Lacković, dipl.ing i Siniša Horvat, mag. ing. traff.
15:00 – 15:20	*Analiza prometnih podatkov prikazovalnikov hitrosti*, Haris Ćordić, mag. inž. prom.
15:20 – 15:40	*»Prijazno« usposabljanje kandidatov za kategorijo »A1« v Republiki Sloveniji*, Dušan Veršec, dipl. inž. prom.i Benjamin Pivec, mag. inž. prom.
15:40 – 16:00	*Vpliv asistenčnih sistemov (ADAS) na varnost v prometu*, Boštjan Kolbič, Inž.mehatronike
16:00 – 16:20	*Prednosti i nedostaci u početku korišćenja prve dionice autoputa Bar- Boljare sa posebnim osvrtom na paljenje automobila*, Srećko Kljajić dipl.ing.saobraćaja – master i Biljana Kljajić dipl.ing.tehnologije - master
16:20 – 16:40	*Varna vožnja z e-skirojem*, Ksenja Rožanski Fidler, univ. dipl. inž. tehnologije prometa
16:40 – 17:00	**Pitanja i diskusija, zaključci I dana**
17:00	**Sastanak Programskog i Organizacionog odbora**
20:00	Predstava **„Moskvičem do pakla“** (fakultativno, ograničen broj mesta – prijave i informacije pri registraciji na INFO-pultu)

Datum	**30.09.2022. godine** (II dan)

10:00 – 11:40	**I sesija – *moderatori Kemal Jaganjac i Nemanja Radović***
10:00 – 10:20	*Analiza stajališta javnog gradskog prijevoza*, Maja Balenović, mag.ing.traff. i Igor Jelić, mag.ing.traff.
10:20 – 10:40	*Trženjski pristopi v akcijah prometne varnosti*, mag. Andreja Jelen Mernik, univ. dipl. matem.
10:40 – 11:00	*Prognoze kretanja trendova e-usluga u poslovanju BH poštanskih operatora*, Mr.sci.Emilija Martinčević, dipl.ing.saob. i kom. i Sabahudin Solak, dipl.ing.saob. i kom.
11:00 – 11:20	*Soobrakajno planiranje – potreba za poveke velo pateki*, m-r Gordana Kožuvarovska, pretsedatel na RSBSP
11:20 – 11:40	Zastoji v cestnem prometu, dipl. ing. log. Jožica Pavlovič
11:40 – 12:00	**Pauza za osveženje** (kafa, čaj, sok, voda)
12:00 – 13:40	**II sesija - *moderatori Roman Krajnc i Nemanja Radović***
12:00 – 12:20	*Principi zelene logistike*, Goran Pujić dipl. inž. saobraćaja
12:20 – 12:40	*Hladna logistika južnega in tropskega sadja*, Tjaša Gerič, univ. dipl. inž. živ. tehn. mag. inž. log.

12:40 – 13:00	*Inteligentni transportni sistemi*, Zoki Stojmirov, dipl. soob. inž.
13:00 – 13:20	*Strokovna terminologija v Angleščini*, Eva Boh, profesorica angleščine
13:20 – 13:40	*Lokalniot soobrakaj vo globalniot svet*, dipl. soobr. ing. Sekuloska Violeta
13:45 – 15:00	**Ručak za učesnike**
15:00 – 16:40	**III sesija – *moderatori Srećko Kljajić i Nemanja Radović***
15:00 – 15:20	*Vlijanieto na soobraćajot i transportot vrz zagaduvanjeto životnata sredina*, Josheski Borche, Pipidjanoska Irena i Geramitchioska Valentina
15:20 – 15:40	*Idejno rješenje povećanja sigurnosti na raskrižju Svetice ulice – Ulice kneza Branimira – Ulice Donje Svetice*, Tomislav Ćurković, dipl. ing. i Igor Jelić, mag. ing. traff.
15:40 – 16:00	*Preduslovi za vozenje elektricni trotineti*, Nikolče Spasovski dipl. soob. inž.
16:00 – 16:20	*Glasni izpuhi rešujejo življenja – mit ali resnica?*, Zoran Jazbinšek, dipl. inž. Str.
16:20 – 16:40	*Elektromobilnost u Strojarskoj i prometnoj školi u Varaždinu*, Monika Žganec, mag. ing. traff. i Marijana Balić Lovrec, mag. ing. traff.
16:40 – 17:00	**Pitanja i diskusija, zaključci II dana**
20:00	**Svečana večera u restoranu „Stara kapetanija“ u Zemunu**

Datum	**01.10.2022. godine** (III dan)

09:00 – 09:40	**I sesija – *moderator Nemanja Radović***
09:00 – 09:20	*Komparativna analiza rezultata takmičenja Pažljivkove smotre Šapca i Vranja*, Milica Cvetković, Ivana Selenić, Tomislav Petrović i Ivica Ristić
09:20 – 09:40	*Takmičenje učenika saobraćajnih škola Republike Srbije*, Svetlana Veličković dipl. Inž. saobraćaja, Marko Popović dipl. Inž. saobraćaja i Nemanja Radović dipl. Inž. Saobraćaja
09:40 – 10:00	**Pitanja i diskusija, zaključci III dana**
10:00 – 11:00	**Zatvaranje XII Međunarodnog simpozijuma** - Evaluacija simpozijuma - Predstavljanje Web stranice simpozijuma www.ilt-symposium.org - Preuzimanje domaćinstva simpozijuma za 2023. godinu i termin održavanja - Svečana dodela sertifikata
11:00	**Izlet za učesnike simpozijuma (fakultativno – prijave na INFO-pultu)**

SADRŽAJ

I POGLAVLJE

Savremeni trendovi u saobraćajnom obrazovanju

Autori:

Tomislav Kučina, dipl. ing. prometa - prof. izvrsni savjetnik

Tomislav Ćurković, dipl. ing. prometa - prof. savjetnik

ŠKOLA ZA CESTOVNI PROMET, ZAGREB

1. IMPLEMENTACIJA PROJEKATA U NASTAVI - OD RAZMJENE DOBRE PRAKSE DO NATJECANJA UČENIKA – PROJEKT DESCO

Sažetak:

Škola za cestovni promet iz Zagreba je koordinator projekta „Driver Exchange Skill Competition“ - DESCO u sklopu programa Erasmus+. Partneri u projektu su Kouvola Region Vocational College KSAO multidisciplinarna strukovna ustanova smještena u Kouvoli (Finska) Saobraćajno tehnička škola iz Zemuna (Srbija), i Lycée des métiers Maréchal Leclerc de Hauteclocque iz Saint Jean de la Ruelle (Francuska).

Projekt povezuje strukovne škole iz sektora promet i logistika koje obrazuju učenike za zanimanje vozač motornog vozila. Njime se ojačava povezanost strukovnog obrazovanja u sektoru prometa i logistike i tržišta rada te osigurava kvalitetno obrazovanje u zanimanju vozač motornih vozila kroz prijenos i diseminaciju znanja, vještina i dobre prakse među strukovnim školama. Projekt je doprinio povećanju kvalitete i atraktivnosti strukovnog obrazovanja vozača motornog vozila razmjenom znanja i iskustava između partnera u projektu. Kao dugoročnu mjeru koja doprinosi poboljšanju i unaprjeđenju kvalitete te privlačnosti obrazovnog programa vozač motornog vozila, kroz projekt smo osmislili sustav razmjene iskustava i znanja učenika u formi natjecanja. Natjecanje se je prikazalo kao atraktivno i vrlo korisno i za učenike i za nastavnike uz zaključak da se nastavi i iduće godine uz redovito korištenje nastavnog materijala i opreme koji su postali dostupni školama kroz projekt „Driver Exchange Skill Competition – DESCO”.

Ključne riječi:

- Program za cjeloživotno učenje – Program Erasmus+
- Obrazovanje vozača motornih vozila
- Natjecanje učenika

IMPLEMENTACIJA PROJEKATA U NASTAVI - OD RAZMJENE DOBRE PRAKSE DO NATJECANJA UČENIKA – PROJEKT DESCO

1. O projektu

Projekt povezuje strukovne škole iz sektora promet i logistika koje obrazuju učenike za zanimanje vozač motornog vozila u cilju ojačavanja povezanosti strukovnog obrazovanja u sektoru prometa i logistike i tržišta rada te osiguranja kvalitetnog obrazovanja u zanimanju vozač motornih vozila kroz prijenos i diseminaciju znanja, vještina i dobre prakse među strukovnim školama. U cilju doprinosa poboljšanju i unaprjeđenju kvalitete te privlačnosti zanimanja vozač motornog vozila, projektom smo osmisliti sustav razmjene iskustava i znanja učenika u formi natjecanja.. Razvili smo i održivo partnerstvo za uspostavu i daljnji razvoj nacionalnih, regionalnih i sektorskih ustanova za natjecanje u vještinama kao oblik povećanja privlačnosti, atraktivnosti i izvrsnosti strukovnog obrazovanja i osposobljavanja za zanimanje vozač motornog vozila.

Projekt je usmjeren na sljedeće ciljne skupine:

1. Učenici iz partnerskih škola koji se školuju za zanimanje vozač motornog vozila koji su kroz projektne aktivnosti stekli dodatna znanja i vještine, a kroz sustav natjecanja uvid o psolovima vozača i koliko je tražen na tržištu rada. Učenici, zahvaljujući novim znanjima koja su stekli njihovi nastavnici, imaju veća i potpunija teoretska i praktična znanja neophodna za obavljanje njihove buduće djelatnosti.
2. Nastavnici iz partnerskih škola koji su uključeni u sve provedbene faze projekta. Razmjena iskustava i dobre prakse između nastavnika te ciljani specifični treninzi doprinijeli su poboljšanju nastavničkih kompetencija te učinkovitijoj obuci učenika.
3. Budući učenici i nezaposlene osobe kojima se kroz razne diseminacijske aktivnosti i promociju zanimanja potiče interes za zanimanje vozač motornog vozila, s time da promocija zanimanja nije samo usmjerena na mušku populaciju već i na motiviranje djevojaka da se školuju za vozačice.
4. Sve projektne aktivnosti su usmjerene gospodarstvu jer projektom želimo ostvariti spremnije i lakše uključivanje učenika na tržište rada i kvalitetnije obrazovanje za zanimanje vozača.

Projektne aktivnosti su trajale 36 mjeseci. U prvoj fazi projekta svaka škola partner je organizirala stručno usavršavanje nastavnika iz ostalih partnerskih škola kako bi se podigla razina znanja i informiranosti o specifičnostima prijevoznog procesa u pojedinim državama EU. U drugoj fazi projekta partneri su za učenike koji se obrazuju za vozača motornog vozila

organizirali natjecanje u vještinama i znanjima na način da učenici pokažu sva znanja iz područja zanimanja vozač motornog vozila.

2. Partneri na projektu

Svaka škola partner donijela je u projekt vrijedna specifična znanja i iskustva te vrlo razgranatu mrežu partnera koja omogućuje kvalitetnu diseminaciju projektnih rezultata.

Škola za cestovni promet je nositelj projekta. Škola pruža usluge edukacije vezanih uz odgoj i obrazovanje učenika i odraslih, odnosno stjecanje kompetencija potrebnih za dobivanje strukovnih kvalifikacija za cestovni promet i logistiku. Škola za cestovni promet je organizirala za nastavnike trening na temu telematika u cestovnom prometu. Kouvola Region Vocational College KSAO multidisciplinarna je strukovna ustanova smještena u Kouvoli. Kouvola Region Vocational College KSAO je organizirala za nastavnike trening vožnje u zimskim uvjetima. Saobraćajno tehnička škola iz Zemuna je parnterska ustanova koja do sada nije sudjelovala u Erasmus+ programu.. Organizirala je za nastavnike trening iz područja sigurnosti i osiguranja tereta. Lycée des métiers Maréchal Leclerc de Hauteclocque iz Saint Jean de la Ruelle, France upoznala je nastavnike s francuskim obrazovnim sustavom, posebno s kurikulom za vozača motornog vozila. Organizirala je trening za nastavnike iz područja prijevoza opasnih tvari i trening rukovanja viličarom.

3. Projektne aktivnosti učenja, podučavanja i osposobljavanja

3.1. Vožnja u zimskim uvjetima (Kovuola, Finska)

Predmet transnacionalne aktivnosti učenja je proširenje znanja, vještina i kompetencija u područjima:

1. stjecanje vještina pravilne ugradnje zimske opreme na vozilo
2. vještina sigurne vožnje u zimskim uvjetima i upravljanja vozilom na zaleđenoj površini
3. stjecanje znanja o postupcima u iznimnim i opasnim situacijama tijekom vožnje zimi

Sudionici treninga su bili po 3 profesora iz svake partnerske škole, od kojih najmanje jedan vozač instruktor (trener) vožnje.

Slika 1. Prikaz uvodnog predavanja u edukaciju Vožnja u zimskim uvjetima

Od 10. do 12. veljače 2020. održana je edukacija Vožnje u zimskim uvjetima u organizaciji partnerske škole Kouvola Region Vocational College KSAO iz Finske.

Sudionicima edukacije je predstavljen je sustav školovanja u Finskoj. U stručnom dijelu je na poligonu organizirana edukacija vožnje u zimskim uvjetima. Cilj vježbe je odrediti zaustavni put kočenja ovisno o brzini vožnji i podlozi kočenja. Vježba je odrađivana u osobnim i teretnim vozilima.

Slika 2. Vožnja po zaleđenoj površini

Slika 3. Postavljanje lanaca

U centru za obrazovanje odraslih i logističkom odjelu su prezentirani su strojevi, oprema, alati i načini za sigurniju provedbu vožnje u zimskim uvjetima. Neka od rješenja je OnSpot sustav koji podrazumijeva automatsko aktiviranje lanaca iz kabine vozača. Kotač je opremljen s nekoliko lanaca koji se spuštaju prema pogonskim kotačima kako bi se povećala vučna sila. Sustav se uključuje samo kada je to potrebno pri brzini od 35– do 50 km/h bez zaustavljanja vozila. Prezentiran je i način upotrebe rasipača pijeska. Rasipač pijeska trajno je montiran na svakoj strani vozila i sastoji se od spremnika za pijesak i sustava za dopremanje. Sustavom ručno upravlja vozač i dovodi pijesak ispred pogonskih kotača kako bi povećao vuču. Sudionici su

također odradili vježbu postavljanja i skidanja lanaca s kotača. U teorijskom dijelu obuke vezane za zimske uvjete vožnje te zimsku opremu su povezana stečena praktična i teorijska znanja i vještine.

U logističkom centru sudionici su imali priliku isprobati simulatore vožnje viličara i kamiona. Simulatori vožnje kamiona koriste se za obuku kandidata. Na viličarima sudionici su obavili prekrcaj tereta, te se kroz taj dio upoznali sa sigurnim načinom rada viličarem. Organiziran je posjet helikopterskom odjelu. Uz razgledavanje helikoptera i zrakoplova predstavljen je i obrazovni sustav za učenike koji se školuju za zrakoplovne mehaničare. Odgovornosti uključuju održavanje, popravak i modifikaciju zrakoplova u servisima za civilne zrakoplove i zrakoplovnu industriju.

3.2. Telematika (Zagreb, Hrvatska)

Predmet transnacionalne aktivnosti učenja je proširenje znanja, vještina i kompetencija u područjima:

1. Modeli, alati i metode za podučavanje novih tehnologija, digitalnih sadržaja i komunikacijskih vještina;
2. primjena suvremenih informacijskih i telekomunikacijskih tehnologija za povećanje atraktivnosti strukovnog obrazovanja;
3. stjecanje dodatnih psiholoških znanja i komunikacijskih vještina u prometu

Sudionici treninga su najmanje 3 profesora iz svake partnerske škole. Trening odnosno edukacija je održana online.

Slika 4. Prikaz uvodnog predavanja u edukaciju Telematika

Od 13. do 15.listopada.2020. u virtualnom obliku (ZOOM) održan trening i edukacija u organizaciji Škole za cestovni promet na temu Telematika.

Na edukciji odnosno projektnoj aktivnosti učenja, podučavanja i osposobljavanja prezentiran je SELFIE alat za samoprocjenu upotrebe digitalnih tehnologija za učenje i

poučavanje u školi kako i rezultati provedene ankete u Školi za cestovni promet. Gostujući predavač iz tvrtke CVS Mobile je prezentirao Fleet management CVS Molile sustav kao dio globalnog telematskog rješenja te je kroz primjere prikazao funkcionalnost navedene aplikacije. Sudionici su upoznati i sa novim zakonskim okvirima radnog vremena vozača i vremena odmora vozača u međunarodnom prometu. Prezentirana je virtulana tvrtka za virtualno praćenje prometa kroz upotrebu napredne telematike u cestovnom prometu, a na radionici su prisutni uvježbavali primjenu korištenja telematičkog sustava. Upoznati su sa mogućnostima telematičkog sustava za nadzor vozača i kako sustav utječe na rad profesionalnog vozača uz obuku nastavnika o korištenju telematike (komunikacija, slanje ruta i naredbi, primjena dokumentacije te unos i evidencija troškova) Objašnjen je i utjecaj telematike na sigurnost prometa. upoznavanje mogućnosti telematičkog sustava za nadzor vozača i kako sustav utječe na rad profesionalnog vozača.

3.3. Sigurnost i zaštita u cestovnom prometu (Zemun, Srbija)

Predmet transnacionalne aktivnosti učenja je proširenje znanja, vještina i kompetencija u područjima:

1. sigurnosti i zaštite - prometni propisi i pravila
2. ekološke i ekonomične vožnje i zaštite okoliša
3. vožnje uz korištenje navigacijskih sustava
4. primjene prve pomoći i postupcima u slučajevima prometne nesreće

Sudionici treninga su bili 3 profesora iz svake partnerske škole.

Slika 5. Prikaz uvodnog predavanja u edukaciju Sigurnost i zaštita

Od 18.-20.listopada 2021. održana je edukacija u organizaciji partnerske Saobraćajno-tehničke škole iz Zemuna, Srbija.

Na edukaciji su sudionici upoznati sa s vještinama sigurne vožnje i postupcima u slučaju prometnih nesreća. Obrađena su područja iz prometnih propisa i pravila, eko vožnje u svrhu obuke vozača, vožnje uz korištenje navigacijskih sustava. Stekle su se i dodatne vještine u primjeni prve pomoći i postupanju u slučajevima prometne nezgode, u svrhu pravodobnog i pravilnog reagiranja vozača u takvim slučajevima i povećanja sigurnosti cestovnog prometa. U skladu s tim, realizaciju obuke podržale su i u njoj sudjelovale tvrtke i ustanove: VOLVO, Crveni križ Zemun, Tahograf BG i nacionalna Agencija za sigurnost prometa.

Polaznici su upoznati sa sustavom obrazovanja i načinom edukacije vozača u Srbiji. Predstavljen je način polaganja završnog ispita za zanimanje vozač motornog vozila. Kroz dio edukacije koji je posvećen sigurnosti u prometu, polaznici su upoznati sa stanjem sigurnosti prometa te radom pojedinih institucija na poboljšanju sigurnosti prometa.

Slika 6. Slaganje tereta

Slika 7. Pružanje prve pomoći

Predstavnici Agencije za sigurnost prometa održali su tribinu čiji je cilj bio skrenuti pozornost nazočnima na važnost sigurnog ponašanja, kao i na posljedice negativnog ponašanja među mladima. Isproban je simulator vožnje – vožnja pod utjecajem alkohola i korištenje mobitela tijekom vožnje, gdje su mogli vidjeti koliko alkohol i korištenje mobitela negativno utječe na vožnju. Nakon edukacije o pružanju prve poći prikazana je pokazna vježba simulacija prometne nesreće i pružanje prve pomoći. Predstavnici tvrtke „Tahograf BG“ su polaznicima prezentirali simulator digitalnog tahografa I navigacijsku opremu u vozilu. U tvrtki VOLVO, polaznici su prošli obuku EKO vožnje.

3.4. Prijevoz opasnih tvari i rukovanje viličarom (Orleans, Francuska)

Predmet transnacionalne aktivnosti učenja je proširenje znanja, vještina i kompetencija u područjima:

1. upravljanje viličarom i smanipulacija teretom uz pomoć viličara
2. dužnosti i postupci vozača pri prijevozu opasnih tvari uz praćenje protokola i pravila pri prijevozu opasnih tvari.

Sudionici treninga su bili 3 profesora iz svake partnerske škole

Slika 8. Edukacija rukovanja viličarom

Od 19.studenog do 2. prosinca 2021. održana je edukacija u organizaciji partnerske škole Lycée des métiers Maréchal Leclerc de Hauteclocque iz Saint Jean de la Ruelle iz Francuske.

Nastavnici partnerskih škola koji su prisustvovali stručnom usavršavanje stekli su teoretska i praktična znanja iz područja prijevoza i rukovanja opasnim tvarima. Edukacija iz upravlja nja viličarom sadržavala je je teoretska predavanja i praktične vježbe iz upravljanja različitim vrstama viličara.

4. Natjecanje učenika u vještinama i znanjima

Od 28. ožujka do 1. travnja 2022. održano je natjecanje u vještinama i znanjima učenika koji se obrazuju za vozača motornog vozila u organizaciji Škole za cestovni promet iz Zagreba.

Glavni cilj natjecanja je stjecanje suvremenih kompetencija vozača motornog vozila kojeg odlikuju sigurnost, savjesnost i kultura upravljanja motornim vozilom. Na natjecanju su sudjelovali učenici iz svih partnerskih škola gdje su imali priliku pokazati sva nova znanja i vještine koje su im prenijeli nastavnici koji su sudjelovali u projektu. Natjecanje su osmislili nastavnici svih partnerskih škola iz područja u kojima su se usavršavali na transnacionalnim aktivnostima učenja tijekom trajanja projekta. Izrađena je baza teoretskih i praktičnih zadataka iz različitih područja iz kojih su nastavnici pripremali učenike za natjecanje.

Učenici su se natjecali iz teoretskog poznavanja pravila i propisa u cestovnom prometu, praktičnih vježbi pružanja prve pomoći, slaganja i učvršćivanja tereta na palete te ukrcavanje istih u teretni prostor kamiona uz korištenje ukrcajnih rampi i ručnih viličara uz poštovanje svih sigurnosnih elemenata i pravila osiguranje tereta u vozilu, praktičnih vještina upravljanja teretnim motornim vozilom na poligonu, stavljanje lanaca na kotače teretnih vozila, planiranja prijevoza poštujući pravila o radnom vremenima i odmorima vozača te korištenju telematskih uređaja u vozilu. Natjecanjem su provjerene vještine, i kompetencije učenika koji se obrazuju u zanimanju za vozača motornog vozila iz svih partnerskih škola kojeg odlikuju sigurnost, savjesnost i kultura upravljanja motornim vozilom. Ugostili smo projektne partnere Kouvola Region Vocational College KSAO iz Finske, Saobraćajno tehnička škola iz Zemuna i Lycée des métiers Maréchal Leclerc de Hauteclocque iz Saint Jean de la Ruelle iz Francuske, čiji su se mješoviti timovi učenika natjecali u vozačkim vještinama i znanjima. Na taj smo način razbili i predrasude o poslu vozača kao isključivo muškom zanimanju.

Slika 9. Ukrcaj tereta

Slika 10. Postavljanje lanaca

Škola za cestovni promet je u sklopu projekta a za potrebu edukacije učenika i provođenje natjecanja oformila logistički praktikum koji je opremljen s paletnom regalnom konstrukcijom, ručnim paletnim viličarom, ručnim paletnim viličarom s vagom, električnim viličarom za visoko dizanje, euro paletama, transportnim kolicima, lancima za snijeg i opremom za omatanje i osiguranje tereta. Provedeno je i osposobljavanje iz rukovanja viličarom za 26 djelatnika škole kako bi svoja praktična znanja mogli uspješno prenositi učenicima.

Natjecanje je završilo svečanom dodjelom nagrada i proglašavanjem pobjednika. Svi sudionici natjecanja su dobili zahvalu za sudjelovanje a prva tri učenika i medalje.

5. Zaključak

Natjecanje se je prikazalo kao vrlo korisno i za učenike i za nastavnike uz zaključak da se nastavi i iduće godine uz redovito korištenje nastavnog materijala i opreme koji su postali dostupni školama kroz projekt „Driver Exchange Skill Competetition – DESCO". Sama forma natjecanja i područja mogu se konstantno nadograđivati i širiti u skladu sa potrebama tržišta rada i suvremenim tehnologijama koje se koriste ili će se koristiti u području prometa i logistike.

Slika 11. Sudionici završnog natjecanja

Literatura

1. www. desco.hr - web stranica projekta

Authors:

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Škola za cestovni promet ROAD TRAFFIC SCHOOL, ZAGREB

1. PROJECT IMPLEMENTATION IN TEACHING – FROM GOOD PRACTICE EXCHANGE TO STUDENTS' COMPETITIONS – PROJECT DESCO

Summary:

The Road Traffic School from Zagreb is the coordinator of the "Driver Exchange Skill Competition" - DESCO project, as part of the Erasmus+ program. Partners taking part in this project are Kouvola Region Vocational College KSAO, a multidisciplinary vocational institution in Kouvola (Finland), Traffic Technical School from Zemun (Serbia), and the Lycée des métiers Maréchal Leclerc de Hauteclocque from Saint Jean de la Ruelle (France).

The project connects vocational traffic and logistics schools educating students for the profession of motor vehicle driver. It aims at strengthening the connection between vocational logistics and traffic education and the labor market, as well as ensuring the quality of education in the profession of motor vehicle driver through the transfer and dissemination of knowledge, skills and good practice among vocational schools. The DESCO project has contributed to increasing quality and attractiveness of vocational education for motor vehicle driver by exchanging knowledge and skills among project partners. As a long-term measure contributing to the improvement and enhancement of quality and attractiveness of the educational program for motor vehicle driver, through this project we have established the students' experiences and knowledge exchange system in the form of competitions. The competitions proved to be attractive and useful not only for students, but also for teachers, and resulted in continuing with the project next year, accompanied by the regular use of teaching materials and equipment that became accessible to schools through the DESCO project.

Keywords:

- Lifelong Learning Program – Erasmus+
- Motor vehicle drivers education
- Students competitions

PROJECT IMPLEMENTATION IN TEACHING – FROM GOOD PRACTICE EXCHANGE TO STUDENTS' COMPETITIONS – PROJECT DESCO

1. About the project

The project connects vocational transport and logistics schools educating students for the profession of motor vehicle driver. The project aims to strengthen the connection of vocational education in the transport and logistics sector with the labor market providing quality education in the profession of motor vehicle driver through the transfer and dissemination of knowledge, skills and good practice among vocational schools. With the aim of contributing to improvement and enhancement of the quality and attractiveness of the motor vehicle driver educational program, through this project we have established the students' experiences and knowledge exchange system in the form of competitions. We have also developed a sustainable partnership for the establishment and further development of national, regional and sector skills competition institutions in order to increase the attractiveness and excellence of vocational education and training for the profession of motor vehicle driver.

The project aims at the following target groups:

1. Students from partner schools studying for the profession of motor vehicle driver who have gained additional knowledge and skills through project activities, and through the competition system have gained insight into how driving profession functions and how much it is wanted after in the labor market. Thanks to the new knowledge acquired by their teachers, students have greater and more complete theoretical and practical knowledge necessary to perform their future activities.
2. Teachers from partner schools involved in all implementational phases of the project. The exchange of experiences and good practice among teachers and targeted specific trainings have contributed to the improvement of teacher competencies and more effective students' trainings.
3. Future students and unemployed persons whose interest for the profession of motor vehicle driver is increased through various dissemination activities and the promotion of this profession. The promotion is not only focused on the male population but also on motivating girls to train for drivers.
4. All project activities are ultimately focused on the economy because the project aims to achieve the more willing and easier inclusion of students in the labor market, as well as better education for the profession of the motor vehicle driver.

The duration of the project activities was 36 months. In the first phase of the project, each partner school organized a professional training for teachers from other partner schools in order to increase the level of knowledge and information about the specifics of the transport process in individual EU countries. In the second phase of the project, the partners organized a skills and knowledge competition for students studying to be a motor vehicle driver, which aimed at students showing their complete knowledge in the motor vehicle driver area.

2. Project partners

Each partner school has brought valuable specific knowledge and experience to the project, as well as a very extensive network of partners that enables the quality of project results dissemination.

The Road Traffic School is the project holder. The school provides educational services related to the upbringing and education of students and adults, as well as the acquisition of competencies needed to obtain professional qualifications for road transport and logistics. The Road Traffic School organized a teacher training on the topic of telematics in road traffic. Kouvola Region Vocational College KSAO is a multidisciplinary vocational institution located in Kouvola. Kouvola Region Vocational College KSAO organized teachers' driving training in winter conditions. The Traffic Technical School from Zemun is a partner institution that has not participated in the Erasmus+ program so far. This school organized a teachers' training in the field of security and cargo insurance. The Lycée des métiers Maréchal Leclerc de Hauteclocque from Saint Jean de la Ruelle (France) introduced us to the French educational system, especially the curriculum for the motor vehicle driver. The school organized a teachers' training in the transport of hazardous substances as well as forklift management training.

3. Project activities of learning, teaching and training

3.1. Winter driving (Kovuola, Finland)

The subject of transnational learning activity is the expansion of knowledge, skills and competencies in the areas of:

1. acquisition of skills needed for proper installation of winter equipment on the vehicle
2. the skill of safe driving in winter conditions and driving a vehicle on a frozen surface
3. acquiring knowledge about the procedures in exceptional and dangerous situations while driving in winter

The training participants were 3 vocational school teachers from each partner school, at least one of them a driving instructor.

Picture 1: Presentation of the introductory lecture on driving in winter conditions

From the 10th to 12th February 2020, a Winter Driving training was organized by the partner school Kouvola Region Vocational College KSAO from Finland.

The training participants were introduced to the educational system in Finland. In the professional part, driving training in winter conditions was organized on the training ground. The purpose of the exercise was to determine the stopping braking distance according to the driving speed and the braking surface. The exercise was performed in cars and cargo trucks.

Picture 2: Driving on a frozen surface

Picture 3: Placing chains

The Adult Educational Center and the logistics department presented machines, equipment, tools and ways to make driving safer in winter conditions. One of the solutions is the OnSpot system, which involves the automatic activation of chains from the driver's cabin. The wheel is equipped with several chains descending towards the drive wheels to increase traction. The system switches on only when required at the speed of 35 to 50 km/h without stopping the vehicle.

The use of sand spreader was also presented. The sand spreader is permanently mounted on each side of the vehicle and consists of a sand tank and a delivery system. The system is manually operated by the driver, and it brings sand in front of the drive wheels to increase traction. The participants also did an exercise of setting up and removing the chains from the wheels. In the theoretical part of the training related to winter driving conditions and winter equipment, the acquired practical and theoretical knowledge and skills were connected.

At the logistics center, participants had the opportunity to try out the forklift and truck driving simulators. Truck driving simulators are used for the candidates' training. At the forklifts, the participants reloaded the cargo, and through that part they got acquainted with the secure forklift management. A visit to the helicopter department was organized. In addition to the helicopters and airplanes sightseeing, an educational system for students studying to become aircraft mechanics was presented. Responsibilities include aircraft maintenance, repair and modification in service departments for civil aircraft and aerospace industry.

3.2. Telematics (Zagreb, Croatia)

The subject of transnational learning activity is the expansion of knowledge, skills and competencies in the areas of:

1. models, tools and methods for teaching new technologies, digital content and communication skills;
2. application of modern information and telecommunication technologies to increase the attractiveness of vocational education;
3. acquisition of additional psychological knowledge and communication skills for the purpose of their application in traffic

Participants in the training are at least 3 vocational school teachers from each partner school. This educational training was held online.

Picture 4: Presentation of the introductory lecture on Telematics

From the 13th to the 15th October 2020, a training and education was held in virtual form (ZOOM), organized by the Road Traffic School on the topic of Telematics.

During the education or project activity of learning, teaching and training, the SELFIE tool for self-assessment of the use of digital technologies for learning and teaching in school was presented, as well as the results of a survey conducted at the Road Traffic School. A guest lecturer from CVS Mobile company presented the Fleet management CVS Mobile system as part of a global telematics solution and the functionality of this application through examples. Participants were also introduced to the new legal framework of drivers' working hours and rest periods in the international traffic. A virtual company for virtual traffic monitoring was presented through the use of road traffic advanced telematics, and at the workshop the participants practiced the use of the telematics system. They are acquainted with the possibilities of the telematics system for driver supervision and how the system affects the work of a professional driver as well as the teacher training on the use of telematics (communication, sending routes and commands, applying documentation and entering and recording costs). The effects of telematics on the traffic safety were also explained, as well as getting acquainted with the possibilities of a telematics driver monitoring system and how the system affects the work of a professional driver.

3.3. Security and protection in road traffic (Zemun, Serbia)

The subject of transnational learning activity is the expansion of knowledge, skills and competencies in the areas of:

1. security and protection – traffic rules and regulations
2. ecologic and economic driving and environment protection
3. driving with the help of navigation systems
4. providing first aid and traffic accidents procedures

Participants in the training are at least 3 vocational school teachers from each partner school.

Picture 5: Presentation of the introductory lecture on Security and protection

From the 18th to the 20th October 2021, an education was organized by the Traffic Technical School from Zemun (Serbia).

During the education, the participants were introduced to the skills of safe driving and the traffic accident procedures. The education covered areas of traffic rules and regulations, eco-driving, and the use of navigation systems in driving. Additional skills in providing first aid and in the procedures in case of traffic accidents were acquired, with the aim of educating drivers to timely and proper reactions in such situations, thus enhancing the security in road traffic. For this purpose, the training realization was supported by the participant companies and institutions: VOLVO, Red cross Zemun, Tahograf BG and the National agency for traffic security.

The participants were introduced to the educational system, drivers' education in Serbia, as well as the process of taking the final exam for becoming a motor vehicle driver. Through the part of education dedicated to traffic security, the participants were introduced to certain institutions working on traffic security improvement.

Picture 6: Cargo stacking

Picture 7: Providing first aid

The representatives of the Agency for traffic security held a lecture with the aim of raising awareness to the importance of safe conduct, as well as consequences of negative conduct among young people. A driving simulator was tested in the driving under the influence of alcohol, as well as driving while using the phone, both of which showed the negative consequences of such conduct. After the training in providing first aid, a drill of simulated traffic accident and providing first aid was presented. The representatives of Tahograf BG company presented a simulator of digital tachograph and the navigation equipment in a vehicle. The VOLVO company provided the participants with the eco-driving education.

3.4. Transport of hazardous substances and forklift managing (Orleans, France)

The subject of transnational learning activity is the expansion of knowledge, skills and competencies in the areas of:

1. forklift managing and cargo manipulation with the help of forklift

2. driver's responsibilities and procedures in transporting hazardous substances, accompanied by following the protocols and rules on transporting hazardous substances

Participants in the training are at least 3 vocational school teachers from each partner school.

Picture 8: Forklift management training

From the 19th to the 2nd December 2021, an education was organized by the partner school Lycée des métiers Maréchal Leclerc de Hauteclocque from Saint Jean de la Ruelle (France).

Teachers from other partner schools who participated in the professional education acquired theoretical and practical knowledge in the transport area as well as handling hazardous substances. Forklift managing training included theoretical lectures and practical drills in different kinds of forklift managing.

4. Students' skills and knowledge competition

From the 28th March to the 1st April 2022, a competition in skills and knowledge of students training to become motor vehicle drivers was organized by the Road Traffic School from Zagreb.

The main aim of this competition was for students to acquire modern competences of a motor vehicle driver characterized by safety, consciousness and proper conduct in managing motor vehicles. Students from each partner school participated in this competition having the opportunity to present the new knowledge and skills acquired from their teachers who took part in this project. The competition was designed by the teachers from each partner school, covering the specific areas of transnational learning they participated in throughout the project. A base of theoretical and practical tasks was created, encompassing different areas teachers were preparing their students in.

The students competed in theoretical knowledge of road traffic rules and regulations, practical tasks in providing first aid, arranging and securing cargo onto pallets and boarding those pallets onto a cargo truck using loading ramps and manual forklifts and following safety procedures and cargo insurance rules. They also competed in practical skills such as managing cargo motor vehicle on the training ground, placing chains on a cargo vehicle wheels, organizing transport following the rules on driver's working hours and rest periods as well as using telematics devices in a vehicle. This competition confirmed skills and competences of students training to be motor vehicle driver characterized by safety, consciousness and proper conduct in managing motor vehicles. We were hosts for our project partners Kouvola Region Vocational College KSAO from Finland, Traffic Technical School from Zemun (Serbia) and Lycée des métiers Maréchal Leclerc de Hauteclocque from Saint Jean de la Ruelle (France), whose mixed teams of students competed in driving skills and knowledge. This was also a way to break down prejudice on driver's profession being exclusively for male population.

Picture 9: Cargo loading

Picture 10: Placing chains

As part of this project, and for the purpose of students' education and competition, the Road Traffic School has established a logistics practicum equipped with pallet racking constructions, manual pallet forklift, manual pallet forklift with a scale, electric forklift for high lifting, euro pallets, transport carts, snow chains and wrapping and cargo insurance equipment. A training in forklift managing has been organized for 26 teachers who can transfer their practical knowledge onto their students.

At the end of the competition, the winner was pronounced and awards given in a ceremonial manner. All the participants received acknowledgment for participating, with the first three students receiving medals as well.

5. Conclusion

The competition proved to be very useful for both students and teachers, and resulted in continuing with the project next year, accompanied by the regular use of teaching materials and equipment that became accessible to schools through the DESCO project. The competition itself and its covered areas can be further upgraded and broadened according to the needs of labor market as well as modern technologies which are used or will be used in the transport and logistics area.

Picture 11: Participants of the final competition

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АВТОСООБРАКАЕН УЧИЛИШЕН ЦЕНТАР

“Боро Петрушевски” - Скопје

2. ОБРАЗОВНИ СИСТЕМИ *(минато, сегашност и иднина)*

1. ВОВЕД

Јас Зоки Стојмиров, Нора Бекири и Анета Пашоска, Причината од која се одлучивме 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, туки на оние помалите: семејство како систем во образованието, училиштето како систем за образование, мегународна соработка со колегите како систем на взаемно почитување и професионална соработка).

Автосообраќајниот училишен центар “Боро Петрушевски”на град Скопје, е модерен, современ, единствен и уникатен центар за образование на кадри од областа на патниот сообраќај во Република Македонија. Во склоп на центарот има низа објекти во кои се остварува основната воспитно – образовна дејност, како и други дополнителни дејности. Основната дејност на АСУЦ “Боро Петрушевски” на град Скопје, е образование на кадри од областа на сообраќајната, машинската и автотехничката струка, по пат на редовно и

вонредно школување на македонски и албански наставен јазик. Исто така, училиштето нуди можност за стекнување повеќе видови образование за возрасни како што се:

- специјализации од областа на патниот сообраќај и одржување на моторните возила
- обуки и курсеви за стекнување компетенции (СПК) и лиценци за вршење на дејноста во областа на патниот сообраќај и одржувањето на моторните возила.

Покрај образовната, училиштето остварува и споредни дејности:

- Станица за технички преглед и регистрација на моторни возила (како единствена)
- Центар за хомологација на моторни возила
- Автосервис
- Авто - полигон
- Автоперална

Благодарејќи на добриот менаџмент и трпеливо и мудро раководење на раководните структури во училиштето, се придонесе да училиштето се осовремени и се насочува кон превземање на приматот на Мегународен Регионален центар за обука на стручни кадри од областа на сообраќајот, машинството и автотехниката во Македонија и пошироко, што претставува реална и природна последица на подолгиот развоен процес и постигнатите резултати.

АСУЦ “Боро Петрушевски” на град Скопје е јавна установа која врши воспитно-образовна дејност.

Со својот кадровски потенцијал, искуство, просторна и материјално-техничка опременост е во состојба да ги врши следните работи:

- Реализира наставни планови и програми со што образува кадар од областа на патниот сообраќај по пат на редовно и вонредно школување
- Организира и реализира континуирана обука и семинари за занимањата возач-инструктор и контролор во станицата за технички преглед на моторни возила, патно-сообраќаен оператор, автомеханичар специјалист, автолимар специјалист.
- Издава наставни помагала и друг вид литература за учениците, односно за корисниците на услугите
- Дава услуги на клиенти во сопствениот автосервис, автошколата, автоперална, станицата за технички преглед на моторни возила и центарот за хомологација.
- Вршеше продажба на половни моторни возила (први и единствени од образовната дејност).

Суштината на логистичките услуги што ги дава училиштето е во обезбедување подобри услови за остварување на основната дејност, а тоа значи:

- Задоволство на вработените од условите за работа, заработувачката и односот на средината кон сработеното
- Задоволство на корисниците од односот што кон нив го манифестира училиштето.

Мото на училиштето е Секогаш може подобро... што во суштина значи постојана тенденција за следење на модерните трендови и качување скалило погоре во секој сегмент на училишниот живот и работа.

2. Визија за училиштето

Визијата за училиштето, која е дефинирана како резултат на извршената анализа на состојбите и изготвената стратегија за развој на училиштето гласи:

„Добро организирана, кадровски екипирана, материјално-технички и просторно опремена воспитно-образовна установа, со зајакнат домашен кредибилитет, во која квалитетно ќе се образува кадар за претпријатијата од областа на патниот сообраќај; многу ќе се работи и доста ќе се заработува“.

3. Глобална стратегија

За целосно оживотворување на таквата визија постојано се работи на усовршување на решенијата за клучните проблеми од стратегијата на училиштето, кои би можеле да го попречат брзиот развој на училиштето во наредниот период, и тоа:

- Се усовршува тимското работење, се формираат и развиваат тимовите за истражување, обука, развој и маркетинг
- Се интензивира домашната и меѓународната соработка со училишта слични на нашето, како и со претпријатија со кои училиштето има аеднички интереси
- Се усовршува системот на информации и комуникации
- Се усогласуваат и изготвуваат нормативни акти. Посебно се трага по решенија за спорните критериуми за наградување.

Целосната реализација на сето тоа треба да резултира со:

Од функционален аспект:

- Повисок квалитет во задоволувањето на потребите на постојните корисници на училиштето.

Од организациски аспект:

- Усовршување на раководењето, стекнување нови сознанија и искуства
- Прилагодување на организациската структура кон новите потреби

- Развивање позитивна клима, која ќе делува стимулативно за постигнувања на професионален и материјален план
- Јакнење на врските со корисниците и средината.

Од аспект на дејноста:

- Унапредување на стандардите и критериумите што важат во рамките на дејноста во Република Македонија и нивно усогласување со оние кои важат во земјите членки на ЕУ
- Понатамошна афирмација на дејноста на училиштето, како битен чинител во остварувањето на развојот на Република Македонија.

Работејќи на ваков начин, по тој пат и тие насоки ќе ја оживотвориме визијата за училиштето.

А сега нешто ке потсетам што ми е и идејата што веке е познато како еден и единствено бразовен систем до 90 тите Години од сообракајната струка што имаше заземено големи размери беше занимањето ВОЗАЧ НА МОТОРНО ВОЗИЛО трет степен средно стручно занимање. Накратко ке го претставам наставниот план на предметите во Република Северна Македонија:

Наставен план

Струка: сообракајна

Образовен профил: ВОЗАЧ НА МОТОРНО ВОЗИЛО

Степен на стручна подготовка: III

Занимање: возач на моторно возило

Стручно образование

А) заедничко стручно

б) посебно стручно

в) образовно работна практика

феријална практика

наставни подрачја и предмети година и фонд на часови

		I прва година и број на часови	II втора година и број на часови	III трета година и број на часови
1	Мајчин јазик и литература	3	3	3
2	Странски јазик	2	2	2
3	Музилка култура	1	-	-
4	Ликовна култура	-	1	-
5	Физичко и здравствено воспитание	2	2	2
6	Одбрана и заштита	-	2	2
7	Историја	2	2	-
8	Географија	2	-	-
9	Марксизам и самоуправување	-	2	2
10	Математика	3	3	3
11	Физика	2	2	-
12	Хемија	3	-	-
13	Биологија	3	-	-
		23	**19**	**13**
	СТРУЧНО ОБРАЗОВАНИЕ			
	Заедничко стручно			
1	Техничко цртање	2	--	-
2	Основи на сообракајот	3	-	-
3	Сообракајна географија	-	2	-
4	Познавање на стоката во транспортот	-	2	-
5	Прва помош и заштита при работа	-	2	-
6	Машински елементи	-	2	-
7	Психологија	-	-	2
	Посебно стручно			
1	Мотори и моторни возила	-	-	2
2	Безбедност во сообракајот	-	-	3
3	Техничка и оперативна евиденција	-	-	2
4	Организација на патниот сообракај	-	-	2
5	Гаражи и сервиси	-	2	2
6	Техника на возење	-	-	4
	Вкупно часови од стручно	**5**	**10**	**17**
	Вкупно часови	**28**	**29**	**30**
	Образовна работна практика			
	Феријална практика		**10**	

Напомена. Секој ученик имаше можност предвидено во програмата да извози соодветен број на часови од категорија Б, за почетно оспособување за добивање на возачка дозвола да добие можност за полагање на комплетен возачки испит пред сопствена комисија формирана од директорот на училиштето за добивање на возачка дозвола со тоа што беше предвидено во законот за безбедност во сообракајот на

патиштата. Со самото успешно завршување на испитот на возач, ученикот се стекнуваше со возачка дозвола од Б категорија и добиваше свидетелство за завршено образование ВОЗАЧ НА МОТОРНО ВОЗИЛО.

Трошоците кои беа предвидени и направени пагаа на товар на државата и училиштето со тоа што учениците понатаму ги завршуваа и повисоките категории Ц, Ц+Е, Д, Д+Е, во зависност од старосната граница предвидена според законот за Безбедност во сообракајот на патиштата.

Со новите образовни системи и реформираното образование, и сите измени што претстоеја во образованите и со промена на законот за Безбедност во сообракајот на патиштата ова занимање ВОЗАЧ НА МОТОРНО ВОЗИЛО беше згаснато - престана со образување на ваков кадар во редовно школување. Ова беше накратко само потсетување за занимањето ВОЗАЧ НА МОТОРНО ВОЗИЛО.

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 1780 транспортни претпријатија кои се занимаваат со мегународен 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 евроспски 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.

Од разните законски регулативи според законот за превоз во патниот сообракај, за да еден возач да учествува во мегународен транспорт на стоки и патници треба да поседува стручна компетентност, за учество на возачите во мегународен 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 овој труд.

4. ЗАКЛУЧОК

Се надевам дека ке можеме да ги усогласиме и заеднички да настапиме и дејствуваме во создавањето на кадри од ова област со тоа што ке 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

Ви Благодарам

Authors:

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АВТОСООБРАКАЕН УЧИЛИШЕН ЦЕНТАР

“Боро Петрушевски” - Скопје

2. EDUCATION SYSTEMS (past, present and future)

1. Introduction

I, Zoki Stojmirov, Nora Bekiri and Aneta Pašoska, the reason we decided to write and present and with the purpose of developments in the EU, this topic, is because of my respect and trust in - that 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, school as an education system, international cooperation with colleagues as a system of mutual respect and professional cooperation).

ASUC "Boro Petrushevski" traffic school center of the city of Skopje, is a modern, contemporary, unique and unique center for the education of personnel in the field of road traffic in the Republic of Macedonia. As part of the center, there are a number of facilities in which the basic educational activity is carried out, as well as other additional activities.

The main activity of the ASUC "Boro Petrushevski" of the city of Skopje, is the education of personnel in the field of traffic, mechanical and auto technical professions, through regular and part-time schooling in the Macedonian and Albanian teaching languages. Also, the school offers the opportunity to acquire several types of education for adults such as:

- specializations in the field of road traffic and maintenance of motor vehicles
- trainings and courses for the acquisition of competencies (SPK) and licenses for performing the activity in the field of road traffic and maintenance of motor vehicles.

In addition to education, the school also carries out secondary activities:

- Station for technical inspection and registration of motor vehicles
- Center for homologation of motor vehicles
- Car service
- Auto - polygon
- Car wash

Thanks to the good management and patient and wise leadership of the management structures in the school, it contributed to the modernization of the school and it is heading towards taking over the primacy of the International Regional Center for the training of professional personnel in the field of traffic, mechanical engineering and auto engineering in Macedonia and beyond, which is a real and natural consequence of the longer development process and the achieved results.

ASUC "Boro Petrushevski" of the city of Skopje is a public institution that carries out educational activities.

With its personnel potential, experience, spatial, material and technical equipment is able to do the following:

- Implements curricula and programs, as training staff in the field of road traffic through regular and extraordinary education
- Organizes and implements continuous training and seminars for driver-instructor occupations and controller at the station for technical inspection of motor vehicles, road traffic operator, auto mechanic specialist, autobody specialist.
- Publishes teaching aids and other types of literature for students, that is, for users of the services
- Provides services to customers in its own car service, driving school, car wash, service station technical inspection of motor vehicles and the homologation center.
- Used to sell used motor vehicles (first and only in the educational business).

The essence of the logistics services provided by the school is in security better conditions for the realization of the main activity, which means:

- Employee satisfaction with working conditions, earnings and the attitude of the environment to the work done
- Users' satisfaction with the school's attitude towards them.

The motto of the school is Always can do better... which essentially means a constant tendency to follow modern trends and climb a step higher in every segment of school life and work.

2. Vision for the school

The vision for the school, which is defined as a result of the analysis of the situation and the prepared strategy for the development of the school, reads:

"A well-organized, staffed, material-technical and spatially equipped educational institution, with strengthened domestic credibility, in which staff will be trained with quality for the enterprises in the field of road traffic; a lot of work will be done and a lot of money will be earned."

3. Global strategy

In order to fully revive such a vision, we are constantly working on perfecting the solutions for the key problems of the school's strategy, which could hinder the rapid development of the school in the coming period, namely:

- Teamwork is improved, research, training, development and marketing teams are formed and developed
- Domestic and international cooperation with schools similar to ours is being intensified, as well as with enterprises with which the school has common interests.
- The system of information and communications is being improved
- Normative acts are harmonized and drafted. In particular, solutions are sought for the disputed award criteria.

The full realization of all that should result in:

From a functional point of view:

- • Higher quality in meeting the needs of the existing users of the school.

From an organizational point of view:

- Improving management, gaining new knowledge and experiences
- Adapting the organizational structure to new needs
- Developing a positive climate, which will act as a stimulus for professional and material achievements
- Strengthening connections with users and the environment.

From the aspect of the activity:

- Improvement of the standards and criteria valid within the framework of the activity in the Republic of Macedonia and their alignment with those valid in the EU member states

- Further affirmation of the activity of the school, as an important actor in the realization of the development of the Republic of Macedonia.

By working in this way, along that path and those directions, we will revive the vision for the school.

And now I will remind you something about the idea that has always been known as the one and only educational system until the 90s Years of the traffic profession that had taken a large scale was the occupation of MOTOR VEHICLE DRIVER third degree secondary professional occupation. I will briefly present the curriculum of the subjects in the Republic of North Macedonia:

Curriculum

Profession: traffic

Educational Profile: MOTOR VEHICLE DRIVER

Degree of professional training: III

Occupation: motor vehicle driver

Vocational education

A) joint professional

b) special professional

c) educational work practice

d) ferial practice

Teaching areas and subjects Year and class fund

		I year number of classes	II year number of classes	III year number of classes
1	Mother tongue and literature	3	3	3
2	Foreign language	2	2	2
3	Music culture	1	-	-
4	Art culture	-	1	-
5	Physical and health education	2	2	2
6	Defense and protection	-	2	2
7	History	2	2	-
8	Geography	2	-	-
9	Marxism and self-government	-	2	2
10	Mathematics	3	3	3
11	Physics	2	2	-
12	Chemistry	3	-	-
13	Biology	3	-	-
		23	**19**	**13**
	Vocational education			
	Joint vocational education			
1	Technical drawing	2	--	-
2	Basics of traffic	3	-	-
3	Traffic geography	-	2	-
4	Knowledge of goods in transport	-	2	-
5	First aid and protection at work	-	2	-
6	Mechanical elements	-	2	-
7	Psychology	-	-	2
	Especially professionally			
1	Engines and motor vehicles	-	-	2
2	Traffic safety	-	-	3
3	Technical and operational records	-	-	2
4	Organization of road traffic	-	-	2
5	Garages and services	-	2	2
6	Driving technique	-	-	4
	Total hours of professional	**5**	**10**	**17**
	Total hours	**28**	**29**	**30**
	Educational work practice			
	Ferial practice		**10**	

Warning. Each student had the opportunity provided in the program to take the appropriate number of classes of category B, for initial training to obtain a driver's license, to get the opportunity to take a complete driving test before his own committee formed by the school director for obtaining a driver's license by was provided for in the road safety law. With the

successful completion of the driver's exam, the student acquired a category B driver's license and received a certificate of completion of the MOTOR VEHICLE DRIVER education.

The costs that were foreseen and incurred were borne by the state and the school, as the students further completed the higher categories C, C+E, D, D+E, depending on the age limit stipulated by the law on Road Traffic Safety.

With the new educational systems and the reformed education, and all the changes that were to come in the educated and with the change of the law on Safety in road traffic, this occupation of MOTOR VEHICLE DRIVER was extinguished - it stopped educating such staff in regular schooling. This was just a brief reminder about the occupation of MOTOR VEHICLE DRIVER.

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 a number that we have researched that in the Republic of North Macedonia out of 1780 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 daily wages. The same problem occurs in the neighboring countries as well as the countries of the ex-EU areas. That is why 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.

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 COD 95 is to have completed the occupation of MOTOR VEHICLE DRIVER, where with a certificate - diploma, the five modules provided for attending a seminar are recognized and he immediately receives the appropriate competence.

4. CONCLUSION

I hope that we will be able to harmonize them and jointly perform and act in the creation of staff from this area by having for our labor market and outside our countries to offer suitable professional and well-trained staff MOTOR VEHICLE DRIVER.

BE A PART OF THE EDUCATION SYSTEM OF THE EUROPEAN FAMILY OF DRIVERS

Thank you

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3. Implementacija novih metod IKT tehnologije v času pandemije Covida - 19 v programih logistike

Pandemija Covid-19 je spremenila delovanje celotne družbe. Tako je vplivala tudi na potek izobraževanja v izobraževalnih inštitucijah po Sloveniji.

Prispevek je sestavljen iz dveh delov. V prvem delu bomo predstavili raziskavo med dijaki, kako je pandemija Covid – 19 vplivala na njihovo delo, kako so oni sprejemali samo delo ter učenje v času pandemije Covid – 19. S pomočjo tega dela bi radi predstavili njihov vidik delovanja v času dela na daljavo ter uporabo IKT opreme.

V drugem delu bomo predstavili praktično uporabo IKT tehnologij, ki lahko pripomorejo k temu, da se lahko pouk naredi na daljavo bolj interaktiven – zanimiv, da so slušatelji lahko aktivni. Prav tako bi v prispevku želeli predstaviti orodja preko katerih lahko predavatelji lažje delajo na daljavo in si s tem omogočijo enostavnejše in bolj kvalitetno delo. Želimo postaviti izhodišča v primeru, da se situacija, kot je bila pandemija Covid-19, spet ponovi.

Ključne besede: *IKT, izobraževanje v času Covid-19, izobraževanje, srednja šola, Covid-19*

1. Uvod

Če samo razmislimo kako je izobraževanje potekalo pred pandemijo Covid – 19 ugotovimo, da je pouk večinoma potekal frontalno. Prve spremembe so se začele kazati v letih 2004 do 2007. Takrat so se začele v Sloveniji uvajati prve pametne table. V omenjenem obdobju je Ministerstvo za šolstvo omogočilo financiranje pametnih tabel. V teh letih so opremili več kot 500 osnovnih in srednjih šol. Največ pametnih tabel imajo v osnovnih šolah, sledijo srednje šole, višje in strokovne šole ter fakultete (Ušeničnik, 2012).

Z uporabo pametnih naprav smo želeli narediti izobraževanje bolj aktivno za slušatelje ter ure bolj zanimive. Želeli smo doseči, da so slušatelji bolj aktivni, da niso samo pasivni v klopi in poslušajo frontalno predavanje predavatelja.

Potrebno je poudariti tudi dejstvo, da kljub temu da so šole dobile opremo (pametne table), se vsi predavatelji niso bili pripravljeni na novo učiti kako uporabljati te pametne naprave – pametne tehnologije. V raziskavi, ki sem jo opravil leta 2016 (Orel (ur.), 2016), sem ugotovil, da je pri mladih učiteljih uporaba pametnih naprav dobro sprejeta in jo z veseljem uporabljajo, prav tako nimajo problemov z nadgradnjo znanja uporabe. Ravno nasprotno pa je s starejšimi učitelji, pri njih se pojavlja odpor pri uporabi pametnih naprav. Pri starejših učiteljih je potrebno več argumentacije in prepričevanja zakaj to potrebujejo.

Ko se je vedno bolj govorilo o tem, da se bodo izobraževalne ustanove zaprle zaradi pandemije Covid-19, smo se vsi spraševali kaj to pomeni za sam izobraževalni proces. Kako bo potekal pouk na daljavo, kako bomo lahko delali z mladimi preko zaslonov. Problem, ki je nastal, je bil ta, da učitelji niso bili pripravljeni na delo na daljavo, pravzaprav nekateri sploh niso vedeli, kako bi začeli z delom na daljavo. V primeru, da bi učitelji predhodno bolj uporabljali pametne naprave, bi bili bolj poučeni o IKT platformah, zato bi bil tak preskok iz resničnosti v virtualnost veliko lažji.

Sodobne IKT tehnologije nam dajejo možnost, da lahko preko pametnih naprav kot so telefon, tablica ali druga pametna naprava naredimo izobraževalni proces bolj zanimiv. Ravno ta orodja so nam pomagala, da smo se lahko soočili z delom na daljavo v času pandemije Covid-19. Poleg pametnih naprav poznamo tudi več različnih platform preko katerih lahko komuniciramo na relaciji predavatelji – slušatelji. V nadaljevanju prispevka bomo predstavili tudi nekaj dobrih praks uporabe takšnih orodij.

2. Metodologija

Kot raziskovalno orodje smo izbrali kvantitativen vprašalnik preko spletnega orodja 1ka. Sestavili smo dva vprašalnik preko katerih smo dijake spraševali kako so doživljali in spremljali pouk v času pandemije Covid-19. Na vprašalnik je odgovorilo sto dijakov programa Logistični tehnik. Podatke smo nato izvozil iz spletne strani 1ka in jih s programom Excel uredili in obdelali.

Pri večini odgovorov v vprašalnikih, razen v dveh, pomeni številka pet, da trditev povsem velja, številka ena pa da trditev sploh ne velja. Pri dveh vprašanjih pa je specifično napisano kaj pomeni številka.

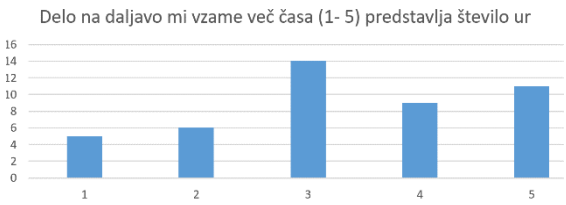
3. Rezultati

Slika 1: anketno vprašanje, vir: lasten vir

Odgovor iz Slike 1 nas ni presenetil, saj smo pričakovali, da so mladi vešči uporabe pametnih naprav. Po kasnejšem pogovoru z dijaki smo ugotovili, da si različno interpretiramo delo z digitalnimi napravami. Dijaki so mnenja, da so to predvsem naprave preko katerih lahko oni komunicirajo za lastne potrebe, ne pa za potrebe izobraževanja. Vprašanje bi lahko nadgradili tako, da bi točno spraševali katere digitalne naprave in za kakšen namen jih uporabljajo.

Slika 2: Anketno vprašanje, vir: lasten vir

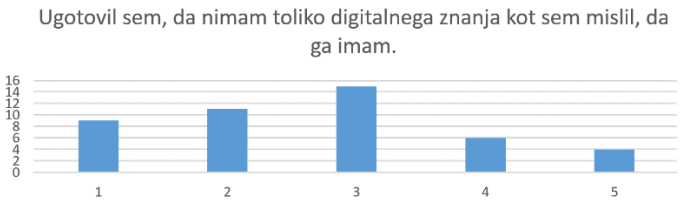
Iz Slike 2 je razvidno, da je večina izbrala, da jim je lažje urejati gradivo v zvezke kot to omogoča klasični pouk. Ta odgovor je zanimiv zato, ker kljub vsej digitalizaciji in temu, da večinoma učitelji posredujejo gradivo v digitalni obliki, dijaki gradivo še vedno lažje urejajo v fizični obliki.



Slika 3: Anketno vprašanje, vir: lasten vir

Iz rezultata na Sliki 3 vidimo, da dijaki za delo na daljavo porabijo več časa, kot bi ga porabili sicer. Kasneje smo se z dijaki pogovarjali o analizi rezultatov in ugotovili smo, da so

dijaki dobili prevelike količine snovi s strani predavateljev. Problem je bil v tem, da niso znali filtrirati, kaj je za njih uporabno in kaj ni. Prav tako so nekateri učitelji nalagali znatno več dela, kot bi ga sicer.



Slika 4: Anketno vprašanje, vir: lasten vir

Tudi ti rezultati iz Slike 4 presenečajo, saj smo pričakovali da imajo mladi več digitalnih kompetenc. Dijaki so ugotovili, da določene ukaze ali programe, ki so bili potrebni za pouk sploh ne poznajo. Potrebno je bilo najprej dijake naučiti kako se programi uporabljajo, potem so jih šele znali uporabljati.

4. Analiza rezultatov

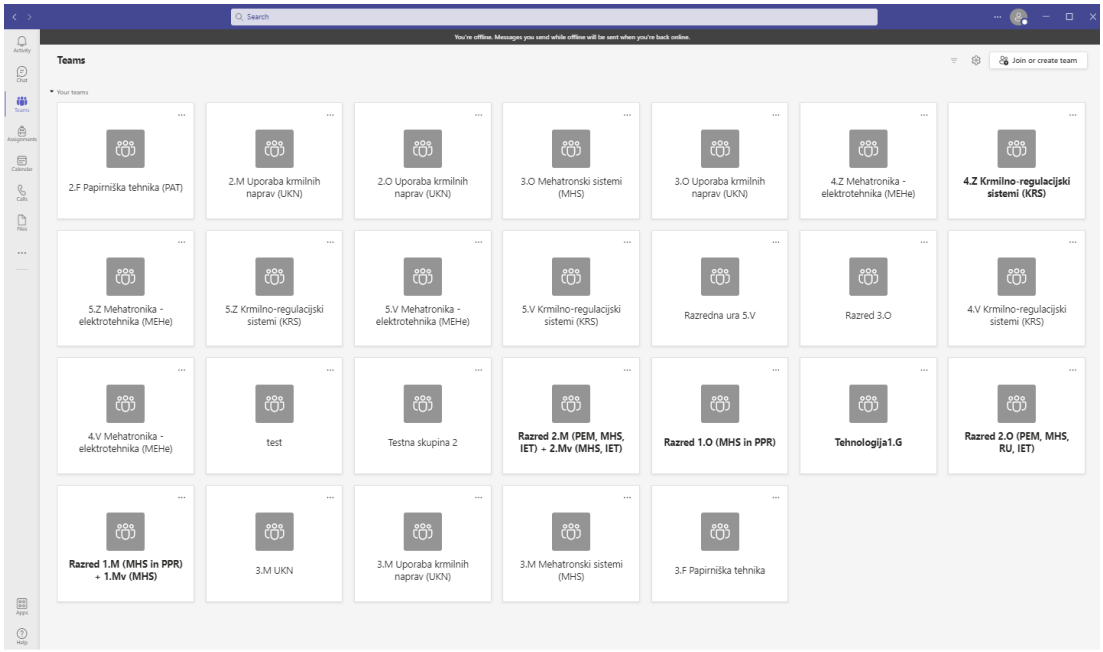
Glede na dobljene rezultate lahko rečemo, da so bili odgovori jasni, in sicer da je klasičen pouk bolj zanimiv. Prav tako so dijaki povedali, da lažje urejajo zvezke v klasični obliki kot zapiske v digitalni obliki on-line. Pri tem vprašanju je zanimivo to, da dijaki dobijo vso gradivo v digitalni obliki, ampak kot se kaže naprej pri naslednjih odgovorih, je problem tudi v neznanju pri uporabi digitalnih medijev – portalov in programov. Prav tako je bil problem pri posredovanem e-gradivu ta, da dijaki niso znali izluščiti pomembnih delov od nepomembnih.

Presenetili so nas odgovori, da dijaki nimajo toliko digitalnih kompetenc, kot mislijo, da jih imajo. Mogoče je tudi to eden od ključnih razlogov zakaj trpi on-line pouk. Po pogovoru z dijaki po analizi rezultatov se je izkazalo, da dijaki menijo, da obvladajo IKT opremo s tem ko uporabljajo različna socialna omrežja.

Rezultati in praktična uporaba med samim delom nam je dala izhodišče, da smo pripravili nekaj video vodnikov kako se uporabljajo spletne platforme. Preko teh posnetkov so dijaki spoznali samo platformo in delovanje platforme. S tem so bili pripravljeni, da lahko izkoristijo celoten potencial pri aktivnem poslušanju pouka na daljavo.

5. Primeri dobrih praks uporabe IKT orodij

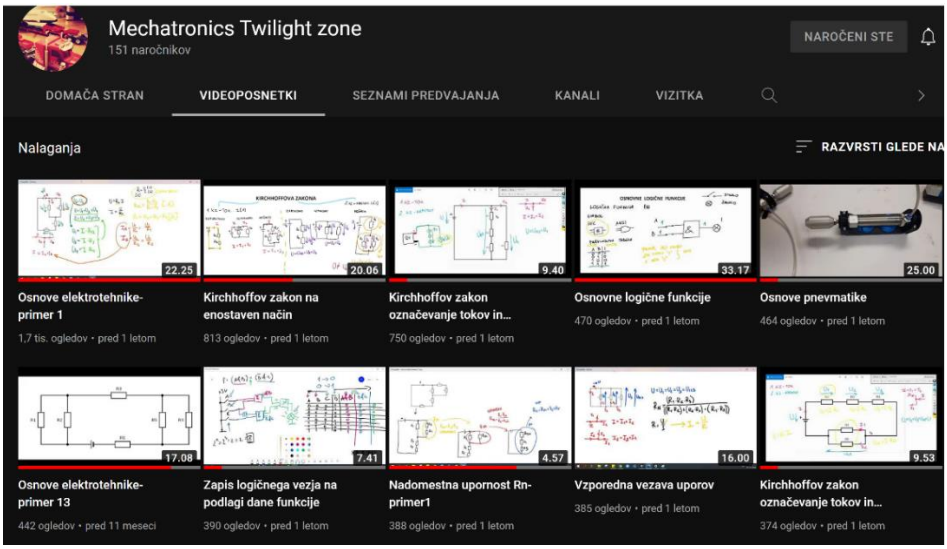
5.1 Platforma Microsoft Teams



Slika 5: Microsoft teams, vir: lasten vir

Platforma, ki jo prikazuje Slika 5, omogoča, da lahko predavatelj za vsak predmet ali skupino naredi svojo mapo. Znotraj mape ima predavatelj dostop do vseh udeležencev predmeta. Znotraj mape lahko naredimo shrambo za datoteke, ki jih vidijo udeleženci in predavatelj. Prav tako lahko udeleženci sami znotraj mape zaženejo video konferenco ali pa se pogovarjajo. To je uporabno predvsem pri pripravljanju na preverjanje znanja. Prav tako je prednost ta, da se beleži zgodovina kaj je delal predavatelj s skupino, prav tako pa za video konferenco ni potrebno kreirati vedno nove povezave.

5.2 Youtube kanal



Slika 6: Anketno vprašanje, vir: lasten vir

Ena od slabosti pri video konferencah je v tem, da po tem, ko predavatelj konča z video konferenco, celotna vsebina predavanja izgine. Ena od možnosti je, da predavatelj med samo razlago snov posname, potem video obdela in ga naloži na enega izmed portalov za prikaz video posnetkov (kot je to razvidno iz Slike 6). Prednost takšnega nalaganje je v tem, da si lahko posnetek ogledajo tudi tisti, ki niso bili na konferenci. Prav tako lahko pred preverjanjem znanja slušatelji to gledajo in s tem utrjujejo znanje.

5.3 Grafične tablice in namizne kamere

Če primerjamo med seboj grafične tablice in namizne kamere lahko ugotovimo, da je prednost grafičnih tablic v tem, da so zapisi bolj čitljivi in da se zapiske lažje deli z ostalimi. Slabost pa je v tem, da so dražje za nakup. Predavatelj lažje uporablja grafično tablico, saj točno vidi kje na delu lista riše. Slabost namizne kamere pa je v svetlobi, saj za njeno uporabo potrebujemo svetel prostor. V primeru, da je zunaj temno potrebujemo dodatno luč za osvetlitev površine po kateri pišemo.

6. Zaključek

Iz raziskave lahko ugotovimo, da dijaki niso bili pripravljeni na delo na daljavo. Znali so uporabljati pametne naprave za namen komunikacije ali uporabe socialnih omrežji. Uporaba platform Microsoft teams ali Moodle jim ni bila poznana, prav tako so nekateri platforme s težavo uporabljali. Zanimivo je to, da jim je bil tudi koncept delovanja same plaftorme tuj, nepoznan.

Po prvem valu epidemije Covid – 19 smo dijakom pripravili vodnike kako lahko uporabljajo določene spletne platforme. S tem smo želeli, da bi se pripravili na samo uporabo.

Na drugi strani pa tudi nekateri učitelji niso znali uporabljati platform. Za začetek smo naredili tako da smo omejili delo samo na dve platformi, in sicer na Moodle in Microsoft Teams. Potem smo pristopili k temu, da smo tudi te nevešče učitelje posamezno platformo naučili uporabljati toliko, da so lahko izvajali pouk na daljavo.

Če primerjamo med seboj Moodle in Microsoft Teams lahko ugotovimo, da je Microsoft Teams bolj napredno orodje in omogoča več stvari, ki jih sam Moodle ne. V Microsoft Temas imamo vse zbrano na enem mestu, prav tako je veliko boljši pregled nad samo platformo. Slabost, ki smo jo zaznali pri omenjeni platformi, je ta, da potrebujemo za uporabo močnejši računalnik in hitrejšo internetno povezavo. Za delovanje Moodla potrebujemo server, da je ta platforma postavljena in strokovnjake, ki kot podpora skrbijo za težave, ki nastanejo pri delovanju same platforme.

Naredili smo analizo dela z grafično tablico in delo z namizno kamero. Ugotovili smo, da je delo z grafično tablico lažje, predvsem iz vidika dela učitelja. Lažje je snov pisati in brisati, prav tako se enostavno vse napisano lahko shrani na disk in potem to posreduje slušateljem. Pri namizni kameri je problem s kvaliteto slike, prav tako ima učitelj slabši pogled kateri kot kamera še pokriva.

Kot zaključek bi vsem, ki se odločate kako izvesti pouk na daljavo, predlagali uporabo platforme Microsoft Teams, saj ima največ funkcij, ki olajšajo delo. Uporabite grafično tablico, ki predstavlja ekvivalent pisanja po tabli. Prav tako je dobro vmes med samim pisanjem preverjati, ali slušatelji sledijo in če spremljajo kaj učitelj piše po tabli.

Viri

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3. The Emplementation of New ICT Methods During the Covid-19 Pandemic in Logistics Programmes/Courses

The Covid-19 pandemic has changed the ways our society functions. Moreover, it has also had an impact on educational processes in Slovenian educational institutions.

The article consists of two parts. In the first part we will present a research conducted among secondary school students on how the Covid-19 pandemic has influenced their schoolwork – how they perceived schoolwork and studying during the Covid-19 pandemic. We will present their points of view on distance learning and their use of ICT equipment.

In the second part we will present the practical use of ICT which can make distance learning more interactive and interesting so that the participants are more active. We will also try to present tools which can make distance learning easier for educators because they impact the quality of teaching. We wish to create starting points in case of another situation similar to the Covid-19 pandemic.

Keywords: *ICT, education during Covid-19 pandemic, education, secondary school, Covid-19*

1. Introduction

If we consider what education was like before the Covid-19 pandemic we can conclude that frontal teaching method prevailed in most lessons. First changes started appearing from 2004 to 2007 when smart boards were being introduced for the first time in Slovenia. The Slovenian Ministry of Education provided financial support for smart boards for more than 500 primary and secondary schools. The number of smart boards is the highest in primary schools followed by secondary schools, vocational schools and faculties (Ušeničnik, 2012).

We started using smart devices in education to make the process more active for the participants and lessons more interesting. We wanted the participants to be actively involved and not merely sit passively and follow frontal lectures.

We have to point out an interesting fact that although schools were provided with smart boards not all educators were prepared to learn how to actually use these smart technology devices. In a research that I performed in 2016 (Orel (ur.), 2016) I found out that younger teachers welcomed smart devices, they used them with pleasure and had no problems with upgrading their knowledge on how to use them. It was quite the opposite with older teachers who resisted using smart devices. More reasoning and persuading was required to make older teachers understand why smart devices were required.

As the possibility of educational institutions closing down due to the Covid-19 pandemic started to be mentioned more often we all wondered how this would affect the educational process itself. What distance learning would actually look like, how we could work with students in front of monitors. The problem was that teachers were not prepared for distance learning and some of them had no idea how to start. If teachers previously used smart devices more, they would know much more about ICT platforms and this would ease the leap from reality into virtuality.

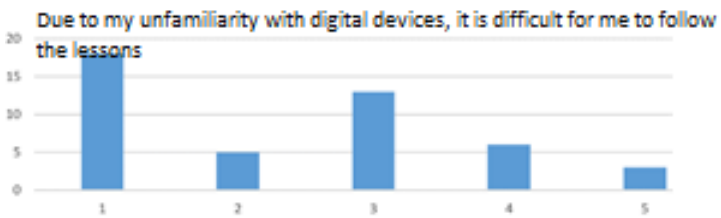
Modern ICT provides a chance to make the educational process more interesting by using smart devices like mobile phones, tablets, etc. These were the actual tools that helped us face remote work during the Covid-19 pandemic. Besides smart devices there are also various platforms that educators can use to communicate with the participants. Some examples of good practices are discussed below.

2. Methodology

We have chosen a quantitative research method by using an online tool 1ka. We have formed two questionnaires in which we asked students what they thought about distance learning and how they followed lessons online during the Covid-19 pandemic. One hundred high school students from the programme Logistics Technician answered the questionnaires. The data was later exported from the online tool 1ka and organized and processed in Excel.

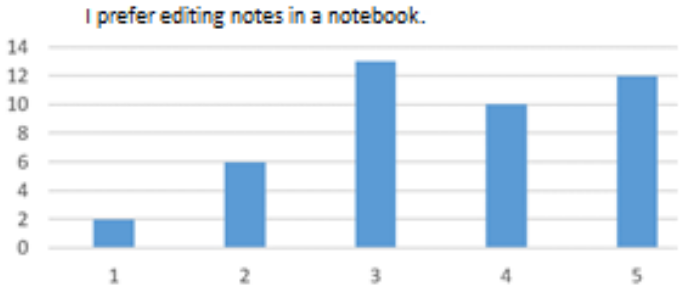
In the majority of inquiry questions – except in two – number five means that the statement is absolutely true whereas number one means that the statement is absolutely false. In two questions the meaning of a number is specified.

3. Results



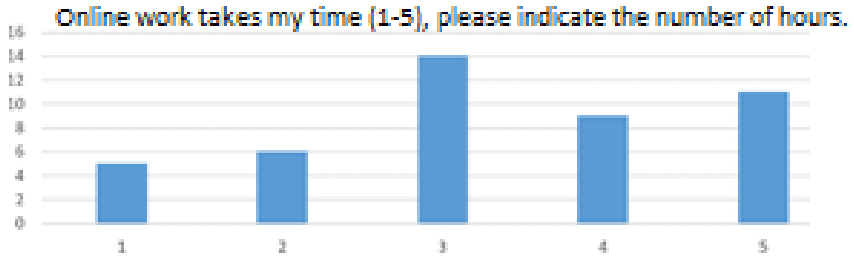
Picture 1: Survey question, surce: own

The answer in Picture 1 did not surprise us because we expected that young people had skills in using smart devices. After further discussion with the students, we realized that we see working with digital appliances differently. The students think that these are mainly devices they can use to communicate for their own needs and are not meant to be used in education. The question could be upgraded and could ask exactly which digital appliances they use and for what purpose.



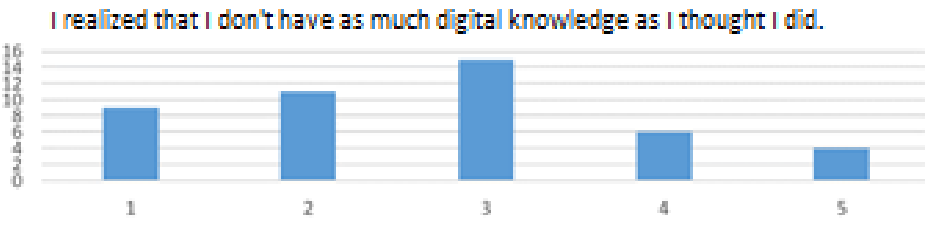
Picture 2: Survey question, surce: own

Picture 2 shows that most students find it easier when they organize their notes in notebooks as is the case in traditional lessons. This answer is particularly interesting because in spite of digitalization and the fact that teachers mediate materials in digital form the students still find it easier to organize their notes in physical form.



Picture 3: Survey question, surce: own

In Picture 3 we can see that students require more time for distance learning than for traditional lessons. After analyzing the results with the students, we concluded that teachers presented students with too much learning material. The problem that the students had was in not being able to filter out what was useful for them and what was not. Furthermore, some teachers gave their students a lot more work than they would in traditional lessons.



Picture 4: Survey question, surce: own

The results in Picture 4 are also surprising because we expected a higher degree of digital competence in students. The students realized that they were not familiar with certain commands or programmes that were required for online learning. Thus, it was necessary to first teach the students how to use particular programmes before they were able to actually work with them.

4. Analysis of the results

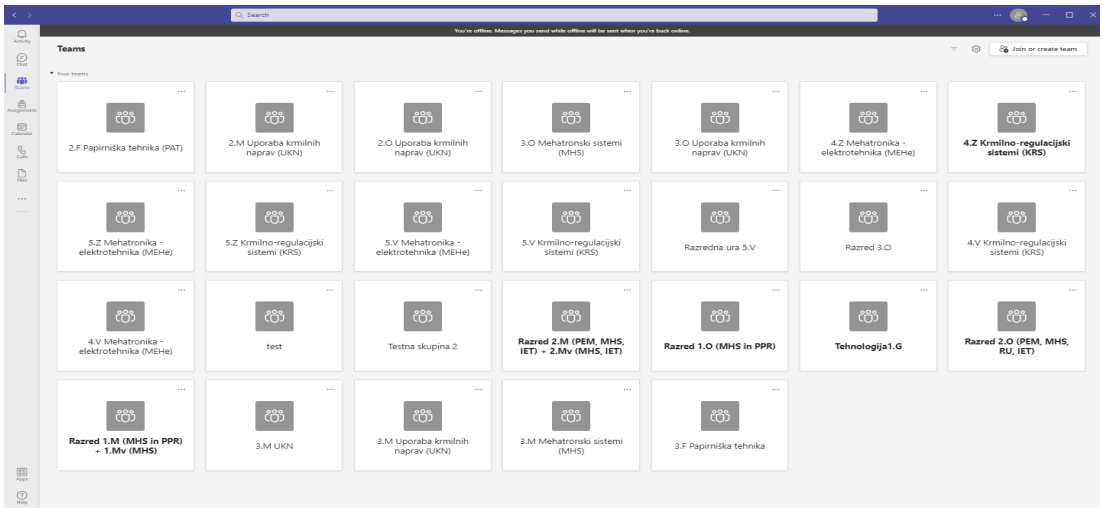
The inquiry results clearly show that there is a preference for traditional lessons because the students find them more interesting. The students also find it easier to organize their notes in notebooks than in digital form online. The interesting thing about this question is that the students are given all learning material in digital form but further answers show that they do not know how to use digital media – portals and programmes. The students had additional problems with E-Materials because they were not able to distinguish between more and less important information.

We were surprised by the students' answers which showed that the students do not have such strong digital competences as they think. Perhaps this is one of the main reasons why online lessons are less successful. After discussing the analysis of the results with the students it became obvious that the students feel that they master the use of ICT simply because they use various social media.

The results and actual practical use during remote work was a starting point for the preparation of several video guides on how to use online platforms. Wtih the help of these videos the students became familiar with the platform itself and its functioning. Thus they were prepared to fully exploit their potential and actively follow distance learning.

5. Examples of good practices in using ICT tools

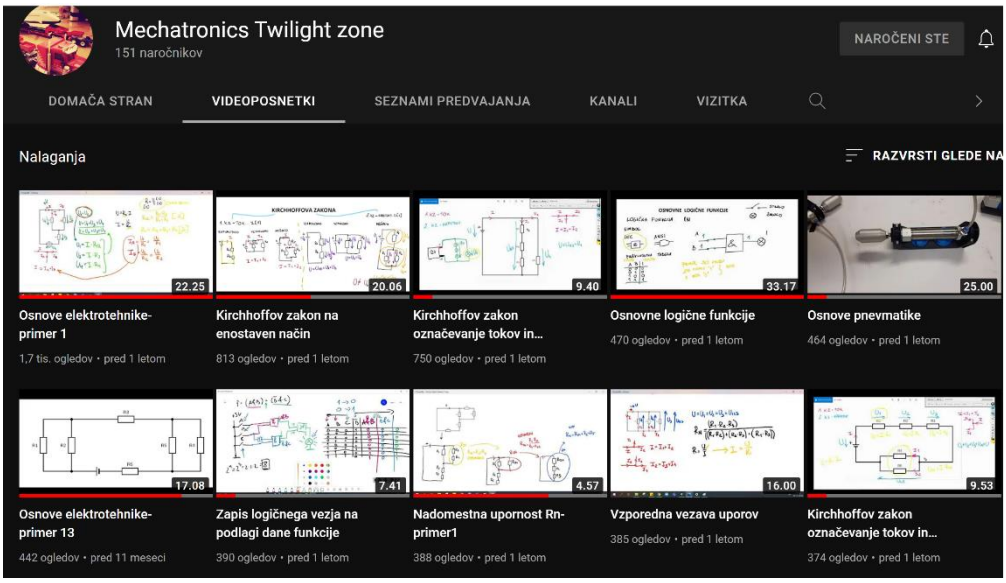
5.1 Platforma Microsoft Teams The Microsoft Teams Platform



Picture 4: Microsoft teams, surce: own

The platform in Picture 5 enables the educator to form a separate folder for each subject or group. The educator has access to all participants of a particular subject within this folder. Within the folder we can also provide a file storage that can be seen by the participants as well as the educator. The participants also have a chance to start a video conference or communicate within the folder. This is especially useful during the preparation for progress check. Another advantage is the recording of the history – what the educator worked on with the group and it also comes in handy that we do not have to form a new link for every video conference.

5.2 YouTube channel



Picture 5: Youtube channel, surce: own

One of the disadvantages of video conferencing is that after the educator finishes the video conference the whole subject of the lecture disappears. It is possible for the educator to record the explanation of a particular topic, then process the video and upload it on one of the video portals (as shown in Picture 6). This allows the people who did not attend the video conference to watch the video. It is also useful before a progress check because the students can watch the video and consolidate their knowledge.

5.2 Graphics tablets and desk cameras

If we compare graphics tablets and desk cameras, we come to a conclusion that the advantage of graphics tablets is a better readability of notes and it is also easier to share notes with others. The disadvantage is a higher price. Educators use a graphics tablet more efficiently because they can see exactly on what part of the paper they are drawing. The disadvantage of a desk camera is the lighting because we have to use it in a well-lit place. If it is dark outside, we need an extra light to brighten the surface on which we are writing.

6. Conclusion

The research gives clear evidence that the students were not prepared for distance learning. They were able to use smart devices for communication or social media. They were either not familiar with the usage of Microsoft Teams platform or Moodle or they used some platforms with difficulty. An interesting fact is that they did not understand how the platform itself functioned.

After the first Covid-19 wave we prepared guides for students on how to use certain online platforms. In this way we tried to help them to use them correctly.

Some teachers were also not able to use the platforms. In the beginning we focused on working on only two platforms, namely Moodle and Microsoft Teams. Then we taught the unskillful teachers how to use a particular platform so that they were equipped for distance learning.

If we compare Moodle and Microsoft Teams, we can ascertain that Microsoft Teams is a more advanced tool and offers more possibilities than Moodle. In Microsoft Teams everything is gathered in one place, and the overview of the platform itself is much better. There is a downside, however, because the platform requires a more powerful computer and a fast internet connection. A server is required if we want Moodle to function correctly and we also need professionals for support in case of any difficulties ocurring in the functioning of the platform itself.

An analysis of working with a graphics tablet and working with a desk camera was performed. We have concluded that working with a graphics tablet is easier, especially from the teacher's point of view. It is easier to write and erase the learning material, everything that was written down can be stored on a disc and later mediated to the participants. When it comes to a desk camera the picture quality can present problems and the teacher has a worse overview of the corners that the camera still covers.

In conclusion we recommend the use of Microsoft Teams platform for distance learning because there are more functions that facilitate teaching. Use a graphics tablet because it is equivalent to writing on the board. While writing remember to check if the participants are able to follow and see what is written on the board.

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Autori:

Vlatka Slunjski Piskač, dipl. ing. prometa

Darinka Lončar Kočić, mag. ing. traff.

STROJARSKA I PROMETNA ŠKOLA VARAŽDIN

4. PRIMJENA INFORMACIJSKIH SUSTAVA U ŠKOLSKOJ VJEŽBENIČKOJ TVRTKI „LOGO-šped d.o.o.“

Sažetak:

Poslovanje bez primjene informacijskih sustava je u današnjim uvjetima rada teško pronaći u bilo kojoj gospodarskoj djelatnosti, a osobito u dinamičnoj interdisciplinarnoj djelatnosti kao što su promet i logistika. Primjena informacijskih tehnologija i sustava bitno utječe na porast produktivnosti i učinkovitosti, uštedu troškova poslovanja i uštedu vremena u poslovnom ciklusu te na podizanje razine usluga. U djelatnosti prometa i logistike informatička potpora ima široku primjenu jer poslovni procesi u toj djelatnosti zahtijevaju brze, točne i korisne informacije u realnom vremenu na različitim prostornim i vremenskim lokacijama. Danas tu potporu djelatnosti daju različiti informacijski sustavi s tendencijom prerastanja u „inteligentne transportne sustave“.

Za korištenje informacijskih sustava u svakodnevnom poslovanju prometnih i logističkih tvrtki neophodna je radna snaga s odgovarajućim kompetencijama. Priprema budućih radnika za uključivanje na radna mjesta u realnim uvjetima mora se ostvariti u sličnom okruženju na sličnim informacijskim sustavima. Navedeno je prepoznala Strojarska i prometna škola osnivanjem vježbeničke tvrtke. Vježbenička tvrtka nastala je provedbom projekta „Inovativne metode u praktičnoj nastavi uvođenjem prijevozničke i logističke vježbeničke tvrtke“ skraćenog naziva ¨VTT-Firm¨. Rad vježbeničke tvrtke provodi su u opremljenoj učionici koja simulira ured, učenici zamjenjuju svoju ulogu s radnikom realne tvrtke, a nastavnik postaje koordinator i kontrolor rada u vježbeničkoj tvrtki.

Zbog toga se u ovom radu prikazuju informacijski sustavi jedne vježbeničke tvrtke iz Hrvatske, a sve sa ciljem da se prikaže postupak korištenja informacijskih sustava u vježbeničkoj tvrtki „LOGO-šped d.o.o.“.

Ključne riječi:

praktična nastava, vježbenička tvrtka, promet i logistika, informacijski sustavi, logistička platforma, navigacijski uređaj

1. Uvod

Praktična nastava učenika obrazovnoga sektora promet i logistika u zanimanju Tehničar cestovnog prometa, Tehničar za logistiku i špediciju te Vozač motornog vozila se u Hrvatskoj dijelom odvija kroz praktičnu nastavu unutar škole i izvan škole u tvrtkama iz područja prometa i logistike. Praktična nastava koja se odvija unutar škole odvija se u prostorima školske vježbeničke tvrtke koja se nalazi u specijaliziranoj učionici opremljenoj opremom i informacijskim sustavima koji se nalaze i u realnim tvrtkama iz djelatnosti prometa i logistike.

2. Primjena informacijskih sustava u vježbeničkoj tvrtki Strojarske i prometne škole

Mnoga poduzeća iz djelatnosti logistike i špedicije u svojem svakodnevnom poslovanju koriste različite informacijske sustave. Djelatnici koji rade sa tim informacijskim sustavima su educirani za rad u njima, ali veliki problem je s onom radnom snagom koja se tek školuje za zanimanja u logističkoj djelatnosti. Tim više, što svako poduzeće kada zapošljava nove radnike želi zaposliti već spremnog radnika za rad u određenim poslovnim procesima i sa primjenom određenih modernih tehnologija.

Ovaj problem su prepoznale i škole koje školuju zanimanja u prometu i logistici. Tako je Strojarska i prometna škola Varaždin s partnerima – Gospodarskom školom Čakovec, Školom za cestovni promet Zagreb i Elektrotehničkom i prometnom školom Osijek, 2012. godine započela sa IPA projektom **„Inovativne metode u praktičnoj nastavi uvođenjem prijevozničke i logističke vježbeničke tvrtke – VTT-Firm“**. U projekt je bilo uključeno oko 350 učenika, te tri tvrtke – Kos transporti d.o.o. iz Varaždina, Gebrüder Weiss iz Zagreba i Gradski prijevoz putnika d.o.o. iz Osijeka. Cilj projekta je bio povećati sposobnosti nastavnika i materijalne uvjete u partnerskim školama obrazovnog sektora prometa i logistike sa svrhom poboljšanja znanja i vještina učenika provedbom praktične nastave u virtualnim vježbeničkim tvrtkama.

Vrlo je važno spomenuti da se učenici nakon provedene praktične nastave u vježbeničkoj tvrtki mogu koristiti sa visoko sofisticiranom opremom i isto tako sa vrlo specifičnim računalnim programima. U konkretnom slučaju učenici kroz rad u vježbeničkoj tvrtki koriste informacijske sustave koji su podrška carinskom poslovanju, sustave za praćenje voznog parka i upravljanje voznim parkom, sustav za obradu podataka iz tahografa, aplikacije za praćenje burze tereta/vozila i slobodnih skladišnih površina te knjigovodstvene programe.

Kao primjer primjene informacijskih sustava u vježbeničkoj tvrtki Strojarske i prometne škole, poslužit će nam vježbenička tvrtka **„LOGO-šped d.o.o.“.** Vježbenička tvrtka „LOGO-

šped d.o.o.“ je smještena u prostorijama računalnog praktikuma za promet i logistiku koji je opremljen sa potrebnom informacijskom tehnologijom, te svako radno mjesto koristi informacijske sustave potrebne za obavljanje određenih radnih zadataka. Osnovna djelatnost navedene vježbeničke tvrtka su usluge iz područja logistike i špedicije.

Uz informacijske sustave, vježbeničkoj tvrtki su na raspolaganju teretno vozilo sa prikolicom iz školske autoškole, 10 vozila iz realne tvrtke te školsko skladište. Organizacija rada vježbeničke tvrtke podijeljena je u dva osnovna odjela, odjel općih poslova te odjel logistike i špedicije u kojima je ove školske godine zaposleno ukupno 15 djelatnika.

2.1 Informacijski sustavi u vježbeničkoj tvrtki „LOGO-šped d.o.o.“

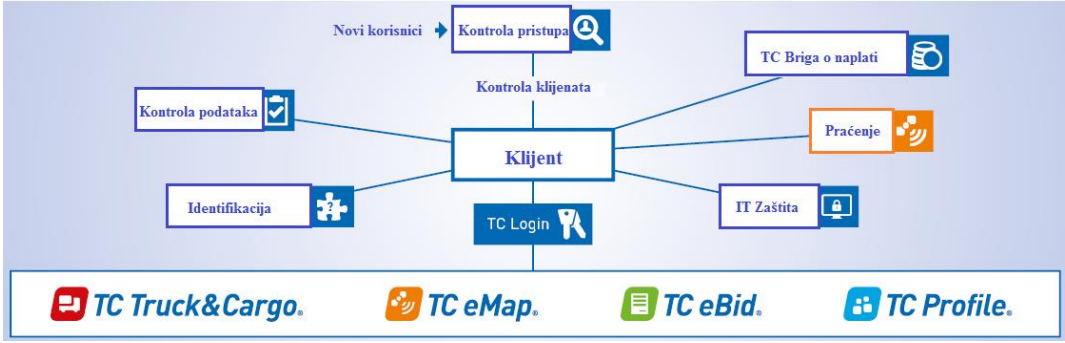
Smanjenjem korištenja papirologije u poslovanje poduzeća uvode se programi pomoću kojih se omogućuje brža i lakša razmjena podataka između poduzeća. Kao i svako poduzeće, tako i vježbenička tvrtka „LOGO-šped d.o.o.“ u svojem radu koristi programe kako bi se učenicima olakšao rad, a samim time ih se upoznaje sa programima koji se koriste u realnim tvrtkama. Neki od navedenih programi su: TimoCom, Mobilisis, CVS, eCarinskiOtpremnik, DBstudio I Victory.

Logistička platforma „TimoCom“

Temeljni razlog za osnivanje TimoCom platforme je bila burza tereta kojom bi se smanjile prazne vožnje teretnih vozila. Sa vremenom je TimoCom uz osnovnu uslugu Truck&Cargo (burza tereta, utovarnog prostora i skladišnog prostora), razvio i ostale usluge kao što su:

- TC eMap - uz pomoć planera ruta može se izravno iz burze tereta i utovarnih prostora izračunati prijevozni put za pojedinu relaciju, a istovremeno se mogu kalkulirati i svi pripadajući troškovi vožnje i ostali popratni troškovi. Davatelj IT usluga TimoCom je započeo nuditi i integrirano rješenje za praćenje (tracking) koje omogućuje korištenje različitih telematičkih sustava na jednoj platformi. Cilj navedene usluge je povisiti sigurnost prilikom prijevoza i pripomoći svim poduzećima koja su uključena u prijevoz kako bi imali veću transparentnost, preglednost i bolju komunikaciju. Jedan od telematičkih sustava koje koristi je sustav i poduzeća Mobilisis koji od sada sudjeluje sa svojim GPS sustavima.
- TC eBid - platforma za transportne natječaje diljem Europe.

TimoCom korisnici nakon registracije plaćaju mjesečno uslugu te dobivaju ovlašteni pristup sustavu preko određenog broja (tri) računala.



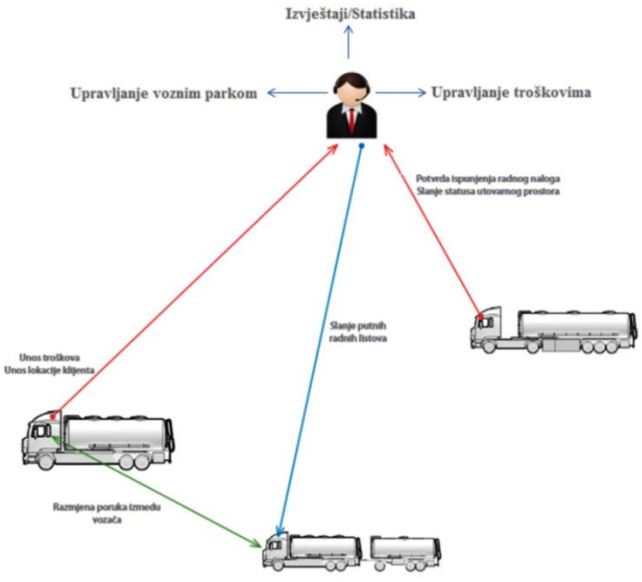
Slika 1. Moduli i način registracije unutar logističke platforme „TimoCom“

Informacijski sustav „Mobilisis“

Mobilisis je sustav koji ima široku primjenu, a prvenstveno je namijenjen tvrtkama sa vlastitim voznim parkom. Mobilisis sustav se uglavnom koristi za praćenje vozila u realnom vremenu. Predstavlja inteligentni sustav za upravljanje, optimizaciju, nadzor i administraciju voznog parka. Sustav omogućuje generiranje izvještaja koji obuhvaćaju sve aspekte voznog parka koji su od velike važnosti: potrošnja goriva, prijeđeni kilometri po vozilu i po vozaču, prekoračenje brzine, pregled i statistika vožnji, pregled detektiranih alarmnih situacija, pregled isteka registracije, nadolazećih servisa, troškova po vozilu i još mnogo toga.

Mobilisis sustav je dostupan svima sa bilo kojeg računala uz odgovarajuće ime i lozinku. Za svaki se korisnički račun može odrediti pravo pristupa samo onim podacima koji su potrebni za obavljanje posla. Tako se, na primjer, može odrediti da računovodstvo vidi samo troškove i putne račune, a disponenti samo svoja vozila i putne radne listove. Isto tako, klijenti mogu pratiti vozilo koje prevozi njihovu pošiljku u realnom vremenu.

Uz navedeni informacijski sustav u vježbeničkoj tvrtki se koristi još jedan inteligentni telekomunikacijski sustav upravljanja voznim parkom, a to je **CVS Mobile**.



Slika 2. Mogućnosti informacijskog sustava „Mobilisis“

Informacijski sustav eCarinskiOtpremnik

Poduzeće Nova ICT kreiralo je informacijski sustav „eCarinski Otpremnik - eCO“ koji se koristi u više od stotinu hrvatskih tvrtki. Aplikacija sadrži sve oblike carinskog postupanja sa robom.

Neke od značajaka ove aplikacije su:

- uključeni su svi carinski postupci te necarinski (komercijalni) moduli fakturiranja;
- carinska tarifa sa ugrađenom tarifom poreza i svim posebnim porezima, dozvolama;
- više od stotinu propisanih obrazaca u PDF formatu (JCD, DCV, EUR.1, CMR, CIM,);
- ogledni primjerci upravnih postupaka: molbi, zahtjeva itd.;
- svaki modul pojedinih carinskih postupaka može biti korišten zasebno;
- podatci se nasljeđuju iz dokumenta u dokument, bez obzira kojim redom dokumenti nastaju i bez obzira na tip dokumenta (eksterni, interni, carinski itd.);
- povezanost informacijskog sustava sa informacijskim sustavom Carinske uprave RH.

Važno je napomenuti kako je mogućnost povezivanja navedenog informacijskog sustava (IS) vježbeničke tvrtke sa IS Carinske uprave RH vrlo korisna jer se učenicima pruža mogućnost provjere izrađenih dokumenata od strane same Carinske uprave.

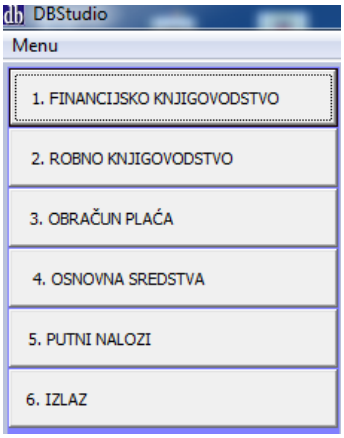
Sve navedene značajke ove aplikacije korisniku su vidljive kroz module koji se nalaze na *tablici 1*. Korisnik kroz prikazane module bira koje će poslove obavljati elektroničkim putem.

Tabela 1. eCarinski Otpremnik – Moduli

eCarinski Otpremnik – MODULI
CARINSKI POSTUPAK • UVOZ • PROVOZ (NCTS) • UNUTARNJA PROIZVODNJA • IZVOZ • VANJSKA PROIZVODNJA • CARINSKO SKLADIŠTENJE
OVLAŠTENI GOSPODARSKI SUBJEKTI • OVLAŠTENI PRIMATELJ • OVLAŠTENI POŠILJATELJ
KOMERCIJALNI POSTUPCI • POZICIJE • FAKTURNI NALOG • FAKTURIRANJE
OPCIONALNI MODULI • SLANJE FAKSA-A INTERNET SERVISOM • SLANJE SMS-A INTERNET SERVISOM

Knjigovodstveni program DBstudio

Program DBstudio je knjigovodstveni program koji pruža usluge financijskog knjigovodstva, robnog knjigovodstva, obračuna plaće, pregled osnovnih sredstava, te unos putnih naloga. U radu VT „LOGO-šped d.o.o.“ najčešće se koristi za izradu faktura, praćenje prihoda i troškova, izradu obračuna plaća za pojedina radna mjesta te za unos putnih naloga.

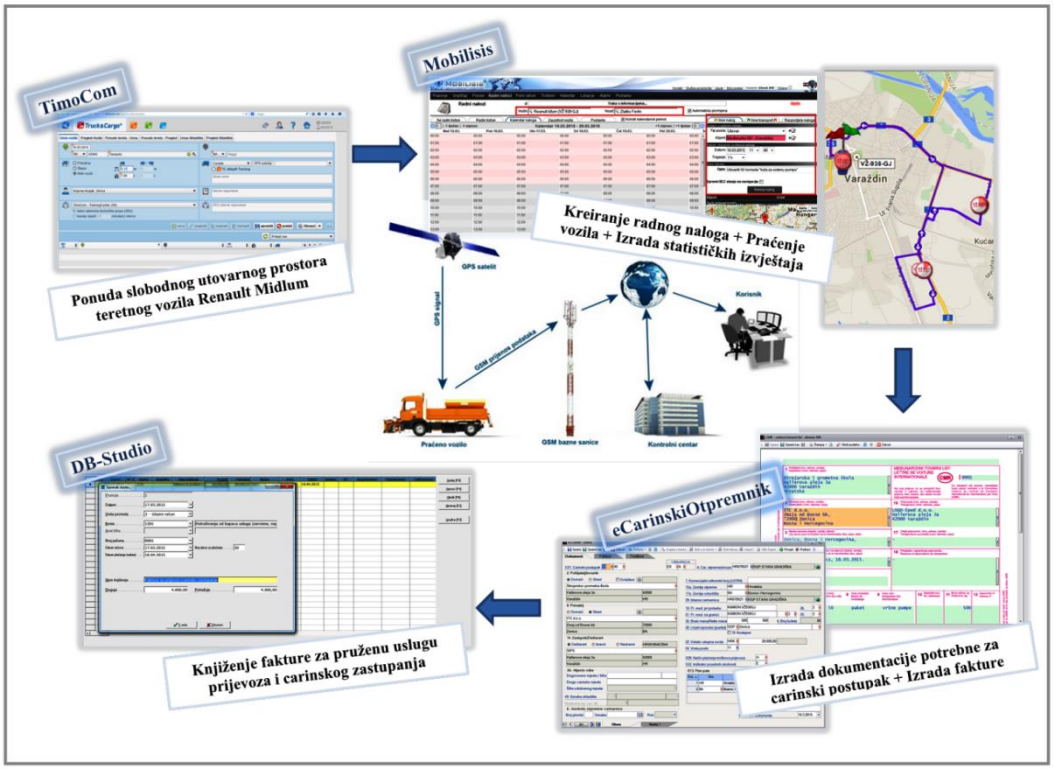


Slika 3. Sučelje programa DBstudio

Postupak korištenja informacijskih sustava u vježbeničkoj tvrtki „LOGO-šped d.o.o.“

Cjelokupan shematski prikaz postupka korištenja informacijskih sustava u vježbeničkoj tvrtki „LOGO-šped d.o.o.“ je prikazan na sljedećoj slici 4.

Iz shematskog prikaza se može zamijeti kako je učenik (voditelj odjela logistike) najprije objavio ponudu slobodnog utovarnog prostora teretnog vozila Renault Midlum, koji je u vlasništvu školske autoškole. Ponuda se objavila na logističkoj platformi **„TimoCom“.**



Slika 4. Postupak korištenja informacijskih sustava u vježbeničkoj tvrtki „LOGO-šped d.o.o.“

Tijekom radnog dana zamjenik voditelja odjela logistike je dobio zadatak da za školsku radionicu organizira nabavu dijelova potrebnih za proizvodnju vodenih pumpi od poduzeća Međimurka BS iz obližnjeg Čakovca. Poduzeće Međimurka BS je u dugogodišnjoj suradnji sa Strojarskom i prometnom školom te je bilo potrebno samo telefonski najaviti dolazak kamiona u poslovnicu koja se nalazi u Varaždinu. Na temelju navedenog naloga odjel logistike je poslao potreban nalog za prijevoz na navigaciju pomoću informacijskog sustava **„Mobilisis“,** koja se nalazi u vozilu Renault Midlum.

Tijekom obavljanja prijevoznog zadatka pratilo se navedeno vozilo putem **„Mobilisisa“** te je prema tome odjel logistike obavijestio školsko skladišno osoblje o skorom dolasku školskog vozila kako bi se oni na vrijeme pripremili za istovar vozila.

Istog dana odjel izvoza je dobio radni zadatak te dispoziciju prema kojoj su trebali organizirati izvozni postupak vodenih pumpi iz školske radionice u poduzeće ITC d.o.o. iz Zenice u Bosni i Hercegovini. Cjelokupna dokumentacija od „CMR-Međunarodnog teretnog lista“ pa sve do „Izvozne deklaracije“ se izrađivala putem informacijskog sustava **„eCarinskiOtpremnik“.**

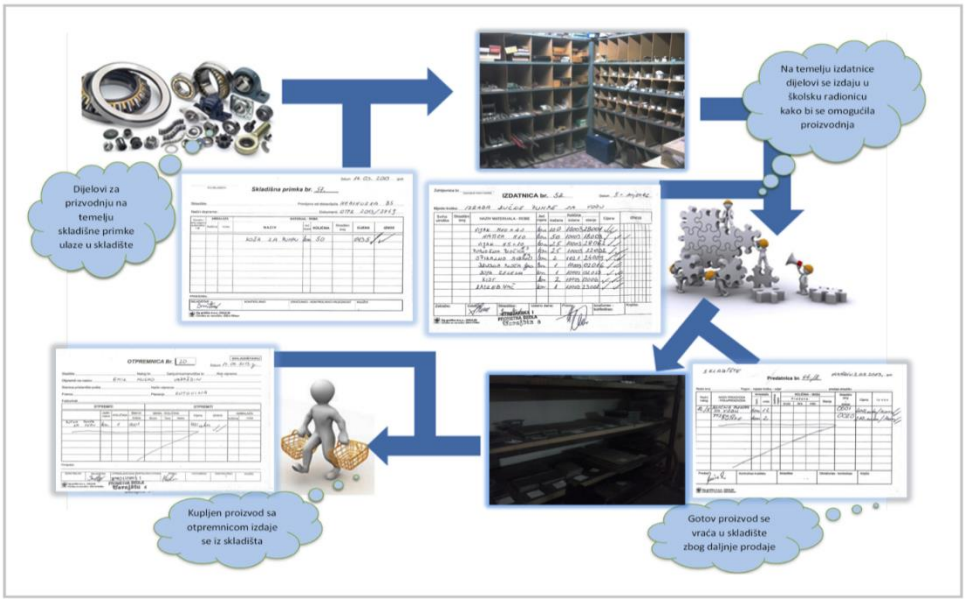
Na kraju izvoznog posla voditelj izvoza je izradio fakturu u programu **„eCarinski Otpremnik“**, zatim je fakturu proslijedio voditelju računovodstva koji ju je unio u knjigovodstveni program **„DBstudio“** i proslijedio nalogodavatelju (Strojarska i prometna škola).

Kao što je već navedeno, u sklopu škole nalazi se i skladište u koje se skladišti roba koju učenici obrtničkih zanimanja, zajedno sa majstorima, proizvode za daljnju prodaju . Također, skladište se i materijali koji su potrebni za proizvodnju te robe. Za prodaju se nude mnogobrojni proizvodi, a neki od njih su: vrtna pumpa, roštilj, peke, rešetke ložišta, ploče štednjaka, dimna vratašca, šahtovi zavarene izvedbe, ormarići za vatrogasne aparate, školske klupe i stolice, ograde zavarenih izvedbi, metalna građevinska galanterija i drugo. Učenici vježbeničke tvrtke sudjeluju u radu skladišta tako da za vrijeme svojeg radnog vremena pomažu kod prijema i otpreme robe.

Nažalost, u školskom skladištu se sve obavlja ručno i u papirnatom obliku te se ne može reći kako školsko skladište prati razvoj modernih tehnologija sa područja skladištenja, ali isto tako u skladištu se skladište jako male količine robe tako da se ni ne primjećuju nedostaci takovog načina poslovanja.

Tehnika skladištenja vrtne pumpe i dijelova potrebnih za proizvodnju

Cjelokupan shematski prikaz postupka skladištenja u vježbeničkoj tvrtki „LOGO-šped d.o.o.“ te u školskom skladištu je prikazan na *slici 5.*



Slika 5. Tehnika skladištenja vrtne pumpe i dijelova potrebnih za proizvodnju

Iz shematskog prikaza se može zamijetiti kako je učenik iz odjela logistike zajedno sa skladišnim osobljem primio u skladište dijelove potrebne za proizvodnju vrtne pumpe na temelju skladišne primke. Skladišna primka je dokument preko kojega se roba, kupljena od dobavljača (Međimurka BS), zaprima u skladište. Zatim su se iz skladišta, uz izdatnicu, izdali potrebni dijelovi za proizvodnju u školsku radionicu. Izdatnica je dokument kojim se razdužuje skladište robe, a pri tome ta roba ima status potrošnog materijala. Nakon što su potrebni materijali izdani školskoj radionici, kreće proizvodnja same vrtne pumpe, a nakon završene proizvodnje vrtna pumpa se vratila u skladište kao gotov proizvod te je bila spremna za prodaju. Vrtna pumpa se iz školske radionice u skladište unijela na temelju predatnice. Predatnica je dokument kojim se predaje gotov proizvod iz proizvodnje i zaprima se u skladište gotovih proizvoda. Na samom kraju procesa skladištenja, kada je klijent (Emil Mucko) kupio vrtnu pumpu, ona se iz skladišta izdala na temelju otpremnice.

Kao što je već spomenuto u vođenju skladišta ne koriste se računalni programi, već se koristi klasični način poslovanja. Da bi se u svakom trenutku znalo koja se roba nalazi u skladištu, postoje skladišne kartice. Na skladišnoj kartici svakog pojedinog proizvoda i materijala može se vidjeti kronologija svih njihovih ulaza i izlaza u/iz skladišta. Školska vježbenička tvrtka je uspjela nabaviti skladišni program Victory sa kojim će poboljšati poslovanje skladišta.

3. Zaključak

Poslovanje bez primjene informacijskih sustava je u današnjim uvjetima rada teško pronaći u bilo kojoj gospodarskoj djelatnosti, a osobito u dinamičnoj interdisciplinarnoj djelatnosti kao što je logistika. Primjena informacijskih tehnologija i sustava bitno utječe na porast produktivnosti i učinkovitosti, uštedu troškova poslovanja i uštedu vremena u poslovnom ciklusu te na podizanje razine usluga. Uz pomoć informacijskih sustava djelatnost logistike povezuje cjelokupno poslovanje: proizvodnju, nabavu, skladištenje, prodaju, distribuciju te druge prateće poslovne funkcije. Danas se u djelatnosti logistike i špedicije najučestalije koriste EDI, GSM, GPS i WMS sustavi koji se međusobno povezuju u cjelovite informacijske sustave te se mogu nadograđivati ITS aplikacijama.

U vježbeničkoj tvrtki Strojarske i prometne škole iz Varaždina koja djeluje pod nazivom „LOGO-šped d.o.o.“ i čija je osnovna djelatnost logistika i špedicija koristi se logistička platforma „TimoCom“, informacijski sustav „Mobilisis“ i „eCarinskiOtpremnik“ te knjigovodstveni program „DBstudio“. Njihova primjena omogućuje pretraživanje burze tereta, praćenje i upravljanje voznim parkom škole i jedne realne tvrtke, obavljanje carinskih procedura i knjigovodstvenih poslova u vježbeničkoj tvrtki.

Napredak u korištenju informacijskih sustava u vježbeničkoj tvrtki može se ostvariti osnivanjem većeg broja vježbeničkih tvrtki u školama obrazovnog sektora promet i logistika sa ciljem da se poveća broj korisnika i primjera poslovnih aktivnosti te da se prošire baze podataka. Također skladišni prostor vježbeničke tvrtke bi se trebao osuvremeniti i opremiti modernim tehnologijama.

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Authors:

Vlatka Slunjski Piskač, B.Sc. Ing. Traffic

Darinka Lončar Kočić, mag. ing. traff.

STROJARSKA I PROMETNA ŠKOLA VARAŽDIN

4. APPLICATION OF INFORMATION SYSTEMS IN THE SCHOOL TRAINEE COMPANY "LOGO-Šped d.o.o."

Summary:

It is difficult to find business without the application of information systems in any economic activity in today's working conditions, especially in dynamic interdisciplinary activities such as transport and logistics. The application of information technologies and systems has a significant impact on increasing productivity and efficiency of business, by saving business costs and time in the business cycle and raising the level of services. In the activities of transport and logistics, IT support has a wide application because business processes in these activities require fast, accurate and useful real-time information in different spatial and temporal locations. Today, this support is provided by various information systems with a tendency to grow into "intelligent transport systems".

With information systems in day-to-day operations of transport and logistics companies, it is indispensable to have a workforce with appropriate competencies. The preparation of future workers for real-world inclusion in real-world jobs must be achieved in a similar environment on similar information systems as those found in transport and logistics companies. This fact was recognized by The Mechanical Engineering and Transport School by establishing a trainee company which was created during the implementation of the project "Innovative Methods in Practical Training by Introducing Transport and Freight-Forwarding Training Firm", with the abbreviated name "VTT-Firm". The trainee company has been located in an equipped classroom that simulates the office, while the students replace their role with the workers of a real company and the teacher becomes the coordinator and controller of the whole process.

This paper presents the information systems that have been used in one trainee company in Croatia, with the aim of showing the procedure of using information systems in the trainee company "LOGO-šped d.o.o.".

Keywords: practical training, trainee company, transport and logistics, information systems, logistics platform, navigation device

1. Introduction

In Croatia, the practical training of students in the education sector of transport and logistics in the professions Road Transport Technician, Logistics and Freight Forwarding Technician and Motor Vehicle Driver is partly conducted through practical classes within the school, but also outside school in the companies which work in the field of transport and logistics. Practical classes that take place within the school are organized in the premises of a school trainee company located in a specialized classroom equipped with equipment and information systems that are also found in real companies in the traffic and logistics industries.

2. Application of information systems in The Mechanical Engineering and Transport School trainee company

Many companies in the logistics and freight forwarding industries use different information systems in their daily operations and their employees are educated to work in these information systems. The problem occurs when the students, that are just being educated for occupations in the logistics industry, are not familiar with the information systems. More so, every company when hiring new workforce wants to hire an already skilled worker who knows to work in certain business processes and modern technologies.

This problem was recognized by schools that educate students in the field of traffic and logistics. Thus, in 2012, The Mechanical and Transport School in Varaždin with its partners – The School of Economics in Čakovec, The School of Road Transport Zagreb and The Electrical and Transport School Osijek, started the IPA project **"Innovative Methods in Practical Training by Introducing Transport and Freight-Forwarding Training Firm"– VTT-Firm"**. About 350 students and three companies were involved in the project – Kos transporti d.o.o. from Varaždin, Gebrüder Weiss from Zagreb and City Passenger Transport Ltd. from Osijek. The aim of the project was to increase teachers' abilities and material conditions in transport and logistics education sector of the partner schools with the purpose of improving students' knowledge and skills by conducting practical classes in virtual trainee companies.

It is very important to mention that after conducting practical classes in a trainee company, students can use highly sophisticated equipment and very specific computer programs. In this case, through work in a trainee company, students use information systems that support customs operations, fleet monitoring and fleet management systems, a tachograph data processing

system, the applications for monitoring the cargo/vehicle exchange and free storage areas, and bookkeeping programs.

As an example of the information systems application, we will be looking into the trainee company of The Mechanical Engineering and Transport School called "LOGO-šped d.o.o.". The trainee company **"LOGO-šped d.o.o."** is located in the specialized computer classroom for transport and logistics that is equipped with all the necessary information technology, and every workplace usesinformation systems necessary to perform certain work tasks. The main activity of the trainee company is conducting services in the field of logistics and freight forwarding.

In addition to information systems, the trainee company has at its disposal a cargo vehicle with a trailer which is being used in school's driving school, ten vehicles from a real sector company and a school warehouse. The organization of the work is divided into two basic departments, the general affairs department and the logistics and freight forwarding department, which employ a total of 15 employees this school year.

2.1. Information systems in the trainee company "LOGO-šped d.o.o."

By reducing the use of paperwork, programs have been introduced into the company's business which allows faster and easier exchange of data between companies. Like any company, the trainee company "LOGO-šped d.o.o." uses programs in its work to make it easier for students to work, and therefore introduces them to programs used in real sector companies. Some of the programs are: TimoCom, Mobilisis, CVS, eCarinskiUpnik, DBstudio I Victory.

Logistics platform "TimoCom"

The main reason for the establishment of the TimoCom platform was the cargo exchange, which would reduce the empty driving of trucks. Over time, TimoCom has developed other services such as:

- TC eMap - with the help of a route planner, a transport route for a particular route can be calculated directly from the cargo exchange and loading bays, while at the same time all related driving costs and other accompanying costs can be calculated. IT service provider TimoCom has also started offering an integrated tracking solution that allows the use of different telematic systems on one platform. The aim of this service is to increase safety while transporting and to help all companies involved in transport to have greater transparency, visibility, and better communication. It uses one of the telematic systems called Mobilisis, which now participates with its GPS systems.
- TC eBid - a platform for transport tenders across Europe.

After registration, TimoCom users monthly pay for the service and receive authorized access to the system through a certain number (three) of computers.

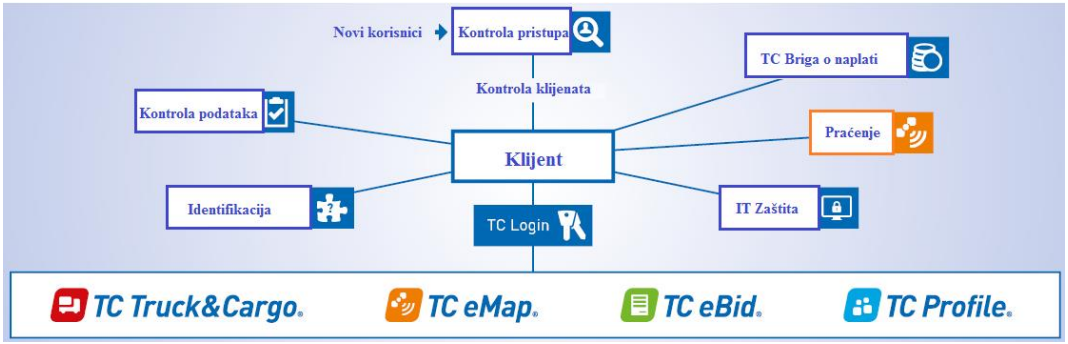

Image 1. Modules and method of registration within the logistics platform "TimoCom"

Information system "Mobilisis"

Mobilisis is a system that has wide application and is primarily intended for companies with their own fleet. The Mobilisis system is mainly used to track vehicles in real time. It represents an intelligent system for fleet management, optimization, monitoring, and administration. The system enables generating reports that cover all aspects of the fleet that are of great importance: fuel consumption, mileage per vehicle and per driver, speeding, viewing, and driving statistics, an overview of detected alarm situations, an overview of registration expiry, upcoming services, costs per vehicle and much more.

The Mobilisis system is available to anyone from any computer with the appropriate name and password. For each user account, the data necessary only for the performance of work can be determined. Thus, for example, it can be determined that accounting sees only costs and travel bills, and disponents only see their vehicles and travel worksheets. Likewise, customers can track the vehicle carrying their shipment in real time.

In addition to the above information system, another intelligent and telecommunication fleet management system is used in the trainee company called **CVS Mobile.**

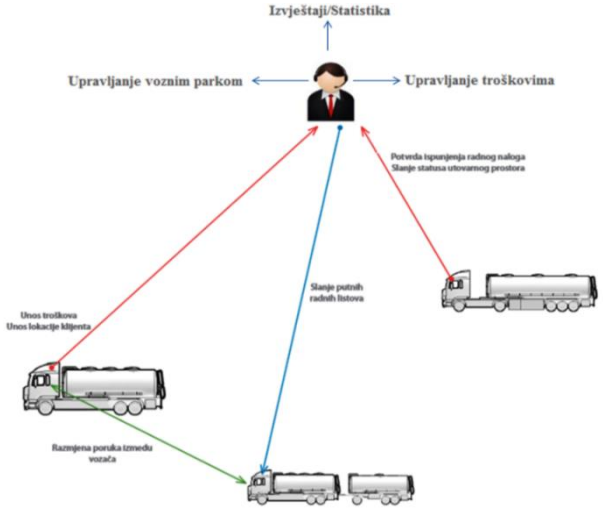

Image 2. Features of the information system "Mobilisis"

Information System eCarinskiOtpremnik

The company Nova ICT has created the information system "eCarinskiOtpremnik - eCO" which is used in more than a hundred Croatian companies. The application contains all forms of customs operations with goods.

Some of the highlights of this application:

- all customs procedures and non-tariff (commercial) invoicing modules are included;
- customs tariff with a built-in tax tariff and all special taxes, permits;more than a hundred prescribed forms in PDF format (JCD, DCV, EUR.1, CMR, CIM,);
- examples of administrative proceedings: applications, requests, etc.;
- each module of individual customs procedures may be used separately;
- the data is inherited from a document to document, regardless of the order in which the documents are created and regardless of the type of a document (external, internal, customs, etc.);
- connection of the information system with the information system of the Customs Administration of the Republic of Croatia.

It is important to note that the possibility of connecting the information system (IS) of the trainee company with the IS Customs Administration of the Republic of Croatia is very useful because the students are given the opportunity to check the produced documents by the Customs Administration itself.

All the above features of this application are visible to the user through the modules in Table 1. Through the presented modules, the user chooses which tasks to perform electronically.

Table 1. eCarinski Otpremnik – Modules

eCarinski Otpremnik – MODULI
CARINSKI POSTUPAK • UVOZ • PROVOZ (NCTS) • UNUTARNJA PROIZVODNJA • IZVOZ • VANJSKA PROIZVODNJA • CARINSKO SKLADIŠTENJE
OVLAŠTENI GOSPODARSKI SUBJEKTI • OVLAŠTENI PRIMATELJ • OVLAŠTENI POŠILJATELJ
KOMERCIJALNI POSTUPCI • POZICIJE • FAKTURNI NALOG • FAKTURIRANJE
OPCIONALNI MODULI • SLANJE FAKSA-A INTERNET SERVISOM • SLANJE SMS-A INTERNET SERVISOM

Bookkeeping program DBstudio

The DBstudio program is a bookkeeping program that provides financial accounting, commodity bookkeeping, salary calculation, overview of basic funds, and entry of travel orders. In the trainee company „LOGO-šped d.o.o." it is most often used for creating invoices, monitoring revenues and expenses, making payroll for individual jobs and for entering travel orders.

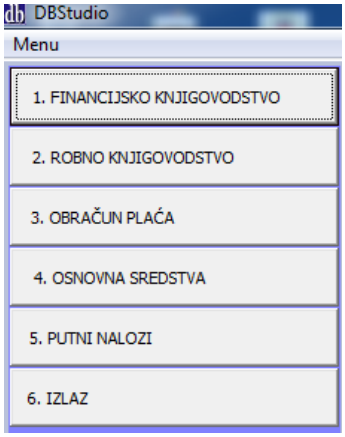

Image 3. DBstudio Interface

The procedure for using information systems in the trainee company "LOGO-šped d.o.o."

The full schematic representation of the procedure for the use of information systems in the trainee company "LOGO-šped d.o.o." is shown in the following *Image 4.*

From the schematic representation it can be noted that the student (head of the logistics department) first announced the offer of free loading space of the Renault Midlum truck, which is owned by the school's driving school. The offer was announced on the logistics platform **"TimoCom".**

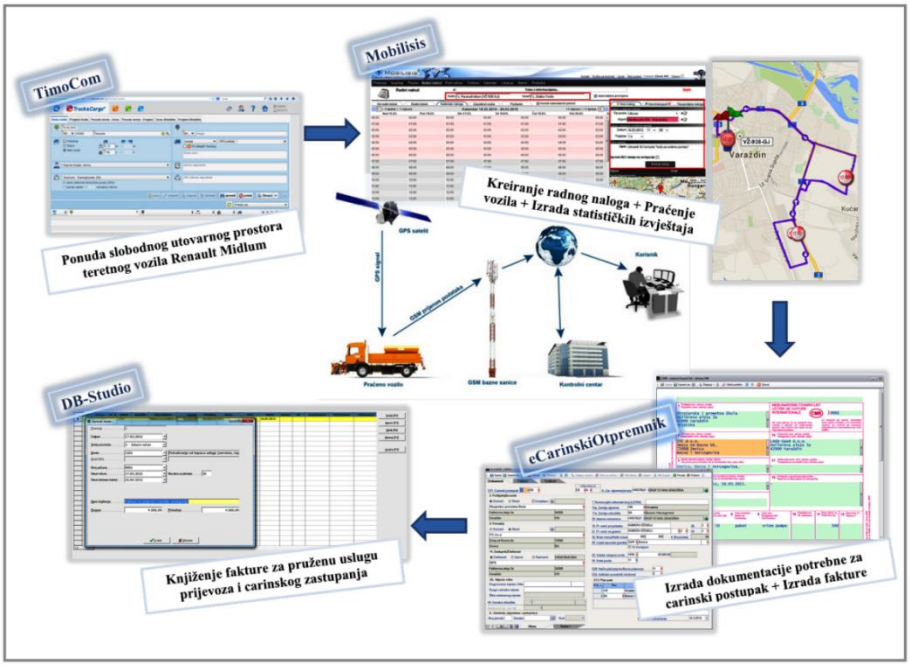

Image 4. The procedure for using information systems in the trainee company "LOGO-šped d.o.o."

During the working day, the deputy head of the logistics department got a task of organizing the purchase of parts necessary to produce water pumps in the school workshop. The parts should have been bought from the company Međimurka BS situated in nearby Čakovec. Međimurka BS had been in a long-term cooperation with The Mechanical Engineering and Transport School, and it was only necessary to announce the truck arrival to their branch located in Varaždin over the phone. Based on the abovementioned order, the logistics department sent the necessary transport order to navigation using the information system **"Mobilisis"**, which is in the Renault Midlum vehicle.

During the performance of the transport task, the vehicle was monitored through **„Mobilisis"** and the logistics department informed the school storage staff about the imminent arrival of the school vehicle so they could be prepared in time for the unloading of the vehicle.

On the same day, the export department received a work assignment and a disposition according to which they were to organize the export procedure of water pumps from the school workshop to the company ITC d.o.o. from Zenica in Bosnia and Herzegovina. The entire documentation, from the "CMR-International Consignment Note" to the "Export Declaration", was produced through the information system **"eCarinskiOtpremnik"**.

At the end of the export, the export manager created an invoice in the program **"eCarinskiOtpremnik" ("eCarinski Shipper"),** then forwarded the invoice to the head of accounting who entered it into the bookkeeping program **"DBstudio"** and forwarded it to the principal (The Mechanical Engineering and Transport School).

As already noted, within the school there is also a warehouse where goods are stored. The goods have been produced for further sale by students of craft professions, together with their teachers. Also, the materials necessary to produce these goods are stored in this warehouse. Numerous products are offered for sale, some of them are a garden pump, a barbecue, a baking lid, grills, firebox grills, stove panels, smoke doors, manholes of welded design, cabinets for fire extinguishers, school benches and chairs, fences of welded design, metal construction accessories and others. Students of the trainee company work in the warehouse by helping with the reception and shipment of goods during their working hours.

Unfortunately, here everything is done manually and in paper form, and it cannot be said that the development of modern technologies in the field of storage is being followed. However, since very small quantities of goods are stored in the warehouse, the disadvantages of such a way of doing business are not even noticed.

Storage technique of a garden pump and parts necessary for its production

From the schematic representation (Image 5) we can notice that the student from the logistics department and the warehouse staff received the parts necessary for the manufacture of the garden pump in the warehouse based on a warehouse receipt. The warehouse receipt is a document through which goods, purchased from suppliers (Međimurka BS), are received in the warehouse. Next, together with the delivery note, the necessary parts for the production were issued from the warehouse to the school workshop. The delivery note is a document that

deleverages the goods in the warehouse, and they are considered to be consumable goods. After the necessary materials were issued to the school workshop, the production of the garden pump began; and after the production was completed, the garden pump returned to the warehouse as a finished product and was ready for sale. The garden pump was brought into the warehouse from the school workshop based on the delivery note which stated that the finished product was released from the production and received in the warehouse as a finished product. At the very end of the storage process, when the client (Emil Mucko) bought the garden pump, it was issued from the warehouse based on a bill of lading.

The entire schematic representation of the storage process in the trainee company "LOGO-šped d.o.o." and in the school warehouse is shown in Image 5.

As already mentioned, computer programs are not used in the management of the warehouse, but the old-fashioned ways of doing business. Storage cards are used to always know what goods there in the warehouse are. A storage card of any individual product and material shows the chronology of all their entrances and exits to/from the warehouse. The school trainee company was able to acquire Victory warehouse program which will improve operations in the warehouse.

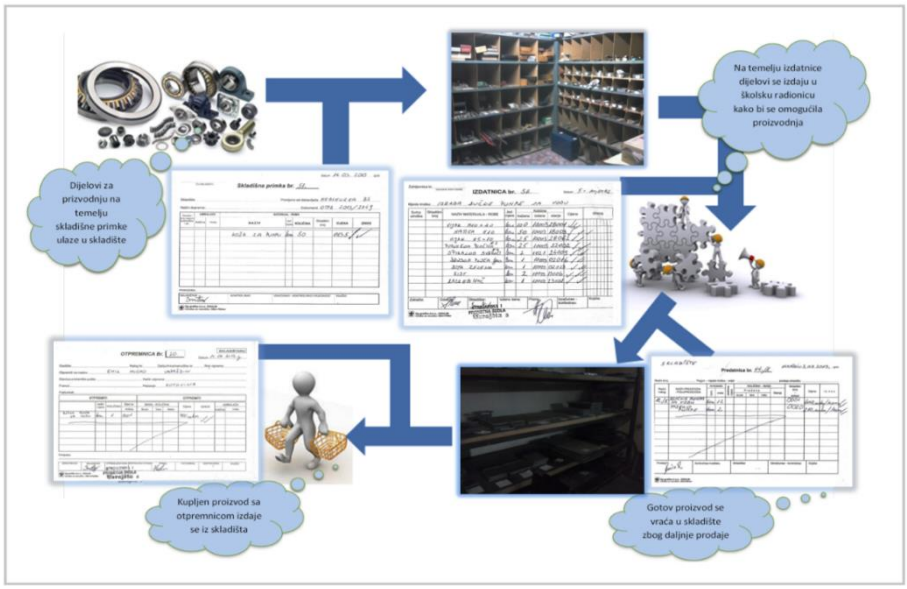

Image 5. Storage technique of a garden pump and parts necessary for its production

3. Conclusion

It is difficult to find business without the application of information systems in any economic activity in today's working conditions, especially in dynamic interdisciplinary activities such as transport and logistics. The application of information technologies and systems has a significant impact on increasing productivity and efficiency of business, by saving business costs and time in the business cycle and raising the level of services. By using information systems, logistics activities connect all the phases of the business: production, procurement, storage, sales, distribution, and other supporting business functions. Today, EDI,

GSM, GPS, and WMS systems are most frequently used in logistics and freight forwarding activities. They connect into complete information systems and can be upgraded with ITS applications.

The logistics platform "TimoCom", the information systems "Mobilisis" and "eCarinskiOtpremnik" and the bookkeeping program "DBstudio" are used in the trainee company of The Mechanical Engineering and Transport School from Varaždin, which operates under the name "LOGO-šped d.o.o." and whose main activity is logistics and shipping. Their application allows searching the cargo exchange, monitoring the vehicle fleet of the school and one real sector company, performing customs procedures and bookkeeping. Progress in the use of information systems in a trainee company can be made by setting up more trainee companies in schools of the education sector transport and logistics, with the aim of increasing the number of users and examples of business activities and expanding databases. Also, the warehouse of the trainee company should be modernized and equipped with modern technologies.

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Autori:
Renata Heljić dipl. ing. - prof. mentor
Željka Turković dipl. oecc. – nastavnica strukovnih predmeta

ŠKOLA ZA CESTOVNI PROMET
Trg J.F.Kennedyja 8, Zagreb

5. Digitalizacija nastavnih procesa kao rezultat projekta „LOG-IN“

Sažetak:

Škola za cestovni promet iz Zagreba sudjeluje kao partner u projektu “LOG-IN" u sklopu programa Europske unije Erasmus+ .

Nositelj projekta je BGZ Berliner Gesellschaft für Internationale Zusammenarbeit mbH iz Berlina koji svojim višegodišnjim iskustvom i radom na projektima nastoji ostvariti ideju o uspostavi strateškog partnerstva između ustanova za strukovno obrazovanje i visokog školstva kako bi razmjenom dobre prakse i digitalnih tehnoloških inovacija u strukovnom obrazovanju ojačali njihove međusobne veze i suradnju. Osim Škole za cestovni promet i Fakulteta prometnih znanosti iz Zagreba, nositelju projekta iz Berlina partneri su: Oberstufenzentrum Logistik, Touristik und Steuern iz Berlina, Njemačka; STC Group, iz Rotterdama, Nizozemska; Poznan University of Technology, te Zespół Szkół nr 2 im. Przyjaźni Polsko – Norweskiej iz Poljske.

Cilj projekta "LOG-IN" je jačanje uključivanja digitalnih tehnologija, procesa i aplikacija u programe strukovnog obrazovanja i osposobljavanja u području prometa i logistike. Rezultati projekta su modernizacija poučavanja, podizanje kvalitete i atraktivnosti strukovnog obrazovanja, razmjena znanja, iskustava, te izrada nastavnih materijala koje će koristiti učenici u programima prometa i logistike svih partnerskih zemalja. Važan rezultat je i internacionalizacija škole kao i jačanje suradnje s partnerskim školama u tom obrazovnom sektoru, s Fakultetom prometnih znanosti, te sa tvrtkama koje se bave prometom i logistikom.

Ključne riječi:

- Program za cjeloživotno učenje – Program Erasmus+
- Digitalizacija nastavnih procesa

Digitalizacija nastavnih procesa kao rezultat projekta „LOG-IN“

1. O projektu

Nositelj projekta je BGZ Berliner Gesellschaft für Internationale Zusammenarbeit mbH iz Berlina koji svojim višegodišnjim iskustvom i radom na projektima nastoji ostvariti ideju o uspostavi strateškog partnerstva između ustanova za strukovno obrazovanje i visokog školstva kako bi razmjenom dobre prakse i digitalnih tehnoloških inovacija u strukovnom obrazovanju ojačali njihove međusobne veze i suradnju.

Cilj projekta je značajno ojačati digitalne vještine polaznika u obrazovanju i osposobljavanju u sektoru prometa i logistike, kako bi se mladi stručnjaci pripremili za zahtjeve koje pred njih stavlja digitalno radno okruženje. Posebni ciljevi su jačanje kapaciteta strukovnih nastavnika i promicanje suradnje među obrazovnim institucijama srednjeg i visokog obrazovanja, te internacionalizacija strukovnih škola. Partneri na projektu su strukovne škole i sveučilišta iz Njemačke, Nizozemske, Poljske i Hrvatske s dugogodišnjim iskustvom poučavanja u području prometa i logistike.

Partneri zajednički razvijaju matricu kompetencija za područje digitalne logistike, model digitalnog poučavanja u logističkim zanimanjima, nastavne jedinice za učenje, te edukaciju za nastavnike.

Projekt je započeo je 1.studenog, 2019., a trajanje mu je zbog pandemije produljeno do 31. kolovoza, 2022.godine.

2. Izrada nastavnih tema/nastavnih jedinica u sklopu projekta LOG-IN

2.1. Matrica kompetencija i nastavne teme

U skladu s ciljevima projekta bilo je potrebno odrediti nastavne teme koje će biti korisne svim partnerima. U tu svrhu najprije smo sastavili matricu kompetencija u kojoj su navedena znanja i vještine koje su ujednačene kod svih partnera u području logistike. Unatoč tome, obzirom na specifičnost zanimanja u pojedinoj zemlji partnera, ideja je prikupiti materijale, a svaki partner će koristiti materijale za nastavnu jedinicu prema potrebi i planu. Nakon izrade matrice dogovorene su slijedeće teme:

1. Organizacija prijevoza

2. Upravljanje prijevoznim procesima

3. Skladišno poslovanje

4. Istraživanje tržišta i poslovne komunikacije

Partneri iz Berlina su prikupili materijale i digitalizirali nastavne sadržaje iz područja skladišnog poslovanja.

Škola za cestovni promet digitalizirala je nastavne sadržaje iz područja Organizacije prijevoza i Upravljanje prijevoznim procesima dok se teme vezane za istraživanje tržišta i poslovne komunikacije prožimaju kroz navedene nastavne teme.

U dogovoru s partnerima iz Berlina materijale smo prikupljali u digitaliziranom obliku u aplikaciji ThingLink, a svaki partner je svoj rad dijelio na platformi koja je dostupna svim partnerima na projektu.

Svoje teme Škola za cestovni promet obradila je kroz tri osnovne cjeline:

1. Planiranje prijevoza
2. Prijevozna dokumentacija
3. Manipuliranje teretom

2.2. Struktura nastavnih cjelina-priprema za nastavu

Za navedene cjeline prikupljeni su digitalizirani materijali i izrađena je struktura nastavnih cjelina kao priprema za izvođenje nastavnih procesa.

Sve tri cjeline u ukupnom su trajanju od 34 sata i odnose se na stjecanje teoretskog znanja i stjecanje vještina kroz praktičan rad. Na kraju obrade pojedine nastavne teme učenici imaju mogućnost samoprocjene kroz rješavanje online kvizova, a nastavnik ima mogućnost provjere stečenih znanja i vještina učenika kroz rješavanje problemskih zadataka.

Nastavna cjelina Planiranje prijevoza odnosi se većinom na stjecanje teoretskog znanja učenika kroz različite prezentacije i video isječke u ukupnom trajanju od 12 sati. U tih 12 sati učenici prolaze kroz 3 koraka:

1. Organizacija i planiranje prijevoza
2. Dokumentacija u transportu
3. Manipuliranje teretom

Ishodi u ovoj cjelini su:

- Učenici mogu organizirati prijevoz
- Učenici razlikuju vrstu tereta koji se prevozi
- Učenici razlikuju dokumentaciju koja prati proces prijevoza i robu
- Učenici razumiju važnost poštivanja dogovorenih rokova

U nastavnoj cjelini Dokumentacija u prijevozu učenici tijekom 7 sati kroz tri koraka stječu većinom praktično znanje i ovladavaju vještinom ispunjavanja dokumenata u prijevozu:

1. Vrste dokumenata
2. Dokumenti u internacionalnom prijevozu
3. Incoterms

U ovoj nastavnoj cjelini postižu se slijedeći ishodi:

- Učenici razlikuju dokumente kod pojedine vrste prijevoza
- Učenici mogu pravilno popuniti potrebnu dokumentaciju

Nastavna cjelina Manipulacija teretom odvija se u 4 koraka u ukupnom trajanju od 15 sati u kojima učenici stječu teoretska znanja, ali u većini vremena svladavaju vještinu manipulacije teretom:

1. Upotreba paleta i kontejnera
2. Poznavanje teretne mehanizacije
3. Utovar i istovar tereta
4. Smještaj i osiguravanje tereta u vozilu

Ova nastavna jedinica sadrži slijedeće ishode:

- Učenici znaju odabrati odgovarajuću opremu i znaju postupak za pripremu tereta za prijevoz
- Učenici znaju kako pakirati teret za prijevoz
- Učenici razlikuju različita sredstva manipulacije i znaju koristiti teretnu mehanizaciju u školskom praktikumu

Items	Description	Comments or possible alternative suggestions
Organization of transport	Students will learn about organization of transport in general -types od transport and transport planning. Students will analyze stages of transport proces and select optimal vehicle and route concerning safety procedures and using new technologies.	
Brief description	Topics deals with the field of transport organization through the application of modern digital systems used in transport, organization and planning of transport and selection of means of transport. Student will use ThingLink application and through ppt presentations, document examples,video-links, searching and exploring the web they will get acquainted with the topic. After each part of learning unit students can do the self evaluation trough the quiz. Finally they will solve the problem task – formative evaluation	
Duration	18 hours	
Learning objective	The student interprets the application of modern technology for organizing the transport by using digital tools.	
Learning contents	Freight and traffic analysis	
percentage ratio of theoretical knowledge – practical competences	75 % theoretical knowledge, 25 % practical competences	

Slika 1. Primjer strukture nastavnih jedinica

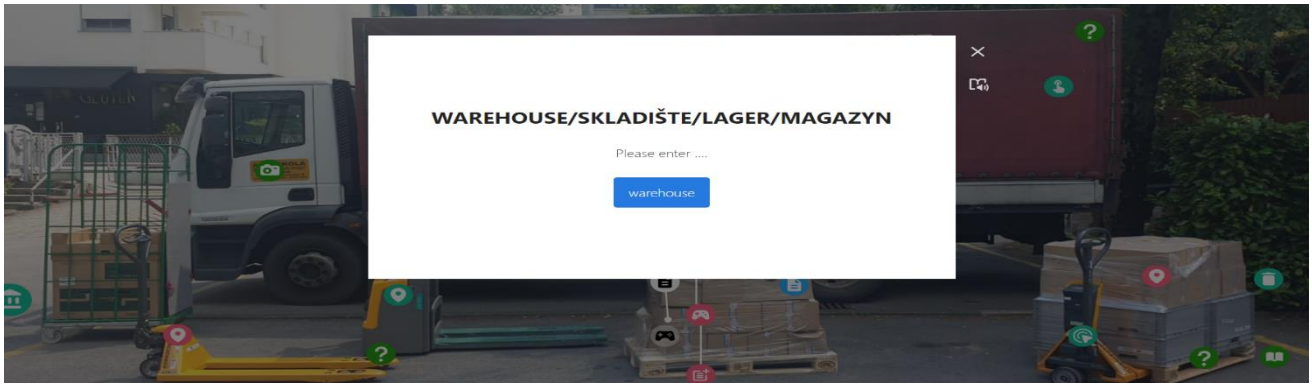
2.3. Digitalizacija prikupljenih materijala – ThingLink

Osnovni cilj ovog projekta odnosi se na digitalizaciju nastavnih sadržaja te smo u tu svrhu tražili adekvatan alat koji može zadovoljiti sve kriterije. Kriteriji kod odabira su bili dostupnost nastavnicima i učenicima, jednostavnost korištenja i mogućnost korištenja dosadašnjih prezentacija, video isječaka, online kvizova (npr. forms) i sl.

Sve ove kriterije zadovoljio je ThingLink te smo iz tog razloga odabrali ovu aplikaciju kao mjesto gdje ćemo pohraniti naše već postojeće materijale, a na kojem će učenici na nov i interesantan način moći tim istim materijalima pristupiti.

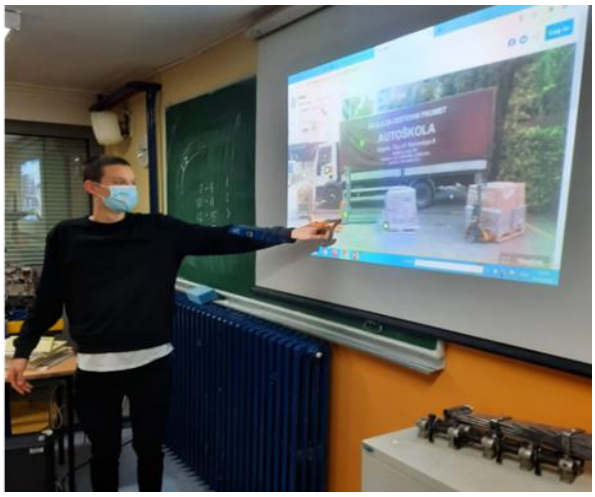
Slika 2. Početna stranica ThingLink – Organizacija prijevoza

Obzirom da su i kolege iz Berlina koristile ovu aplikaciju, na vrlo jednostavan način smo naše radove spojili te na taj način postigli da je koristeći jedan link moguće koristiti materijale i za Organizaciju prijevoza, ali i za Skladišno poslovanje.



Slika 3 Pristup stranici za Skladišno poslovanje

Po završetku stranice svoj rad smo prezentirali strukovnim nastavnicima u našoj školi. Povratna informacija bila je zadovoljavajuća, nastavnici su pokazali interes za rad u aplikaciji i za korištenje materijala na ovoj stranici. Osim ovih materijala, nastavnici su iskazali interes koristiti ThingLink za vlastite materijale.


Slika 4. Korištenje ThingLinka u nastavi - Dani Erasmusa

Tijekom Dana Erasmusa koje smo obilježili u našoj školi, učenici su imali priliku prisustvovati nastavi na kojoj su koristili materijale u ThingLinku i upoznali su se s ovakvim načinom izvođenja nastave. Tijekom izvođenja nastave vidjeli smo njihov interes i znatiželju i dobili smo pozitivne reakcije. Osim toga, ne očekujemo otpor spram nepoznatog jer se koristeći ovu aplikaciju susreću s PowerPoint prezentacijama, kvizovima u Forms-u i ostalim online formama za kvizove, Youtube filmovima i drugim njima poznatim načinima izvođenja nastave.

2.4. Uvođenje i upotreba WMS sustava u nastavi

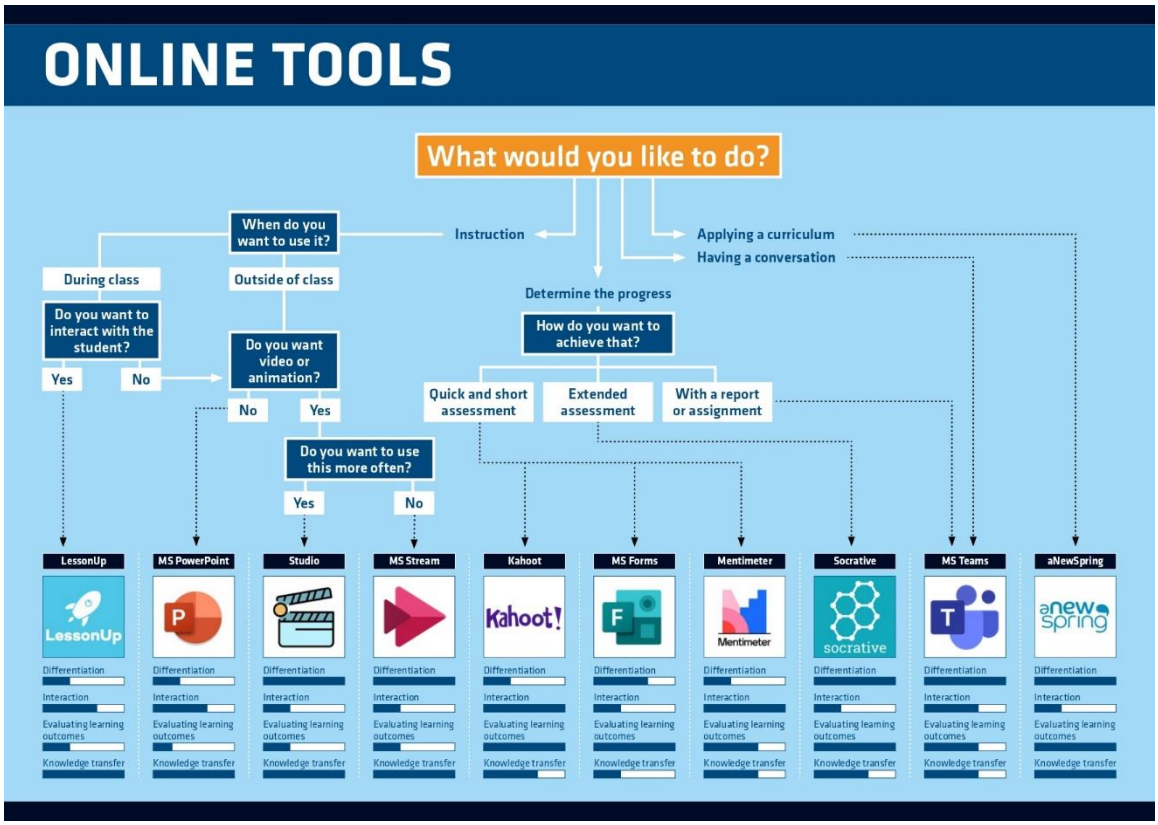
Jedan od rezultata projekta je uvođenje WMS sustava. Sustav koji uvodimo prilagođen je isključivo za korištenje u nastavi te je zbog toga jednostavan za korištenje i ne zahtijeva dodatnu računalnu opremu.

Ovaj sustav je izuzetno koristan, jer unatoč tome što je prilagođen nastavnom procesu, vrlo reprezentativno prikazuje odvijanje procesa u WMS sustavima kakve koriste tvrtke. Smatramo da je ovaj sustav neophodan za pripremu učenika za tržište rada, jer osim teoretskog znanja učenici će imati mogućnost stjecanja praktičnog znanja i vještina. Imati će mogućnost upoznati se s procesima koji su nužni za organizaciju prijevozničkog poslovanja.

Jednim od prethodnih Erasmus projekata opremili smo logistički praktikum u koji će se ovaj sustav savršeno uklopiti i zaokružiti cjelokupni logistički proces.

3. Korištenje digitalnih alata u nastavi

Partneri iz Nizozemske bili su zaduženi za provedbu istraživanja koje će pokazati koje digitalne alate nastavnici najčešće koriste i u koju svrhu. Rezultati istraživanja pokazali su da za podučavanje u učionici, ali i na daljinu, nastavnici najčešće koriste slijedeće alate: LessonUp, MS Power Point, Studio i MS Stream. Za potrebe kratke i brze provjere usvojenosti nastavnih sadržaja koriste se Kahoot, MS Forms i Mentimeter. Za proširenu provjeru koriste alat Socrative, a za rješavanje problemskih zadataka ili pisanje izvještaja i direktnu komunikaciju s učenicima najčešće koriste MS Teams. Alat aNewSpring jednako dobro pokriva poučavanje kao i provjeru usvojenosti sadržaja.



Slika 5. Digitalni alati u nastavi

4. Prezentacija rezultata projekta nastavnicima

Rezultate projekta predstavili smo na stručnom skupu namijenjenom nastavnicima srednjih škola Hrvatske koji rade u sektoru prometa i logistike. Skupu je nazočilo pedesetak nastavnika koji su pokazali veliki interes za prezentirane sadržaje. Nakon upoznavanja s projektom i njegovim rezultatima, nastavnici su u radionicama mogli naučiti kako koristiti alat ThingLink te samostalno isprobati njegove mogućnosti. Na skupu je bio prezentiran i WMS sustav prilagođen korištenju u nastavi, te je organiziran obilazak digitaliziranog logističko distributivnog centra gdje su u razgovoru s predstavnicima tvrtke "Tokić" mogli čuti koje su vještine potrebne za rad u takvim centrima.

Nastavnici su vrlo visoko ocijenili skup i usprkos činjenici da koriste različite digitalne alate u svojoj nastavi velika većina se prvi puta susrela s alatom ThikgLink. Stoga im je radionica o korištenju ThingLinka bila posebno korisna. Izrazili su i potrebu za korištenjem WMS sustava te istaknuli činjenicu da je učenje kroz praktičnu nastavu izrazito važno za usvajanje digitalnih kompetencija potrebnih za rad u logistici.

Slika 6. Stručni skup strukovnih nastavnika

Slika 7. Radionica ThingLink na stručnom skupu strukovnih nastavnika

5. Prezentacija rezultata projekta predstavnicima tvrtki

Na skupu namijenjenom predstavnicima tvrtki nazočilo je tridesetak voditelja logističkih centara, ljudskih resursa, lanaca opskrbe, transporta i slično. Posebno je istaknuta tema digitalizacije, koja je prema komentarima predstavnika iznimno aktualna, te ju je potrebno nadograđivati kako bi tvrtke na hrvatskom logističkom tržištu bile konkurentne i na Europskom tržištu. U tom smislu razmatrani su različiti oblici suradnje vezani uz prijenos znanja između škole i tvrtki te je dogovorena suradnja u vidu različitih posjeta učenika logističkim centrima, praktična nastava za učenike te mogućnost praćenja, stipendiranja ili nagrađivanja izvrsnih učenika. Također je dogovorena suradnja u smislu edukacije nastavnika u tvrtkama s ciljem praćenja novih trendova i načina poslovanja u logističkim tvrtkama.

Slika 8. Predstavljanje projekta predstavnicima tvrtki

6. Zaključak

Projekt bliži svom završetku, a partneri iz Rotterdama završavaju rad na osmišljavanju edukacije za nastavnike u kojoj će sudjelovati nastavnici strukovnih predmeta partnerskih škola. Vjerujemo da će rezultati projekta doprinijeti modernizaciji poučavanja, a time i kvaliteti i atraktivnosti strukovnog obrazovanja. Razmjena znanja, iskustava, te izrada nastavnih materijala koje će koristiti učenici u programima prometa i logistike svih partnerskih zemalja pridonose internacionalizaciji škole i produbljuju suradnju s partnerskim školama u tom obrazovnom sektoru. Suradnja s tvrtkama, kao i sa Fakultetom prometnih znanosti, dobila je novu dimenziju i otvorila mnoga nova područja za buduću suradnju. Smatramo ovo samo početkom digitalizacije u nastavi logistike u našoj školi i radit ćemo kontinuirano na daljnjoj digitalizaciji i razmjeni iskustava.

7. Reference i literatura:

https://bgz-berlin.city-web.biz/

www.thinglink.com

Authors:
Renata Heljić grad. eng. – prof. mentor
Željka Turković grad. oecc. – teacher of vocational subjects

ROAD TRAFFIC SCHOOL, Zagreb
JFK Square 8, Zagreb

5. Digitalization in teaching as a result of „LOG-IN" project

Summary:

The Road Traffic School from Zagreb participates as a partner in the "LOG-IN" project within the European Union's Erasmus + program.

The project holder, "BGZ Berliner Gesellschaft für Internationale Zusammenarbeit mbH" from Berlin, with its yearlong experience and projects intends to realise the idea of establishing a strategic partnership between vocational education institutions and higher education in order to strengthen their mutual connections and collaboration through the exchange of good practice and digital technological innovations in vocational education. Apart from the Road Traffic School and the Faculty of Transport and Traffic Sciences in Zagreb, other partners of the Berlin's project holder are: Oberstufenzentrum Logistik, Touristik und Steuern from Berlin (Germany); STC Group from Rotterdam (the Netherlands); Poznan University of Technology, te Zespół Szkół nr 2 im. Przyjaźni Polsko – Norweskiej from Poland.

The goal of the "LOG-IN" project is to strengthen the inclusion of digital technologies, processes and applications in vocational education and training programs in the field of transport and logistics. The project results include modernization of teaching, raising quality and attractiveness of vocational education, exchanging knowledge and experiences, as well as creating teaching materials which the students of all partner countries will be using in traffic and logistics programs. Another important results includes internationalization of the school and strengthening cooperation with other partner schools in the field of education, with the Faculty of Transport and Traffic Sciences, as well as companies dealing with transport and logistics.

Keywords:
- Lifelong Learning Program - Erasmus + Program
- Digitalization in teaching

Digitalization in teaching as a result of „LOG-IN" project

1. About the project

The project holder, "BGZ Berliner Gesellschaft für Internationale Zusammenarbeit mbH" from Berlin, with its yearlong experience and projects intends to realize the idea of establishing a strategic partnership between vocational education institutions and higher education in order to strengthen their mutual practice connections and collaboration through the exchange of good practices and digital technological innovations in vocational education.

The aim of the project is to strengthen the digital skills of education and training's participants in the transport and logistics sector in order to prepare young professionals for the demands placed on them by the digital work environment. The specific objectives are to strengthen the capacity of vocational teachers, to promote cooperation between secondary and higher education institutions, and the internationalization of vocational schools. The project partners are vocational schools and universities from Germany, the Netherlands, Poland and Croatia, with their yearlong teaching experience in the field of transport and logistics.

The partners jointly develop a matrix of competencies for the field of digital logistics, a model of digital teaching in logistics professions, teaching units for learning and teachers' education.

The project started on the 1st November 2019 and due to pandemics its duration was extended until 31st August 2022.

2. Creation of teaching units as part of LOG-IN project

2.1. Matrix of competencies and teaching unit

Having in mind the project goals, it was essential to determine teaching topics useful to all partners. For this purpose we first created a matrix of competencies which included knowledge and skills harmonized with all our partners in the logistics area. Despite of that, considering certain specifics of professions in each individual partner country, the idea was to collect materials, with each partner using those materials with a teaching unit based on their needs and plans. After creating the matrix, the following topics were agreed upon:

1. Transport organization
2. Transport process management
3. Warehousing
4. Market research and business communication

Our partners from Berlin collected the materials and digitalized teaching units in the field of warehousing. The Road Traffic School digitalized teaching units in the fields of Transport

Organization and Transport Process Management, while topics related to market research and business communication are integrated in the mentioned teaching topics.

In accordance with our Berlin partners, we collected the materials in digitalized form with the help of ThingLink application, and each of the partners was sharing their work on a platform available to all project partners.
The Road Traffic School covered its topics through three basic units:

1. Transport planning
2. Transport documentation
3. Cargo manipulation

2.2. Teaching units' structure – preparation for teaching

Digitalized materials were collected for these units, and their structure was created as a preparation for teaching processes.

Duration for all three units is 34 hours which include acquisition of theoretical knowledge and skills acquired through practice. At the end of each teaching topic the students have the opportunity for self-evaluation through online quizzes, whereas the teacher has the opportunity to evaluate students' acquired knowledge and skills through problem-solving tasks.

Teaching unit *Transport planning* mostly refers to students' acquisition of theoretical knowledge through various presentations and videos in duration of 12 hours. During this time, the students go through 3 steps:

1. Transport organization and planning
2. Transport documentation
3. Cargo manipulation

This unit's outcomes are:

- Students can organize transport
- Students can distinguish the type of cargo being transported
- Students can distinguish documents necessary for transport and goods
- Students understand the importance of respecting deadlines

In the *Transport documentation* unit, students acquire mostly practical knowledge and skills of filling out transport documents, all covered in the following 3 steps (7 hours):

1. Types of documents
2. Documents in the international transport
3. Incoterms

This teaching unit has the following outcomes:

- Students can distinguish documents based on the transport type
- Students can fill out the necessary transport documents

Teaching unit *Cargo manipulation* included the following 4 steps (15 hours) where students acquire theoretical knowledge, but most of the time acquiring the skill of cargo manipulation:

1. Using pallets and containers
2. Understanding cargo mechanization
3. Cargo loading and unloading
4. Placing and insuring cargo in a vehicle

This teaching unit has the following outcomes:

- Students know how to choose the corresponding equipment and are familiar with the procedure of preparing cargo for transport
- Students know how to pack cargo for transport
- Students can distinguish different means of manipulation and know how to use cargo mechanization in school practicum

Items	Description	Comments or possible alternative suggestions
Organization of transport	Students will learn about organization of transport in general -types od transport and transport planning. Students will analyze stages of transport proces and select optimal vehicle and route concerning safety procedures and using new technologies.	
Brief description	Topics deals with the field of transport organization through the application of modern digital systems used in transport, organization and planning of transport and selection of means of transport. Student will use ThingLink application and through ppt presentations, document examples,video-links, searching and exploring the web they will get acquainted with the topic. After each part of learning unit students can do the self evaluation trough the quiz. Finally they will solve the problem task – formative evaluation	
Duration	18 hours	
Learning objective	The student interprets the application of modern technology for organizing the transport by using digital tools.	
Learning contents	Freight and traffic analysis	
percentage ratio of theoretical knowledge – practical competences	75 % theoretical knowledge, 25 % practical competences	

Picture 1: Example of a teaching unit structure

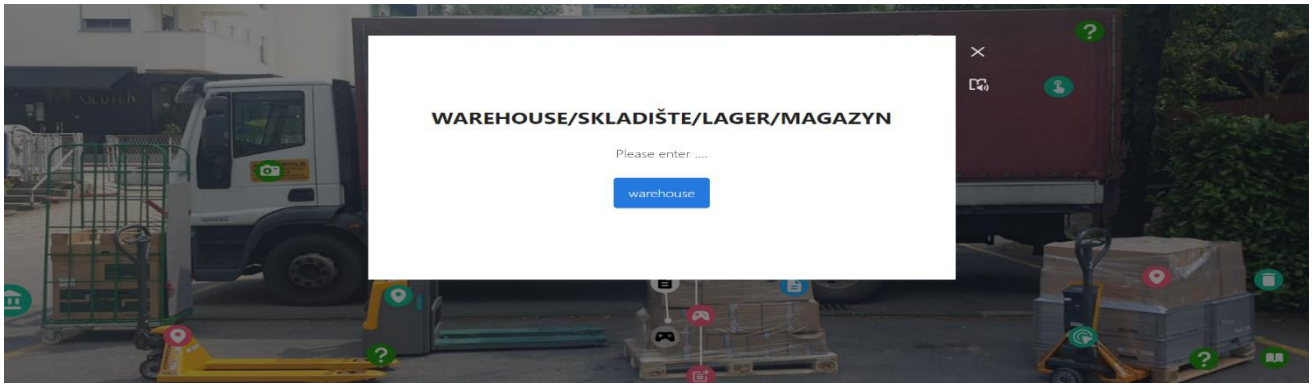
2.3. Digitalization of collected materials – ThingLink

The main of aim of this project refers to digitalization of teaching contents, which required an adequate tool to satisfy all the criteria: availability to students and teachers, user-friendly, possibility of using the existing presentations, videos, online quizzes (e.g. Forms) etc.

The application ThingLink satisfied all these criteria, and for that reason we chose this application as a location for storing all our existing materials, which our students could retrieve in a new and interesting way.

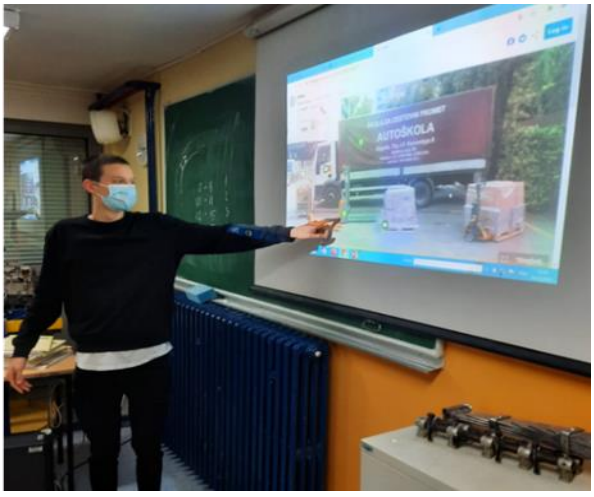
Picture 2: Cover page of ThingLink – Transport organization

Since our Berlin colleagues used this application, we attached our work as well, which resulted in having one link for using materials for both Transport organization and Warehousing.



Picture 3: Entering page for Warehousing

After finishing the web page, we presented our work to vocational teachers in our school. The teachers gave us positive feedback showing interest for using this application as well as the materials found on this page. Apart using the application for these materials, the teachers expressed their interest in using ThingLink for their own materials.



During the Erasmus Days organized in our school, students had the opportunity to attend classes where materials in ThingLink were used, getting themselves familiarized with this type of teaching. They expressed interest, curiosity and positive reactions. We did not expect any resistance to the unknown on their part, since using this application they can see the already familiar PowerPoint presentations, Forms and other types of quizzes, YouTube videos and other sources used in teaching so far.

Picture 4: Using ThingLink in teaching – Erasmus Days

2.4. Introducing and using WMS system in teaching

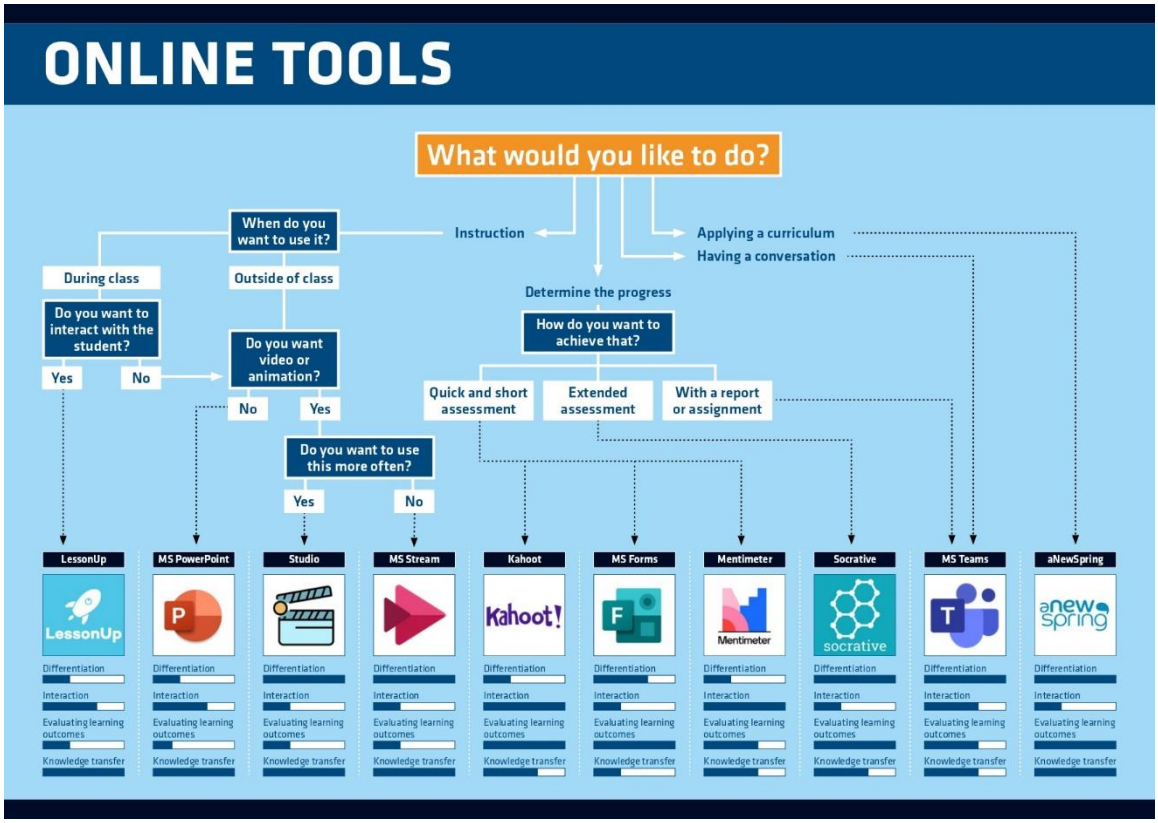
One of the project results was also introducing the WMS system. This is a system adapted exclusively for teaching and is therefore user-friendly and does not require any additional computer equipment.

Despite the fact it was adapted only to teaching process, this system is extremely useful since it faithfully represents processes in WMS systems used by different companies. We find this system to be essential for preparing students for labor market, since beside theoretical knowledge they will also have the possibility of acquiring practical knowledge and skills. Also, they will have the possibility to learn about processes essential for the business in transport organization.

Through one of the previous Erasmus projects we created a logistics practicum where this system will be perfectly implemented thus contributing to the completion of logistics process.

3. Using digital tools in teaching

Our partners from the Netherlands were in charge of conducting a study showing which digital tools teachers use the most in class, and with which purpose. The study showed that teachers most often use these tools for classroom, as well as online teaching: LessonUp, MS Power Point, Studio i MS Stream. To quickly check if the teaching content was acquired, teachers use Kahoot, MS Forms and Mentimeter. For an extended evaluation they use Socrative, while for problem-solving tasks or report writing and direct communication with students they most frequently use MS Teams. There is also aNewSpring tool which equally covers teaching as well as evaluation of content acquisition.



Picture 5: Digital tools in teaching

4. Presenting project results to teachers

The project results were presented at a conference for Croatian high-school teachers working in the transport and logistics sector. About 50 teachers attended the conference and showed a great interest for the presented topics. After presenting the project and its results, through organized workshops the teachers had the opportunity to learn how to use ThingLink tool and try out its options by themselves. The conference also presented the WMS system adapted for teaching purposes, after which a tour to digitalized logistic-distributive center was organized, where the representatives of the "Tokić" company talked about the skills required for working in such centers.

The teachers evaluated the conference with highest marks, and despite the fact they use various digital tools in their classes, for most of them this was the first encounter with the ThingLink tool, which made the workshop on using ThingLink particularly useful to them. They expressed the need for using the WMS system, and emphasized the importance of learning through practice in order to acquire digital competencies essential for working in logistics.

Picture 6: Vocational teachers conference

Picture 7: Conference workshop on using ThingLink

5. Presenting project results to companies

Around 30 managers of logistics centers, human resources, supply chains, transport and other company areas attended a conference held for companies. The attendees found the topic of digitalization particularly important, and therefore, according to their comments and suggestions, should be constantly upgraded in order for companies in the Croatian logistics market to be competitive in the European market as well. For this reason, various forms of cooperation in knowledge transfer between school and companies were discussed, which resulted in establishing cooperation in the form of students' visits to logistics centers, organizing practice for students, and the possibility of mentoring, funding or rewarding excellent students. Another major cooperation was established in the form of teachers' training organized by companies with the aim of keeping up with the new trends and business activities in logistics companies.

Picture 8: Presenting the project to companies' representatives

6. Conclusion

The project is coming to its end, and the Rotterdam partners are finished their work on organizing a training for vocational teachers from partner schools. We believe the project results will contribute to teaching modernization, along with the quality and attractiveness of vocational education. Exchanging knowledge and experiences, as well as creating teaching materials that would be used by students in the transport and logistics programs of all partner countries contribute to school internationalization, strengthening the cooperation among partner schools in this educational sector. Cooperation with companies, as well as with the Faculty of Transport and Traffic Sciences, has gained a new dimension thus opening many new ways for future cooperation. We consider this to be only a starting point of digitalization of logistics teaching in our school, and we aim to further work on both digitalization and exchange of experiences.

7. References

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www.thinglink.com

6. КОМПАРАТИВНА АНАЛИЗА РЕЗУЛТАТА ТАКМИЧЕЊА ПАЖЉИВКОВЕ СМОТРЕ ШАПЦА И ВРАЊА

Милица Цветковић[1], Ивана Селенић[2], Томислав Петровић[3] Ивица Ристић[4],

Резиме: На формирање правилних ставова код деце утичу породица, школа, средства јавног информисања, сви они који се баве васпитно-образовним процесом, узори и социјална средина. Веома је важно да се у савременом животу дете што пре оспособи, формира за учествовање у саобраћају. То је процес у којем сви субјекти морају да учествују од малих ногу. Најпре се дете припрема у породици, затим предшколској установи и школи. Агенција за безбедност саобраћаја је водећа установа у Републици Србији која се бави покретањем акција и кампања за безбедно учествовање деце у саобраћају. Агенција је у 2019. години покренула пилот пројекат „Пажљивкова смотра“ у којем је учествовало 5 локалних самоуправа. Наставак пројекта је реализован током 2022. године у којем је учествовало 40 локалних самоуправа у којим је обухваћено 32.000 деце. Такмичење „Пажљивкова смотра“ обухвата децу предшколског узраста, децу првог и другог разреда основних школа. Такмичење је реализовано у 4 фазе. Прва фаза је било Школско такмичење где су учествовала сва деца. Друга фаза је било Општинско такмичење где су учествовала по 4 детета (представници школе) и где је морала да буде заступљена родна равноправност. Екипу су чинили две девојчице и два дечака. Представници школа су били изабрани из 4 бодовне групе које су носиле различит број бодова. Прва група су била деца са највећим бројем бодова, а четврта група су била деца са најмањим бројем бодова. Циљ оваквог рангирања је да се сва деца доведу на исти ниво знања. Из сваке од 4 групе је изабрано по једно дете. Трећа фаза је било Регионално такмичење, где су учествовали победници општинског такмичења. Четврта фаза је била Републичко такмичење где су учествовали победници Регионалног такмичења. Циљ рада је да се сагледа и анализира знање деце победничких градова Врања и Шапца, на основу резултата школског такмичења пројеката „Пажљивкова смотра“. Врање је победило у категорији првог разреда, Шабац је победио у категорији другог разреда. Тестирању је било подвргнуто 1.571 дете у Врању и 789 деце у Шапцу.

Кључне речи: пажљивкова смотра, знање, безбедност саобраћаја

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УВОД

На формирање правилних ставова код деце утичу породица, школа, средства јавног информисања, сви они који се баве васпитно-образовним процесом, узори и социјална средина. Веома је важно да се у савременом животу дете што пре оспособи, формира за учествовање у саобраћају. То је процес на којем сви субјекти морају да учествују од малих ногу. Најпре се дете припрема у породици, затим предшколској установи и школи.

Агенција за безбедност саобраћаја је водећа установа у Републици Србији која се бави покретањем акција, кампања за безбедно учествовање деце у саобраћају. Агенција је у 2019. години покренула пилот пројекат „Пажљивкова смотра“ у којем је учествовало 5 локалних самоуправа.

Наставак пројекта је реализован током 2020. године у којем је учествовало 50 локалних самоуправа у којим је обухваћено преко 70.000 деце. Тада је било реализовано само Школско такмичење у фебруару 2020. године.

Наставак реализације пројекта је прекинут због глобалне епидемије Корона вирусом.

Пројекат је трећи пут реализован током 2022. године у којем је учествовало 40 локалних самоуправа у којим је обухваћено 32.000 деце. Такмичење „Пажљивкова смотра“ обухвата децу предшколског узраста, децу првог и другог разреда основних школа. Тестови су израђени поред српског и на 5 језика националних мањина: мађарски, албански, словачки, румунски и русински.

Агенција је реализовала састанак са представницима локалних самоуправа, члановима Савета за безбедност саобраћаја у вези инструкција за реализацију пројекта.

Свака локална самоуправа је организовала састанак са учитељима и васпитачима у вези прве и друге фазе. Учитељи и васпитачи су добили инструкције да за припрему деце за школску смотру користе књигу Пажљивкова правила у саобраћају и сајтове pazljivko.rs и kviz.pazljivko.rs

Локална самоуправа је имала задатак да штампа тестове добијене од Агенције за свако дете и да дистрибуира тестове до основних школа и предшколских установа.

Такмичење је реализовано у 4 фазе. Прва фаза је било Школско такмичење где су учествовала сва деца. Друга фаза је било Општинско такмичење где су учествовала по 4 детета (представници школе) и где је морала да буде заступљена родна равноправност. Екипу су чинили две девојчице и два дечака. Представници школа су били изабрани из 4 бодовне групе које су носиле различит број бодова. Прва група су била деца са највећим бројем бодова, а четврта група су била деца са најмањим бројем бодова. Циљ оваквог рангирања је да се сва деца доведу на исти ниво знања. Из сваке од 4 групе је изабрано по једно дете. Трећа фаза је било Регионално такмичење, где су учествовали победници Општинског такмичења. Четврта фаза је било Републичко такмичење где су учествовали победници Регионалног такмичења.

Циљ рада је да се сагледа и анализира знање деце победничких градова Врања и Шапца, на основу резултата школског такмичења пројеката „Пажљивкова смотра“. Врање је победило у категорији првог разреда, Шабац је победио у категорији другог разреда. Тестирању је било подвргнуто 1.571 дете у Врању и 789 деце у Шапцу.

МЕТОД ИСТРАЖИВАЊА

У овом раду вршена је анализа познавања саобраћајних прописа и правила деце предшколских установа и ученика првог и другог разреда основних школа за градове Шабац и Врање. Тестирању је било подвргнуто укупно 2.360 деце од тог броја 1.571 дете у Врању и 789 деце у Шапцу. Укупан број предшколаца је 447, од тог броја 345 деце из Врања и 102 детета из Шапца. Укупан број првака је 949, од тог броја 613 деце из Врања и

336 деце из Шапца. Укупан број другака је 964, од тог броја 613 деце из Врања и 351 дете из Шапца.

Истраживање је рађено у фебруару 2022. године у Врању и у Шапцу.

Свако дете је радило исти тест у зависности да ли је дете предшколац, ученик првог или другог разреда. Тестове је осмислила Агенција за безбедност саобраћаја Републике Србије. Израда теста за све узрасте трајала је по 45 минута.

Тест за предшколце се састојао из 7 питања.

Прво питање – КО ЈЕ БРЖИ? За сваки пар возила деца су морала да одреде ко се брже креће. Црвеном бојом су бојили кружић поред возила које се креће брже. Парови возила су били следећи: аутобус или авион, аутомобил или трактор и бицикла или мотор. За сваки тачан одговор 1 поен, максимално 3 поена.

Друго питање – ЛЕВО, ДЕСНО, ЛЕВО? Деца су имала задатак да црвеном бојом обоје кружић поред оног превозног средства које се налазило на траженој левој или десној страни.

За сваки тачан одговор 1 поен, максимално 4 поена.

Треће питање – ГДЕ СЕДЕ ДЕЦА? Деца су морала да кружић на слици обоје црвено ако мисле да се дете понаша погрешно или зелено ако се понаша правилно у аутомобилу. За сваки тачан одговор 1 поен, максимално 6 поена.

Четврто питање – ПОКАЗИВАЊЕ ПРАВЦА КРЕТАЊА. Деца су морала да кружић на слици обоје у зелену боју поред дечака који показује да скреће лево. За тачан одговор 1 поен.

Пето питање – КОЈОМ ПУТАЊОМ ДО ЦИЉА. Деца су морала да кружић на слици обоје зеленом бојом на путањи за коју мисле да је најбезбеднија за прелазак улице. За сваки тачан одговор 1 поен, максимално 4 поена.

Шесто питање – ПРАВИЛНА ВОЖЊА БИЦИКЛА. Деца су морала да кружић на слици обоје поред особе која правилно вози бицикл у зелену боју, а која неправилно у црвену боју. За сваки тачан одговор 1 поен, максимално 6 поена.

Седмо питање – ОПАСНО И БЕЗБЕДНО ПОНАШАЊЕ. Деца су морала да кружић на слици обоје поред деце чије је понашање опасно у црвено, а поред деце која се понашају исправно у зелено. За сваки тачан одговор 1 поен, максимално 9 поена.

Максималан број бодова на тесту је био 33 бода.

Тест за први разред се састојао из 14 питања. Прво и друго питање је било да се повежу појмови на сликама стрелицама. Четврто питање је било да се упише у празно поље тачан одговор. Остала питања су била питања затвореног типа, вишеструки избор, на заокруживање.

Питања су носила по 1, 2 и 3 поена. Максималан број бодова на тесту је био 24 бода.

Тест за други разред се састојао из 19 питања. Друго, четврто, седмо, девето и једанаесто питање је било да се упише у празно поље тачан одговор. Остала питања су била питања затвореног типа, вишеструки избор, на заокруживање.

Питања су носила по 1, 2, 4 и 5 поена. Максималан број бодова на тесту је био 39.


Слика 1. Приказ тестирања

РЕЗУЛТАТИ СПРОВЕДЕНОГ ИСТРАЖИВАЊА

У следећој табели дати су упоредни резултати спроведеног тестирања деце предшколског узраста. Табеларно су приказани резултати за децу из Врања и Шапца.

Најмању успешност у Врању је имао вртић Звончица 75,61%, а највећу успешност вртић Невен 86,62%. Просечна успешност за Врање је 83,36%.

Најмању успешност у Шапцу је имао вртић Слобода 91,71%, а највећу успешност вртић Бубамара 99,44%. Просечна успешност за Шабац је 95,85%.

У категорији предшколаца успешнији су били предшколци из Шапца за 12,49%.

Из Врања је било обухваћено 9 вртића, а из Шапца 6.

Ограничавајући фактор овог истраживања је што су у Врању у свим предшколским установама и школама дежурали поред васпитача и учитеља и ученици Техничке школе из Врања, саобраћајног смера. Такав случај није био у Шапцу.

Табеларни приказ резултата тестирања деце предшколског узраста

Предшколске установе			
Врање		**Шабац**	
Вртић	**Успешност (%)**	**Вртић**	**Успешност (%)**
Вртић Пчелица	80,05	Вртић Слобода	91,71
Вртић Сунце	81,69	Вртић Пчелица	95,71
Вртић Невен	86,62	Вртић Бубамара	99,44
Вртић Наше дете	85,58	Вртић Бамби	89,81
Вртић Дечија радост	83,24	Вртић Младост	99,33
Вртић Бошко Буха	85,19	Вртић Бајка	99,12
Вртић Чаролија	86,43		
Вртић Бамби	85,83		
Вртић Звончица	75,61		

У следећој табели дати су упоредни резултати спроведеног тестирања деце првог разреда Табеларно су приказани резултати за децу из Врања и Шапца.

Најмању успешност у Врању је имала школа Краљ Петар I Ослободилац 72,62%, а највећу успешност Бранко Радичевић 86,71%. Просечна успешност за Врање је 80,05%.

Најмању успешност у Шапцу је имала школа Лаза Лазаревић 76,57%, а највећу успешност Николај Велимировић 87,79%. Просечна успешност за Шабац је 82,76%.

У категорији првог разреда успешнији су били основци из Шапца за 2,71%.

Из Врања је било обухваћено 12 школа, а из Шапца 5.

Табеларни приказ резултата тестирања деце I разреда

I разред			
Врање		**Шабац**	
Школа	**Успешност (%)**	**Школа**	**Успешност (%)**
20.Октобар	75,69	Јанко Веселиновић	84,94
Бранислав Нушић	80,63	Јеврем Обреновић	87,3
Краљ Петар I Ослободилац	72,62	Николај Велимировић	87,79
Предраг Девецић	82,24	Лаза К. Лазаревић	76,57
Радоје Домановић	74,64	Мајур	77,19
Јован Јовановић Змај	84,29		
Вук Караџић	83,55		
Светозар Марковић	79,31		
Доситеј Обрадовић	76,03		
01.Мај	84,58		
Бранко Радичевић	86,71		
Бора Станковић	80,25		

У следећој табели дати су упоредни резултати спроведеног тестирања деце другог разреда Табеларно су приказани резултати за децу из Врања и Шапца.

Најмању успешност у Врању је имала школа Доситеј Обрадовић 60,53%, а највећу успешност Краљ Петар I Ослободилац 79,06%. Просечна успешност за Врање је 71,46%.

Најмању успешност у Шапцу је имала школа Доситеј Обрадовић 50,32%, а највећу успешност Николај Велимировић 87,75%. Просечна успешност за Шабац је 66,01%.

У категорији другог разреда успешнији су били основци из Врања за 5,45%.

Из Врања је било обухваћено 12 школа, а из Шапца 6.

Табеларни приказ резултата тестирања деце II разреда

I разред			
Врање		**Шабац**	
Школа	**Успешност (%)**	**Школа**	**Успешност (%)**
20.Октобар	76,56	Јанко Веселиновић	69,36
Бранислав Нушић	73,82	Јеврем Обреновић	62,74
Краљ Петар И Ослободилац	79,06	Николај Велимировић	82,75
Предраг Девецић	75,5	Лаза К. Лазаревић	63,53
Радоје Домановић	67,53	Мајур	67,37
Јован Јовановић Змај	76,23	Доситеј Обрадовић	50,32
Вук Караџић	68,48		
Светозар Марковић	66,57		
Доситеј Обрадовић	60,53		
01.Мај	68,87		
Бранко Радичевић	70,51		
Бора Станковић	73,84		

У следећој табели дати су упоредни резултати спроведеног тестирања по питањима деце предшколског узраста. Табеларно су приказани резултати за децу из Врања и Шапца.

Највећи проблем деци предшколског узраста је задало питање 5.3. Која је путања најбезбеднија? (Види слику 2). Успешност у Врању за решавање овог питања је 13,62%, а у Шапцу 72,55%. Предшколци у Шапцу су били успешнији за 58,93%.

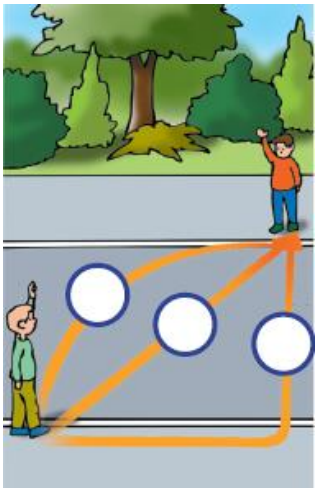
Најмањи проблем деци предшколског узраста је задало питање 7.7. Да ли се дете понаша исправно? (Види слику 3). Успешност у Врању за решавање овог питања је 99,13%, а у Шапцу 100%.

Евидентан проблем са децом предшколског узраста у Врању и Шапцу је избор безбедне путање. У наредном периоду би сви субјекти који су укључени у васпитање и образовање деце, а нарочито породица и васпитачи требали да практично деци покажу избор безбедне путање. Избор неправилне путање може бити велики проблем и потенцијални ризик за настанак саобраћајне незгоде.

Табеларни приказ резултата тестирања по питањима деце предшколског узраста

Предшколци	**Врање**	**Шабац**
Питање	**Успешност (%)**	**Успешност (%)**
7. Да ли се дете/деца понашају исправно?	97,68	99,02
7. Да ли се дете/деца понашају исправно?	96,52	97,06
7. Да ли се дете/деца понашају исправно?	96,81	100
7. Да ли се дете/деца понашају исправно?	95,94	99,02
7. Да ли се дете/деца понашају исправно?	94,2	94,12
7. Да ли се дете/деца понашају исправно?	97,68	100
7. Да ли се дете/деца понашају исправно?	99,13	100
7. Да ли се дете/деца понашају исправно?	81,45	97,06

7. Да ли се дете/деца понашају исправно?	94,49	100
6. Да ли дете/деца правилно возе бицикл?	73,33	97,06
6. Да ли дете/деца правилно возе бицикл?	62,32	96,08
6. Да ли дете/деца правилно возе бицикл?	87,83	98,04
6. Да ли дете/деца правилно возе бицикл?	84,93	98,04
6. Да ли дете/деца правилно возе бицикл?	93,62	100
6. Да ли дете/деца правилно возе бицикл?	96,81	100
5. Која путања је најбезбеднија?	86,67	93,14
5. Која путања је најбезбеднија?	28,12	76,47
5. Која путања је најбезбеднија?	13,62	72,55
5. Која путања је најбезбеднија?	84,64	84,31
4. Који дечак скреће лево?	62,03	95,1
3. Да ли се дете/деца понашају правилно?	94,78	99,02
3. Да ли се дете/деца понашају правилно?	65,22	100
3. Да ли се дете/деца понашају правилно?	96,23	98,04
3. Да ли се дете/деца понашају правилно?	97,97	99,02
3. Да ли се дете/деца понашају правилно?	93,62	99,02
3. Да ли се дете/деца понашају правилно?	93,33	99,02
2. Који мотоцикл је на десној страни?	83,77	98,04
2. Који камион је на левој страни?	73,04	98,04
2. Који аутобус је на левој страни?	81,45	100
2. Који аутомобил је на десној страни?	88,12	100
1. Ко је бржи?	95,07	99,02
1. Ко је бржи?	90,72	98,04
1. Ко је бржи?	87,25	98,04



Слика 2. Питање број 5.3 за предшколце

Слика 3. Питање број 7.7 за предшколце

У следећој табели дати су упоредни резултати спроведеног тестирања по питањима деце првог разреда. Табеларно су приказани резултати за децу из Врања и Шапца.

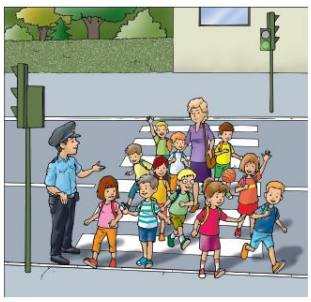
Највећи проблем деци првог разреда је задало питање 11. Да ли се група деце са наставницом понаша правилно? (Види слику 4). Успешност у Врању за решавање овог питања је 60,06%, а у Шапцу 60,36%.

Најмањи проблем деци првог разреда је задало питање 8. Заокружи смајлија испред места где се деца играју безбедно. (Види слику 5). Успешност у Врању за решавање овог питања је 96,7%, а у Шапцу 95,11%.

Деца првог разреда у Врању и Шапцу имају проблем са кретањем у групи. У том узрасту деца крећу у школу самостално, формирају групице приликом доласка у школу и тада најчешће греше. У наредном периоду би сви субјекти који су укључени у васпитање и образовање деце, а нарочито породица и учитељи требали да практично деци покажу како се деца крећу у групи. Овакво понашање деце носи потенцијални ризик за настанак саобраћајне незгоде.

Табеларни приказ резултата тестирања по питањима деце I разреда

I разред	Врање	Шабац
Питање	**Успешност (%)**	**Успешност (%)**
1. Повежи стрелицама. Ко се по чему креће?	84,98	85,48
2. Повежи стрелицама.	83,18	84,34
3. Посматрај слику. Заокружи аутомобил који је Пажљивку са леве стране.	83,48	72,92
4. Упиши бројеве у празна поља на слици.	86,19	83,03
5. Посматрај слику и заокружи тачан одговор. Да ли светла на семафорима показују да деца могу прећи улицу?	89,79	84,67
6. Шта треба даураде деца ако семафор показује зелено светло за пешаке?	75,98	75,69
7. На пешачком прелазу безбедно и правилно улицу прелази:	84,38	82,22
8. Заокружи смајлија испред места где се деца играју безбедно.	96,7	95,11
9. Шта треба Миша и Ана даураде да би прешли улицу?	70,87	54,49
10. Када изађе из аутобуса како ће девојчица безбедно прећи улицу?	87,39	84,67
11. Да ли се група деце са наставницом понаша правилно?	60,06	60,36
12. Како се тата и дечак крећу?	80,78	85,81
13. Како се девојчица на слици превози у аутомобилу?	86,79	88,25
14. Да ли се дечак понаша исправно и безбедно приликом вожње бицикла?	76,88	80,26



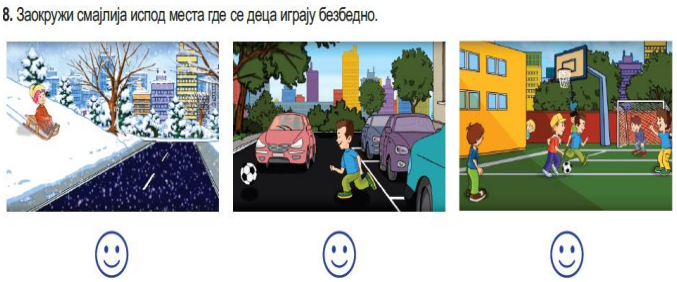
11. Да ли се група деце са наставницом понаша правилно?
(заокружи тачан одговор)

а) Да, јер прелазе улицу на пешачком прелазу.

б) Не, јер су врло немирна и не крећу се у колони.

в Не, јер им полицајац забрањује прелазак улице.

Слика 4. Питање број 11 за први разред



Слика 5. Питање број 8 за први разред

У следећој табели дати су упоредни резултати спроведеног тестирања по питањима деце другог разреда. Табеларно су приказани резултати за децу из Врања и Шапца.

Највећи проблем деци другог разреда је задало питање 1. Погледај Пажљивка на слици и заокружи одговоре који су тачни. Пажљивку је:? (Види слику 6). Успешност у Врању за решавање овог питања је 8,81%, а у Шапцу 34,79%.

Најмањи проблем деци другог разреда је задало питање 11.1. У празна поља на слици упиши знак + за правилно, а знак - за неправилно понашање деце. (Види слику 7). Успешност у Врању за решавање овог питања је 93,64%, а у Шапцу 94,58%.

Деца другог разреда у Врању и Шапцу имају проблем са левом и десном страном. Овај проблем може да буде веома опасан прилико преласка улице, уколико деца не знају стране и самим тим погледају на погрешну страну приликом преласка улице. У наредном периоду би сви субјекти који су укључени у васпитање и образовање деце, а нарочито породица и учитељи требали да практично деци покажу како се прелази улица и да дете увек прилико преласка улице мора да погледа прво у леву страну. Погрешно уверавање деце носи потенцијални ризик за настанак саобраћајне незгоде.

Табеларни приказ резултата тестирања по питањима деце II разреда

II разред	**Врање**	**Шабац**
Питање	**Успешност (%)**	**Успешност (%)**
1. Погледај Пажљивка на слици и заокружи одговоре који су тачни. Пажљивку је:	8,81	34,79
2. Како се деца понашају у саобраћају?	74,71	80,42
2. Како се деца понашају у саобраћају?	62,15	63,86
2. Како се деца понашају у саобраћају?	87,6	84,34
3. Да ли тата прелази правилно коловоз када води сина у школу?	62,64	61,75
4. Погледај бројеве на слици којима су означени делови улице. Упиши одговарајући број у празно поље испред назива дела улице.	89,4	90,96
5. Да ли се деца могу играти на коловозу?	88,09	84,04
6. Да ли деца могу да се играју на тротоару?	77,49	69,88
7. Упиши + у празно поље на слици уколико је понашање пешака правилно, а - ако је понашање пешака неправилно.	92,66	96,39
7. Упиши + у празно поље на слици уколико је понашање пешака правилно, а - ако је понашање пешака неправилно.	92,17	95,78
7. Упиши + у празно поље на слици уколико је понашање пешака правилно, а - ако је понашање пешака неправилно.	87,6	93,07
7. Упиши + у празно поље на слици уколико је понашање пешака правилно, а - ако је понашање пешака неправилно.	90,05	93,37
8. Посматрај слику и заокружи одговоре уколико су тврдње тачне.	64,44	61,3
9. Посматрај слику и упиши редне бројеве радњи од 1 до 4 у празна поља поред одговора, како би Пажљивко најбезбедније прешао преко улице.	39,31	33,43
10. Да ли смемо да пређемо улицу између паркираних аутомобила?	76,02	73,49
11. У празна поља на слици упиши знак + за правилно, а знак - за неправилно понашање деце.	93,64	94,58
11. У празна поља на слици упиши знак + за правилно, а знак - за неправилно понашање деце.	93,64	93,98
11. У празна поља на слици упиши знак + за правилно, а знак - за неправилно понашање деце.	89,56	86,14
11. У празна поља на слици упиши знак + за правилно, а знак - за неправилно понашање деце.	92,66	93,07
12. Ролере и бицикл безбедно је возити:	80,26	75,6
13. Када возиш бицикл, пешачки прелаз прелазиш тако што:	40,46	46,69

14. Док чекаш аутобус на станици:	74,71	74,1
15. Погледај слику и заокружи тачне тврдње понашања деце у аутобусу.	66,07	68,67
16. Када изађеш из аутобуса заустављеног на стајалишту:	89,4	86,75
17. Заокружи реченицу која описује пристојно понашање.	75,2	75,9
18. Као путник у аутомобилу:	77,81	79,52
19. Када прелазиш улицу на пешачком прелазу док наилази полиција са укљученом ротацијом и сиреном, ти ћеш:	81,89	81,02

Слика 6. Питање број 1 за други разред

Слика 7. Питање број 11 за други разред

ЗАКЉУЧАК

Ограничавајући фактор овог истраживања је што су у Врању у свим предшколским установама и школама дежурали поред васпитача и учитеља и ученици Техничке школе из Врања, саобраћајног смера. Такав случај није био у Шапцу.

У категорији предшколских установа просечна успешност за Врање у решавању тестова је 83,36%, а просечна успешност за Шабац је 95,85%. У категорији предшколаца успешнији су били предшколци из Шапца за 12,49%. Из Врања је било обухваћено 9 вртића, а из Шапца 6.

У категорији ученика првог разреда просечна успешност за Врање у решавању тестова је 80,05%, а просечна успешност за Шабац је 82,76%. У категорији првог разреда успешнији су били основци из Шапца за 2,71%. Из Врања је било обухваћено 12 школа, а из Шапца 5.

У категорији ученика другог разреда просечна успешност за Врање у решавању тестова је 71,46%, а просечна успешност за Шабац је 66,01%. У категорији другог разреда

успешнији су били основци из Врања за 5,45%. Из Врања је било обухваћено 12 школа, а из Шапца 6.

Највећи проблем деци предшколског узраста је задало питање - Која је путања најбезбеднија? Успешност у Врању за решавање овог питања је 13,62%, а у Шапцу 72,55%. Предшколци у Шапцу су били успешнији за 58,93%.

Евидентан проблем са децом предшколског узраста у Врању и Шапцу је избор безбедне путање. У наредном периоду би сви субјекти који су укључени у васпитање и образовање деце, а нарочито породица и васпитачи требали да практично деци покажу избор безбедне путање. Избор неправилне путање може бити велики проблем и потенцијални ризик за настанак саобраћајне незгоде.

Највећи проблем деци првог разреда је задало питање - Да ли се група деце са наставницом понаша правилно? Успешност у Врању за решавање овог питања је 60,06%, а у Шапцу 60,36%.

Деца првог разреда у Врању и Шапцу имају проблем са кретањем у групи. У том узрасту деца крећу у школу самостално, формирају групице приликом доласка у школу и тада најчешће греше. У наредном периоду би сви субјекти који су укључени у васпитање и образовање деце, а нарочито породица и учитељи требали да практично деци покажу како се деца крећу у групи. Овакво понашање деце носи потенцијални ризик за настанак саобраћајне незгоде.

Највећи проблем деци другог разреда је задало питање у вези избора леве и десне стране. Успешност у Врању за решавање овог питања је 8,81%, а у Шапцу 34,79%.

Деца другог разреда у Врању и Шапцу имају проблем са левом и десном страном. Овај проблем може да буде веома опасан прилико преласка улице, уколико деца не знају стране и самим тим погледају на погрешну страну приликом преласка улице. У наредном периоду би сви субјекти који су укључени у васпитање и образовање деце, а нарочито породица и учитељи требали да практично деци покажу како се прелази улица и да дете увек приликом преласка улице мора да погледа прво у леву страну. Погрешно уверавање деце носи потенцијални ризик за настанак саобраћајне незгоде.

Аутори су мишљења да мора постојати обавезна форма едукације за децу посматраног узраста у вези саобраћајног образовања и васпитања. Предлог аутора би био, да се одговарајућим изменама Закона о предшколском образовању и васпитању и Закона о основном образовању и васпитању, пропишу обавезни програми за предшколско образовање и васпитање и обавезни часови у основном образовању и васпитању. Предлог је да деца имају један обавезан час недељно у вези саобраћајног васпитања и образовања.

Капацитете за спровођење ових едукација и тестирања би требало тражити у стручним саобраћајним школама и ауто школама. Наставу би требало да обављају инжењери саобраћаја са положеним стручним испитом за рад у школи.

ЛИТЕРАТУРА

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6. THE COMPARATIVE ANALYSES OF COMPETITION RESEARCH RESULTS OF "PAŽLJIVKO'S PARADE " IN VRANJE AND ŠABAC

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Summary: The formation of correct children's attitudes is influenced by the family, school, media, all those who deal with the educational process, role models and the social environment .It is very important, in modern life, that a child is trained as soon as possible to participate in traffic. It is a process where all subjects must participate from an early age. First, the child is prepared in the family, then in preschool and school.Traffic Safety Agency is the leading institution in the Republic of Serbia that deals with actions and campaigns for the safe participation of children in traffic .In 2019, the Agency started the pilot project named "Pažljivkova smotra" (Pažljivko's parade) in which 5 local communities of self-managing participated. This project was realized during 2022 , 40 local self-managing communities participated and also 30.000 children were included. The competition "Pažljivko's parade" includes preschool age children and also first and second grade children of elementary school. The competition was realized in 4 phases. The first stage was the school competition where all children took part. The second stage was the Municipal competition where 4 children (the school representatives) participated, where gender equality had to be represented. The team consisted of two girls and two boys. The representatives of the school were chosen from 4 groups with different number of points. The first group was the children with the highest number of points and the fourth group was the children with the lowest number of points. The aim of this ranking is to bring all children to the same level of knowledge. One child was chosen from each of the 4 groups. The third stage was the Regional competition, where the winners of the previous Municipal competition participated. The fourth stage was the Republic competition where the winners of the Regional competition took part .The aim of the work is to perceive and analyze the knowledge of children from the winning cities of Vranje and Šabac , based on the school competition results of the project "Pažljivko's parade". Vranje won in the first grade category, Šabac won in the second grade category. 1.571 children in Vranje and 789 children in Šabac were exposed testing.

Keywords: "Pažljivko's parade ", knowledge, traffic safety

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INTRODUCTION

The formation of correct children's attitudes is influenced by the family, school, media, all those who deal with the educational process, role models and the social environment. It is very important, in modern life, that a child is trained as soon as possible to participate in traffic. It is a process where all subjects must participate from an early age. First, the child is prepared in the family, then in preschool and school .

Traffic Safety Agency is the leading institution in the Republic of Serbia that deals with actions and campaigns for the safe participation of children in traffic .In 2019, the Agency started the pilot project named "Pažljivkova smotra" (Pažljivko's parade) in which 5 local communities of self-managing participated.

The continuation of the project was realized during 2020 and 50 local communities of self-managing participated with more than 70.000 children. At that time in February 2020, only the School Competition was held.

The implementation of the project was interrupted due to the global pandemic of the Corona virus.

The project was realized for the third time in 2022, in which 40 local communities of self-managing participated and 32.000 children were included. The competition "Pažljivkova smotra" includes preschool children, the first and second grades children of elementary schools. The tests were made in Serbian language but also in 5 languages of national minorities: Hungarian, Albanian, Slovak, Romanian and Ruthenian.

The Agency held a meeting with the representatives of local self-governments and members of Traffic Safety Council regarding the instructions for the implementation of the project.

Each local self-government organized a meeting with teachers and educators regarding the first and second phases. Teachers and educators were instructed to use a book " Pažljivko rules in traffic" and the websites Pažljivko.rs and quiz.Pažljivko.rs to prepare children for the school examination.

The local self-management has had a task to print tests received from the Agency for each child and also to distribute tests to primary schools and preschool institutions.

The competition was realized in 4 phases. The first stage was the school competition were all children participated. The second stage was the Municipal competition where 4 children (the school representatives) participated, where gender equality had to be represented. The team consisted of two girls and two boys. The representatives of the school were chosen from 4 groups with different number of points. The first group was the children with the highest number of points and the fourth group was the children with the lowest number of points. The goal of this ranking is to bring all children to the same level of knowledge. One child was chosen from each of the 4 groups. The third stage was the Regional competition, where the winners of the previous Municipal competition participated. The fourth stage was the Republic competition where the winners of the Regional competition took part.

The aim of the work is to perceive and analyze the knowledge of children from the winning cities of Vranje and Šabac , based on the school competition results of the project "Pažljivko's parade". Vranje won in the first grade category, Šabac won in the second grade category. 1.571 children in Vranje and 789 children in Šabac have done the testing.

RESEARCH METHOD

In this work it is analyzed the traffic rules knowledge of the preschool, first and second grade children in elementary schools in the cities of Vranje and Šabac. A total of 2.360 children were tested, of which 1.571 children in Vranje and 789 children in Šabac. The total number of preschoolers is 447,of which 345 are from Vranje and102 are from Šabac. The total number of the first grade children is 964, of which 613 are children from Vranje and 336 are from Šabac. The total number of the second grade children is 964,of which 613 children are from Vranje and 351 children are from Šabac.The research is done in February 2022 in Vranje and Šabac.

Each child has done the same test, depending on whether the child was a preschooler, first or secondgrader. The tests were designed by the Traffic Safety Agency of the Republic of Serbia. The test production for all ages took 45 minutes.

The test for preschoolers consisted of 7 questions

The first question – WHO IS FASTER? For each pair of vehicles, the children had to decide who is faster. They painted a red circle next to the faster moving vehicle. Vehicle pairs were as follows: bus or airplane ,car or tractor and bicycle or motorcycle. For each correct answer 1 point, maximum 3 points.

The second question – LEFT, RIGHT, LEFT? The children had a task to paint a red circle next to the means of transportation that was on the left or right side. For each correct answer 1 point, maximum 4 points.

The third question - WHERE DO THE CHILDREN SIT? The children would have to paint the circle on the picture in red if they think the child is behaving wrongly or to paint green if he is behaving correct in the car. For each correct answer 1 point, maximum 6 points.

The forth question – SHOWING THE DIRECTION OF MOVING. The children had to paint green circle next to the boy who is turning left on the picture. 1 point for a correct answer.

The fifth question – WHAT PATH TO REACH THE FINISH LINE? The children had to paint the circle in green on the path they think is the safest to cross the street. For each correct answer 1 point, maximum 4 points.

The sixths question- THE CORRECT CYCLING. The children had to paint the circle in green next to the person who is correctly riding a bicycle and the one in red for person who is riding incorrectly. For each correct answer 1 point, maximum 6 points .

The seventh question – DANGEROUS AND SAFE BEHAVIOUR. The children had to paint the circle in red next to the children whose behavior in traffic is bad and in green next to the children who behave well on the picture. For each correct answer 1 point, maximum 9 points.

Maximum score on the test was 33 points.

The test for the first grade consisted of 14 questions. The first and second questions were to connect the concepts in the picture with arrows. The forth question was to write down the correct answer in the empty field. The rest of the questions were closed type, multiple- choice and circled questions.

The questions were of 1,2 and 3 points each . The maximum score on the test was 24 points.

The test for the second grade consisted of 19 questions. The second, fourth, seventh, ninth and eleventh questions were to write the correct answer in an empty field. The rest of the questions were closed type, multiple-choice and circled questions.

The questions were of 1,2,4 and 5 points each. The maximum score on the test was 39.


Picture 1. The testing

THE RESULTS OF THE RESEARCH

The following table shows the comparative results of the preschool testing. The results for children from Vranje and Šabac are presented in a *Table 1*.

The Zvoncica kindergarten had the lowest success in Vranje, 75,61% and the Neven kindergarten had the highest success rate, 86,62%. The average success rate for Vranje is 83,36%.

In Šabac, the Sloboda kindergarten had the lowest success rate of 91,71% and the Bubamara kindergarten had the highest success rate of 99,44%. The average success rate for Šabac is 95,85%.

In the category of preschoolers, the city of Šabac got better results and preschoolers were better by 12,49%.

9 kindergarten were included from Vranje and 6 from Šabac.

The limiting factor of this research is that in Vranje , students of the Secondary Technical School, traffic department, were presented with educators and teachers in all preschool institutions and schools. Such a case was not in Šabac.

Table 1 *Tabular presentation of testing results for preschool children*

Preschool institutions			
Vranje		Sabac	
Kindergarten	Success rate (%)	Kindergarten	Success rate (%)
Kindergarten Pčelica	80,05	Kindergarten Sloboda	91,71
Kindergarten Sunce	81,69	Kindrgarten Pčelica	95,71
Kindregarten Neven	86,62	Kindrgarten Bubamara	99,44
Kindergarten Naše dete	85,58	Kindrgarten Bambi	89,81
Kindergarten Dečija radost	83,24	Kinfergarten Bajka	99,33
Kinergarten Boško Buha	85,19	Kindergarten Mladost	99,12
Kindergarten Čarolija	86,43		
Kindrgarten Zvončica	85,83		
Kindrgarten Bambi	75,61		

The following table (table 2) shows the comparative results of the first grade children's testing.

It shows the results for children from Vranje and Šabac.

The lowest success rate in Vranje was in the school "Kralj Petar I Oslobodilac 72,62% and the highest position was for "Branko Radičević" school 86,71%. The average success rate for

Vranje is 80,05%. “Laza Lazarević” school had the lowest success rate in Šabac, 76,57% and “Nikolaj Velimirović” school had the highest success rate 87,79%. The average success rate for Šabac is 82,76%.

Primary school students in the first grade category from Šabac were more successful by 2,71%. 12 school were included from Vranje and 5 from Šabac

Table 2. *Tabular presentation of testing results for the first grade children*

1st GRADE			
Vranje		Šabac	
School	Success rate (%)	School	Success rate (%)
20. Oktobar	75,69	Janko Veselinović	84,94
Branislav Nušić	80,63	Jevrem Obrenović	87,3
Kralj Petar I Oslobodilac	72,62	Nikolaj Velimirović	87,79
Predrag Devedžić	82,24	Laza K. Lazarević	76,57
Radoje Domanović	74,64	Majur	77,19
Jovan Jovanović Zmaj	84,29		
Vuk Karadžić	83,55		
Svetozar Marković	79,31		
Dositej Obradović	76,03		
01.Maj	84,58		
Branko Radičević	86,71		
Bora Stanković	80,25		

The following table *(table 3*) represents the comparative results of the second grade children’s testing. It shows the results for children from Vranje and Šabac. The lowest success rate in Vranje was in the school “Dositej Obradović” 60,53% and the highest position was for “Kralj Petar I Oslobodilac” school 86,71%. The average success rate for Vranje is 71,46%. “Dositej Obradović” school had the lowest success rate in Šabac, 50,32% and “Nikolaj Velimirović” school had the highest success rate 87,75%. The average success rate for Šabac is 66,01%.

Primary school students of the second grade category from Vranje were more successful by 5,45 %. In this competition there were 12 schools from Vranje and 6 from Šabac.

Table 3. Tabular presentation of testing results for the second grade children

1st GRADE			
Vranje		Šabac	
School	Success rate (%)	School	Success rate (%)
20. Oktobar	76,56	Janko Veselinović	69,36
Branislav Nušić	73,82	Jevrem Obrenović	62,74
Kralj Petar I Oslobodilac	79,06	Nikolaj Velimirović	82,75
Predrag Devedžić	75,5	Laza K. Lazarević	63,53
Radoje Domanović	67,53	Majur	67,37
Jovan Jovanović Zmaj	76,23	Dositej Obradović	50,32
Vuk Karadžić	68,48		
Svetozar Marković	66,57		
Dositej Obradović	60,53		
01.Maj	68,87		
Branko Radičević	70,51		
Bora Stanković	73,84		

The following table (*Table 4)* represents the comparative test results by questions of preschool children. The results from Vranje and Šabac are presented in a table.

The biggest problem of preschool children had been the questions 5 and 3. Which path is the safest? (see Figure 2). The success rate for solving this question is 13,62%, and in Šabac 72,55%. Preschoolers in Šabac were mor successful by 58,93%.

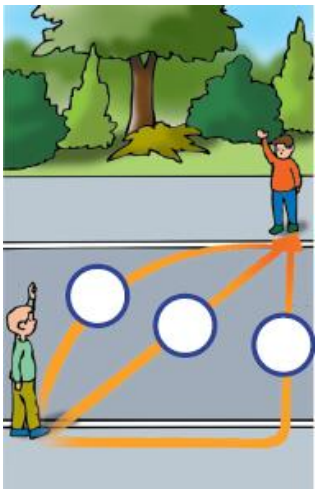
Question 7.7 was the easiest for preschool children. Is the child behaving properly? (see Figure 3). The success rate in Vranje for solving this questions is
99,13% and in Šabac 100%.

An obvious problem with preschool children in Vranje and Šabac is choosing a safe path .In the following period, everyone who is included in upbringing and education, especially families and teachers, should practically point out the right path to children. Choosing the wrong path to cross can be a big problem and a potential risk of a traffic accident.

Table 4. Tabular presentation of testing results according to questions of preschool children

Preschoolers	**Vranje**	**Šabac**
The questions	success rate (%)	success rate (%)
7.Is the child/children behaving properly?	97,68	99,02
7.Is the child/children behaving properly?	96,52	97,06
7.Is the child/children behaving properly?	96,81	100
7.Is the child/children behaving properly?	95,94	99,02
7.Is the child/children behaving properly?	94,2	94,12
7.Is the child/children behaving properly?	97,68	100
7.Is the child/children behaving properly?	99,13	100
7.Is the child/children behaving properly?	81,45	97,06
7.Is the child/children behaving properly?	94,49	100
6. Does the child/children ride a bike properly?	73,33	97,06
6. Does the child/children ride a bike properly?	62,32	96,08
6. Does the child/children ride a bike properly?	87,83	98,04
6. Does the child/children ride a bike properly?	84,93	98,04
6. Does the child/children ride a bike properly?	93,62	100
6. Does the child/children ride a bike properly?	96,81	100
5.Which path is the safest?	86,67	93,14
5.Which path is the safest?	28,12	76,47
5.Which path is the safest?	13,62	72,55
5.Which path is the safest?	84,64	84,31
3. Is the child/children behaving regularly?	62,03	95,1
4.Which boy turns left?	94,78	99,02
3. Is the child/children behaving regularly?	65,22	100
3. Is the child/children behaving regularly?	96,23	98,04
3. Is the child/children behaving regularly?	97,97	99,02
3. Is the child/children behaving regularly?	93,62	99,02
3. Is the child/children behaving regularly?	93,33	99,02
2.Which motorcycle is on the right?	83,77	98,04
2.Which truck is on the left?	73,04	98,04
2.Which bus is on the left?	81,45	100
2.Which car is on the right?	88,12	100

1.Who is faster?	95,07	99,02
1.Who is faster?	90,72	98,04
1 Who is faster?	87,25	98,04



Picture 2 The question 5.3 for preschool children

Picture 3 The question 7.7 for preschool children

The following table *(Table 5)* represents the comparative test results by questions of the first grade children. The results for children from Vranje and Šabac are presented in the table.

The biggest problem for first grade children was question 11. Does the group of children with the teacher behave properly? (See Figure 4). The success rate in Vranje for solving this quwestion is 60,06 and in Šabac 60,36%.

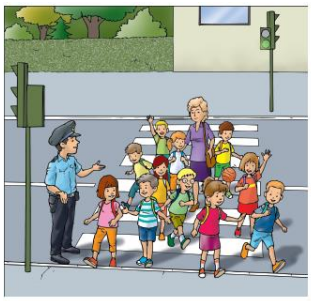
First grade children had the least problem with question 8. Circle the smiley in front of the place where the children are playing safely.(See Figure 5). The success rate in Vranje for solving this question is 96,7% and in Šabac 95,11%.

First grade children in Vranje and Šabac have problem with moving in a group. At that age, children go to school independently ,form groups when they arrive at school and then they most often make mistakes. In the following period, everyone who is included in upbringing and education, especially families and teachers, should practically show children how to move in a group. This behavior of children has a potential risk of traffic accident.

Table 5. Tabular presentation of testing results on questions of first grade children

1st GRADE	**Vranje**	**Šabac**
Question	Success rate (%)	Success rate (%)
1.Connect with arrows. Who moves on what –base?	84,98	85,48
2.Connect with arrows.	83,18	84,34
3. Look at the picture .Round the car that is on the left of Pažljivko	83,48	72,92
4.Write the numbers in the empty fields in the picture.	86,19	83,03
5.Look at the pictiure and circle the correct answer.Do the lights on the traffic lights show the children can cross the street?	89,79	84,67
6.What should children do if the traffic light shows a green light for pedestrians?	75,98	75,69
7.Who crosses the street safely and correctly at the pedestrian crossing?	84,38	82,22
8. Circle a smiley face in front of the place where children play safely.	96,7	95,11
9. What should Misha an Ana do to cross the street?	70,87	54,49
10. When she gets of the bus,how will the girl cross the street safely?	87,39	84,67

11. Does the group of children with the teacher behave safely?	60,06	60,36
12.How do dad and boy move?	80,78	85,81
13. How does the girl in the picture transport in a car?	86,79	88,25
14.Does the boy behave properly and safely while he is riding a bicycle?	76,88	80,26



11. Да ли се група деце са наставницом понаша правилно? (заокружи тачан одговор)

а) Да, јер прелазе улицу на пешачком прелазу.

б) Не, јер су врло немирна и не крећу се у колони.

в Не, јер им полицајац забрањује прелазак улице.

Picture 4. The question number 11 for the first grade

8. Заокружи смајлија испод места где се деца играју безбедно.

Picture 5. The question number 8,the first grade

The following table *(Table 6)* represents the comparative test results on questions of the second grade children. The results for children from Vranje and Šabac are presented in the table.

The biggest problem for second grade children was question 1.Look at the Pažljivko in the picture and circle the correct answers. Pažljivko is ?
(See Figure 6). The success rate in Vranje for solving this question is 8,81% and In Šabac 34,79%.

The least problem for second grade children had been question 11.1.In the empty fields in the picture, put + for correct and – for incorrect children's behavior.(See Figure 7). The success rate in Vranje for solving this question is 93,64% and in Šabac 94,58%.

Second grade children in Vranje and Šabac have problems with their left and right sides. This problem can be very dangerous when crossing the street, if children don't know the sides they'll look on the wrong side while they are crossing the street. In the following period, everyone who is included in upbringing and education, especially families and teachers, should practically point out to children how to cross the street and the child always look on the left first. The wrong assurance of the children can cause the potential risk of a traffic accidents.

Table 6. Tabular presentation of testing results on questions of the second grade children

2nd GRADE	**Vranje**	**Šabac**
Question	Success rate (%)	Success rate (%)
1.Look at the Pažljivko and circle the correct answers. Pažljivko is:	8,81	34,79
2.How do the children behave in traffic?	74,71	80,42
2. How do the children behave in traffic?	62,15	63,86
2. .How do the children behave in traffic?	87,6	84,34
3. Does dad cross the road properly when he takes his son to school?	62,64	61,75
4.Look at the numbers in the picture thatmark the parts of the street. Put the	89,4	90,96
appropriate number in an empty space in front of the name of street part .	88,09	84,04

5. Can children play on the road?	77,49	69,88
6. Can children play on the pavement?	92,66	96,39
7.Write + in the empty field on the picture if behavior of the pedestrian is correct and – if it is incorrect	92,17	95,78
7.Write + in the empty field on the picture if behavior of the pedestrian is correct and – if it is incorrect	87,6	93,07
7.Write + in the empty field on the picture if behavior of the pedestrian is correct and – if it is incorrect	90,05	93,37
7.Write + in the empty field on the picture if behavior of the pedestrian is correct and – if it is incorrect	64,44	61,3
8.Look at the pictures and circle the answers if the statements are true.	39,31	33,43
9.Look at the pictures and write ordinal numeral of the actions from 1 to 4 in the empty spaces next to the existing answers, so Pažljivko could cross the street in a safest way.	76,02	73,49
10.Are we allowed to cross the street between parked cars?	93,64	94,58
11.In the empty fields in the picture, write + for correct and – for incorrect children's behavior.	93,64	93,98
11.In the empty fields in the picture, write + for correct and – for incorrect children's behavior.	89,56	86,14
11.In the empty fields in the picture, write + for correct and – for incorrect children's behavior.	92,66	93,07
11.In the empty fields in the picture, write + for correct and – for incorrect children's behavior.	80,26	75,6
12.Inline skates and bicycles are safe to ride:	40,46	46,69
13.When riding a bicycle, you cross a pedestrian crossing by:	74,71	74,1
14.While waiting for the bus at the station:	66,07	68,67
15.Look at the picture and circle the correct statements about the children's behavior on the bus.	89,4	86,75
16.When you get off the bus while it is at a bus stop:	75,2	75,9
17.Circle the sentence that describes polite behavior.	77,81	79,52
18.As a passenger in a car:	81,89	81,02

Picture 6. *The question number 1 for the second grade*

Picture 7. The question number 11 for the second grade

CONCLUSION

The limiting factor of this research is that in Vranje , students of the Secondary Technical School, traffic department, were on duty with educators and teachers in all preschool institutions and schools. Such a case was not in Šabac.

In the categories of preschool institutions, the average success rate for Vranje in doing tests is 88,36% and the average success rate for Šabac is 95,85%. In the category of preschoolers, students from Šabac were successful by 12,49%. 9 kindergartens were included from Vranje and 6 from Šabac.

In the first grade category students, the average success rate for Vranje in doing tests is 80,05% and the average success rate for Šabac is 82,76%. In the first grade category ,elementary school students from Šabac were more successful by 2,71. 12 schools were included from Vranje and 5 from Šabac.

In the category of second grade children, the average success rate for Varnje in solving tests is 71,46% and the and the average success rate for Šabac is 66,01%. In the second grade category,primary school students from Vranje were more successful by 5,45%. 12 schools were included from Vranje and 6 from Šabac.

The biggest problem for preschool children was the question- Which path is the safest? The success rate in Vranje for solving this issue is 13,62% and in Šabac 72,55%. Preschoolers in Šabac were more successful by 58,93% . An obvious problem with preschool children in Vranje and Šabac is choosing a safe path. In the following period, everyone who is included in upbringing and education, especially families and teachers, should practically show children the choise of safe path. Choosing the wrong path can be a big problem and a potential risk of a traffic accident.

The biggest problem for first grade children was question 11. Does the group of children with the teacher behave properly? The successfulness for solving this problem in Vranje was 60,06% and in Šabac was 60,36%.

First grade children in Vranje and Šabac have problem with moving in a group. At that age, children go to school independently,form groups when they arrive at school and then they most often make mistakes. In the following period, everyone who is included in upbringing and

education, especially families and teachers, should practically show children how to move in a group. This behavior of children has a potential risk of traffic accident.

Second grade children in Vranje and Šabac have problems with their left and right sides. This problem can be very dangerous when crossing the street, if children don't know the sides they'll look on the wrong side while they are crossing the street. In the following period, everyone who is included in upbringing and education, especially families and teachers, should practically point out to children how to cross the street and the child always look on the left first. The wrong assurance of the children can cause the potential risk of a traffic accidents.

The authors are of the opinion that compulsory form of education should be of these children connected with traffic education and upbringing. The author's proposal is to change and prescribes The Law of Preschool Eucation and The Law of Elementary Education in the way that compulsory programs and compulsory classes should be organized in preschool institutions and elementary schools. The proposal is that children should have one mandatory lesson per week related to traffic education.

The capacities for carrying out these educations and tests should be found in vocational traffic schools and driving schools. Teaching should be conducted by traffic engineers who have passed the professional exam for work in the school.

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7. Такмичење ученика саобраћајних школа Републике Србије

Аутори: Светлана Величковић, Марко Поповић и Немања Радовић

Сажетак:

Заједница саобраћајних школа Републике Србије је непрофитно удружење основано ради остваривања аличитих циљева средњем стручном образовању и образоњу одраслих у подручју рада Саобраћај. Најважнија активност Заједнице је годишње Републичко такмичење ученика саобраћајних школа. Републичко такмичење ученика добило је међународни карактер од 2019. године. Техничка школа из Врања је била домаћин ученицима средњих саобраћајних школа, који су на специјални позив дошли из Словеније, Хрватске, Бугарске, Северне Македоније и БиХ (Републике Српске) и за које је организовано ревијално такмичење. У новом концепту Републичког такмичења, препознали смо прилику да позовемо компаније које послују у подручју саобраћаја, транспорта и логистике да учествују у манифестацији. Нове активности захтевају додатно ангажовање свих заинтересованих колега које ће се укључити у организацију наредног Републичког такмичења и пратећег програма манифестације. Надамо се да сте заинтересовани да сазнате шта је следеће што ће нам пружити ова манифестација и позивамо вас да нам се придружите како бисмо заједно то открили!

ПРЕГЛЕД ОБРАЗОВНОГ СИСТЕМА У ПОДРУЧЈУ РАДА

Средње стручно образовање у подручју рада Саобраћај за занимања у саобраћају, транспорту и логистици има дугу традицију у Србији. Државна саобраћајна железничка школа (The State Rail Traffic school) основана 1922. године и Књажевска српска железничка и трговачка школа (The Rail Traffic and Commercial School of The Principality of Serbia) која је исшколовала само једну генерацију ученика 1881. године, заједно са Државном средњом техничком школом (The State Technical High School in Belgrade) основаном 1924. године, најстарије су образовне установе у подручју рада Саобраћај у Србији и заправо су најстарије образовне институције у овом подручју рада свеукупно посматрано у оквиру свих држава насталих након расформирања СФРЈ.

Агенција за квалификације је установа створена како би се омогућили услови за осигурање квалитета на свим нивоима развоја и примене Националног оквира квалификација Републике Србије (НОКС-а)[5]. Секторско веће за Саобраћај и услуге транспорта развија квалификацијски оквир и предлаже стандарде квалификација у подручју рада Саобраћај и сродним делатностима (ISCED-F 2013). Стандарди квалификација су документи донети на националном нивоу ради стварања темења за развој програма образовања/тренинга и обука. Савет за Национални оквир квалификација републике Србије и Министар просвете, науке и технолошког развоја, усвојили су и прогласили до сада 14 стандарда квалификација за образовање у подручју рада Саобраћај и на основу тих стандарда развијени су планови и програми наставе и учења за образовне профиле.

Подручје рада Саобраћај обухвата више од 20 образовних профила у средњем стручном образовању, подељених у 6 области:

- Друмски саобраћај,
- Железнички саобраћај,
- Водни саобраћај,
- ПТТ саобраћај,
- Ваздушни саобраћај,
- Логистика, интермодални и унутрашњи транспорт.

Техничар друмског саобраћаја и Возач моторних возила су највећи образовни профили у подручју рада Саобраћај са приближно 10,000 ученика који се на њима образују у средњим стручним школама. Најпрестижнији образовни профили у подручју рада су у области ваздушног саобраћаја, при чему се план и програм наставе и учења за образовни профил Техничар ваздушног саобраћаја реализује и би-лингвално (енглеско - српски програм).

ЗАЈЕДНИЦА САОБРАЋАЈНИХ ШКОА РЕПУБЛИКЕ СРБИЈЕ

Заједница саобраћајних школа Републике Србије је недобитно удружење основано ради остваривања циљева у области средњег стручног образовања и васпитања и образовања одраслих у подручјурада саобраћај. Радом Заједнице управљају Извршни одбор (чланови су директори средњих стручних школа које уписују више од 300 ученика у подручју рада саобраћај) и Скупштина Заједнице (чланови су представници свих школа чланица Заједнице). Заједница окупља више од 50 средњих стручних школа и представља функционалну платформу за сарадњу чланица у циљу унапређивања организације и имплементације образвоних процеса. Такође, омогућава наставницима размену добрих искустава из праксе и да учествују у програмима стручног усавршавања.

[5] noks.mpn.gov.rs/en/about-the-agency/

Ради остваривања својих циљева Заједница нарочито предвиђа следеће програмско деловање[6]:

- организовање и координацију активности школа ради ефикаснијег и рационалнијег остваривања наставних планова и програма;
- организовање Републичког такмичења ученика саобраћајних школа;
- организовање производних делатности у оквиру практичне наставе;
- издавачку делатност у складу са Законом;-организовање стручног усавршавања наставника;
- организовање професионално –стручног развоја и усавршавања кадрова у саобраћају;
- реализација пројеката у области безбедности саобраћаја;
- остваривање сарадње са Заводом за унапређивање образовања и васпитања;-остваривање сарадње са Министарством просвете, науке и технолошког развоја;
- остваривање сарадње са Агенцијом за безбедност саобраћаја;
- остваривање сарадње са другим организацијама које се баве стручним оспособљавањем кадрова уподручју рада саобраћај;
- остваривање сарадње са школама и другим организацијама из региона и иностранства;
- разматра и друга питања од заједничког интереса за рад школа.

Заједница је развила веб-страницу која служи као платформа за све кључне активности и представља поуздан и релевантан извор информација за наставнике, ученике, као и директоре школа.

РЕПУБЛИЧКО ТАКМИЧЕЊЕ

The most important activity of the association is the annual State Competition for Students of Traffic, Transportation and Logistics High Schools. State competitions for high school students are mandatory by low and every year, a different school is selected to organize this event. Nearly 30 years long tradition was interrupted only twice, during the bombing of Serbia in 1999 and due to COVID restrictions in 2020, and 2021.

Табела 1. Градови домаћини Републичког такмичења

бр.	Град домаћин	година
1.	**Земун**	**1993**
2.	**Крагујевац**	**1994**
3.	**Сомбор**	**1995**
4.	**Крушевац**	**1996**
5.	**Краљево**	**1997**
6.	**Лесковац**	**1998**
	/	**1999**
7.	**Нови Пазар**	**2000**
8.	**Смедерево**	**2001**
9.	**Краљево**	**2002**
10.	**Београд**	**2003**
11.	**Нови Сад**	**2004**
12.	**Краљево**	**2005**
13.	**Крагујевац**	**2006**
14.	**Земун**	**2007**

бр.	Град домаћин	година
15.	**Чачак**	**2008**
16.	**Лесковац**	**2009**
17.	**Ниш**	**2010**
18.	**Нови Сад**	**2011**
19.	**Краљево**	**2012**
20.	**Суботица**	**2013**
21.	**Врање**	**2014**
22.	**Сомбор**	**2015**
23.	**Пирот**	**2016**
24.	**Ужице - Тара**	**2017**
25.	**Пожаревац**	**2018**
26.	**Врање**	**2019**
	/	**2020**
	/	**2021**
27.	**Ниш**	**2022**

[6] zss.edu.rs/index.php/n

Competition is a three day event for students and teachers as well. It's custom practice for the Executive Board to hold a meeting during the first day of competition and prepare a report for the Assembly. Assembly holds a meeting on the second day of the competition and reviews the report, confirms the Executive Board decisions and discusses all issues of common interest.

ТАКМИЧЕЊЕ – ТРАДИЦИОНАЛНО И МОДЕРНО, нека буде сјајно!

Since 2019, The State competition became international. On special invitation, the Technical School in City of Vranje, hosted students of VET profiles in field of traffic, transportation and logistics from Slovenia, Croatia, Bulgaria, Northern Macedonia and BiH (RS) and organized a revue competition. The international participation in The State Competition proved to be a success and every year since, Association of Traffic, Transportation and Logistics High Schools of The Republic of Serbia prepares tests and driver's skills tasks on different languages for guest students from abroad. This event proved to be an excellent opportunity for students to meet their pears from other countries in the region of South-East Europe, to make friendships and learn about other cultures, not just to compete. For the teachers as well, it's an opportunity to start new international projects and exchange ideas and good practice in education. Partnerships between schools from different countries enable these schools to apply for EU funds. Hopefully, some new projects will develop from the collaboration of schools, benefiting students, and teachers as well.

Слика 1. Такмичење возача у Нишу 2022

The second interruption in the organization of competition due to Covid19 pandemic (2020 and 2021), gave us a chance to analyze the competition framework and overall concept of the three day event. Since all the disciplines of the competition were designed for students of road traffic and transportation sector, it was necessary to create a new interdisciplinary competition for students of all sectors. A team of teachers selected common topics for all six sectors and created a database of more than 500 theoretical tasks for second and third year students of all VET profiles in the field of Traffic, Transportation and Logistics.

The Host of the 27th State Competition was the Vocational High School Niš in april 2022. The improvements implemented in City of Niš in 2022 are the very essence of the new concept for the Competition event. A special training for students was organized by the Serbia's National Employment Service (NES). Experts tutored students how to write a CV and how to prepare themselves for job interviews. Also, NES organized a workshop with the students on career guidance and counseling.

A special traffic and transportation experts meeting was organized in the Science and Technology Park Niš, as part of the Official Program of the event. International form of the event created opportunity for teachers and other experts in the field to exchange experiences and discuss issues of common interest. The key topic of the meeting was "The Roll of the Vocational

Education in Facing the Issue of Shortage of Professional Drivers". Participants of the discussion were representatives of the Ministry of Education, Science and Technological Development, members of the Association, representatives of the Serbian Association of International Road Hauliers, representatives of Serbian Armed Forces, ABS, NES, ZUOV, local traffic and transportation authorities and vocational academies. Guests from schools from Slovenia, Croatia and Northern Macedonia took part in the discussion and informed about the issue in their countries.

ШТА ДАЉЕ НАКОН СВЕГА?

In the new State Competition concept, we see the opportunity to invite companies operating in the field of traffic, transportation and logistics to take part in the event. These companies should sponsor the event and take part in a Job Fair to promote themselves or to select students for scholarships. Companies will offer awards for students winners of the Competition and organize visits for all participants to present their businesses.

There is a plan is to organize a small Exhibition of traffic signs and equipment. Companies producing or importing this equipment and schools will have the opportunity to make business contracts and students will see the up to date equipment and learn how it works. The participation in the exhibition will be commercial in order to finance organization of meetings and discussions of important issues in the field and for professional improvement of teachers.

We hope to develop a special cooperation with the University of Defence and Military Academy. There is an interest on both sides to promote Military Academy among students participating in the State Competition. Academy will benefit by promoting programs and engaging new candidates for enrollment, and students will learn about new and challenging opportunities to continue their education.

These new activities demand additional engagement of all the enthusiasts involved in the organization of the next State Competition event. We hope you are interested to see what is this event going to give us next and we invite you to join us and find out!

Слика 2 – Додела Сертификата за учешће на XI Међународном симпозијуму у Загребу 2021 (Ниш 2022)

ЛИТЕРАТУРА

http://zss.edu.rs/index.php/n *on 13th of march 2019*
http:// noks.mpn.gov.rs/en/about-the-agency/ *2017*
http://www.nsz.gov.rs/sadrzaj/nsz-na-27-republickom-takmicenju-saobracajnih-skola-u-nisu/8701 *on 15th of april 2022*

7. The State Competition for Students of Traffic, Transportation and Logistics High Schools of the Republic of Serbia

Authors: Svetlana Veličković, Marko Popović i Nemanja Radović

Abstract:

The Association of Traffic, Transportation and Logistics High Schools of the Republic of Serbia is a non-profit organization established for the purpose of achieving different goals in VET and Adult Education in the field of Traffic, Transportation and Logistics. The most important activity of the association is the annual State Competition for Students of Traffic, Transportation and Logistics High Schools. Since 2019, The State competition became international. On special invitation, the Technical School in City of Vranje, hosted students of VET profiles in field of traffic, transportation and logistics from Slovenia, Croatia, Bulgaria, Northern Macedonia and BiH (RS) and organized a revue competition. In the new State Competition concept, we see the opportunity to invite companies operating in the field of traffic, transportation and logistics to take part in the event. These new activities demand additional engagement of all the enthusiasts involved in the organization of the next State Competition event. We hope you are interested to see what is this event going to give us next and we invite you to join us and find out!

REVIEW OF EDUCATION SYSTEM IN THE FIELD OF TRAFFIC, TRANSPORTATION AND LOGISTICS

Vocational education for occupations in transport and traffic industry has long lasting tradition in Serbia. State Rail Traffic school (Državna saobraćajna železnička škola) established in 1922 and The Rail Traffic and Commercial School of The Principality of Serbia (Knjaževska srpska železnička i trgovačka škola) that schooled only one generation of students in 1881, together with State Technical High School in Belgrade (Državna srednja tehnička škola) established in 1924 are oldest education institutions in the field of traffic and transportation in Serbia and in fact in all the states formed after disintegration of SFRY.

Qualifications Agency is institution designed to provide quality on all levels of development and implementation of the National Qualifications Framework in the Republic of Serbia (NQFS)[7]. Sector Skills Council for the field of Traffic and Transportation Services develops the qualifications framework and proposes Standards of Qualifications of the field. Standards of Qualifications are documents established on the national level in order to set foundation for the development of programs of education/training. The NQFS Council recommended and Minister of Education, Science and Technological Development adopted some 14 Standards of Qualifications in the field of Traffic and Transportation Services, and the programs of education are based on these standards.

The field of Traffic, Transportation and Logistics offers more than 20 VET profiles, divided in 6 sectors:

- Road Traffic and Transportation,
- Rail Traffic and Transportation,
- Waterborne Traffic and Transportation,
- Postal and Telecommunications Traffic,
- Air Traffic and Transportation,
- Logistics, Intermodal and Industrial Transport.

Road Traffic and Transportation Technician and Driver of Motor Vehicles are largest VET profiles of the field with about 10,000 students. However most prestigious VET profiles are in the sector of air traffic and transportation, Air Traffic and Transportation Technician includes bi-lingual (English and Serbian language) education program.

ASSOCIATION OF TRAFFIC, TRANSPORTATION AND LOGISTICS HIGH SCHOOLS OF THE REPUBLIC OF SERBIA

The Association of Traffic, Transportation and Logistics High Schools of the Republic of Serbia is a non-profit organization established for the purpose of achieving different goals in VET and Adult Education in the field of Traffic, Transportation and Logistics. Management bodies of the Association are the Executive Board (members are principals of the schools enrolling more than 300 students in VET profiles of the field) and the Assembly (members are representatives of all member schools). The association assembles more than 50 high schools and it provides a functional platform for the members to collaborate in order to improve organization and implementation of the education process. Also, teachers can exchange good practices and take part in professional improvement programs.

[7] noks.mpn.gov.rs/en/about-the-agency/

The association declared a program of 11 key actions[8]:

- organization and coordination of activities of the member schools;
- organization of State Competition for Students of Traffic, Transportation and Logistics High Schools;
- organization of production as part of the practical training in schools;
- publishing activities and organization of professional improvement activities for the teachers;
- organization of professional improvement activities for professionals in the field of traffic and transportation;
- implementation of traffic safety activities and projects;
- cooperation with Ministry of Education, Science and Technological Development and the Institute for the Improvement of Education (ZUOV);
- cooperation with the Traffic Safety Agency of the Republic of Serbia (ABS);
- cooperation with other organizations involved in professional improvement activities for professionals in the field of traffic and transportation;
- cooperation with schools and other organizations of the field in the region and abroad;
- representing common interests of the member schools.

The association developed a website www.zss.edu.rs as a platform for all the major activities and a very relevant source of information for teachers, students and school principals as well.

THE STATE COMPETITION

The most important activity of the association is the annual State Competition for Students of Traffic, Transportation and Logistics High Schools. State competitions for high school students are mandatory by low and every year, a different school is selected to organize this event. Nearly 30 years long tradition was interrupted only twice, during the bombing of Serbia in 1999 and due to COVID restrictions in 2020, and 2021.

Table 1. Host Cities of the State Competition

No.	Host City	Year
1.	**Zemun**	**1993**
2.	**Kragujevac**	**1994**
3.	**Sombor**	**1995**
4.	**Kruševac**	**1996**
5.	**Kraljevo**	**1997**
6.	**Leskovac**	**1998**
	/	**1999**
7.	**Novi Pazar**	**2000**
8.	**Smederevo**	**2001**
9.	**Kraljevo**	**2002**
10.	**Beograd**	**2003**
11.	**Novi Sad**	**2004**
12.	**Kraljevo**	**2005**
13.	**Kragujevac**	**2006**
14.	**Zemun**	**2007**

No.	Host City	Year
15.	**Čačak**	**2008**
16.	**Leskovac**	**2009**
17.	**Niš**	**2010**
18.	**Novi Sad**	**2011**
19.	**Kraljevo**	**2012**
20.	**Subotica**	**2013**
21.	**Vranje**	**2014**
22.	**Sombor**	**2015**
23.	**Pirot**	**2016**
24.	**Užice – Tara**	**2017**
25.	**Požarevac**	**2018**
26.	**Vranje**	**2019**
	/	**2020**
	/	**2021**
27.	**Niš**	**2022**

[8] zss.edu.rs/index.php/n

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COMPETITION - TRADITIONAL AND MODERN, let's make it great!

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Picture 1. *Competition of Drivers in Niš 2022*

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WHERE DO WE GO FROM HERE?

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There is a plan is to organize a small Exhibition of traffic signs and equipment. Companies producing or importing this equipment and schools will have the opportunity to make business contracts and students will see the up to date equipment and learn how it works. The participation in the exhibition will be commercial in order to finance organization of meetings and discussions of important issues in the field and for professional improvement of teachers.

We hope to develop a special cooperation with the University of Defence and Military Academy. There is an interest on both sides to promote Military Academy among students participating in the State Competition. Academy will benefit by promoting programs and engaging new candidates for enrollment, and students will learn about new and challenging opportunities to continue their education.

These new activities demand additional engagement of all the enthusiasts involved in the organization of the next State Competition event. We hope you are interested to see what is this event going to give us next and we invite you to join us and find out!

Picture 2 – Awarding the Certificate for attending the XI International Symposium in Zagreb 2021 (Niš 2022)

LITERATURE

http://zss.edu.rs/index.php/n *on 13th of march 2019*
http:// noks.mpn.gov.rs/en/about-the-agency/ *2017*
http://www.nsz.gov.rs/sadrzaj/nsz-na-27-republickom-takmicenju-saobracajnih-skola-u-nisu/8701 *on 15th of april 2022*

II POGLAVLJE

Unapređenje bezbednosti učesnika u saobraćaju

Srednja šola za storitvene dejavnosti in logistiko

mag. Roman Krajnc

Policijska uprava Celje,
Sektor uniformirane policije

mag. Elvis Alojzij Herbaj

8. Preventivna aktivnost

Poletje bo, zato z glavo na e-skiro!

Povzetek

Sodobna civilizacija in s tem tehnični razvoj cestnega prometnega sistema je poleg velikih prednosti prinesla s seboj tudi tragedije. Zlasti v prometu, z razvojem avtomobila, motornih koles, ter v zadnjem obdobju tudi električnih skirojev (v nadaljevanju e-skirojev), je tem ugodnostim sledila tudi temna plat - prometne nesreče. Pri ugotavljanju posledic prometnih nesreč spremljamo tako izgube življenj in hude invalidnosti kot nenadomestljive ter nepopravljive izgube v družinah, družbi, kot tudi škode, ki jih ima družba zaradi posledic prometnih nesreč. Najhujše posledice prometnih nesreč, ki terjajo smrtne žrtve in hude telesne poškodbe, občutijo predvsem družine.

Pričujoči prispevek ima pomenljiv naslov. Tokrat bomo analizirali stanje prometne varnosti uporabnikov e-skirojev - prevoznega sredstva, ki je novost v cestnem prometu. Njegova uporaba se je v kratkem času močno povečala, zato je potrebno v sklop preventive v cestnem prometu dodati tudi vsebine varne uporabe e-skirojev. Nasloviti je potrebno vso starostno strukturo populacije, ob tem pa pretehtati, ali zakonodaja zahteva sistemske spremembe z vidika uporabnikov, tehničnih značilnosti in pravil vožnje. Za analizo stanja smo vzpostavili anketiranje preko spleta, ki še vedno poteka.

1. Uvod

Mladostništvo je obdobje med otroštvom in odraslostjo, v katerem pride do hitrega telesnega in čustvenega razvoja, iskanja in oblikovanja identitete, soočanja z novimi razvojnimi nalogami, velik vpliv pa imajo pri tem tudi vrstniki. Mladostniki imajo v povprečju v primerjavi z odraslimi nekoliko drugače izražene osebnostne lastnosti. Zanje velja, da imajo manj nadzora nad čustvenim izražanjem in doživljanjem, so precej impulzivni ter pogosto v življenju iščejo raznovrstnost, novosti in spremembe. Običajno so tudi manj previdni pri vedenju, kar pa je najverjetneje posledica tega, da imajo manj izkušenj z negativnimi posledicami tveganih ravnanj. Prav zato se večkrat podajo v drzna in tvegana vedenja ter na različnih področjih preizkušajo svoje zmogljivosti (šport, promet). Številni mladostniki imajo manj realne predstave o sebi (na določenih področjih se podcenjujejo ali pa precenjujejo), ki se kažejo ob zmotnem pojmovanju sebe kot superiornega, pretirano edinstvenega in neranljivega ter ob pretiranem razlikovanju svojih značilnosti od značilnosti drugih ljudi. Značilnost mladostnikov je tudi težnja po nasprotovanju in povečani samokritičnosti. In vožnja z e-skirojem je nedvomno izziv za mladino. Pri obravnavani temi smo se usmerili v celotno populacijo, vse od otrok do odraslih.

2. Poletje bo, zato z glavo na e-skiro!

Tako smo poimenovali preventivno akcijo, ki smo jo izvedli 20. 4. 2022 na Srednji šoli za storitvene dejavnosti in logistiko (SŠSDL) Šolskega centra Celje. V aktivnosti so sodelovali dijaki 3p1 oddelka programa Logistični tehnik. Aktivnost smo izvedli v sodelovanju s partnerji: Splošno bolnišnico Celje, Zavodom Vozim, Zavarovalnico Triglav, Eko Drive d. o. o., Policijsko upravo Celje in Srednjo šolo za strojništvo, mehatroniko in medije, ŠCC.

Dogodek je potekal v dveh delih. Prvi del je vseboval teoretično spoznavanje tehničnih značilnosti skiroja, pravnih pogojev za vožnjo, fizikalnih zakonitosti upravljanja skiroja in posledic poškodb udeležencev nesreče pri vožnji s skirojem. V drugem delu je bila predstavljena vožnja s skirojem na poligonu, ki so ga posebej za ta namen in za to prevozno sredstvo izdelali dijaki v sklopu raziskovalne dejavnosti Mladi za Celje, skupaj s prikazom pristopa reševanja ponesrečenca s skirojem.

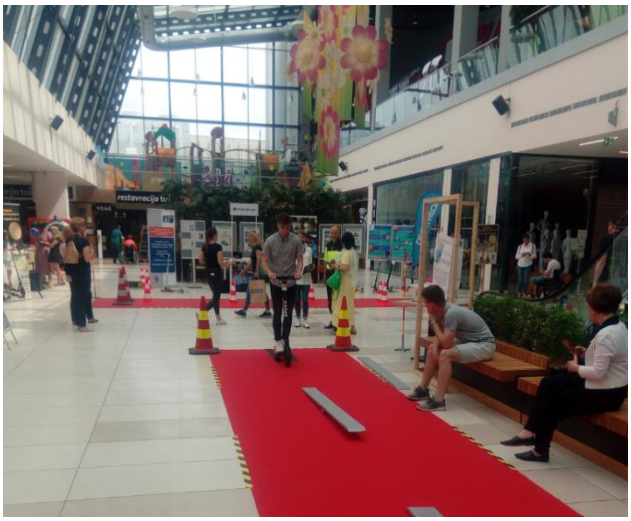
Slika 1: Udeleženci na teoretičnem delu

Slika 2: Predavatelj iz Splošne bolnišnice Celje

Dogodek smo ponovili 23. 5. 2022 v trgovskem centru Planet Tuš Celje, kjer smo nagovorili njegove obiskovalce. Z aktivnostjo smo stopili v stik tudi starejšo populacijo, ki prav tako uporablja e-skiro.

Slika 3: Letak za napoved dogodka

Slika 4: Utrinek s preventivnega dogodka



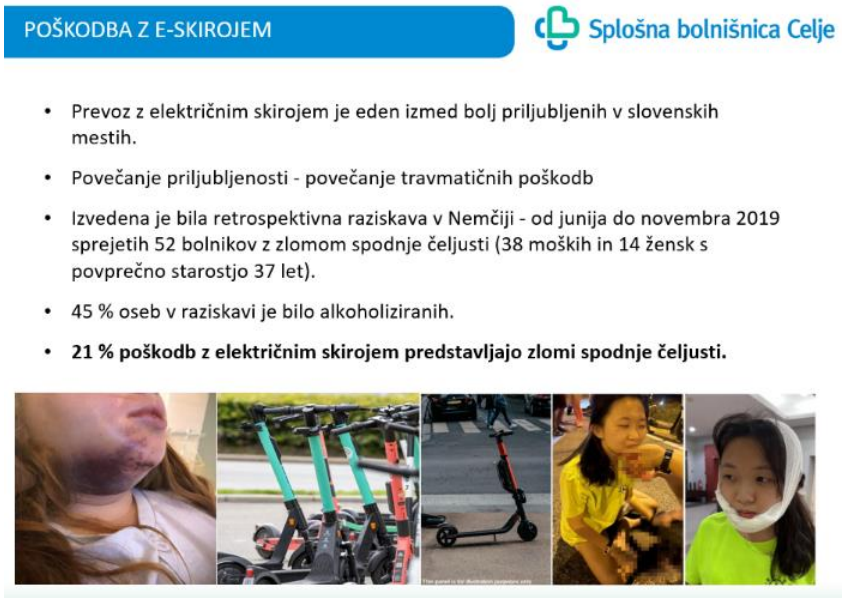
3. Vsebina preventivne aktivnosti

Na obeh dogodkih obravnavali vsebine s področij:
- zakonskih določil s področja e-skiroja kot prevoznega sredstva,
- fizikalnih zakonitosti pri vožnji z e-skirojem,
- poškodb v primeru nesreče z e-skirojem,
- primerov poškodb ob nesrečah z uporabo e-skiroja – prikaz primera.

Predavatelji so na praktični način prikazali vsebine. Tako smo s celovitim pristopom povzeli vzroke, uporabnost in morebitne poškodbe udeležencev kot uporabnikov e-skirojev. V nadaljevanju prikazujemo del vsebine s predavanj.

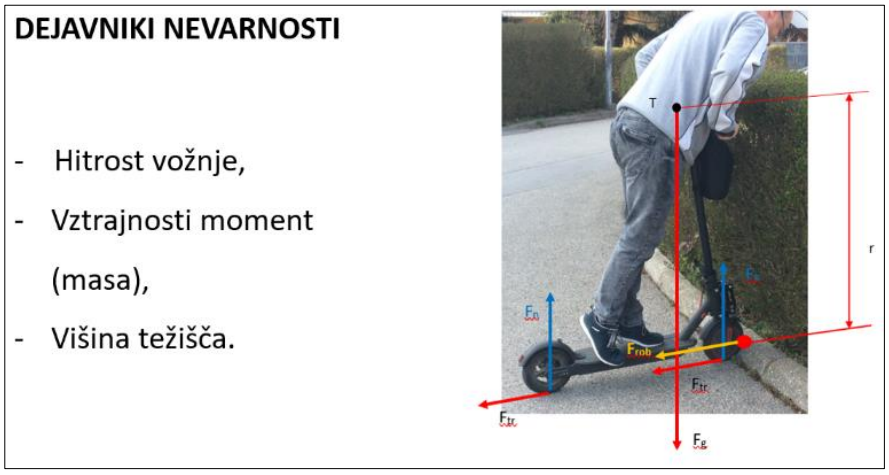
Slika 5: Izsek s predavanja o poškodbah udeleženca predavateljev Andreja Strahovnika, dr. med., specialista splošne kirurgije, travmatološki oddelek in Kaje Pevcin, dr. med., specializantke urgentne medicine

Slika 6: S predavanja o poškodbah udeleženca predavateljev Eve Ferčec, dr. med., specializantke fiziatrije, Oddelek za medicinsko rehabilitacijo in Andreja Strahovnika, dr. med., specialista splošne kirurgije, travmatološki oddelek



Slika 7: S predavanja o zakonodajnem področju predavatelja mag. Elvisa A. Herbaja, Policijska uprava Celje

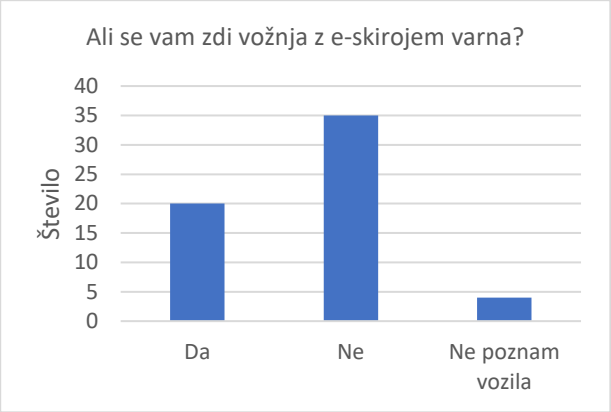
Slika 8: S predavanja o fizikalnih zakonitostih predavatelja mag. Romana Krajnca, SŠSDL



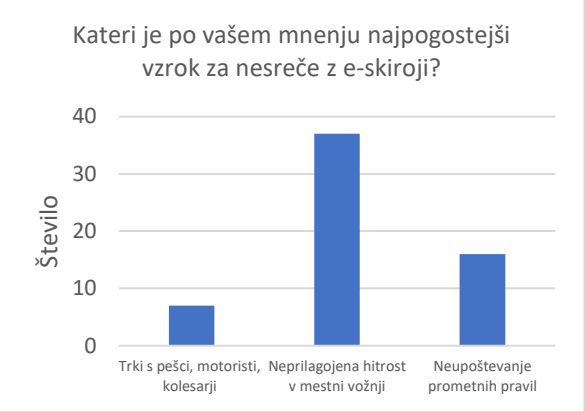
4 Anketiranje

Za pridobitev mnenj širše javnosti smo odprli spletno javno anketiranje o poznavanju uporabe e-skirojev, ki še vedno poteka. Za ta prispevek smo povzeli rezultate ankete prejete med 20. 4. 2022 in 20. 6. 2022. Vključenih je bilo 60 anketirancev. Pri nekaterig vprašanjih je prejetih odgovorov manj, saj določenih anket vsi anketiranci niso izpolnili v celoti. Sodelovalo je 30 moških in 19 žensk (vsi anketiranci niso vpisali spola). Starostni rang anketirancev je bil od 14 let naprej. Slednjih je bilo 46 %. V nadaljevanju navajamo anketna vprašanja in grafični prikaz podatkov v absolutnih deležih anketirancev.

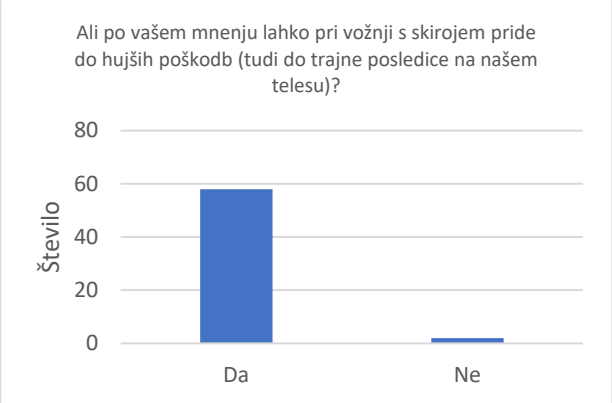
Graf 1



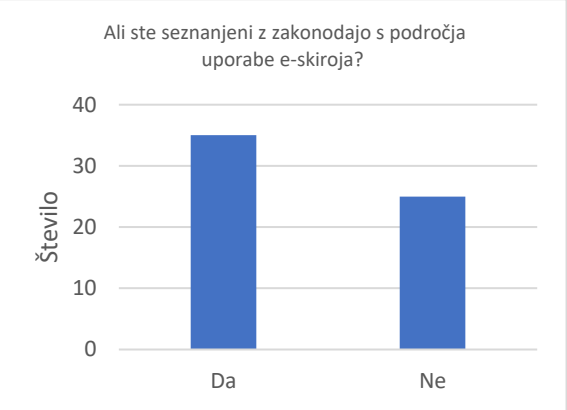
Graf 2



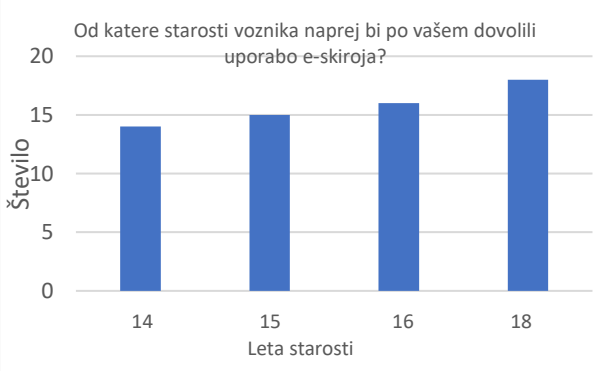
Graf 3



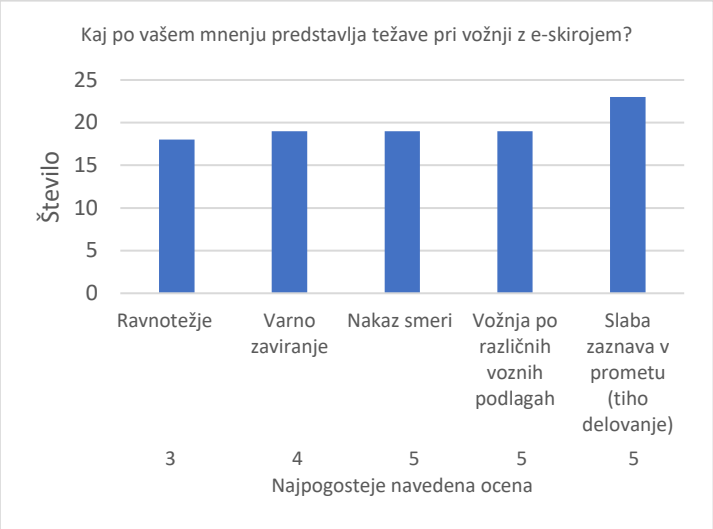
Graf 4



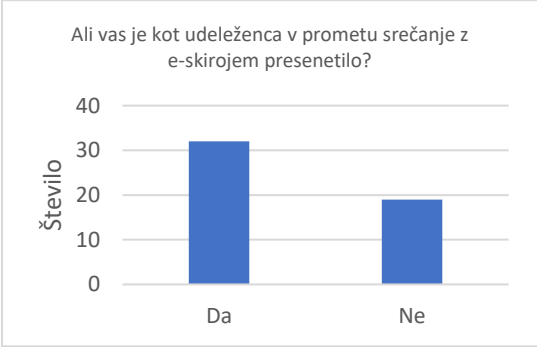
Graf 5



Graf 6



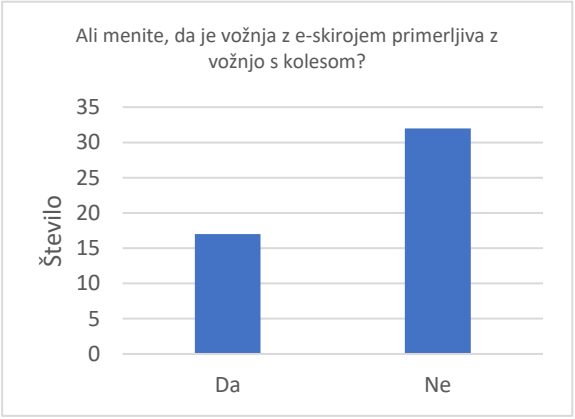
Graf 7



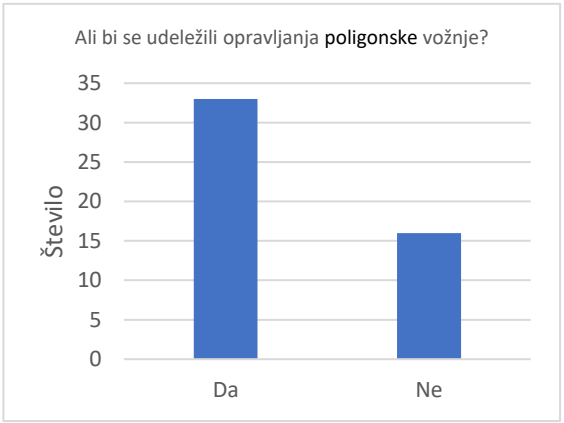
Vprašanju z grafa 7 smo dodali še možnost, da anketiranci navedejo, kaj jih je prestrašilo. Navedenih je bilo veliko odgovorov, ki so bili enakomerno porazdeljeni. Navajamo nekaj najpogostejših: tiho delovanje vozila, neosvetljen skiro, hitrost in vijuganje, majhna bočna razdalja, neobzirnost vožnje idr.

Pri postavljenem vprašanju iz grafa 8 so anketiranci dodali mnenje o razlikah upravljanja vozila. Najpogostejša stališča so bila: stabilnost vozila, visoko težišče, se ne utrudiš, drugačna hitrost, zaviranje idr.

Graf 8



Graf 9



Anketirancem smo postavili tudi vprašanje »Kaj bi kot udeleženec v cestnem prometu sporočili voznikom e-skirojev?« Najpogostejši odgovori so bili: naj vozijo pametno, da niso nepremagljivi, naj gledajo okoli sebe, naj pazijo nase, prilagodijo hitrost, previdna in strpna vožnja, naj vozijo previdno idr.

Iz odgovorov anketirancev lahko zaključimo, da je uporaba e-skirojev kot prevoznega sredstva še precejšnja neznanka, ki ustvarja praznino tako z zakonodajnega, kakor tudi tehničnega in praktičnega vidika. Prav tako lahko iz odgovorov zasledimo samokritičnost vseh anketirancev, kar daje anktiranju dodatno vrednost in bo predmet nadaljnjega raziskovanja oz. obravnavanja teme.

5 Zaključek

Akterji predstavljane preventivne aktivnosti smo mnenja, da smo ujeli bistvo problema uvajanja nove tehnike, prevoznega sredstva e-skiro. Ljudje smo dovzetni za vse tehnične novosti. Ali smo tudi dovolj ozaveščeni o uporabi? Odgovorite si sami!

Viri:

Zakon o pravilih cestnega prometa (Uradni list RS, št. 156/21 – uradno prečiščeno besedilo in 161/21 – popr.)

Roman Krajnc, M.Sc.

Police Directorate Celje,
Uniformed Police Directorate

Elvis Alojzij Herbaj, M.Sc.

8. Road safety activity

A summer commuter? Be careful on an e-scooter!

Summary

Modern civilization and thus the technical development of the road transport system, has brought tragedies in addition to great advantages. Especially in transport, with the development of cars, motorcycles, and recently electric scooters (hereafter e-scooters), these advantages have always been accompanied by a pitfall - traffic accidents. When determining the consequences of traffic accidents, we monitor both loss of life and severe disability as well as irreplaceable and irreparable losses in families and society, and the impact these accidents have on the society. The worst consequences of traffic accidents, which claim fatalities and serious injuries, are felt mostly by families.

This article has a relevant and important title. We will analyze the traffic safety of e-scooter users. This means of transport is a novelty in road transport. Its use has increased significantly in a short time and it is therefore necessary to incorporate the content of safe use of e-scooters into the road traffic safety. It is necessary to address the entire age structure of the population, while considering whether the legislation requires systemic changes - from the users point of view, technical characteristics and mandatory rules for road users. To analyze the situation, we have set up an online survey, which is still ongoing.

1 Introduction

Adolescence is the period between childhood and adulthood, during which there is a rapid physical and emotional development, when individuals explore and form their identities, face new developmental tasks, while managing peer pressure. Adolescents, on average, have somewhat differently expressed personality traits compared to adults. They are considered to have less control over emotional expression, are quite impulsive and often seek variety and novelty in their dynamic lives. They also tend to be less cautious, which is most likely the result of having less experience with the negative consequences of risky behavior. This is why they repeatedly engage in daring and risky behaviors and test their capabilities in various fields (sports, traffic). Many adolescents have less realistic ideas about themselves (they underestimate or overestimate themselves in certain areas), which manifests itself in the inaccurate conception of themselves as superior, excessively unique and invulnerable individuals, and in the excessive differentiation of their characteristics from the characteristics of other people. Adolescents are also characterized by a tendency to rebel and self-criticise. And driving an e-scooter is undoubtedly an intriguing challenge for young people. In this article, we focused on the entire population, from children to adults.

2. A summer commuter? Be careful on an e-scooter!

This was the title of the road safety campaign, which we carried out on the 20th of April 2022 at the Secondary School of Services and Logistics of the Celje School Centre with the students of the 3p1 class of the Logistics Technician programme. The activity was carried out in cooperation with partners: General Hospital Celje, »Vozim« Institute, Triglav Insurance Company, Eko Drive d. o. o., Police Directorate Celje and Secondary School of Mechanical Engineering, Mechatronics and Media, Celje School Centre.

The event was held in two parts. In the first part, we dealth with the theoretical knowledge of the technical characteristics of the e-scooter, the legal conditions for driving, the physical laws of maneuvering with an e-scooter, and the consequences of e-scooter injuries. The second part consisted of driving with a scooter on the training ground (made specifically for this purpose and for this means of transport by students as part of the research activity »Mladi za Celje«), along with a demonstration of the approach to rescueing an e-scooter accident victim.

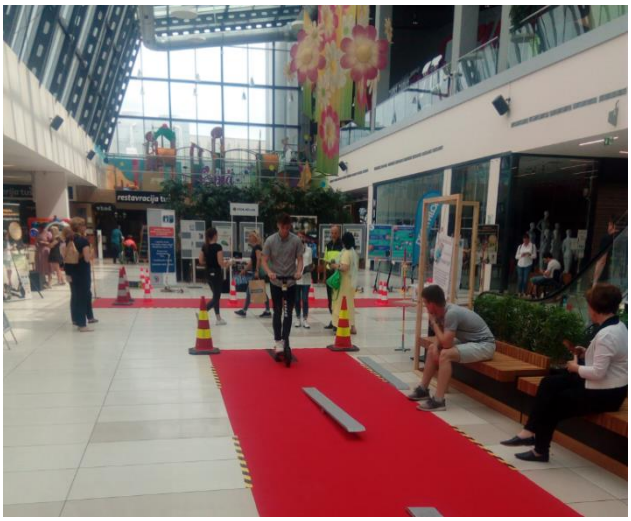
Figure 1: Participants at the theoretical part

Figure 2: Lecturer from General Hospital Celje

We organised the event again on the 23rd of May 2022 in the Planet Tuš Celje shopping center for its visitors. With this activity, we also reached the older population, who are also users of e-scooters.

Figure 3: Event announcement leaflet

Figure 4: Snapshot from the road safety event



3. Content of the road safety activity

At both events, topics from the following areas were discussed:

- legal provisions in the field of e-scooter as a means of transport,
- physical laws when driving an e-scooter,
- injuries in the event of an accident with an e-scooter,
- cases of injuries due to using an e-scooter – a case study.

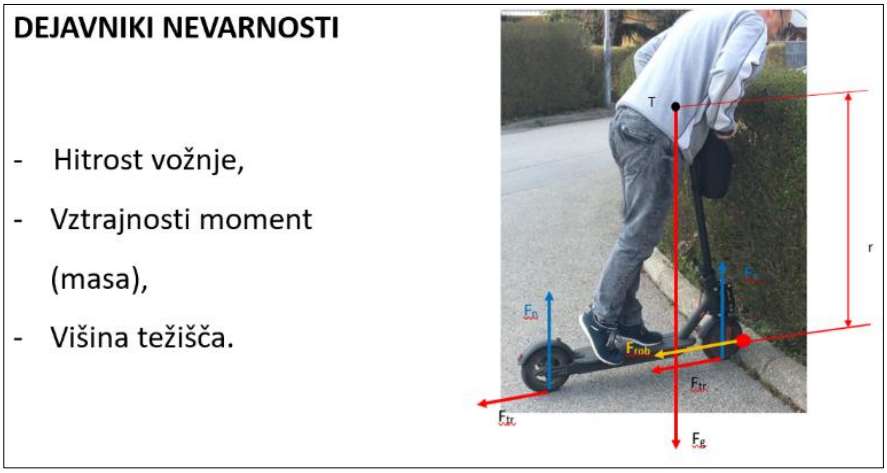
The lecturers presented the contents with a practical example. Thus, with a comprehensive approach, we summarized the purpose, usefulness and possible injuries to the users of e-scooters. In the following section, we present a part of the content from the lectures.

Figure 5: The lecture on injuries by the lecturers Andrej Strahovnik, M.D., general surgery specialist, traumatology department and Kaja Pevcin, M.D., specialist in emergency medicine

Figure 6: The lecture on injuries by the lecturers Eva Ferčec, M.D., physiatry specialist, Department of Medical Rehabilitation, and Andrej Strahovnik, M.D., general surgery specialist, traumatology department

Figure 7: The lecture on the legislative field by lecturer Elvis A. Herbaj, M.Sc., Police Directorate Celje

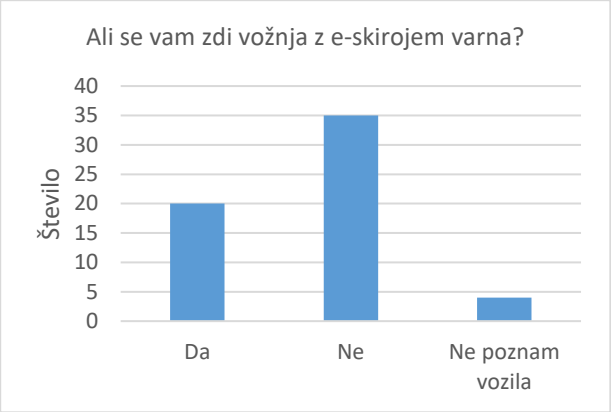
Figure 8: The lecture on physical laws by lecturer Roman Krajnc, M.Sc., Secondary School of Services and Logistics



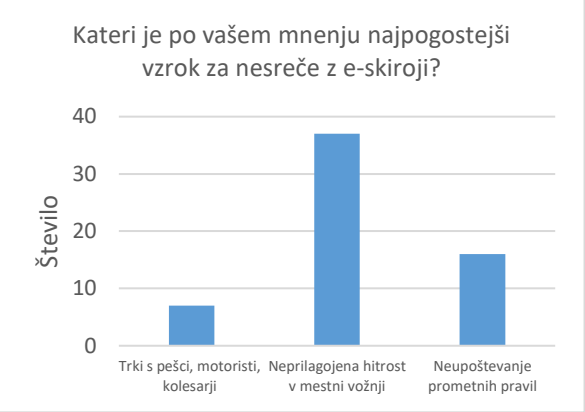
4. Surveying

In order to obtain the general public opinion, we opened an online public survey on knowledge of the e-scooters use, which is still ongoing. For this paper, we summarized the results of the survey conducted between the 20th of April 2022 and the 20th of June 2022. There were 60 respondents included. There are fewer received answers for some questions, as not all respondents completed the survey in full. 30 men and 19 women participated (not all respondents declared their gender). The respondents were 14 years old or older. In the following section, we list the survey questions and a graphical representation of the data in absolute proportions of respondents.

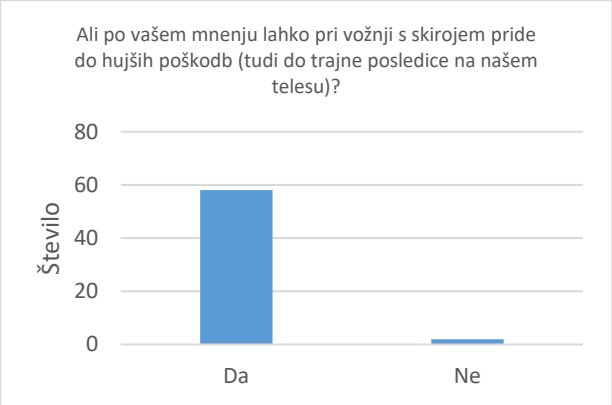
Graph 1



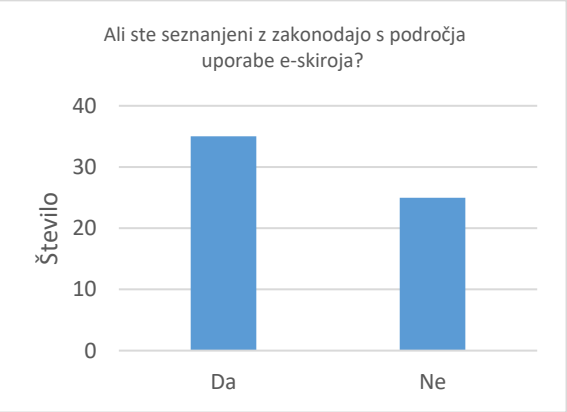
Graph 2



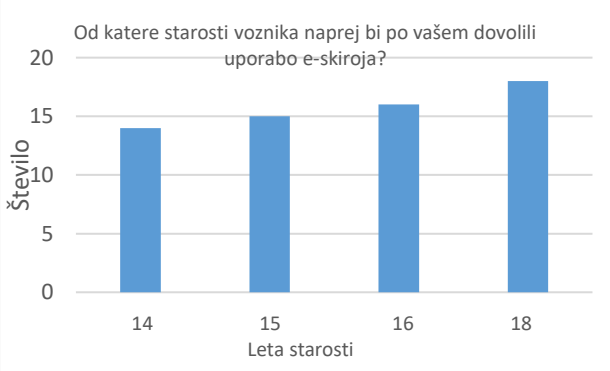
Graph 3



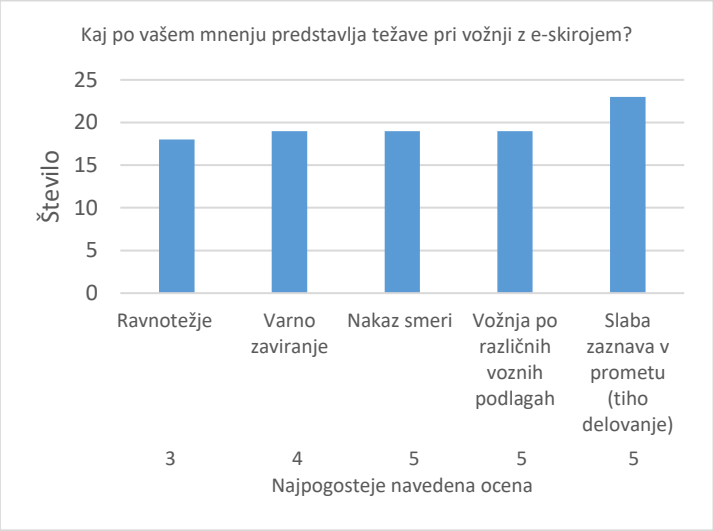
Graph 4



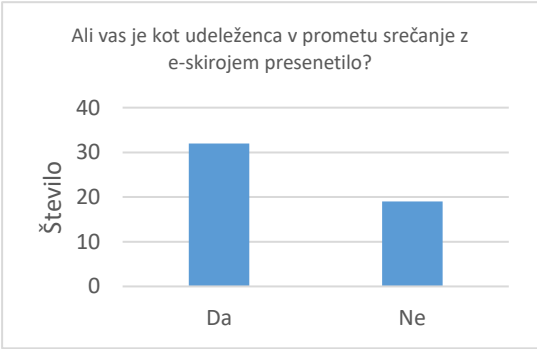
Graph 5



Graph 6

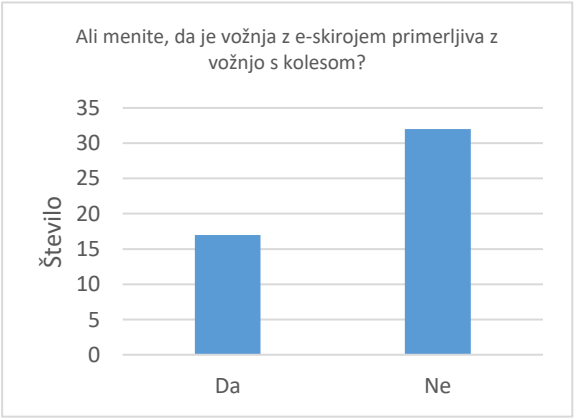


Graph 7

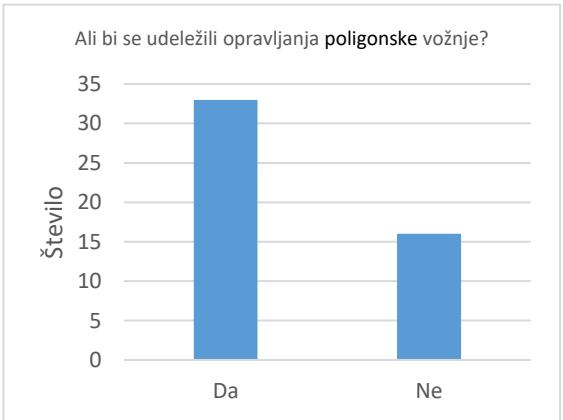


To this question, we added the option for the respondents to state what scared them. Various responses were given and they were evenly distributed. These are some of the most common: quietness of the vehicle, unlit scooter, speed and meandering, small lateral distance, reckless driving, etc.

When asked the question from graph 8, the respondents added an opinion about the differences in vehicle handling. The most common points of view were: vehicle stability, high center of gravity, not getting tired, different speed, braking, etc.



Graph 8



Graph 9

We also asked the respondents the question "What would you, as a road user, tell the drivers of e-scooters?" The most common answers were: they should drive smart, they should not feel invincible, they should look around them, they should take care of themselves, adjust their speed, drive carefully and patiently, etc.

From these responses, we can conclude that the use of e-scooters as a means of transport is still a considerably unknown area, which creates a void both from a legislative, as well as a technical and practical point of view. In the answers, we can also notice the self-awareness of all respondents, which gives the survey an additional value and will be the subject of further research.

5 Conclusion

We, the collaborators on this road safety activity, are of the opinion that we have captured the essence of the problem of introducing a new technology, the e-sctooter as a means of transport. Humans are susceptible to all technical innovations. Are we also sufficiently aware of its use? It's for you to answer.

Resources:

Zakon o pravilih cestnega prometa (Uradni list RS, št. 156/21 – uradno prečiščeno besedilo in 161/21 – popr.)

Autori:
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STROJARSKA I PROMETNA ŠKOLA VARAŽDIN, Varaždin, 26.05.2022.

9. SIGURNOST PROMETA NA SEMAFORIZIRANOM RASKRIŽJU S VIZUALNIM INDIKATORIMA TRAJANJA POJEDINIH FAZA

Sažetak:

Povećanje broja vozila na gradskim prometnicama uzrok su povećanju broja prometnih nesreća. Najveći broj prometnih nesreća događa se na raskrižjima. Način upravljanja prometom na raskrižju značajno utječe na broj prometnih nesreća pa je važno odrediti kako upravljati prometom. Prometnim svjetlima ostvaruju se višestruki učinci, a dodatnom ugradnjom indikatora trajanja pojedinih faza u ciklusu rada semafora nastala su oprečna mišljenja o svrhovitosti ugradnje.

Cilj ovog rada je istražiti utjecaj vizualnih indikatora trajanja pojedinih faza u radu semafora na broj prometnih nesreća na raskrižju i usporediti stanje sigurnosti prometa na raskrižju prije i poslije ugradnje indikatora.

U prvom poglavlju ovoga rada opisuju se vrste ortogonalnih raskrižja, načini upravljanja prometom na raskrižju kao i postupci s vozilom u raskrižju te moguće točke sudara pri tim postupcima.

U narednom poglavlju prikazuju se obilježja te način upravljanja prometom na semaforiziranom ortogonalnom raskrižju Ulice Zrinskih i Frankopana i Vidovskog trga u Varaždinu. Na tom raskrižju su uz prometna svjetla postavljeni indikatori trajanja pojedinih faza rada semafora, a program rada semafora utvrđen je prema Websterovoj metodi.

U trećem poglavlju daje se prikaz istraživanja stanja sigurnosti prometa na spomenutom raskrižju prije i poslije postavljanja vizualnih indikatora trajanja pojedinih faza u ciklusu rada semafora. Istraživanje je provedeno prikupljanjem podataka o broju i vrsti prometnih nesreća u određenom vremenskom razdoblju, obradom tih podataka i njihovom usporedbom sa svrhom dobivanja dokaza o opravdanosti ugradnje indikatora.

Ključne riječi: *sigurnost prometa, vizualni indikatori, semaforizirana raskrižja, upravljanje prometom*

UVOD

Ortogonalno raskrižje je jedno od najčešćih oblika raskrižja u uličnoj mreži. Razlog tome je mogućnost poštivanja gotovo svih načela vođenja prometnih tokova. Način upravljanja prometom na ortogonalnom raskrižju ovisi o značaju prometnica koje se presijecaju, odnosno o veličini prometnih tokova koji prolaze raskrižjem.
Vozač vozilom u raskrižju može izvršiti četiri osnovna postupka. To je postupak odvajanja, postupak spajanja, postupak križanja i postupak preplitanja.

Cilj ovog rada je istražiti utjecaj vizualnih indikatora trajanja pojedinih faza u radu semafora na broj prometnih nesreća na raskrižju i usporediti stanje sigurnosti prometa na raskrižju prije i poslije ugradnje indikatora.

U ovom radu se daje prikaz istraživanja stanja sigurnosti prometa na raskrižju prije i poslije postavljanja vizualnih indikatora trajanja pojedinih faza u ciklusu rada semafora. Istraživanje je provedeno prikupljanjem podataka o broju i vrsti prometnih nesreća u određenom vremenskom razdoblju, obradom tih podataka i njihovom usporedbom sa svrhom dobivanja dokaza o opravdanosti ugradnje indikatora.

UPRAVLJANJE PROMETOM NA ORTOGONALNOM RASKRIŽJU

Vozač vozilom u raskrižju može izvršiti četiri osnovna postupka. To je postupak odvajanja, postupak spajanja, postupak križanja i postupak preplitanja.

Odvajanje je postupak na raskrižju kada vozilo skreće iz prometnog toka kojim se kretalo, u lijevu ili desnu stranu drugog prometnog toka. Prilikom izvođenja te radnje mogući oblik prometne nesreće je nalet vozila sa stražnje strane. Da bi se povećala sigurnost prometa prilikom odvajanja prometnih tokova dodaju se razdjelni otoci i grade se prometne trake za usporenje namijene vozilima koja skreću lijevo ili desno. Spajanje podrazumijeva izvođenje radnje na raskrižju kada se vozilo s desne ili lijeve strane uključuje u drugi prometni tok. Vozač tu radnju mora obaviti uz povećani oprez kako ne bi došlo do ometanja vozila koja se već kreću tim tokom. Tom prilikom je moguć nastanak bočnog sudara pod oštrim kutom, a doprinos povećanju sigurnosti daju trake za ubrzanje.

Križanje nastaje presijecanjem pravocrtnih prometnih tokova, presijecanjem prometnih tokova koji skreću u lijevo s pravocrtnim prometnim tokovima kao i presijecanjem lijevih skretanja. Na tim mjestima mogu nastati sve vrste prometnih nesreća, a sigurnost se može povećati odgovarajućom regulacijom prometa. Preplitanje se pojavljuje kod smaknutih raskrižja i kod raskrižja s kružnim tokom prometa, odnosno kod promjene prometne trake pri paralelno vođenim prometnim tokovima. Na tim mjestima potrebno je osigurati dovoljnu duljinu preplitanja.

Preplitanjem, spajanjem, razdvajanjem i križanjem prometnih tokova nastaju točke sjecišta koje se nazivaju točke sudara, kolizione točke ili konfliktne točke. Točke sudara između prometnih tokova posljedica su odvijanja prometa u razini. O vrsti raskrižja, broju prometnih traka i smjeru kretanja vozila ovisi broj točki sudara. Cilj je da je u raskrižju što manji broj točaka sudara kako bi bila što manja mogućnost nastanka prometne nesreće, odnosno što veća sigurnost kretanja

vozila i pješaka. Broj točaka sudarana na ortogonalnom raskrižju najviše ovisi o vrsti raskrižja i o načinu regulacije prometa.

Ortogonalno raskrižje s dvosmjernim prometom ima 32 točke sudara od kojih je 8 odvajanja, 8 spajanja te 16 križanja, za razliku od ortogonalnog raskrižja s jednosmjernim odvijanjem prometa sa po dvije prometne trake u istom smjeru koje ima 16 točaka sudara i to 4 odvajanja, 4 spajanja te 8 križanja. Križanje dvosmjernog sa jednosmjernim tokom odvijanja prometa, gdje je jednosmjerni tok sa dvije prometne trake, ima također 16 točaka sudara, 4 odvajanja, 4 spajanja i 8 križanja, dok kod kružnog toka sa istim brojem prilaza ima 8 točaka sudara, 4 odvajanja i 4 spajanja, a niti jedne točke križanja.

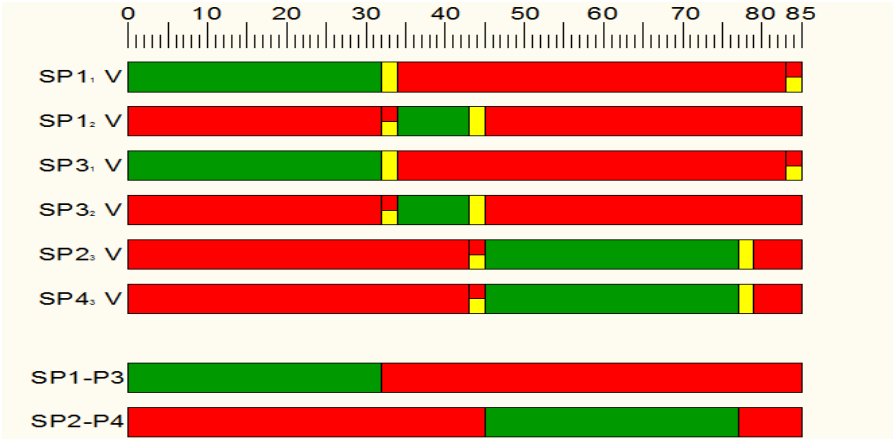
Da bi se smanjio broj točki sudara pribjegava se različitim rješenjima regulacije prometa, rekonstrukciji raskrižja i ulaganjem u infrastrukturu.

UPRAVLJANJE PROMETOM NA RASKRIŽJU ULICE ZRINSKIH i FRANKOPNA I VIDOVSKOG TRGA U VARAŽDINU

Raskrižje Ulice Zrinskih i Frankopana i Vidovskog trga nalazi se u neposrednoj blizini centra grada pored autobusnog kolodvora (slika 1.). Lokacija raskrižja na jednoj od najvažnijih ulica koja povezuje sjeverni i južni dio grada kao i neposredna blizina autobusnog kolodvora uzrokuju veliki intenzitet prometnih tokova tijekom cijelog dana, a posebno u vršnom opterećenju.

Slika 1. Raskrižje Ulice Zrinskih i Frankopana i Vidovskog trga
Izvor: Google Street View

To je tipično ortogonalno raskrižje na kojemu se upravlja prometom svjetlosnim uređajima. Specifičnost načina upravljanja prometom sastoji se u tome da su pored svjetala u semaforu ugrađeni vizualni indikatori trajanja pojedinih faza u ciklusu rada semafora. Na Slici 2. prikazan je vremenski raspored rada faza svjetlosnih uređaja,

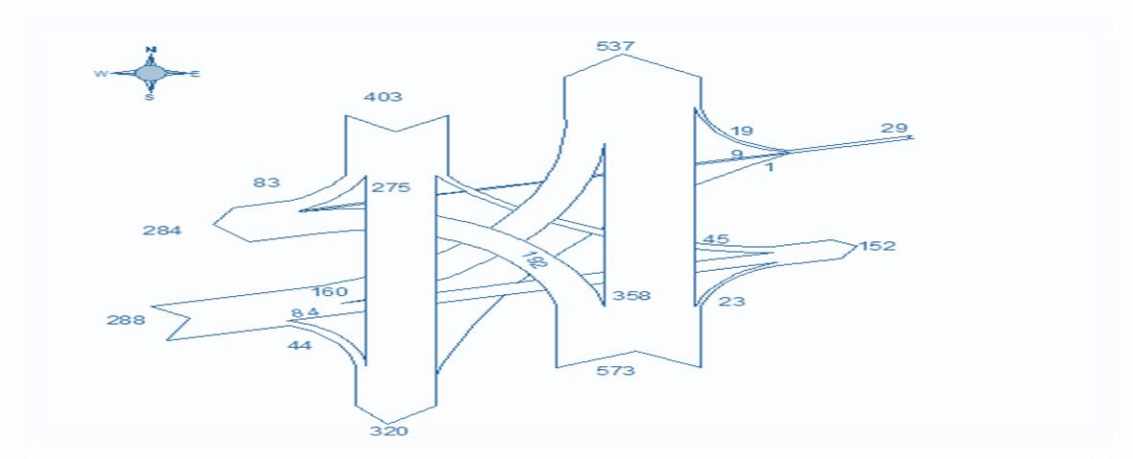


Slika 2. Vremenski raspored rada faza svjetlosnih uređaja
Izvor: izradili autori

PROMETNO OPTEREĆENJE RASKRIŽJA

Prometno opterećenje raskrižja Ulice Zrinskih i Frankopana i Vidovskog trga utvrđeno je brojanjem vozila dana 20.05.2022. u vremenu od 12:45 do 13:45 sati. Veličina prometnog opterećenja prikazana je u tablici 2. Podaci su prikazani po prilazima raskrižju i smjerovima kretanja kroz raskrižje, a izraženi su brojem vozila i jedinicom PAJ. Ukupno opterećenje raskrižja je 1293 PAJ/sat.

Znatno je veće prometno opterećenje u smjeru sjever-jug, a najopterećeniji je južni prilaz odakle većina vozila nastavlja kretanje ravno prema sjeveru uz značajan broj vozila koja skreću lijevo pa to u presijecanju s prometnim tokom iz smjera sjevera predstavlja problem. Iz smjera zapada najveći broj vozila skreće lijevo što također zahtijeva dulje vrijeme prolaženja kroz raskrižje i presijecanje s prometnim tokom iz smjera istoka. Osim toga, zbog blizine autobusnog kolodvora intenzivan je i pješački promet. Tokovi pješačkog prometa se presijecaju s tokovima vozila koja skreću u lijevo ili u desno pa to dovodi do dodatnog produljivanja vremena prolaženja vozila kroz raskrižje. Na slici 2. grafički je prikazano opterećenje raskrižja za koje se u nastavku rada određuje način upravljanja prometom.



Slika 3. Prometno opterećenje na križanju Ulice Zrinskih i Frankopana i Vidovskog trga
Izvor: Izradili autori

UPRAVLJANJE PROMETOM SVJETLOSNIM UREĐAJIMA SA INDIKATORIMA TRAJANJA U CIKLUSU RADA SEMAFORA

Regulacija prometa svjetlosnom signalizacijom ostvaruje višestruke prednosti. Upravljanje programom rada semafora može se prilagoditi veličini prometnih tokova koji se presijecaju u samom raskrižju. Program rada semafora je utvrđeni način prema kojem se odvija izmjena faza u ciklusu, tj. vremenskom razmaku potrebnom za izmjenu svih svjetala na semaforu, te se mjeri u sekundama. Svjetlosna signalizacija su svjetlosni uređaji koji služe za upravljanje i upozoravanje svih sudionika u prometu.

Glavne funkcije svjetlosnih uređaja su:

1. Uspostavljanje pravilnog i urednog prometnog toka
2. Povećanje sigurnosti prometa
3. Uspostavljenje približno kontinuiranog prometnog toka s određenom brzinom
4. Prekidanje prometa zbog prolaza pješaka i vozila sporednim prometnicama
5. Davanje prednosti jedne vrste vozila nad drugom
6. Upućivanje prometa
7. Upozoravanje na opasnim mjestima

Svjetlosna prometna signalizacija osim prednosti u vidu sigurnijeg i bržeg odvijanja prometa kroz raskrižje ima i preventivni značaj, jer se iz većih udaljenosti i iz svih smjerova može lako uočiti oznaka na prometnom svjetlu i po danu i po noći i za vrijeme slabe vidljivosti zbog loših vremenskih uvjeta.

Semafori mogu biti sa i bez postavljenih semaforskih vizualnih indikatora trajanja pojedinih faza u ciklusu rada semafora koji prikazuju vrijeme trajanja određene faze na semaforu (slika 2.). Postavljaju se na postojeći semaforski stup, a njihova integrirajuća LED tehnologija omogućuje odličnu vidljivost vozačima u svim vremenskim uvjetima. Lanterna indikatora vremena izrađena je od UV polikarbonata, dok mogu biti promjera 210, odnosno 300 milimetara. Također, prednost indikatora vremena je mogućnost sinkroniziranja prema postojećem vremenskim intervalima na semaforima.

Slika 4. Vizualni indikator trajanja pojedinih faza u ciklusu rada semafora
Izvor:Internet

Raskrižje Ulice Zrinskih i Frankopana i Vidovskog trga ima postavljene semafore na svim prilazima, a na južnom i sjevernom prilazu su na konzolama postavljena i semaforska svjetla ponavljači. Na južnom, sjevernom i zapadnom prilazu uz semaforska svjetla postavljeni su vizualni indikatori trajanja pojedinih faza u ciklusu rada semafora. Na istočnom prilazu nije postavljen vizualni indikator zbog vrlo slabog intenziteta prometa. Promatranjem je utvrđena duljina trajanja ciklusa semafora od 85 sekundi.

ANALIZA I USPOREDBA PROMETNIH NESREĆA NA RASKRIŽJU ULICE ZRINSKIH I FRANKOPANA I VIDOVSKOG TRGA

Raskrižje Ulice Zrinskih i Frankopana i Vidovskog trga jedno je od specifičnih i najfrekventnijih raskrižja u samom centru Varaždina. Ovo raskrižje je prvo raskrižje u Varaždinu na kojem su na semafore postavljeni vizualni indikatori trajanja pojedinih faza u ciklusu rada semafora. Indikatori su na semafore postavljeni u svibnju 2008. godine sa ciljem smanjenja broja prometnih nesreća na zahtjev PU Varaždinske. Osim na ovom raskrižju, indikatori trajanja pojedinih faza, do danas su postavljeni na gotovo sve semafore u centru Varaždina koji su pod upravom Grada. Koliko vizualni indikatori trajanja pojedinih faza u ciklusu rada semafora utječu na sigurnost prometa na raskrižju, najlakše je prikazati pomoću statističkih podataka o broju prometnih nesreća tijekom određenog razdoblja, prije i poslije postavljanja indikatora. Istraživanje je provedeno na temelju podataka o prometnim nesrećama od strane PU Varaždinske.

Tablica 1. Broj prometnih nesreća prije i poslije postavljanja indikatora

Razdoblje prije postavljanja indikatora									
Godine	2001	2002	2003	2004	2005	2006	2007	2008	Ukupno
Broj prometnih nesreća	12	8	8	4	11	4	4	4	55
Razdoblje poslije postavljanja indikatora									
Godine	2015	2016	2017	2018	2019	2020	2021	2022	Ukupno
Broj prometnih nesreća	1	6	3	2	2	0	3	3	20

Izvor: izradili autori

U proteklom razdoblju od 8 godina nakon postavljanja indikatora iz tablice 1. vidljiv je trend smanjenja prometnih nesreća, gdje se dogodilo ukupno 9 prometnih nesreća sa ozlijeđenim osobama, što je za 50% manje od promatranog razdoblja prije postavljanja indikatora.

UTJECAJ INDIKATORA VREMENA U CIKLUSU RADA SEMAFORA NA SIGURNOST PROMETA

Vozači i ostali sudionici u prometu su veoma dobro prihvatili način vožnje prema vizualnim indikatorima trajanja pojedinih faza u ciklusu rada semafora. Prihvaćanje indikatora od strane vozača i ostalih sudionika u prometu vidljivo je na način da vozači pravovremeno postupaju prema zahtjevima koje im nalažu promjene faza rada semafora. Tako vozač već na udaljenosti od nekoliko stotina metara može procijeniti dali će stići proći kroz raskrižje za vrijeme trajanja zelene faze rada semafora ili će se morati zaustaviti i u vezi s time poduzeti odgovarajuće radnje. Radnje zaustavljanja za vrijeme promjene svjetla na semaforu su bez intenzivnog kočenja i ugrožavanja sigurnosti vozila, odnosno smanjena je mogućnost nalijetanja na vozilo ispred.
Kroz prethodne tablice i grafikone, jasno je vidljivo da vizualni indikatori trajanja pojedinih faza u ciklusu rada semafora djeluju pozitivno na sigurnost prometa. Pozitivno djelovanje indikatora na sigurnost prometa vidljivo je kroz:

1. Povećanje prometne kulture vozača
2. Smanjenje broja prometnih nesreća

Povećanje prometne kulture vozača vidljivo je iz njihovih postupaka na raskrižju. Na vozače pozitivno djeluje činjenica da u svakome trenutku znadu koliko vremena trebaju čekati prije prolaska kroz raskrižje, kao i koliko vremena imaju da prođu kroz raskrižje.
Prometna kultura vozača indirektno djeluje na smanjenje broja prometnih nesreća, jer je sve manji broj vozača koji će se uključiti u rizične radnje znajući koliko vremena imaju za obavljanje tih radnji.
Prikazani podaci potvrđuju trend smanjenja broja prometnih nesreća nakon postavljanja indikatora vremena u ciklusu rada semafora. Ukupan broj prometnih nesreća smanjio se za čak **64%**, što zaista nije ni malo, ni slučajno. Broj prometnih nesreća sa ozlijeđenim osobama smanjio se za **50%**, a broj prometnih nesreća sa materijalnom štetom smanjio se za **62%**.
Sudara vozila iz suprotnih smjerova nije bilo nakon postavljanja indikatora za razliku od razdoblje prije, kada se dogodilo 10 takvih sudara, što je **100%** smanjenje broja prometnih nesreća toga tipa.
Broj prometnih nesreća gdje je došlo do bočnog sudara smanjio se za **40%**, nalet na vozilo ispred prilikom vožnje u slijedu smanjio se za **78%**, nalet na pješaka smanjen je za **75%**, a nalet na biciklistu **50%.**

Tablica 2. Razlika u broju prometnih nesreća prije i poslije postavljanja indikatora

	Prije postavljanja indikatora	Poslije postavljanja indikatora	Razlika u %
Ukupan broj prometnih nesreća	55	20	58%
Sa ozlijeđenim osobama	16	9	48%
Sa materijalnom štetom	39	14	62%
Sudar vozila iz suprotnih smjerova	10	0	100%
Bočni sudar	28	17	40%
Vožnja u slijedu	9	2	78%
Nalet na pješaka	4	1	75%
Nalet na biciklistu	2	1	50%
Ostalo	2	2	0%

Izvor: izradili autori

Prema podacima u tablici 2. jasno je vidljiva opravdanost postavljanja vizualnih indikatora trajanja pojedinih faza u ciklusu rada semafora.

ZAKLJUČAK

Raskrižja su mjesta povećanog rizika u prometu pa sva rješenja koja doprinose povećanju sigurnosti imaju veliki značaj.
U tom smislu, cilj istraživanja prikazan u ovom radu bio je dokazati svrhovitost jednog tehničkog rješenja vezanog uz rad svjetlosnih signala kojima se upravlja prometom na raskrižju.
U Varaždinu su, 2008. godine na raskrižju ulica Zrinskih i Frankopana i Vidovskom trgu, uz svjetlosne signale na semaforima ugrađeni vizualni indikatori trajanja pojedinih faza. Nakon toga, usprkos različitim mišljenjima stručne javnosti, nastavljena je ugradnja istih uređaja i na druga raskrižja.
Spomenuto raskrižje je tipično ortogonalno raskrižje na kojemu se upravlja prometom svjetlosnim uređajima. Prometno opterećenje iz svih prilaza, utvrđeno brojanjem, iznosi 1293 PAJ/h. Veće prometno opterećenje je u smjeru sjever-jug duž ulice s dvije kolničke trake,a svaka

kolnička traka s dvije prometne trake. Duljina trajanja ciklusa u programu rada semafora je 85 sekundi, a odvija se kroz tri faze. U prvoj fazi zeleno svjetlo namijenjeno slobodnom prolazu vozila koja idu ravno i skreću u desno s ulice Zrinskih i Frankopana traje 32 sekunde. U drugoj fazi namijenjenoj slobodnom prolazu vozila koja skreću u lijevo traje 9 sekundi, a u trećoj fazi za vozila iz sporedne ulice slobodan prolaz traje 32 sekunde.

Prikupljanjem, obradom i analizom podataka o broju prometnih nesreća na spomenutom raskrižju za razdoblje 7 godina prije ugradnje indikatora i posljednjih 8 godina dobiveni su egzaktni pokazatelji. Utvrđeno je da se ukupan broj prometnih nesreća nakon ugradnje indikatora smanjio za 64%. Broj prometnih nesreća sa ozlijeđenim osobama smanjio se za 50%, a broj prometnih nesreća sa materijalnom štetom za 62%. Pri tome, najteži oblik sudara vozila iz suprotnih smjerova se više uopće nije dogodio, bočni sudari su smanjeni za 40%, a oblik sudara s naletom na vozilo ispred prilikom vožnje u slijedu smanjio se za 78%. Značajno je također da je naleta vozila na pješaka 75% manje, a naleta na biciklistu 50% manje. Navedeni podaci potvrđuju da ugradnja vizualnih indikatora trajanja pojedinih faza u ciklusa rada semafora značajno doprinosi sigurnosti prometa na raskrižju. Svrhovitost ugradnje se očituje u očuvanju zdravlja sudionika u prometu, manjoj materijalnoj šteti na vozilima i uštedama šire zajednice.

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STROJARSKA I PROMETNA ŠKOLA VARAŽDIN, Varaždin, 26.05.2022.

9. RAFFIC SAFETY AT A TRAFFIC INTERSECTION WITH VISUAL INDICATORS OF THE DURATION OF INDIVIDUAL PHASES

Summary:

The increase in the number of vehicles on city roads is the cause of the increase in the number of traffic accidents. The largest number of traffic accidents occur at intersections. The way traffic is managed at an intersection significantly affects the number of traffic accidents, so it is important to determine how to manage traffic. Multiple effects are achieved with traffic lights, and the additional installation of indicators of the duration of individual phases in the cycle of the traffic light led to conflicting opinions about the purposefulness of the installation.

The aim of this paper is to investigate the influence of visual indicators of the duration of individual phases in traffic light operation on the number of traffic accidents at the intersection and to compare the state of traffic safety at the intersection before and after the installation of the indicators.

In the first chapter of this work, the types of orthogonal intersections, the ways of traffic management at the intersection, as well as the procedures with the vehicle at the intersection and the possible points of collision during these procedures are described.

In the next chapter, the characteristics and the way of traffic management at the traffic lighted orthogonal intersection of Zrinskih i Frankopana Street and Vidovski Square in Varaždin are presented. At that intersection, indicators of the duration of individual phases of the traffic lights were placed next to the traffic lights, and the traffic light program was determined according to Webster's method.

In the third chapter, a study of the state of traffic safety at the aforementioned intersection is presented before and after the installation of visual indicators of the duration of individual phases in the traffic light cycle. The research was conducted by collecting data on the number and type of traffic accidents in a certain period of time, processing these data and comparing them with the purpose of obtaining evidence on the justification of installing the indicator.

Keywords: *traffic safety, visual indicators, signalized intersections, traffic management*

INTRODUCTION

Orthogonal intersection is one of the most common forms of intersection in the street network. The reason for this is the ability to comply with almost all principles of traffic management. The method of traffic management at an orthogonal intersection depends on the importance of the intersecting roads, that is, on the size of the traffic flows that pass through the intersection.

A driver with a vehicle at an intersection can perform four basic procedures. It is the process of separation, the process of joining, the process of crossing and the process of interweaving.

The aim of this paper is to investigate the influence of visual indicators of the duration of individual phases in traffic light operation on the number of traffic accidents at the intersection and to compare the state of traffic safety at the intersection before and after the installation of the indicators.

This paper presents the study of the state of traffic safety at the intersection before and after the installation of visual indicators of the duration of individual phases in the traffic light cycle. The research was conducted by collecting data on the number and type of traffic accidents in a certain period of time, processing these data and comparing them with the purpose of obtaining evidence on the justification of installing the indicator.

TRAFFIC MANAGEMENT AT ORTHOGONAL INTERSECTION

A driver with a vehicle at an intersection can perform four basic procedures. It is the process of separation, the process of joining, the process of crossing and the process of interweaving.

Separation is a procedure at an intersection when a vehicle turns from the traffic flow it was traveling in, to the left or right side of another traffic flow. When performing this action, a possible form of traffic accident is a rear-end collision. In order to increase traffic safety when separating traffic flows, dividing islands are added and traffic lanes are built to slow down vehicles turning left or right. Merging means performing an action at an intersection when a vehicle from the right or left side joins another traffic flow. The driver must perform this action with increased caution so as not to interfere with vehicles already moving in that direction. On this occasion, a side collision at a sharp angle is possible, and acceleration lanes contribute to increased safety.

Crossing occurs by crossing straight traffic flows, crossing left-turning traffic flows with straight traffic flows, as well as crossing left turns. All kinds of traffic accidents can occur in these places, and safety can be increased by proper traffic regulation. Interweaving occurs at dead-end intersections and at intersections with a circular flow of traffic, i.e. when changing lanes with parallel traffic flows. In these places, it is necessary to ensure a sufficient length of interlacing.

By intertwining, merging, separating and crossing traffic flows, intersection points are created, which are called collision points, collision points or conflict points. Collision points between traffic flows are the result of level traffic. The number of collision points depends on the type of intersection, the number of traffic lanes and the direction of movement of the vehicle. The goal is to have as few collision points as possible in the intersection, so that there is as little possibility of a traffic accident as possible, that is, as much safety as possible for the movement of vehicles

and pedestrians. The number of collision points at an orthogonal intersection mostly depends on the type of intersection and the method of traffic regulation.

An orthogonal intersection with two-way traffic has 32 collision points, of which 8 are separations, 8 junctions and 16 crossings, in contrast to an orthogonal intersection with one-way traffic with two traffic lanes in the same direction, which has 16 collision points, namely 4 separations, 4 junctions and 8 crossings. A two-way intersection with a one-way flow of traffic, where the one-way flow has two traffic lanes, also has 16 collision points, 4 separations, 4 junctions and 8 crossings, while a roundabout with the same number of approaches has 8 collision points, 4 separations and 4 junctions , and not a single crossing point.

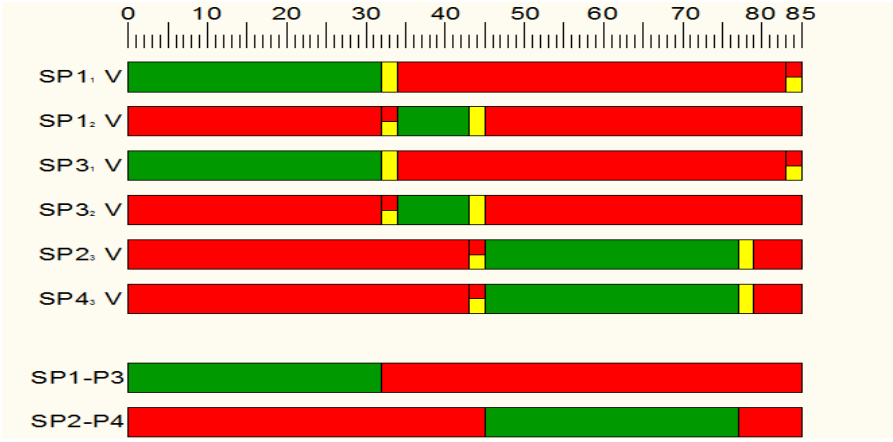
In order to reduce the number of collision points, various traffic regulation solutions, reconstruction of intersections and investment in infrastructure are resorted to.

TRAFFIC MANAGEMENT AT THE INTERSECTION OF ZRINSKIH AND FRANKOPNA STREETS AND VIDOVSKA TRG IN VARAŽDIN

The intersection of Street Zrinskih i Frankopan and Vidovski square is located in the immediate vicinity of the city center next to the bus station (picture 1). The location of the intersection on one of the most important streets that connects the northern and southern parts of the city, as well as the immediate vicinity of the bus station, cause a high intensity of traffic flows throughout the day, especially during peak hours.

Picture 1. The intersection of Zrinskih i Frankopan Street and Vidovski square
Source: Google Street View

It is a typical orthogonal intersection where traffic is controlled by light devices. The specificity of the traffic management method consists in the fact that next to the lights in the traffic lights, visual indicators of the duration of individual phases in the traffic light cycle are installed. Figure 2 shows the time schedule of the phases of the lighting devices.

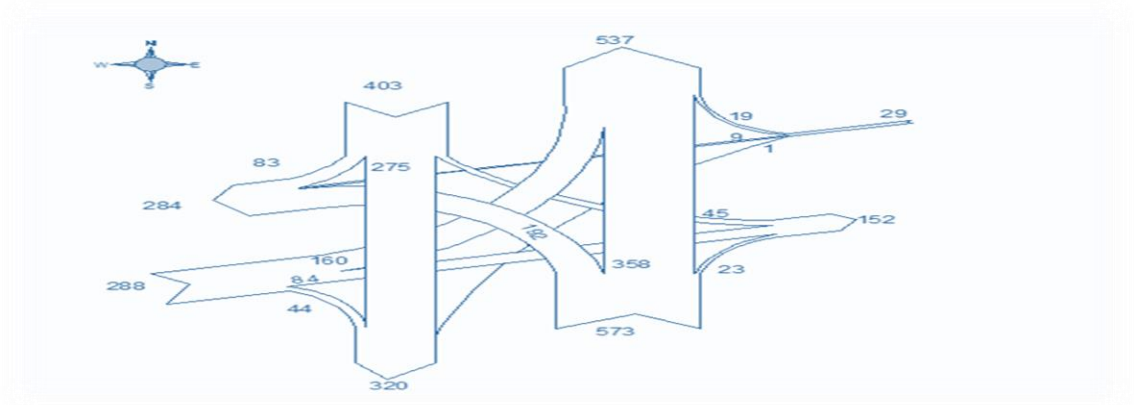


Picture 2. Time schedule of the phases of light devices
Source: created by the authors

TRAFFIC LOAD OF THE INTERSECTION

The traffic load at the intersection of Zrinskih i Frankopan Street and Vidovski Square was determined by counting vehicles on May 20, 2022. in the time from 12:45 to 13:45. The size of the traffic load is shown in table 2. The data are shown by approaches to the intersection and directions of movement through the intersection, and are expressed by the number of vehicles and the PAJ unit. The total load of the intersection is 1293 PAJ/hour.

The traffic load is significantly higher in the north-south direction, and the southern approach is the busiest, from where most vehicles continue to move straight north with a significant number of vehicles turning left, which is a problem in crossing the traffic flow from the north. From the west, the largest number of vehicles turn left, which also requires a longer time to pass through the intersection and intersect with the traffic flow from the east. In addition, due to the proximity of the bus station, pedestrian traffic is also intense. The flow of pedestrian traffic intersects with the flow of vehicles turning left or right, which leads to an additional increase in the time it takes for vehicles to pass through the intersection. Picture 2 graphically shows the load of the intersection for which the traffic management method is determined in the following work.



Picture 3. Traffic load at the intersection of Ulica Zrinski i Frankopana and Vidovski square
Source: Created by the authors

TRAFFIC MANAGEMENT WITH LIGHT DEVICES WITH DURATION INDICATORS IN THE TRAFFIC LIGHT WORK CYCLE

Traffic regulation with light signaling achieves multiple advantages. Traffic light program management can be adjusted to the size of the traffic flows that intersect at the intersection itself. The traffic light program is the established method according to which the phase change takes place in the cycle, i.e. the time interval required to change all the lights on the traffic light, and is measured in seconds. Light signals are light devices that serve to control and warn all road users.

The main functions of light devices are:
1. Establishing a proper and orderly traffic flow
2. Increasing traffic safety
3. Establishing an approximately continuous traffic flow with a certain speed
4. Interruption of traffic due to the passage of pedestrians and vehicles on secondary roads
5. Favoring one type of vehicle over another
6. Referral of traffic
7. Warning in dangerous places

Traffic light signaling, apart from its advantages in the form of safer and faster movement of traffic through the intersection, also has a preventive significance, because the sign on the traffic light can be easily seen from greater distances and from all directions, both during the day and at night, and during low visibility due to bad weather conditions.

Traffic lights can be with or without installed traffic light visual indicators of the duration of individual phases in the traffic light cycle, which show the duration of a specific phase on the traffic light (Figure 2). They are installed on the existing traffic light pole, and their integrating LED technology provides excellent visibility for drivers in all weather conditions. The time indicator lantern is made of UV polycarbonate, while they can be 210 or 300 millimeters in diameter. Also, the advantage of the time indicator is the possibility of synchronizing according to the existing time intervals on the traffic lights.

Picture 4. Visual indicator of the duration of individual phases in the traffic light cycle
Source: Internet

The intersection of Ulica Zrinskih i Frankopan and Vidovski trga has traffic lights installed on all approaches, and traffic light repeaters are installed on consoles on the southern and northern approaches. Visual indicators of the duration of individual phases in the cycle of the traffic lights are placed on the southern, northern and western approaches next to the traffic lights. There is no visual indicator on the eastern approach due to very low traffic intensity. Through observation, the duration of the traffic light cycle was determined to be 85 seconds.

ANALYSIS AND COMPARISON OF TRAFFIC ACCIDENTS AT THE INTERSECTION OF ZRINSKIH AND FRANKOPANA STREETS AND VIDOVSKA TRG

The intersection of Ulica Zrinskih i Frankopan and Vidovski square is one of the specific and most frequent intersections in the very center of Varaždin. This intersection is the first intersection in Varaždin where visual indicators of the duration of individual phases in the traffic light cycle are placed on the traffic lights. The indicators were placed on the traffic lights in May 2008 with the aim of reducing the number of traffic accidents at the request of the Varaždin Public Administration. Except at this intersection, indicators of the duration of individual phases have been placed on almost all traffic lights in the center of Varaždin that are under the administration of the City. How visual indicators of the duration of individual phases in the cycle of traffic lights affect traffic safety at the intersection is easiest to show using statistical data on the number of traffic accidents during a certain period, before and after the installation of the indicators. The research was conducted on the basis of data on traffic accidents by the PU Varaždinska.

Table 1. Number of traffic accidents before and after installation of the indicator

The period before setting the indicator									
Years	2001	2002	2003	2004	2005	2006	2007	2008	Sum
Number of traffic accidents	12	8	8	4	11	4	4	4	55
The period after setting the indicator									
Years	2015	2016	2017	2018	2019	2020	2021	2022	Sum
Number of traffic accidents	1	6	3	2	2	0	3	3	20

Source: created by the authors

In the period last of 8 years after the installation of the indicator from table 1, a trend of reduction in traffic accidents is visible, where a total of 9 traffic accidents with injured persons occurred, which is 50% less than the observed period before the installation of the indicator.

INFLUENCE OF TIME INDICATORS IN THE TRAFFIC LIGHT CYCLE ON TRAFFIC SAFETY

Drivers and other road users have very well accepted the way of driving according to the visual indicators of the duration of individual phases in the traffic light cycle. The acceptance of the indicator by drivers and other road users is visible in the way that drivers promptly comply with the requirements imposed by the changes in the phases of the traffic lights. Thus, the driver can already at a distance of several hundred meters assess whether he will be able to pass through the intersection during the green phase of the traffic light operation or whether he will have to stop and take appropriate actions in this regard. Stopping actions during a traffic light change are without intensive braking and jeopardizing the safety of the vehicle, i.e. the possibility of running into the vehicle in front is reduced.

Through the previous tables and graphs, it is clearly visible that the visual indicators of the duration of individual phases in the traffic light cycle have a positive effect on traffic safety. The positive effect of the indicator on traffic safety is visible through:

1. Increasing the traffic culture of drivers
2. Reduction in the number of traffic accidents

The increase in traffic culture of drivers is evident from their actions at the intersection. Drivers have a positive effect on the fact that they know at all times how much time they need to wait before passing through the intersection, as well as how much time they have to pass through the intersection.

The traffic culture of drivers indirectly reduces the number of traffic accidents, because the number of drivers who will engage in risky actions knowing how much time they have to perform these actions is decreasing.

The presented data confirm the trend of a decrease in the number of traffic accidents after the installation of the time indicator in the traffic light cycle. The total number of traffic accidents decreased by as much as 64%, which is really neither small nor accidental. The number of traffic accidents with injured persons decreased by 50%, and the number of traffic accidents with material damage decreased by 62%.

There were no collisions of vehicles coming from opposite directions after installation of the indicator, in contrast to the period before, when 10 such collisions occurred, which is a 100% reduction in the number of traffic accidents of this type.

The number of traffic accidents where there was a side collision decreased by 40%, the collision with the vehicle in front when driving in a row decreased by 78%, the collision with a pedestrian decreased by 75%, and the collision with a cyclist decreased by 50%.

Table 2. Difference in the number of traffic accidents before and after installation of the indicator

	Before setting the indicator	After setting the indicator	Difference%
Total number of traffic accidents	55	23	58%
With injured persons	16	9	48%
With material damage	39	14	62%
Collision of vehicles from opposite directions	10	0	100%
Side impact	28	17	40%
Driving in sequence	9	2	78%
Running into a pedestrian	4	1	75%
Crashing into a cyclist	2	1	50%
The rest	2	2	0%

Source: created by the authors

According to the data in table 2, the justification of setting visual indicators of the duration of individual phases in the traffic light cycle is clearly visible.

CONCLUSION

Intersections are places of increased risk in traffic, so all solutions that contribute to increasing safety are of great importance. In this sense, the goal of the research presented in this paper was to prove the expediency of a technical solution related to the operation of light signals that manage traffic at the intersection.

In Varaždin, in 2008, at the intersection of Zrinskih and Frankopana streets and Vidovsko trg, visual indicators of the duration of individual phases were installed in addition to light signals on traffic lights. After that, despite the different opinions of the professional public, the installation of the same devices continued at other intersections.

The mentioned intersection is a typical orthogonal intersection where traffic is controlled by light devices. The traffic load from all approaches, determined by counting, amounts to 1293 PAJ/h. The greater traffic load is in the north-south direction along the street with two lanes, and each lane with two traffic lanes. The duration of the cycle in the traffic light program is 85 seconds, and it takes place through three phases. In the first phase, the green light intended for the free passage of vehicles going straight and turning right from Zrinskih i Frankopana street lasts 32 seconds. In the second phase intended for the free passage of vehicles turning to the left, it lasts 9 seconds, and in the third phase, the free passage for vehicles from the side street lasts 32 seconds.

By collecting, processing and analyzing data on the number of traffic accidents at the mentioned intersection for the period of 7 years before the installation of the indicator and last 8 years after, exact indicators were obtained. It was determined that the total number of traffic accidents decreased by 64% after the installation of the indicator. The number of traffic accidents with injured persons decreased by 50%, and the number of traffic accidents with material damage by 62%. At the same time, the most serious form of collision with vehicles coming from opposite directions no longer occurred at all, side collisions were reduced by 40%, and the form of collision with a collision with the vehicle in front when driving in a row was reduced by 78%. It is also significant that the collision of a vehicle with a pedestrian is 75% less, and the collision with a cyclist is 50% less. The above data confirm that the installation of visual indicators of the duration of individual phases in the traffic light cycle significantly contributes to traffic safety at the intersection. The purposefulness of installation is manifested in the preservation of the health of road users, less material damage to vehicles and savings for the wider community.

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10. Analiza prometnih podatkov prikazovalnikov hitrosti

Avtor: Haris Ćordić, mag. inž. prom.

Povzetek

V članku so najprej predstavljeni prikazovalniki hitrosti in njihov namen v prometu. Predstavljene so tudi študije o učinkovitosti teh naprav. Sledi krajša predstavitev delovanja prikazovalnikov hitrosti. V tretjem poglavju so predstavljeni podatki, ki jih lahko pridobimo s pomočjo prikazovalnikov hitrosti in zakaj so le-ti tako pomembni za promet. Na koncu so kot primer predstavljeni obdelani rezultati in možne ugotovitve, ki jih lahko iz podatkov razberemo.

Ključne besede

Prikazovalniki hitrosti, prometna varnost, prometni tokovi

1 Uvod

Prikazovalniki hitrosti so naprave, ki prikazujejo podatek o hitrosti vozila, ko se približuje napravi. Namen naprav je ozavestiti voznika o njegovi hitrosti in tako vplivati nanjo. Nekateri prikazovalniki poleg hitrosti prikazujejo še besedilo (npr. Prehitro!) ali znak (npr. t. i. »palec navzgor«) (Gehlert, 2012). Prikazovalniki hitrosti v prometu informirajo voznike o hitrosti, posledično umirjajo promet ter povečujejo varnost. O učinkovitosti uvedbe omenjenih naprav govori kar nekaj študij, npr. Stern in ostali (2010), pri katerih so opazili upad 85. percentila hitrosti za od 2 do 6 km/h v 6 mesecih po namestitvi naprave.

Najbolj pogosto se postavljajo na občutljivih območjih, kot so šolsko območje, območje pešcev, območje dela (Ullman in Rose, 2005), oz. na območjih, kjer vozila pogosto ne znižajo hitrosti toliko, kot bi morala (Cruzado in Donnell, 2009).

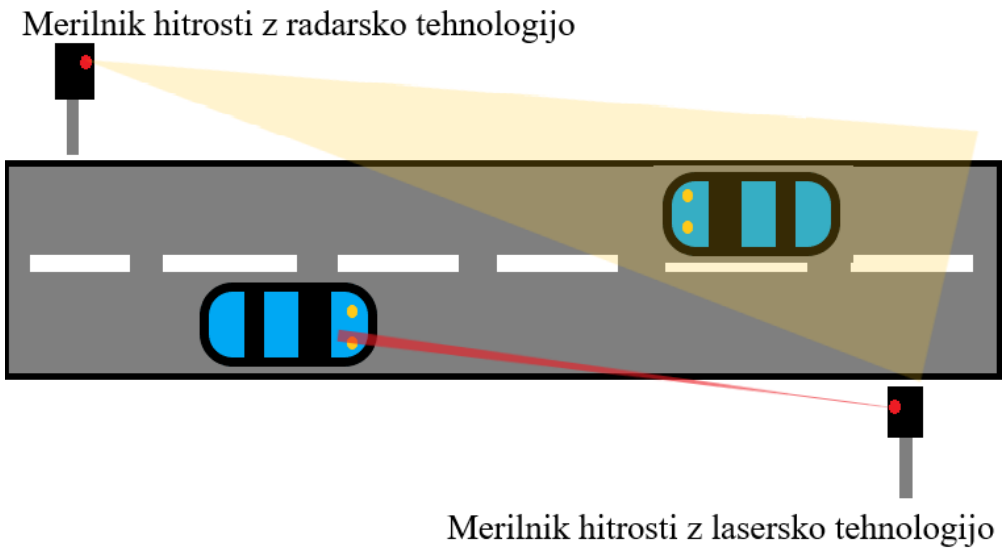
Sodobni prometno informacijski sistemi, kot jih nudi podjetje Sipronika d.o.o., lahko pridobljene podatke s prikazovalnika hitrosti obdelujejo za boljši pregled spoštovanja vpeljanih prometnih ureditev v konkretnem okolju in urejanje prometnih tokov. Podatke lahko obdelujemo in opazujemo trende rasti/upadanja gostote v določenih časovnih intervalih, kot je npr. povečanje gostote prometa v dnevnih konicah ali pa v času turistične sezone. Posledično lahko lastnik ceste predvidi prometne konice in ustrezno prilagodi interval zelenih luči na določenem odseku.

2 Merilniki/prikazovalniki hitrosti

Merilniki hitrosti so naprave, ki merijo hitrost premikajočih se teles z različnimi tehnologijami. Glede na vrsto oddajanih valov jih delimo na »radarje in »lidarje«.

Beseda radar izhaja iz angleške kratice za zaznavanje in razdaljemerstvo z radijskimi valovi *(angl. RAdio Detection And Ranging)* (Skolnik, 1980).

Vsak radar ima anteno, ki služi kot oddajnik in sprejemnik. Antena odda signal, ki se nato odbije od premikajočega se objekta, kar antena zazna kot odmev. Razdalja med objektom in merilnikom hitrosti se izmeri tako, da izračunamo čas, ki ga oddani signal potrebuje za pot do objekta in nazaj. Smer, v kateri radar vidi objekt, določa odčitek trenutne usmerjenosti antene. Ob enem obratu antene klasičnega radarja objekt prepotuje neko razdaljo. Prepotovana razdalja v času enega obrata antene pomeni hitrost. Merilniki hitrosti v prikazovalnikih hitrosti podjetja Sipronika sevajo mikrovalove, toda hitrost objekta določajo po Dopplerjevem principu.



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Slika 1: Prikaz snopa radarske in lidarske tehnologije

3 Pridobljeni podatki

1. Odstotni deleži (percentili) hitrosti

Verjetno najbolj pomembni podatki, ki jih lahko dobimo iz obcestnih prikazovalnikov hitrosti, so trenutne hitrosti vozil, ki vozijo po tej cesti. Kot primer lahko izpostavimo 85. percentil hitrosti.
Po t. i. vključujoči definiciji v statistiki je percentil (ali centil) rezultat, ki pomeni opazovano vrednost, do katere največ sega določen delež podatkov iz neke množice. Na primer 85. percentil hitrosti nam pove, da 85 % vozil vozi s to ali nižjo hitrostjo.
V določenih državah po svetu (npr. v ZDA) s pomočjo 85. percentila določajo izhodišče za omejitve hitrosti na določenem odseku, kar je ena izmed metod določitev omejitve hitrosti. Večina ljudi ne vozi po omejitvah, ampak po občutku, ki je odvisen od dejavnikov, kot so: širina pasu, vidno polje, v katero so vključeni tudi osvetljenost vozišča in ovire, pogostnost zavojev ipd. Če upravljalec ceste (npr. občina) določi omejitev hitrosti, ki ustreza 85. percentilu hitrosti, bodo s takšno omejitvijo zagotovili znatno boljšo varnost, kot če omejitev določijo na drugačen način. Prometne nesreče se pogosto zgodijo, kadar hitrosti vozil močno odstopajo od 85. percentila hitrosti, bodisi navzgor bodisi navzdol (Spack, 2016).

2. Največja dnevna zabeležena hitrost

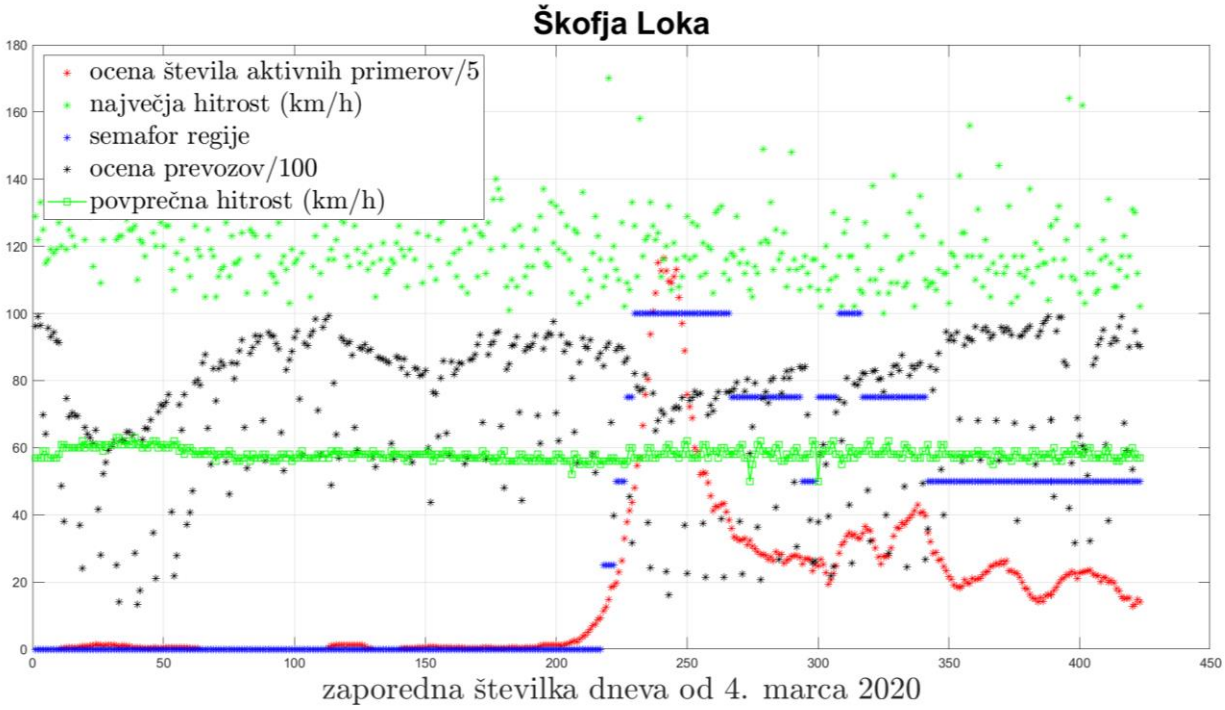
Največja dnevna zabeležena hitrost je podatek o največji hitrosti, izmerjeni v enem posameznem dnevu, v času od 00.00 do 23.59. Iz podatkov po navadi ugotavljamo, da so največje hitrosti pogosto izmerjene v času praznih cest oz. nočnih ur, ko je gostota prometa majhna, vendar dnevnih porazdelitev zabeleženih hitrosti nismo analizirali.

3. Ocena števila prevozov

Ocena števila prevozov izvira iz števila meritev, ki se glede na hitrostni razred deli z določenim faktorjem in predstavlja približek števila vozil v določeni časovni enoti. Za natančno štetje in klasificiranje prometa Sipronika uporablja drugo tehnično napravo.

4 Obdelava podatkov iz prakse

Podatke o prometnih tokovih pridobimo iz sistema v obliki poročila v MS Word dokumentu. Te podatke lahko uporabimo za raznovrstne analize, kot primer pa podajamo obdelavo prometnih podatkov podjetja Sipronike in podatkov Sledilnika Covid-19 o stanju okužb s Covid-19 v regiji, kjer se nahaja prikazovalnik hitrosti. Na spodnjih slikah lahko vidite grafe izdelane v MatLab-u z namenom iskanja korelacij ali gručenja podatkov z uporabo podatkov iz prikazovalnikov hitrosti v Škofji Loki ter podatkov Sledilnika Covid-19 o okužbah s Covid-19 v regiji.



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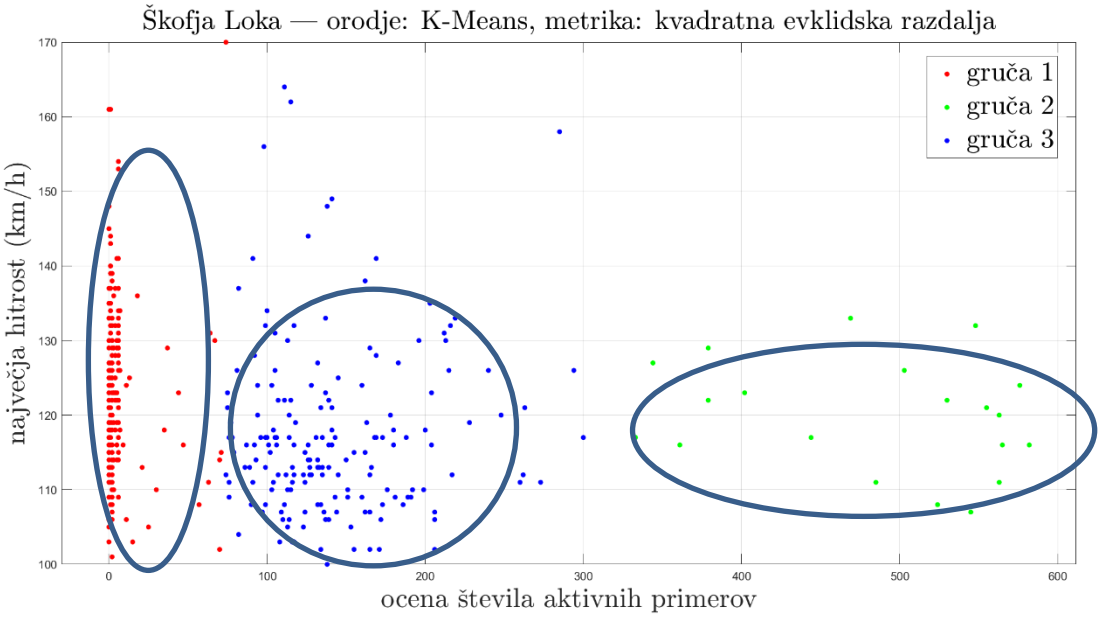
Slika 2: Splošni graf, Škofja Loka

Večjemu številu aktivnih primerov je sledila strožja faza ukrepov, kar je praviloma povzročilo manjšo gostoto prometa (manjše število meritev). Če upoštevamo Greenshieldsov model, bi manjša gostota morala povzročiti večje povprečne hitrosti. Če bi največja hitrost vedno enako relativno odstopala od povprečne hitrosti, bi se morala povečati tudi največja hitrost. V tem primeru bi največje hitrosti morale pozitivno korelirati z oceno števila aktivnih primerov. V večini krajev pa je opazna šibka oz. zelo šibka negativna korelacija med največjimi hitrostmi in številom aktivnih primerov (podobno velja tudi za število novookuženih). Iz tega lahko sklepamo, da so se ob povečevanju števila aktivnih primerov zniževale največje izmerjene hitrosti. Tak pojav v prometu je nepričakovan.

Gručenje



(vir: lasten)

Slika 3: Gručenje največje dnevne hitrosti v odvisnosti od dnevne ocene števila aktivnih primerov covida-19, Škofja Loka

Iz grafa lahko razberemo, da so z večjim številom aktivnih primerov manjše najvišje hitrosti (elipse najbolj desne množice so ploščene in imajo središče sorazmerno nizko). Gre za zanimiv pojav, ki ga morda lahko pripišemo majhnosti tega kraja, v katerih število aktivnih primerov vpliva na življenje v posamezni občini.

5 Zaključek

Prikazovalniki hitrosti ne služijo izključno namenu informiranja voznikov, temveč tudi obdelavi podatkov za upravljalca cest, ki lahko po analizi podatkov prilagaja prometno ureditev. Prometni tokovi so »živi« in se s časom spreminjajo, dejavnikov, ki vplivajo na spreminanje le-teh pa je mnogo. S kvalitetno obdelavo podatkov pa lahko vseeno vidimo določene prometne zakonitosti. Veliko občin podatkov prikazovalnikov hitrosti ne obdeluje, saj je za obdelavo potreben čas in tudi denar. Menimo, da bi občine lahko z učinkovitim sistemom rotiranja prikazovalnikov hitrosti pridobila podatke, ki bi po končani obdelavi pomembno prispevali k razumevanju prometnih tokov v določenih krajih.

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10. Traffic data analysis of speed displays

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Summary

Article first presents speed displays and their purpose in traffic. Studies on the effectiveness of these devices are also presented. The following is a brief presentation of operation of speed displays. Third chapter presents data that can be obtained from speed displays and why they are so important for traffic. Finally, the processed results and possible findings that can be understood from the data are presented as an example.

Key words

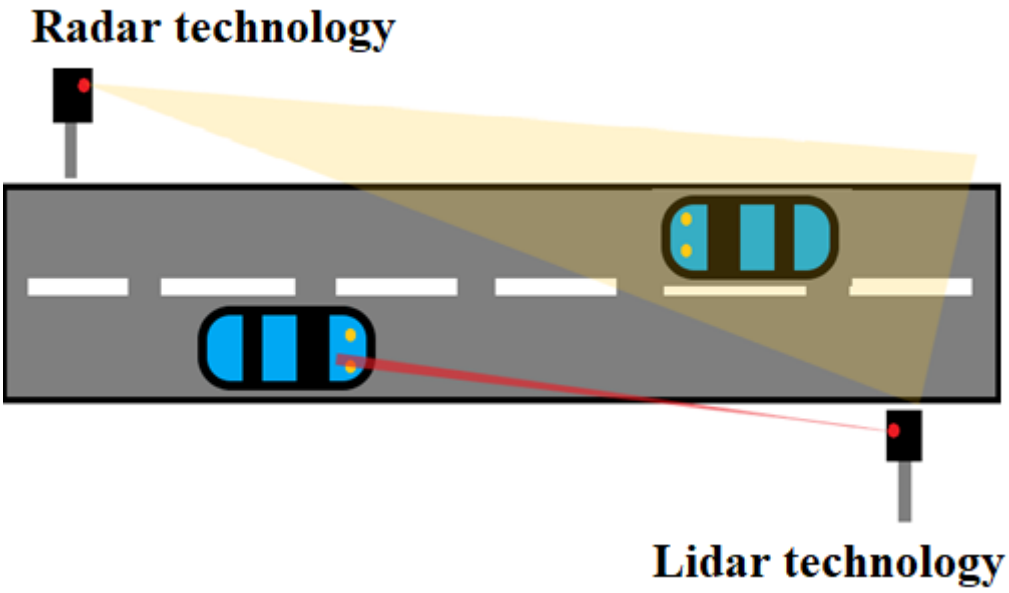
Speed displays, traffic safety, traffic flows

1 Introduction

Speed indicators are devices that display information about the speed of a vehicle as it approaches the device. The purpose of the devices is to make the driver aware of his speed and thus influence it. In addition to the speed some displays also show a text (e.g. Too fast!) or a sign (e.g. "thumbs up") (Gehlert, 2012). Speed displays in traffic inform drivers about the speed, resulting in calmer traffic and increased safety. Quite a few studies talk about the effectiveness of introduction of mentioned devices, e.g. Stern et al. (2010) observed a 2 to 6 km/h decline in 85th percentile speed within 6 months of device placement. They are most often placed in sensitive areas such as school areas, pedestrian areas, work areas (Ullman and Rose, 2005), or in areas where vehicles often do not slow down as much as they should (Cruzado and Donnell, 2009). Modern traffic information systems, such as those offered by the company Sipronika d.o.o., can process data obtained from the speed display for a better review of observance of traffic regulations in a specific environment and regulation of traffic flows. We can process data and observe growth/decrease trends of the density in certain time intervals, such as e.g. increase in traffic density during peak hours or during tourist season. As a result, the road owner can anticipate traffic peaks and adjust the interval of green lights on a certain section accordingly.

2 Speed displays

Speed displays are devices that measure the speed of moving bodies using various technologies. Depending on the type of emitted waves, they are divided into "radar" and "lidar". The word radar comes from the English abbreviation for detection and ranging with radio waves (RAdio Detection And Ranging) (Skolnik, 1980). Each radar has an antenna that serves as a transmitter and receiver. The antenna emits a signal which then bounces off a moving object which the antenna detects as an echo. The distance between the object and the speedometer is measured by calculating the time it takes transmitted signal to travel to the object and back. Direction in which the radar sees the object determines the current antenna orientation reading. With one rotation of classic radar antenna, the object travels a certain distance. The distance traveled during one turn of the antenna is the speed. Speedometers in Sipronika speed displays emit microwaves but determine the speed of the object using the Doppler principle.



(source: own)

Photograph 4: Different beam technology

3 Obtained data

1. **Percentage shares (percentiles) of speed**

   Probably the most important information that can be obtained from speed display is the current speed of vehicles driving on that road. As an example we can highlight the 85th percentile of speed. According to the inclusive definition in statistics, a percentile (or centile) is a result that means an observed value to which a certain proportion of data from a population reaches the maximum. For example, the 85th percentile of speed tells us that 85% of vehicles are traveling at or below that speed. In certain countries around the world (e.g. in the USA) the 85th percentile is used to determine the starting point for speed limits on a certain section, which is one of the methods of determining the speed limit. Most people do not drive according to restrictions, but according to a feeling, which depends on factors such as: lane width, field of vision, which also includes road lighting and obstacles, frequency of turns, etc. If a road manager (e.g. a municipality) sets a speed limit that corresponds to the 85th percentile of speed, such a speed limit will provide significantly better safety than if the limit is set in a different way. Traffic accidents often occur when vehicle speeds deviate significantly from the 85th percentile speed, either up or down (Spack, 2016).

2. **Maximum daily recorded speed**

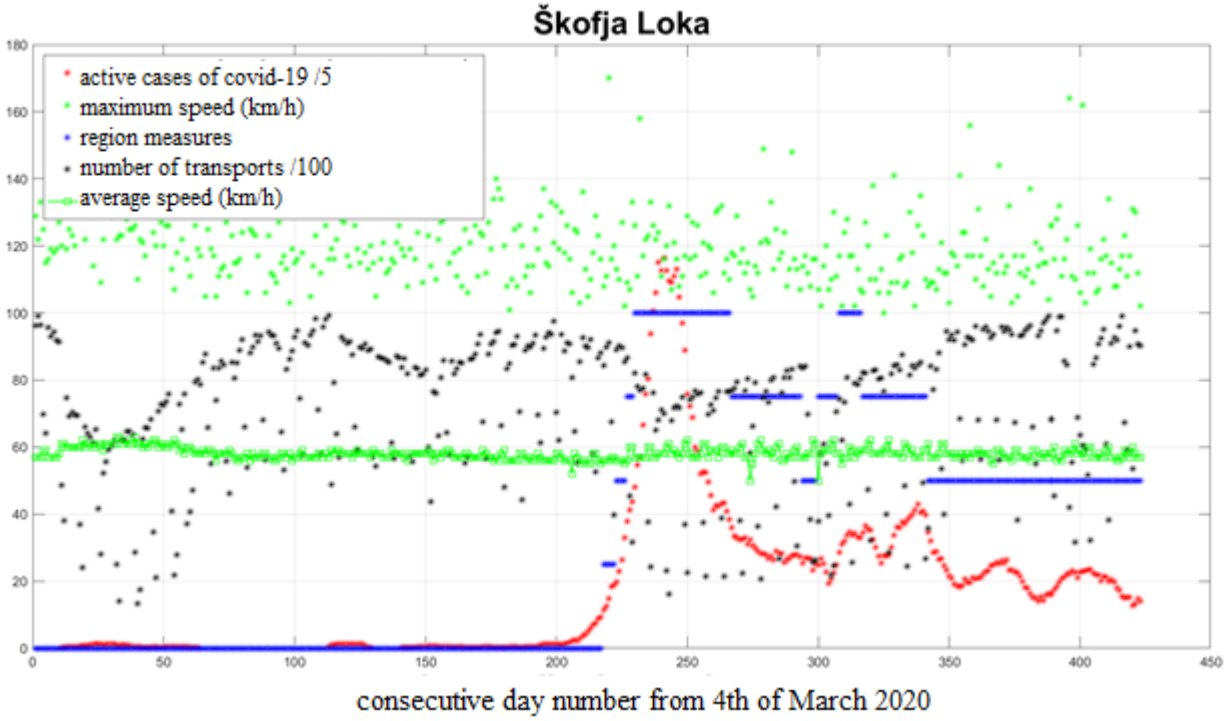
   The maximum daily recorded speed is a data of the maximum speed measured in one single day, between 00:00 and 23:59. From the data, we usually note that the maximum speeds are often measured when the roads are empty or at night hours, when the traffic density is low, but we did not analyze the daily distributions of the recorded speeds.

3. **Estimation of the number of transports**

   The estimate of the number of transports comes from the number of measurements, which, depending on the speed class is divided by a certain factor and represents an approximation of the number of vehicles in a certain time unit. For accurate counting and classification of traffic Sipronika uses another technical device.

4 Practical analysis of data

Data on traffic flows is obtained from system in the form of a report in an MS Word document. This data can be used for various analyses and as an example we give the analysis of traffic data from company Sipronika and data from Sledilnik Covid-19 on the state of Covid-19 infections in the region where the speed display is located. In the images below, you can see graphs made in MatLab with the purpose of finding correlations or clustering of data using data from speed displays in Škofja Loka and data from Sledilnik Covid-19 on Covid-19 infections in the region.

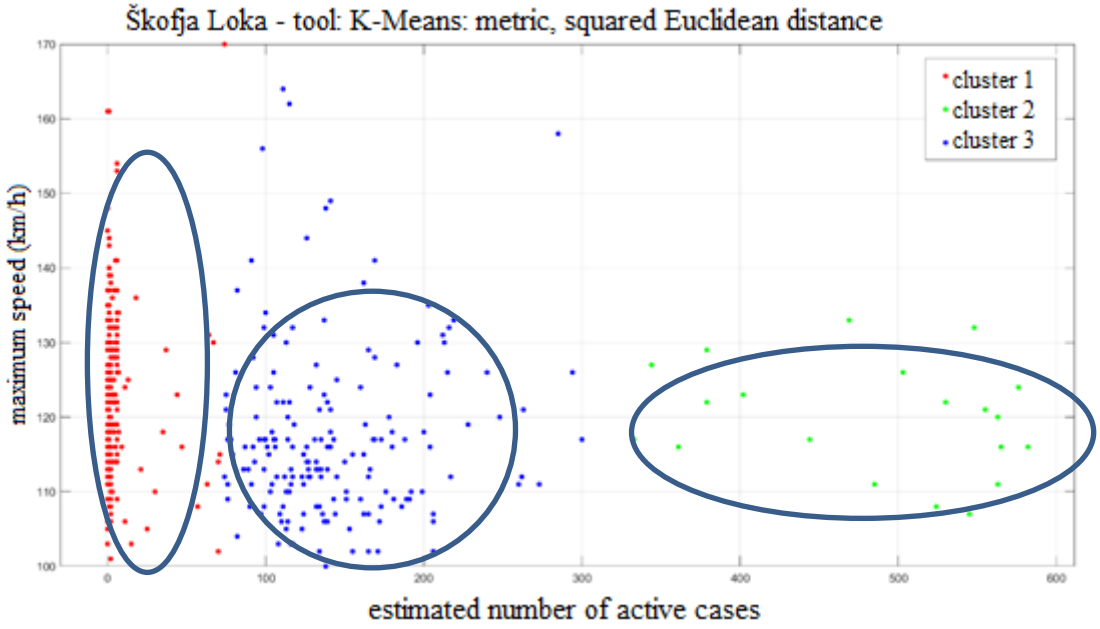


(source: own)

Photograph 5: Graph, Škofja Loka

A higher number of active cases was followed by a stricter phase of measures which generally resulted in lower traffic density (lower number of measurements). If we follow Greenshields' model lower density should result in higher average velocities. If maximum measured speeds were always in same relative deviation from average speeds then the maximum speeds should also increase. In this case peak speeds should correlate positively with the estimate of the number of active cases. In most places, however, there is a noticeable weak or very weak negative correlation between maximum speeds and number of active cases (same applies to number of new infections). From this we can conclude that as the number of active cases increased, the maximum measured speeds decreased. Such traffic phenomenon is unexpected.

Data clustering



(source: own)

Photograph 6: Data clustering, Škofja Loka

We can see from Photo 3 that with a larger number of active cases the maximum speeds are lower (the ellipses of rightmost set are flat and have a relatively low center). It is an interesting phenomenon that can perhaps be attributed to the small size of this place in which the number of active cases affects life in municipality.

5 Conclusion

Speed displays serve not only the purpose of informing drivers, but also processing of data for road manager, who can adjust traffic regulation after analyzing the data. Traffic flows are "living" and ever-changing because of many factors that influence their change. However with quality data processing we can still see certain traffic laws. Many municipalities do not process data from speed displays as processing takes time and money. We believe that with an effective system of rotating speed displays, municipalities could obtain data that after processing would significantly contribute to the understanding of traffic flows in certain places.

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11. »PRIJAZNO« USPOSABLJANJE KANDIDATOV ZA KATEGORIJO »A1« V REPUBLIKI SLOVENIJI

Povzetek:

Vožnja z motornim kolesom predstavlja v današnjem času premagovanje poti zaradi dnevne migracije ali pa kot »otroška« izpolnitev sanj o težkem motorju. Danes motorno kolo omogoča mladini prvi stik z prometom kot udeleženec voznik. Prvi starostni pogoj je 15 let za AM (moped) kategorijo. Pred leti je bila ta starostna omejitev pri 14 letih in je bilo opravljenih izpitov za to kategorijo veliko. Za predstavo, na osnovnih šolah so se prijavili skoraj vsi učenci s pogojem starostne omejitve. Za motorno kolo so se skozi leta spreminjali starostni pogoji in kategorije A. Vse te starostne omejitve in vrste motornih kole se spreminjajo na osnovi opazovanja sosednjih držav, smernic EU in predlogov domačih prometnih strokovnjakov. V tem članku se bomo posvetili pogojem in izvedbi pridobivanja kategorije A1, s katero je omogočeno lažje in hitrejše pridobivanje dovoljenja za vožnjo lahkih motociklov in skuterjev.

Ključne besede: prometna varnost, varna mobilnost, vozniško dovoljenje, AVP, SPV

UVOD

Vožnja z motornim kolesom predstavlja v današnjem času premagovanje poti, zaradi dnevne migracije ali pa kot »otroška« izpolnitev sanj o težkem motorju.
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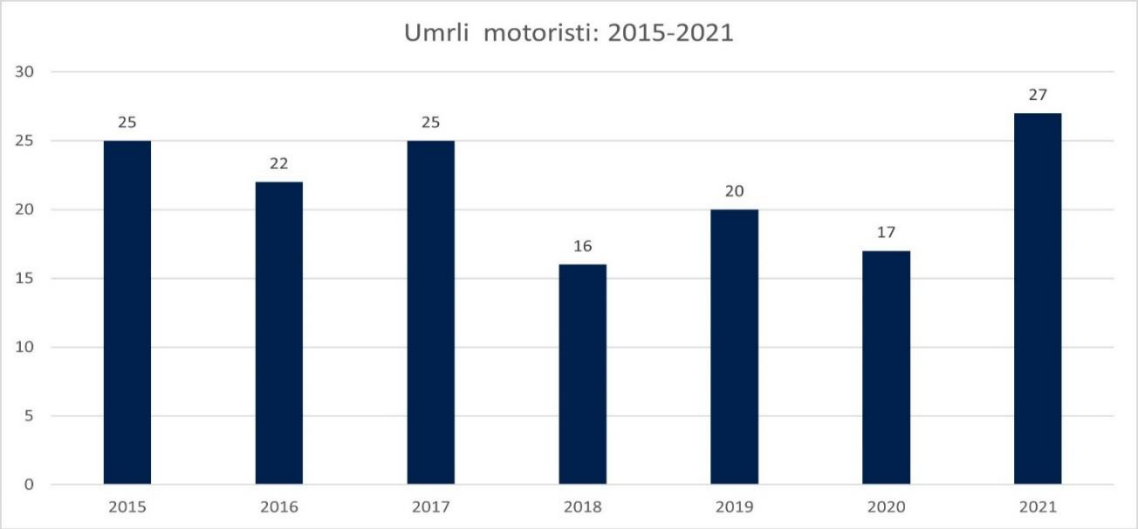
Članek nastaja iz sprejetega predloga za olajšanje pridobitve kategorije A1.
Prometna varnost v Sloveniji je v povprečju v zadnjih letih izboljševala, precej se je zmanjšalo število prometnih nesreč s smrtnim izidom, kar pa je bila predvsem posledica zaprtja države, zaradi pandemije.
V spodnjem grafu, so predstavljeni podatki o umrlih na slovenskih cesta med letoma 2012 in 2021.

Graf 1: Umrli na slovenskih cestah 2012-2021
Vir: https://www.amzs.si/motorevija/mobilnost/promet/2022-01-20-prometna-varnost-v-letu-2021 (pridobljeno 28.5.2022)

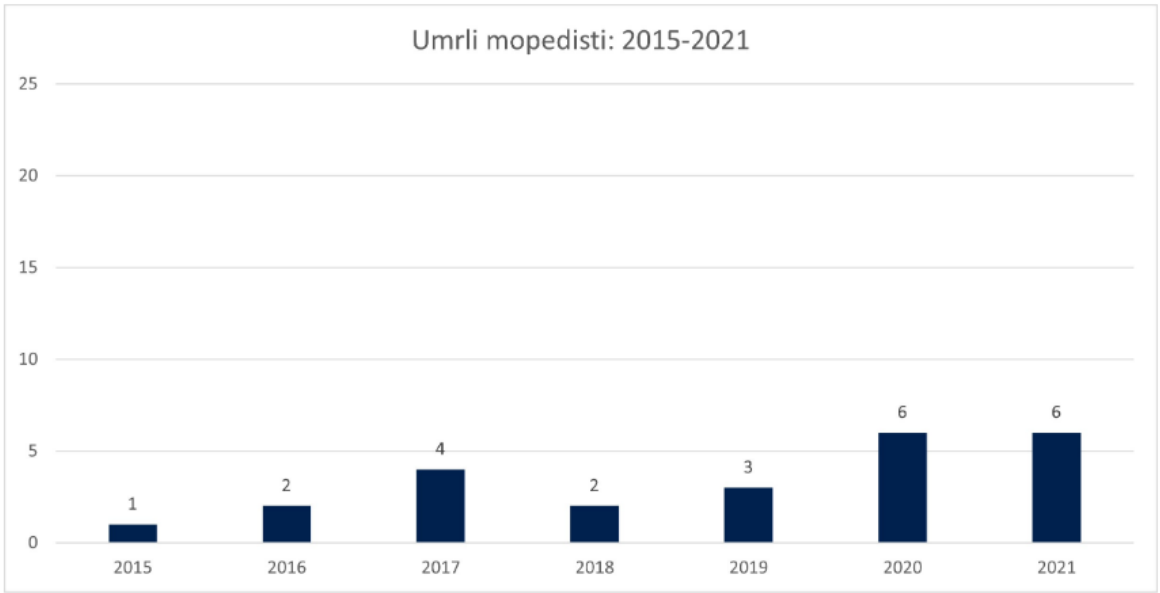
Graf prikazuje desetletno sliko iz naših cest. Ko govorimo o viziji 0, smo od rezultat zelo daleč. Kaj narediti? S tem vprašanjem se v državi ukvarjajo državne inštitucije, avto moto društva, avtošole, nevladne organizacije in šolstvo. Prometno varnost kreiramo vsi udeleženci cestnega prometa in ostalih prometnih podsistemov. Vsakoletne raziskave in ugotovitve prinašajo rezultate, vendar moramo vedeti, da vsaka smrtna žrtev je ena preveč.

Posebno pozornost bi posvetili motoristom in mopedistom, ki so še posebej ranljiva skupina, zaradi samega prevoznega sredstva, ki jim ne nudi takšne zaščite kot avtomobil. V grafu 2, je predstavljena statistika umrlih motoristov med letoma 2015 in 2021.



Graf 2: umrli motoristi 2015-2021
Vir: https://www.amzs.si/motorevija/mobilnost/promet/2022-01-20-prometna-varnost-v-letu-2021 (pridobljeno 28.5.2022)

Iz grafa je razvidno, da se v povprečju varnost motoristov slabša, če analiziramo statistične rezultate prometnih nesreč s smrtnim izidom.
V obravnavano tematiko lahko prištevamo tudi mopediste, katerih nekaj letna statistika, prav tako kaže na povečanje števila prometnih nesreč s smrtnim izidom, kar je razvidno iz grafa 3.



Graf 3: umrli mopedisti 2015-2021
Vir: https://www.amzs.si/motorevija/mobilnost/promet/2022-01-20-prometna-varnost-v-letu-2021 (pridobljeno 28.5.2022)

Umrli motoristi in mopedisti so v letu 2021 dosegli (33/115) 28,7 odstotkov vseh umrlih na slovenskih cestah. To je stanje prometne varnosti pri voznikih enoslednih vozil.

PRIDOBIVANJE VOZNIŠKE KATEGORIJE »A« V REPUBLIKI SLOVENIJI

V Sloveniji imamo Zakon o voznikih (ZVoz-1) (Uradni list RS, št. 85/16, 67/17, 21/18 – ZNOrg, 43/19, 139/20 in 43/22), s katerim se določajo načrtovanja in izvajanja nalog za preventivo in varnost v cestnem prometu, pravila in pogoji za udeležbo voznikov v cestnem prometu, pravila in pogoji za usposabljanje kandidatov za voznike motornih vozil, pogoji za delovanje šol vožnje, pravila in pogoji za opravljanje vozniškega izpita ter pogoji opravljanja zdravstvenih pregledov in dodatnih usposabljanj voznikov.

S tem zakonom se v pravni red Republike Slovenije prenaša Direktiva 2006/126/ES Evropskega parlamenta in Sveta z dne 20. decembra 2006 o vozniških dovoljenjih (UL L št. 403 z dne 30. 12. 2006, str. 18; v nadaljnjem besedilu: Direktiva 2006/126/ES), zadnjič spremenjena z Direktivo Komisije (EU) 2020/612 z dne 4. maja 2020 o spremembi Direktive 2006/126/ES Evropskega parlamenta in Sveta o vozniških dovoljenjih (UL L št. 141 z dne 5. 5. 2020, str. 9) in Direktiva 2006/123/ES Evropskega parlamenta in Sveta z dne 12. decembra 2006 o storitvah na notranjem trgu (UL L št. 376 z dne 27. 12. 2006, str. 36).

Vozniško dovoljenje za motorno kolo se je v zadnjih treh desetletjih. Če pogledamo na primeru Maribora in leto 1987, smo imeli eno kategorijo »A«, ki je predstavljala vsa motorna kolesa. Kandidati so se za praktični izpit pred izpitno komisijo pripravljali sami po naprej določenih progah po Mariboru. Pogoj za pripravo je bila uspešno opravljena teorija na izpitnem centru, na kar so dobili evidenčni kartonček in »L« tablico za motor. Spremembe pri pridobivanju kategorije so nastale s pravilnikom o poučevanju v avtošolah in razdelitvi kategorije »A« na dve kategoriji. Za šestnajst letnike je nastala nova kategorija »A-125« in za osemnajstletnike odprta kategorija »A«.

V pravilniku o avtošolah (Ul. RS št. 106/1999) iz leta 1999 pa je že predpisal delitev kategorije »A« na tri kategorije. Takrat so nastale kategorije motornih koles »A-125« do 11 kw, »A do 350 ccm« in več kot 11 kw in »A nad 350 ccm«. S pravilnikom so se posodobili tudi pogoji o dodatni opremi na učnih vožnjah. Na vožnji se je moralo uporabljati naslednjo opremo: radijsko zvezo za prostoročno komuniciranje kandidat-inštruktor-kandidat, homologirano zaščitno čelado, zaščitno vetrovko v signalni barvi in napisom »avto šola L« na sprednji in zadnji strani in zaščitne rokavice. Takšna dodatna oprema je bila za tiste čase napredek – problem prostoročnih komunikacij se je reševal z opremo iz tujine. Prvič so bile predpisane tudi rokavice in jopič.

Pravilnik o avtošolah iz leta 2005 (Ul. RS, št. 114/05) pa je prinesel naslednje spremembe:

a. za kategorijo A1 – 16 let:
   - motorno kolo, ki spada v to kategorijo, brez stranske prikolice, z delovno prostornino motorja najmanj 120 ccm, ki lahko doseže hitrost najmanj 90 km/h;
b. za kategorijo A2 – 18 let:
   - motorno kolo, ki spada v to kategorijo, brez stranske prikolice, z delovno prostornino motorja najmanj 400 ccm in močjo motorja najmanj 25 kW;
c. za kategorijo A – 24 let ali 2 let A2:
   - motorno kolo, ki spada v to kategorijo, brez stranske prikolice, z delovno prostornino motorja najmanj 600 ccm in močjo motorja najmanj 40 kW;

Pri dodatni opremi za poučevanje, se je natančno določilo, kakšna so lahko vozila kategorije A1, A2, A in napravo, ki omogoča prostoročno zvezo za dvosmerno komunikacijo: kandidat–učitelj vožnje–kandidat. Prav tako se je predpisalo naslednjo opremo za kandidata, ki se usposablja za vožnjo vozil kategorije A1, A2, in A in sicer:

- homologirano zaščitno motoristično čelado,

- zaščitno oblačilo, izdelano za vožnjo z motornim kolesom. Zaščitno oblačilo ali dodatni telovnik, ki v vetru ne sme ovirati kandidata, morata biti v signalnih barvah ter na sprednji in zadnji strani označena s simbolom »L«,
- zaščitne motoristične rokavice,
- zaščitno motoristično obutev ali ustrezno zaprto obuvalo, ki mora pokrivati gležnje,
- ustrezno motoristično zaščito za hrbtenico.

Takrat se je naredilo največ za ozaveščanje voznikov motornih koles.
V letu 2011 je bil sprejet Pravilnik o šolah vožnje in vodenju registra šol vožnje (Ul. RS, št. 44/11), ki je pri kategoriji motornih koles dopolnil pogoje in razložil delitev kategorij »A« na sledeč način:

a. za kategorijo A1:
   - motorno kolo, ki spada v to kategorijo, brez stranske prikolice, z močjo največ 11 kW ter razmerjem moč motorja/masa vozila, ki ne presega 0,1 kW/kg, ki lahko doseže hitrost najmanj 90 km/h. Če motorno kolo poganja motor z notranjim izgorevanjem, mora biti delovna prostornina motorja najmanj 115 cm³, če ga poganja električni motor, mora biti razmerje moč motorja/masa vozila najmanj 0,08 kW/kg;

b. za kategorijo A2:
   - motorno kolo, ki spada v to kategorijo, brez stranske prikolice z močjo najmanj 20 kW in največ 35 kW ter razmerjem moč motorja/masa vozila, ki ne presega 0,2 kW/kg. Če motorno kolo poganja motor z notranjim izgorevanjem, mora biti delovna prostornina motorja najmanj 395 cm³, če ga poganja električni motor, mora biti razmerje moč motorja/masa vozila najmanj 0,15 kW/kg;

c. za kategorijo A:
   - motorno kolo, ki spada v to kategorijo, brez stranske prikolice, katerega masa brez tovora ali potnikov presega 175 kg, z močjo motorja najmanj 50 kW. Če motorno kolo poganja motor z notranjim izgorevanjem, mora biti delovna prostornina motorja najmanj 595 cm³, če ga poganja električni motor, mora biti razmerje moč motorja/masa vozila najmanj 0,25 kW/kg;

Za izvajanje usposabljanja za kategorije A1, A2, in A mora šola vožnje razpolagati z napravo, ki omogoča prostoročno zvezo za dvosmerno komunikacijo: kandidat – učitelj vožnje – kandidat. Kandidat, ki se usposablja za vožnjo motornih vozil kategorije A1, A2, A in učitelj vožnje, ki kandidata, ki se usposablja za vožnjo motornega vozila kategorije A1, A2, ali A, pri usposabljanju spremlja na motornem kolesu, morata med usposabljanjem uporabljati naslednjo zaščitno opremo:

- na glavi ustrezno pripeto homologirano zaščitno motoristično čelado,
- oblečena zaščitna motoristična oblačila z vdelano zaščito za kolena, boke, hrbtenico, komolce in ramena (če oblačila katerega od naštetih elementov zaščite nimajo, se jih lahko nadomesti z ustreznim kosom dodatne motoristične zaščitne opreme, kot so ščitniki za kolena, komolce in hrbtenico, brezrokavnik z vdelano zračno blazino ipd.), pri čemer je zgornji del oblačil ali dodatni telovnik, ki v vetru voznika ne ovira, signalnih barv (živo rumene ali oranžne barve), z vdelanimi odsevnimi trakovi in na zadnji strani označen s simbolom tablice »L« iz prvega odstavka 23. člena tega pravilnika,

- oblečene zaščitne motoristične rokavice in
- obuto motoristično obutev, ki ščiti stopalo in gležnje.

Poleg materialnih pogojev se je spreminjal tudi način poučevanja. Če se vrnemo v leto 1987, se je praktično poučevanje izvajalo znotraj 16 tematskih vaj. Kasneje pa so se pri praktičnem poučevanju določile 3 težavnostne stopnje imenovane: prva učna stopnja, druga učna stopnja in tretja učna stopnja.
Minimalno število učnih ur po stopnjah in glede dodatnih zahtev za izvedbo učnih vaj, ki so predpisane za posamezno kategorijo motornih vozil, je predstavljeno v tabeli 1.

Tabela 1: Minimalno število učnih ur po stopnjah izobraževanja

	1. stopnja	2. stopnja	3. stopnja					SKUPAJ
			R-dnevna	R-nočna	R-AC/HC	drugo	skupaj	
A1	4	6	0	0	0	10	10	20
A2	4	4	2	0	2	8	12	20
A	4	4	2	0	2	8	12	20

Vir: http://www.pisrs.si/Pis.web/pregledPredpisa?id=PRAV13543 (pridobljeno 31.5.2022)

Pri teoretični pripravi kandidatov, so tečaji trajali od 20 do 40 pedagoških ur in nazaj na splošni del 20 pedagoških ur in dodatni del, odvisno od kategorije vozniškega dovoljenja. Za kategorijo A1 se je moralo izvesti dodatni del teoretičnega predavanja v trajanju najmanj osmih pedagoških urah. Primer motornega kolesa kategorije A1 in njem opis, je prikazan na sliki 1.

Slika 7: kategorija A1
Vir: https://prometna.net/sola-voznje/kategorije/ (31.5.2022)

PRIDOBIVANJE VOZNIŠKEGA DOVOLJENJA – »A1« z »B«

Ideja o zmanjšanju prometa z osebnimi vozili v mestnih središčih, kot eno izmed rešitev zajema tudi večjo rabo enoslednih vozil, namesto osebnih vozil. Za udobno in varno vožnjo pa potrebujemo enosledna vozila, ki so karakterno podobna dovoljeni vožnji osebnih vozil – možnost vožnje do hitrosti 70 km/h, kar je dovoljeno na določenih delih v naših mestih.

Konec marca leta 2022, je Državni zbor RS sprejel spremenjen in dopolnjen Zakon o voznikih (Uradni list RS, št. 92/22), ki uvaja novosti pri pridobivanju vozniškega dovoljenja kategorije A1.

V zakonu je dana možnost lažjega in krajšega načina za pridobivanje kategorije A1. V 60. členu zakon določa pogoje za izdajo vozniškega dovoljenja kategorije A1, ki poleg osnovnih pogojev za izdajo le teh, določa še naslednje specifične pogoje:

- ima veljavno vozniško dovoljenje za vožnjo motornih vozil kategorije B,
- ni voznik začetnik,
- je uspešno opravila teoretični del vozniškega izpita za kategorijo A1,
- je v šoli vožnje opravila praktični del usposabljanja kandidatov za voznike kategorije A1 v trajanju najmanj sedem učnih ur,
- je uspešno opravila praktični del vozniškega izpita vozil kategorije A1.

Poleg zgoraj navedenih specifičnih pogojev za izdajo vozniškega dovoljenje kategorije A1, pa zakon v 62. členu določa še, da lahko imetniki veljavnega vozniškega dovoljenja za vožnjo vozil kategorije B, ki niso vozniki začetniki, v Republiki Sloveniji smejo tudi voziti motorna kolesa kategorije A1, če v šoli vožnje opravijo praktični del usposabljanja za vožnjo motornega kolesa kategorije A1 v trajanju najmanj šest učnih ur, kar dokažejo z evidenčnim kartonom vožnje, in imajo v vozniškem dovoljenju z ustrezno kodo označeno pravico do vožnje takih vozil.

Novost torej omogoča, da se kandidati tudi brez teoretičnega dela usposabljanja, lahko že neposredno prijavijo na teoretični izpit. Pri pripravi jim pomagajo digitalna gradiva in digitalne pole za testiranje za kategorijo A1. Prav tako je za praktični del usposabljanja dovolj že sedem učnih ur v avtošoli in nato izpit pred izpitno komisijo.

Še lažji dostop do kategorije A1, pa je s kategorijo B in s kodo 125, ki velja samo za Slovenijo. Za to kategorijo pa je potrebno izvest najmanj 6 učnih ur v avtošoli po modelu 2+1+3.

Tabela 2: minimalno število učnih ur po stopnjah izobraževanja

	1. stopnja	2. stopnja	3. stopnja					SKUPAJ
			R-dnevna	R-nočna	R-AC/HC	drugo	skupaj	
A1	4	6	0	0	0	10	10	20
A1 z B	2	2	0	0	0	3	3	7
A1 z B s kodo 125	2	1	0	0	0	3	3	6

Vir: Podrobnejša obrazložitev AVP – usposabljanje kandidatov za voznike motornih vozil (AM, A1 z B ter A1 z B s kodo 125) (18.5.2022)

Po pridobitvi kategorije A1 s kategorijo B s kodo 125, se vozniku vpiše v vozniško dovoljenje koda nacionalnih administrativnih omejitev, ki jo lahko vidimo v tabeli 3.

Tabela 3: Koda nacionalnih administrativnih omejitev

KODA	OPIS KODE	VPIS V EVIDENCO	VPIS V VOZNIŠKO DOVOLJENJE
125.*	Pravica do vožnje motornega kolesa kategorije A1 z veljavnim vozniškim dovoljenjem kategorije B	125 VOŽNJA A1 Z B	125
* Navedena koda se vpiše v veljavno vozniško dovoljenje pri kategoriji B.			

Vir: Pravilnik o vozniških dovoljenjih (Uradni list RS, št. 200/20, 3/21 in 60/22) (pridobljeno 28.6.2022)

ZAKLJUČEK

Naše sosednje države, takšno ali drugačno bližnjico do kategorije A1 že poznajo. Najbolj liberalni so v Italiji, kjer je kategorijo vozil A1, mogoče voziti že samo z B izpitom in dopolnjenim 21 letom starosti. Na Hrvaškem je s predpogojem B izpita in starosti avtomatsko priznan teoretični del izpita, praktičnega je treba še narediti. V Avstriji velja obveza posebnega usposabljanja v skupni dolžini 14 ur, pridobljeno dovoljenje "koda 111" pa velja le v mejah Avstrije. Prav tako so v Nemčiji pred dvema letoma uvedli podobno ureditev, kot jo zdaj uvajamo v Sloveniji. (Žurnal 24, 9. 6. 2022)

Prepričani smo lahko, da se je marsikateri voznik razveselil poenostavljene možnosti pridobitve kategorije A1 in s tem dostop do 125-kibičnega motornega kolesa. Pri tem ne moremo mimo dejstva, da so fizikalne lastnostni teh vozil popolnoma drugačne, kot je to na štirih kolesih. V smislu prometne varnosti je zaskrbljujoče, da bodo ti bodoči vozniki v večini z velikim pomanjkanjem izkušenj z vožnjo na enoslednih vozilih pridobili kategorijo A1 zgolj s šestimi urami vožnje, ki so vodene le v šoli vožnje in brez končnega preizkusa s strani izpitnega centra.

Trenutne izkušnje kažejo, da je prodaja motornih koles in skuterjev do 125 kubičnih centimetrov izredno poskočila. Kakšen vpliv bo imel poenostavljen način pridobitve kategorije A1 na varnost v prometu, bo pokazal čas. Upamo lahko le, da se bo ta poenostavitev odrazila le na večjih prodajnih številka trgovcev in ne tudi v višjih številka prometnih nesreč in poslabšanju prometne varnosti. Tako je prometna varnost, večja prometna propustnost v mestih in popularnost kategorije A1 s kodo B 125, vprašanja za prometne strokovnjake v prihodnje.

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11. FRIENDLY TRAINING OF CANDIDATES FOR CATEGORY "A1" IN THE REPUBLIC OF SLOVENIA

Summary:

Nowadays, riding a motorcycle represents overcoming the path due to daily migration or as a "childish" fulfillment of dreams of a heavy motorcycle. Today, the motorcycle gives young people their first contact with traffic as a participant rider. The first age requirement is 15 years for the AM (moped) category. Years ago, this age limit was 14 and many exams were taken for this category. For the show, in primary schools, almost all students with an age restriction applied. For motorcycles, age conditions and categories A have changed over the years. All these age restrictions and types of motorcycles change based on observations from neighboring countries, EU guidelines and suggestions from domestic transport experts. In this article, we will focus on the conditions and implementation of obtaining category A1, which makes it easier and faster to obtain a license to drive light motorcycles and scooters.

Keywords: traffic safety, safe mobility, driving license, AVP, SPV

INTRODUCTION

Nowadays, riding a motorcycle represents overcoming a path, due to daily migration, or as the fulfillment of a "child's" dream of a heavy motorcycle.

Today, a motorcycle enables young people to have their first contact with traffic as a participating driver. The first age requirement is 15 years for the AM (moped) category. Years ago, this age limit was at 14 and many exams were conducted for this category. Almost all students with age restrictions applied for the performance in primary schools. Over the years, the age conditions for motorcycles have changed, also have categories A. All these age restrictions and types of motorcycles are and should be different based on the observation of neighboring countries, EU guidelines and suggestions from domestic traffic experts.

The article is based on an accepted proposal to facilitate the acquisition of category A1.

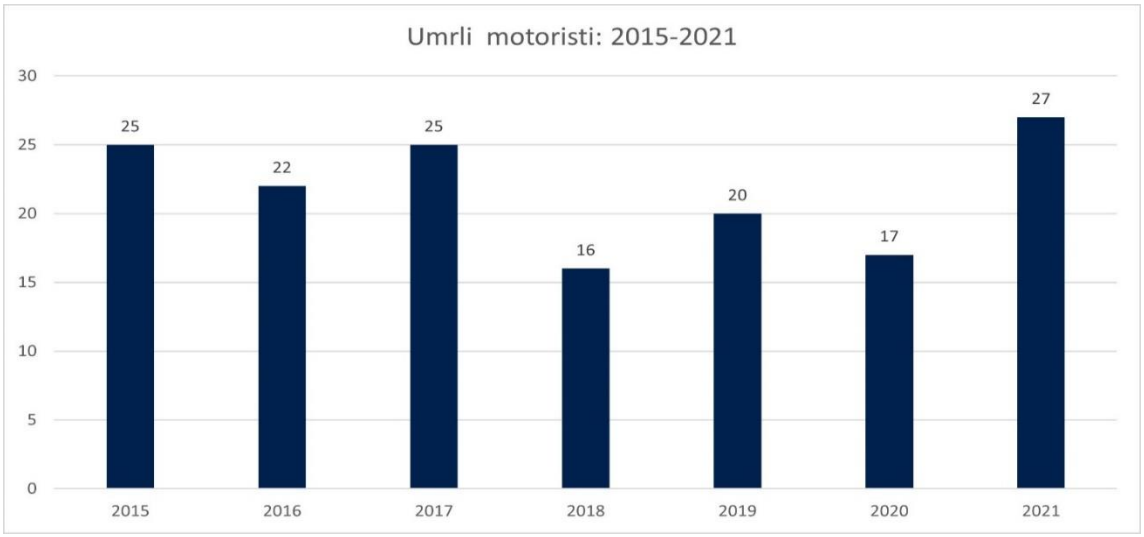
Traffic safety in Slovenia has improved on average in recent years, the number of traffic accidents with a fatal outcome has decreased significantly, which was mainly due to the closure of the country due to the pandemic. The graph below presents data on deaths on Slovenian roads between 2012 and 2021.

Graph 4: Died on Slovenian roads 2012-2021

Source: https://www.amzs.si/motorevija/mobilnost/promet/2022-01-20-prometna-varnost-v-letu-2021 *(obtained 28.5.2022)*

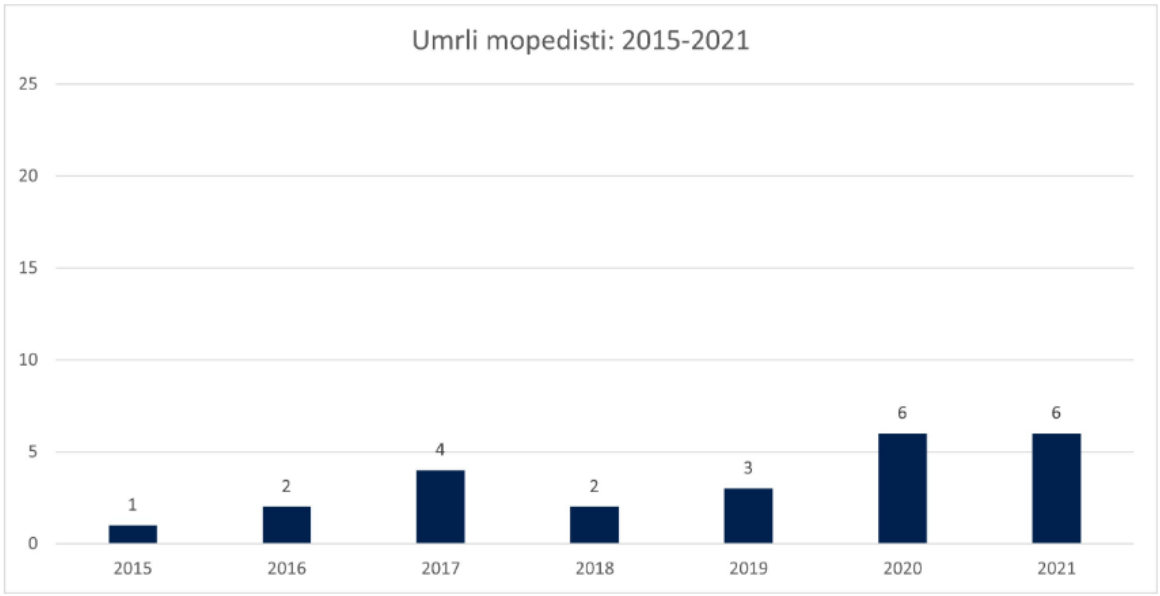
The graph shows a ten-year picture of our roads. When we talk about vision 0, we are very far from the result. What to do? State institutions, automobile associations, driving schools, non-governmental organizations and education are dealing with this issue in the country. Traffic safety is created by all participants in road traffic and other transport subsystems. Every year research and findings bring results, but we must know that every death is one too many.

Special attention would be paid to motorcyclists and moped riders, who are a particularly vulnerable group, due to the means of transport itself, which does not offer them the same protection as a car. Graph 2 presents the statistics of motorcyclist deaths between 2015 and 2021.



Graph 5: Motorcyclist deaths 2015-2021
Source: https://www.amzs.si/motorevija/mobilnost/promet/2022-01-20-prometna-varnost-v-letu-2021 *(obtained 28.5.2022)*

The graph shows that, on average, the safety of motorcyclists deteriorates if we analyze the statistical results of traffic accidents with a fatal outcome.
We can also include moped riders in the discussed topic, whose annual statistics also show an increase in the number of traffic accidents with a fatal outcome, which can be seen in graph 3.



Graph 6: Deceased moped riders 2015-2021
Source: https://www.amzs.si/motorevija/mobilnost/promet/2022-01-20-prometna-varnost-v-letu-2021 *(obtained 28.5.2022)*

In 2021, motorcyclists and moped riders who died reached (33/115) 28.7 percent of all deaths on Slovenian roads. This is the state of traffic safety for drivers of single-track vehicles.

OBTAINING DRIVER CATEGORY "A" IN THE REPUBLIC OF SLOVENIA

In Slovenia, we have the Drivers Act (ZVoz-1) (Official Gazette of the Republic of Slovenia, no. 85/16, 67/17, 21/18 – ZNOrg, 43/19, 139/20 and 43/22), which determines planning and implementation of tasks for prevention and safety in road traffic, rules and conditions for the participation of drivers in road traffic, rules and conditions for training candidates for motor vehicle drivers, conditions for the operation of driving schools, rules and conditions for passing a driving test and conditions for performing medical examinations and additional driver training.
With this law, Directive 2006/126/EC of the European Parliament and of the Council of 20 December 2006 on driving licenses is transposed into the legal system of the Republic of Slovenia (OJ L No. 403 of 30 December 2006, p. 18; hereinafter : Directive 2006/126/EC), last amended by Commission Directive (EU) 2020/612 of 4 May 2020 amending Directive 2006/126/EC of the European Parliament and of the Council on driving licenses (OJ L No. 141 of 5 5. 2020, p. 9) and Directive 2006/123/EC of the European Parliament and the Council of 12 December 2006 on services in the internal market (OJ L No. 376 of 27 December 2006, p. 36).
Driving license for a motorcycle has been in the last three decades often changed. If we look at the example of Maribor and the year 1987, we had one category "A", which represented all motorcycles. Candidates prepared for the practical exam in front of the exam board by themselves along predetermined routes around Maribor. The prerequisite for the preparation was the successful passing of theory at the exam center, for which they received a record card and an "L" plate for the motorcycle. The changes in obtaining the category were created by the regulations on teaching in driving schools and the division of category "A" into two categories. A new category "A-125" was created for sixteen-year-olds and an open category "A" for eighteen-year-olds.
In the rule on driving schools (Ul. RS no. 106/1999) from 1999, it already prescribed the division of category "A" into three categories. At that time the motorcycle categories "A-125" up to 11 kw, "A up to 350 cc" and more than 11 kw and "A over 350 cc" were created. The rules also updated the conditions on additional equipment on training rides. The following equipment had to be used during the drive:

- radio communication for hands-free communication candidate-instructor-candidate,
- homologated protective helmet,
- protective windbreaker in the signal color with the words "driving school L" on the front and back, and
- protective gloves.

Such additional equipment was progress for those times - the problem of hands-free communications was solved with equipment from abroad. Gloves and a jacket were also prescribed for the first time.
The rules on driving schools from 2005 (Ul. RS, no. 114/05) brought the following changes:

d. for category A1 – 16 years:
    - a motorcycle belonging to this category, without a sidecar, with an engine displacement of at least 120 ccm, capable of reaching a speed of at least 90 km/h;
e. for category A2 – 18 years:
    - a motorcycle belonging to this category, without a sidecar, with an engine displacement of at least 400 ccm and an engine power of at least 25 kW;
f. for category A – 24 years or 2 years A2:
    - motorcycle belonging to this category, without a sidecar, with an engine displacement of at least 600 ccm and an engine power of at least 40 kW.

Regarding the additional equipment for teaching, it was precisely determined what the vehicles of categories A1, A2, A and a device that enables a hands-free connection for two-way communication: candidate-driving instructor-candidate. The following equipment was also prescribed for a candidate who is training to drive vehicles of categories A1, A2, and A, namely:

- homologated protective motorcycle helmet,
- protective clothing designed for riding a motorcycle. Protective clothing or an additional vest, which must not obstruct the candidate in the wind, must be in signal colors and marked with the "L" symbol on the front and back,
- protective motorcycle gloves,
- protective motorcycle footwear or suitable closed footwear that must cover the ankles,
- adequate motor protection for the spine.

At that time, the most was done to raise awareness among motorcycle drivers.
In 2011, the rule on driving schools and the management of the register of driving schools was adopted (Ul. RS, no. 44/11), which supplemented the conditions for the motorcycle category and explained the division of "A" categories as follows:

d. for category A1:

- a motorcycle belonging to this category, without a side trailer, with a maximum power of 11 kW and a ratio of engine power/vehicle weight not exceeding 0.1 kW/kg, which can reach a speed of at least 90 km/h. If the motorcycle is powered by an internal combustion engine, the engine displacement must be at least 115 cm^3, if it is powered by an electric motor, the engine power/vehicle mass ratio must be at least 0,08 kW/kg;

e. for category A2:

- a motorcycle belonging to this category, without a side trailer, with a power of at least 20 kW and a maximum of 35 kW and a ratio of engine power/vehicle mass that does not exceed 0.2 kW/kg. If the motorcycle is powered by an internal combustion engine, the engine displacement must be at least 395 cm^3, if it is powered by an electric motor, the engine power/vehicle mass ratio must be at least 0.15 kW/kg;

f. for category A:

- a motorcycle belonging to this category, without a side trailer, whose weight without cargo or passengers exceeds 175 kg, with an engine power of at least 50 kW. If the motorcycle is powered by an internal combustion engine, the working volume of the engine must be at least 595 cm^3, if it is powered by an electric motor, the engine power/vehicle mass ratio must be at least 0.25 kW/kg.

To conduct training for categories A1, A2, and A, the driving school must have a device that enables hands-free communication for two-way communication: candidate - driving instructor - candidate. A candidate who is training to drive motor vehicles of category A1, A2, A and a driving instructor who accompanies a candidate who is training to drive motor vehicle of category A1, A2, or A on a motorcycle during training must use the following protective equipment during training equipment:

- a properly fastened homologated protective motorcycle helmet on the head,
- - wearing protective motorcycle clothing with built-in protection for the knees, hips, spine, elbows and shoulders (if the clothing does not have any of the listed protection elements, it can be replaced with a suitable piece of additional motorcycle protective

equipment, such as knee, elbow and spine protectors, vest with an embedded airbag, etc.), where the upper part of the clothing or an additional vest, which does not obstruct the driver in the wind, is of signal colors (bright yellow or orange), with embedded reflective strips and is marked with the "L" plate symbol on the back ",

- wearing protective motorcycle gloves and
- worn motorcycle footwear that protects the foot and ankles.

In addition to the material conditions, the way of teaching was also changing. Going back to 1987, practical teaching was carried out within 16 thematic exercises. Later, in practical teaching, 3 levels of difficulty were defined: the first learning level, the second learning level and the third learning level.
The minimum number of training hours by level and with regard to additional requirements for the implementation of training exercises prescribed for each category of motor vehicles is presented in table 1.

Table 4: Minimum number of teaching hours by education level

	1. level	2. level	3. level					TOGETHER
			R-day	R-night	R-HW/MW	other	together	
A1	4	6	0	0	0	10	10	20
A2	4	4	2	0	2	8	12	20
A	4	4	2	0	2	8	12	20

Source: http://www.pisrs.si/Pis.web/pregledPredpisa?id=PRAV13543 (obtained 31.5.2022)

In the theoretical preparation of candidates, the courses lasted from 20 to 40 teaching hours and back to the general part of 20 teaching hours and an additional part, depending on the driver's license category. For category A1, an additional part of the theoretical lecture lasting at least eight teaching hours had to be conducted. An example of a category A1 motorcycle and its description is shown in Figure 1.

Figure 8: Category A1
Source: https://prometna.net/sola-voznje/kategorije/ *(obtained 31.5.2022)*

OBTAINING A DRIVER'S LICENSE - "A1" with "B"

The idea of reducing traffic with personal vehicles in city centers, as one of the solutions, also includes the greater use of single-track vehicles instead of passenger vehicles. For comfortable and safe driving, we need single-track vehicles that are similar in character to the permitted driving of passenger cars - the ability to drive up to a speed of 70 km/h, which is allowed in certain parts of our cities.

At the end of March 2022, the National Assembly of the Republic of Slovenia adopted the amended and supplemented Driver's Act (Ul. RS, No. 92/22), which introduces innovations in obtaining a category A1 driver's license.

The law provides for an easier and shorter way to obtain category A1. In Article 60, the law determines the conditions for issuing a category A1 driver's license, which, in addition to the basic conditions for issuing only these, also determines the following specific conditions:

- valid driver's license for driving category B motor vehicles,
- is not a beginner driver,
- successfully passed the theoretical part of the driving test for category A1,
- completed the practical part of training candidates for category A1 drivers at the driving school, lasting at least seven hours,
- successfully passed the practical part of the driving test for category A1 vehicles.

In addition to the above-mentioned specific conditions for issuing a category A1 driver's license, the law in Article 62 also stipulates that holders of a valid driver's license for driving category B vehicles, who are not novice drivers, may also drive category A1 motorcycles in the Republic of Slovenia, if at a driving school, they complete the practical part of the training for driving a category A1 motorcycle, lasting at least six hours, which they prove with a driving record card, and they have the right to drive such vehicles marked in their driver's license with the appropriate code.

The novelty therefore enables candidates to register directly for the theoretical exam even without the theoretical part of the training. Digital materials and digital test panels for category A1 help them prepare. Also, for the practical part of the training, seven lessons at a driving school and then an exam before the examination board are enough.

Even easier access to category A1 is with category B and code 125, which only applies to Slovenia. For this category, it is necessary to complete at least 6 lessons in a driving school according to the 2+1+3 model.

Table 5: Minimum number of teaching hours by education level

	1. level	2. level	3. level					TOGETHER
			R-day	R-night	R-HW/MW	other	together	
A1	4	6	0	0	0	10	10	20
A1 with B	2	2	0	0	0	3	3	7
A1 z B with code 125	2	1	0	0	0	3	3	6

Source: More detailed explanation of AVP - training of candidates for drivers of motor vehicles (AM, A1 with B tand A1 with B with code 125) (obtained 18.5.2022)

After obtaining category A1 with category B with code 125, the national administrative restrictions code is entered in the driver's license, which can be seen in table 3.

Table 6: National administrative restrictions code

Code	Code description	Entry in the register	Registration in the driver's license
125.*	The right to drive a category A1 motorcycle with a valid category B driver's license.	125 DRIVING A1 WITH B	125
*The specified code is printed on a valid driver's license for category B.			

Source: Regulations on driver's licenses (Uradni list RS, no. 200/20, 3/21 and 60/22) (optained 28.6.2022)

CONCLUSION

Our neighboring countries already know one or another way shortcut to category A1. They are the most liberal in Italy, where the A1 vehicle category can be driven only with a B test and over 21 years of age. In Croatia, with the prerequisite B of the exam and age, the theoretical part of the exam is automatically recognized, the practical part still needs to be done. In Austria, special training is required for a total of 14 hours, and the "code 111" license obtained is only valid within the borders of Austria. Also, in Germany, two years ago, a similar arrangement was introduced, as is now being introduced in Slovenia. (Žurnal 24, 9. 6. 2022)

We can be sure that many drivers are happy about the simplified possibility of obtaining category A1 and thus access to a 125 cc motorcycle. We cannot ignore the fact that the physical characteristics of these vehicles are completely different from those of four wheels. In terms of traffic safety, it is worrying that these future drivers, mostly with a great lack of experience in driving single-track vehicles, will obtain the A1 category with only six hours of driving, conducted only in a driving school and without a final test by a test center.

Current experience shows that sales of motorcycles and scooters up to 125 cubic centimeters have jumped tremendously. Time will tell what impact the simplified way of obtaining the A1 category will have on traffic safety. We can only hope that this simplification will be reflected only in higher sales numbers of traders and not in higher numbers of traffic accidents and deterioration of traffic safety. Thus, traffic safety, greater traffic throughput in cities and the popularity of category A1 with code B 125 are questions for traffic experts in the future.

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12. Vpliv asistenčnih sistemov (ADAS) na varnost v prometu

Povzetek:

Razvoj sistemov pasivne in aktivne varnosti v vozilih, ki mu izdelovalci vozil že več desetletij namenjajo veliko pozornost, je in bo pripomogel k izboljšanju stanja prometne varnosti. Od novih naprednih sistemov in njihove obvezne vgradnje v vsa na novo homologirana vozila, od julija 2022 in v vsa nova vozila od julija 2024. Vsled tega se pričakuje še nadaljnji pomemben prispevek avtomobilske industrije k zmanjšanju števila prometnih nesreč.

V zadnjem času lahko uporabniki vozil (predvsem novejših) zaznajo skokovit napredek pri razvoju sistemov aktivne in pasivne varnosti. Zaradi nepoznavanja in neznanja pri uporabi asistenčnih sistemov, pa le-ti ostajajo slabo izkoriščeni, oziroma neizkoriščeni.

V prid ozaveščanja voznikov osebnih vozil ter za potrebe pouka, sem se odločil strniti in zapisati kratek povzetek-pregled sodobnih elektronskih asistenčnih sistemov, ki pomagajo vozniku med vožnjo, so sposobni preprečiti trke, oziroma jih vsaj omiliti.

Želim predstaviti tudi pogled zavarovalniške stroke na te sisteme in njihovo dojemanje koristnosti le-teh predvsem z vidika zavarovalne premije, ki je lahko tudi precej nižja v primeru, da vozilo vsebuje te sisteme.

Boštjan Kolbič

1. Predstavitev ADAS sistemov

1.1 Zakaj potrebujemo asistenčne sisteme

Gostota prometa se dnevno povečuje, ljudje pa v avtomobilih preživimo bistveno več časa.
Zato so Združeni narodi (UN) podali iniciativo »Desetletje varnosti v cestnem prometu«, katere cilj je bil stabilizirati število nezgod do leta 2020, nato pa postopno zmanjševanje le-teh.
Smrtni primeri v EU pa seveda niso edino merilo, glede na 35000 smrti letno, je bistveno pomembnejši podatek število poškodovanih, ki v istem časovnem obdobju znaša 1,9 milijona ljudi.
Poškodbe pa predvsem vplivajo na kakovost življenja, ter delovno zmožnost ljudi vključenih v prometne nesreče.

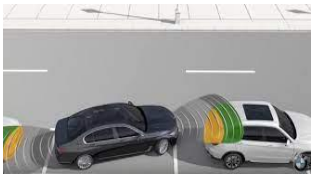
1.2 Kaj so asistenčni sistemi

Asistenčni sistemi ADAS (advanced driver assistance system) so dodatni elektronski sistemi vgrajeni v vozilo. Najpomembnejša funkcija je povečanje varnosti in udobja. Naslednji pomemben aspekt pa predstavlja zmanjšanje porabe goriva.
Ti sistemi lahko delno ali popolnoma avtonomno posegajo v delovanje vozila (npr. plin, zavore), ali v sisteme signalizacije, ter lahko opozorijo voznika med kritično situacijo. Danes je največ sistemov nastavljenih tako, da odgovornost ostaja na vozniku.

1.3 Zgodovinski pregled razvoja asistenčnih sistemov

Slika 9: ABS

Slika 2: ASR



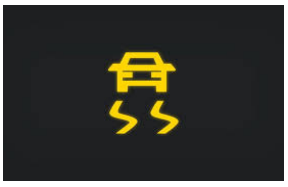
Slika 3: Pomoč pri parkiranju

Slika 4: ACC

1978	1980	1986	1989	1993	1995	2000	2010

Slika 5: Zračna blazina

Slika 6: Navigacija



Slika 7: ESP

Slika 8: Samodejno zaviranje

2. Pregled ADAS sistemov

Sisteme pomoči v grobem lahko razdelimo na video sisteme in radarske sisteme, ultrazvočne sisteme ali pa kombinacijo vseh. Od tega je predvsem odvisno katere asistenčne funkcije lahko izvedemo v avtomobilu, oziroma v vozilu.

VIDEO SISTEMI:

Z video sistemi lahko izvedemo naslednje funkcije:

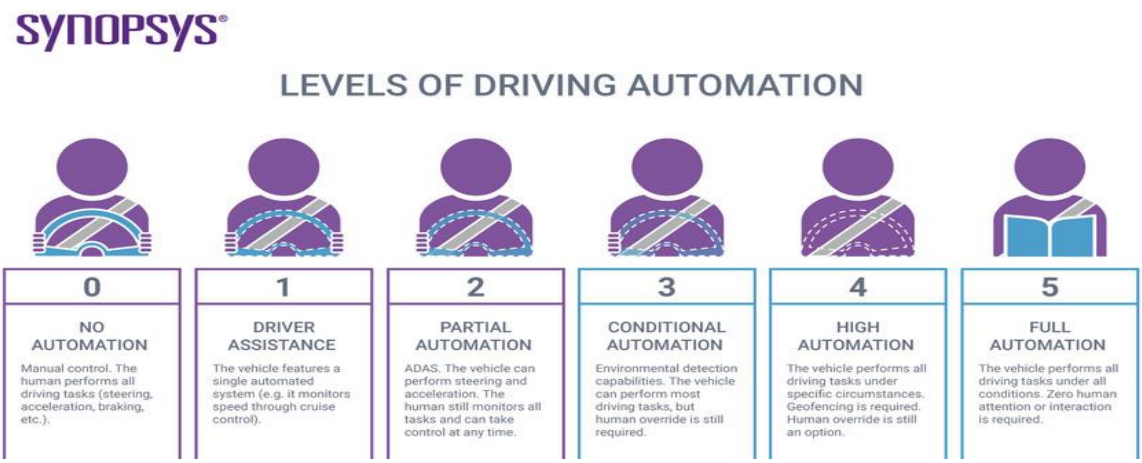
1. Prepoznavanje prometnih znakov
2. Pomoč pri ohranjanju voznega pasu
3. Pametno upravljanje z lučmi

RADARSKI SISTEMI

Z radarskimi sistemi lahko izvedemo naslednje funkcije:

1. ACC (adaptive cruise control)
2. ACC Stop&Go
3. Asistenca pri zaviranju v primeru nevarnosti
4. Avtomatsko zaviranje v primeru nevarnosti

2.1 Stopnje pomoči vozniku po SAE



Stopnje pomoči vozniku

1. **Stopnja 0**: Brez pomoči.
2. **Stopnja 1**: Najnižja stopnja avtomatizacije. Vozilo ima vgrajen samo en sistem pomoči (tempomat). Adaptivni tempomat, pri katerem sistem vzdržuje hitrost in razdaljo, se tudi uvršča v 1.stopnjo, saj ostale funkcije upravlja voznik.
3. **Stopnja 2**: Vozilo je na tej stopnji avtomatizacije sposobno tako upravljanja z volanom, kot vzdrževanja hitrosti in razdalje, vendar voznik kadarkoli lahko poseže v delovanje sistemov. Teslin Autopilot in Cadilacov Super Cruise System se kvalificirata kot Stopnja 2.
4. **Stopnja 3**: Prehod iz stopnje 2 na 3 je iz vidika tehnologije izjemno zahteven. Takšna vozila imajo vgrajene sisteme za zaznavanje okolice in se lahko odločajo samostojno, na podlagi podatkov, na primer prehiteti počasi vozeče vozilo.
5. **Stopnja 4**: Najpomembnejša razlika med stopnjo 3 in 4 je ta, da lahko vozilo reagira v kritičnih situacijah, popolnoma brez človeškega vmešavanja, človek pa še vedno lahko posreduje in odreagira.
6. **Stopnja 5**: Popolnoma avtomatizirana vožnja, brez potrebe po vpletanju potnika. Vozila ne bodo imela niti volana.

2.2 Prepoznavanje utrujenosti voznika

Algoritem prepoznavanja utrujenosti voznika analizira obnašanje voznika, upošteva čas vožnje in tipične znake utrujenosti, kot so trzanje z volanom. Sistem ob tem hitro odreagira in korigira smer vožnje.
Iz podatkov senzorja kota volana in ostalih parametrov, kot so čas vožnje, sistem izračuna indeks utrujenosti. Ko ta indeks prekorači določeno vrednost, sistem opozori voznika, da je čas za počitek.

Senzor kota volana

2.3 ACC – regulacija razmaka in hitrosti vožnje

Pri vožnji na odprti cesti sistem ACC ohranja nastavljeno hitrost vožnje. Če pred seboj zazna počasnejše vozilo, odvzame plin ali pa preko sistema zavor upočasni, ter vzdržuje razmak. Če vozilo pred nami pospeši, sistem samodejno pospešuje do nastavljene hitrosti. Komponenta, ki jo potrebuje sistem za dobro delovanje, je radarski senzor.


Radarski senzor

2.4 Pomoč pri zaviranju

Pozornost voznikov včasih ne zadostuje in majhna nepozornost lahko privede do prometne nesreče. V takšnih primerih mora odreagirati sistem za pomoč vozniku.
Sistem je zasnovan na radarski senzoriki in ESP-ju, ter kontinuirano analizira dogajanje pred vozilom. Če sistem pri vožnji pod 30km/h prepozna kritično približevanje vozilu pred nami ali stoječemu vozilu, se le ta pripravi za morebitno zaviranje. Če voznik v dani situaciji ne odreagira, sistem samodejno polno zavira. Pri vožnji nad 30km/h se sistem pri zaznanju nevarnosti pripravi na zaviranje, ter voznika opozarja z zvočnimi in optičnimi signali. Nato sistem prične z delnim zaviranjem, da se hitrost vozila zmanjša, ter da voznik pridobi nekaj časa za reakcijo. Ko se voznik odzove, pa sistem še vedno nadzira situacijo in po potrebi poveča pritisk v zavornem sistemu.


Pomoč pri zaviranju

2.5 Pomoč v primeru zastoja (ACC in Stop&go)

Asistent v primeru zastoja je zasnovan na senzoriki in principu ACC s Stop&go funkcijo, ter asistentu za vzdrževanje voznega pasu. Če je sistem aktiviran, stalno spremlja dogajanje okoli vozila, predvsem hitrost vozil pred nami ter jo primerja z našo hitrostjo. Če sistem pri hitrostih pod 60km/h zazna zastoj v prometu, lahko voznik s pritiskom na gumb aktivira funkcijo. Sedaj vozilo samodejno sledi vozilu pred njim znotraj voznega pasu.

Komponente sistema:

Stereo kamera

Radarski senzor

ESP 9.generacija

2.6 Pomoč pri parkiranju

Specialni ultrazvočni senzorji se uporabljajo pri tej funkciji. Nameščeni so na robovih blatnikov ali odbijačev. Ko voznik aktivira to funkcijo, senzorji postanejo aktivni in pri vožnji mimo parkiranih vozil iščejo in merijo zadosten prazen prostor. Ko tega zazna, sistem prevzame funkcijo upravljanja z volanom. Voznik pa odvisno od sistema upravlja s plinom in zavoro. Funkcijo izhoda iz parkirnega mesta tudi lahko prevzame ta sistem.

Pomoč pri parkiranju

2.7 Pomoč pri menjavi voznega pasu

Sistem pomoči pri menjavi voznega pasu bazira na dveh radarskih senzorjih srednjega dometa, ki sta nevidno vkomponirana v vzvratna ogledala. Senzorja nadzirata področje ob in za vozilom. Podatki, ki jih zbereta, se združijo v nadzornem računalniku, tako da se ustvari celotna slika prometa za vozilom. Če sistem zazna približajoče se vozilo, ali pa je to že v mrtvem kotu, sistem z oranžim opozorilnim znakom v področju zunanjih ogledal opozori voznika. Če voznik vključi smerokaz, pa ga sistem še dodatno opozori z zvočnim signalom.

Prednosti sistema:

- Opozarja na nevarnost pri menjavi voznega pasu
- Zmanjša se možnost nesreč
- Preprečujejo se bočni trki
- Preprečujejo se prometne nesreče zaradi slabe ocene razdalje

2.8 Sistem za prepoznavanje prometnih znakov

Sistem pomoči za prepoznavanje prometnih znakov za zaznavanje uporablja video kamero, ter algoritem za prepoznavanje prometnih znakov. Ko sistem prepozna določen prometni znak, ga prikaže na kombinirani instrumentni plošči.

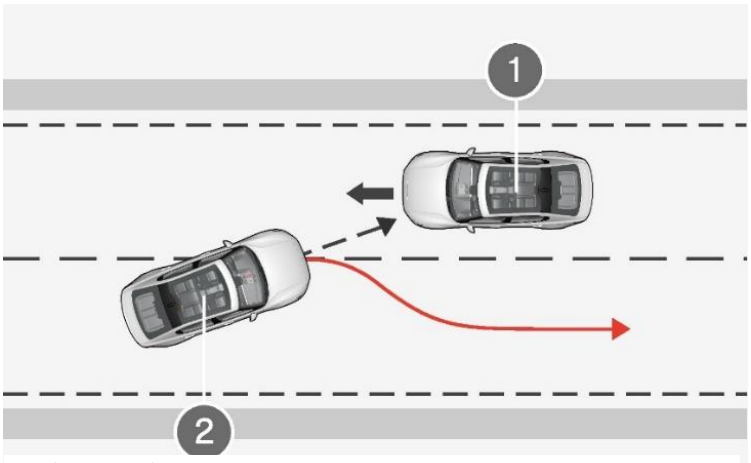
Zaznavanje prometnih znakov

Poleg tega, je mogoče realizirati opozorilne funkcije (optične, akustične, samodejno zaviranje…), na primer pred prekoračitvijo omejitve hitrosti, prehitevanje na selu vozišča kjer to ni dovoljeno in pri neupoštevanju STOP znaka. V kombinaciji s sistemom navigacije, sistem pomoči lahko koristi informacije, ki jih kamera ne zazna (začetek in konec naselja, dodatni tekstovni znaki-vremenske omejitve).

2.9 Sistem za izogibanje vozil

Sistem za izogibanje vozil se aktivira, takoj ko prepozna nevarnost naleta in voznik nakaže manever za izogibanje vozila. Takoj ko voznik skrene z voznega pasu, mu sistem pomaga pri izogibanju prepreke.

Iz podatkov videokamere in radarskega senzorja izračunava najboljšo smer vožnje, pri čemer upošteva razmak, širino in ostale parametre v dani situaciji. Z upravljanjem volana mu pomaga zaobiti prepreko.



Izogibanje vozil

2.10 Inteligentno upravljanje z lučmi

Sistem pomoči kratkih luči jih lahko vključi ali izključi, glede na dano situacijo. Sistem asistence za dolge luči pa omogoča vozniku avtomatsko preklapljanje med dolgimi in kratkimi lučmi. Če sistem ne zazna drugega vozila, vključi dolge luči in s tem omogoči boljšo vidljivost.

Na osnovi video podatkov lahko izvedemo tudi regulacijo dosega dolgih in kratki luči. Ob tem pa ne reguliramo samo dolžine svetlobnega snopa, temveč tudi širino glede na dano situacijo.

Inteligentno upravljanje z lučmi

3. Vpliv na varnost v prometu

V sodobne avtomobile je vgrajeno ogromno asistenčnih sistemov. Nekateri so še do plačljivi, nekateri od njih pa bodo julija 2022 ter julija 2024 postali obvezna oprema na novo homologiranih vozil.

Kot ugotavljajo v združenju evropskih proizvajalcev vozil, se 90 odstotkov nesreč zgodi zaradi človeške napake. Asistenčni sistemi so ob varnih voznikih in varni infrastrukturi, pomemben del na podi do prihodnosti brez smrtnih žrtev.

Milanski IKT-portal 01net navaja, da če bi 70 odstotkov vozil, ki obtičijo v Milanskih zastojih, bilo opremljeno s sistemi za komunikacijo med vozili (V2V), bi za vožnjo potrebovali 63 odstotkov manj časa. Če pa bi imeli še komunikacijo z infrastrukturo (V2I), pa še tretjino manj. Poleg tega pa bi v prvem primeru prihranili za cca 400 ton izpustov CO2, v drugem pa za cca 2700 ton na letni ravni.

Po nekaterih navedbah lahko asistenčni sistemi zmanjšajo možnost nesreč celo do 40 odstotkov. Vgrajeni sistemi pa vam lahko tudi zmanjšajo zavarovalno premijo do 15 odstotkov. Zavarovalnica Triglav na primer ponuja popuste že od leta 2019.

4. Zaključek

Varnost v prometu je izjemno pereča tema, dejstvo je, da vsako leto na cestah izgubimo mnogo življenj, ob tem pa ne smemo pozabiti na trajno poškodovane udeležence prometnih nesreč, katerim se bistveno poslabša kvaliteta bivanja.

Veseli me, da se sistemi, ki vplivajo na varnost v prometu hitro razvijajo in izboljšujejo. Poleg vsega pa odločevalci prepoznajo nujnost obvezne uporabe vsaj osnovnih sistemov v vsakem vozilu. Izplen tehničnega napredka v prometu bo zagotovo bistveno večja varnost vseh udeležencev v prometu.

5. VIRI:

1. Motorcycle ABS (bosch-mobility-solutions.com)
2. The 6 Levels of Vehicle Autonomy Explained | Synopsys Automotive
3. Steering Wheel Angle Sensor LWS (bosch-motorsport.com)
4. EQC from Mercedes-EQ: Active Brake Assist (mercedes-benz.com)
5. Highly Automated Vehicle Systems (bme.hu)
6. ESP® module (bosch-mobility-solutions.com)
7. https://www.jdpower.com/cars/shopping-guides/what-is-automatic-parking-assist
8. Smart Automotive Lighting - Stories (merckgroup.com)
9. Assistance at risk of collision in oncoming traffic (polestar.com)
10. Koristni pomočniki, če jih znamo prav uporabljati - Delo

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12. The influence of Advanced Driver Assistance Systems (ADAS) on road safety

Abstract:

Developing the systems of passive and active vehicle safety, which car manufacturers have been paying special attention to, has already contributed to the improvement of road safety and will also do so in the future. The new advanced systems and their compulsory in-built into all newly type-approved vehicles since July 2022 and all new vehicles from July 2024 are expected to further contribute to lowering the number of road accidents.

Recently, users of vehicles (mostly new ones) can perceive a drastic progress within the development of passive as well as active safety. Unfortunately, due to the ignorance regarding the usage of assist systems, the latter remain poorly used or even unused.

With a view of arising motorists' awareness as well as for educational purposes I have decided to summarise and review the modern electronic assistance systems that help motorists while driving and are capable of preventing collisions or at least alleviate them.

I would also like to present the insurance companies' policies and their perception of assistance systems benefits, especially from the point of view of insurance premium, which can be lower in case a vehicle integrates these systems.

Boštjan Kolbič

1. ADAS presentation

1.1 Why assistance systems are needed

Traffic density is increasing daily and we spend significantly more time in our cars. This is the reason the United Nations launched an initiative " The Decade of Action for Road Safety" whose main goal was to stabilize the number of road accidents by 2020 and then gradually lower their number.

Death cases within EU are certainly not the only criterium; considering 35000 deaths annually, the number of the injured is essentially a more relevant information comprising 1.9 million people within the same time period. Injuries mostly affect the life quality and the working capability of people involved in car accidents.

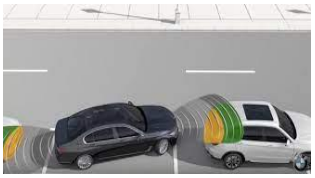
1.2 What assistance systems are

Assistance systems - ADAS (Advanced Driver Assistance System) are added electronic systems built into a vehicle. Their prior function is to increase safety and comfort followed by fuel consumption reduction. These systems can partly or completely intervene into the car's performance (e.g. brakes, acceleration) or into the signalisation systems and therefore, alert the driver in a critical situation. Today the majority of the systems are set in such a way that the responsibility is placed on the driver.

1.3 Historical overview of assistance systems

Picture 1 ABS

Picture 2 ASR



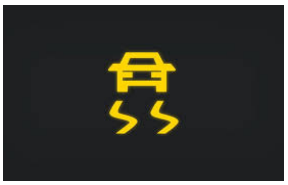
Picture 3 Park assist

Picture 4 ACC

1978	1980	1986	1989	1993	1995	2000	2010

Picture 5 Airbag

Picture 6 Navigation



Picture 7 ESP

Picture 8 Automatic braking

2. Overview of ADAS

The assist systems can roughly be divided into video systems, radar systems, ultrasound systems or the combination of all. The function we want to perform depends on the type of the system that is built in the car.

VIDEO SYSTEMS:

Video systems enable the following functions:

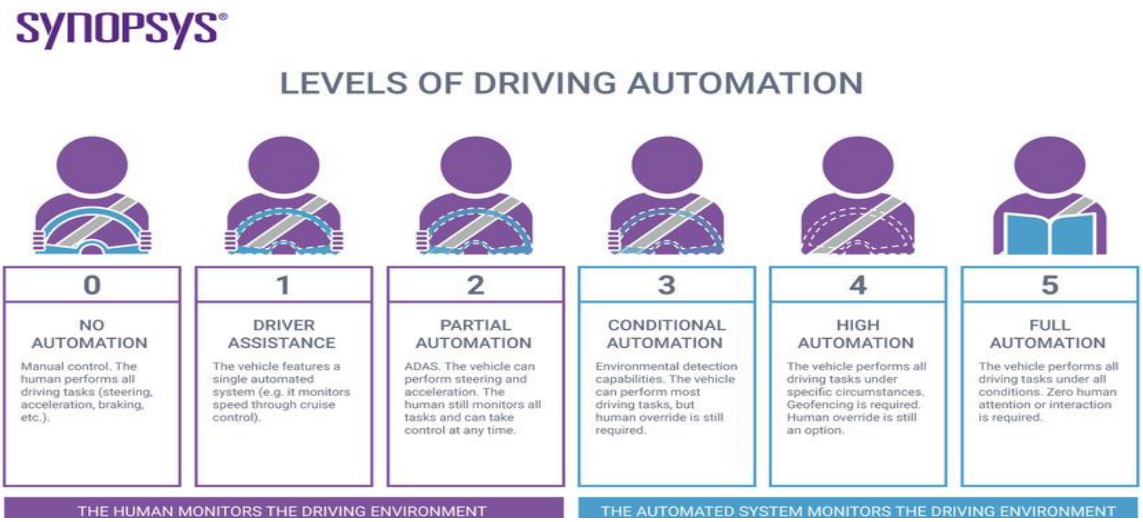
1. Road sign recognition
2. Lane keeping assist
3. Smart light management

RADAR SYSTEMS

Radar systems enable the following functions:

1. ACC (adaptive cruise control)
2. ACC Stop&Go
3. Emergency brake assist
4. Automatic emergency brake

2.1 Levels of driver assistance according to SAE



Levels of driver assistance

1. **Level 0**: No help.
2. **Level 1**: The lowest level of automatization. A vehicle has only one in-built help system (cruise control). Adaptive cruise control by means of which speed and distance are maintained is also integrated into the first level as the other functions are performed by the driver.
3. **Level 2**: A vehicle on this level of automatization can operate the steering wheel as well as speed and distance, but the driver can intervene into the system at any time. Tesla's Autopilot and Cadillac's Super Cruise System qualify as Level 2.
4. **Level 3**: The passage from level 2 to level 3 is technologically extremely demanding. Such vehicles have in-built systems for surroundings detection and can independently decide based on data (e.g. overtaking a slowly moving vehicle).
5. **Level 4**: The most significant difference between level 3 and level 4 lies in the fact that a vehicle can react in critical situations without human intervention. A driver can still intervene and react.
6. **Level 5**: Completely automized driving without the need of human intervention. Such vehicles will not have a steering wheel.

2.2 Driver fatigue recognition

The algorithm for driver fatigue recognition analyses the driver's behaviour taking into account the driving time and the typical signs of fatigue such as steering wheel twitching. The system quickly responds and corrects the travel direction.

Based on data from the sensor for the steering wheel angle and other parameters such as the driving time, the system calculates the fatigue index. When the index surpasses a certain value, the system warns the driver to take a rest.

Sensor for the steering wheel angle

2.3 ACC – Safety distance and speed regulation

Driving on open road the ACC system keeps the set driving speed. If it detects a slower vehicle in front, it reduces speed or slows down through the braking system and thus maintains the distance. If the vehicle in front accelerates, the system automatically accelerates to the set speed. The component needed for the system to function well is the so-called radar sensor.

Radar sensor

2.4 Brake assist

Sometimes the driver's attention does not suffice and a small inattentiveness can lead to a road accident. In such cases brake assist has to respond. The system is designed on radar sensory and ESP. It continuously analyses what is happening in front. If the system while driving below 30km/h identifies critical approaching to the vehicle in front, it prepares itself for potential braking. If the drivers do not react themselves, the system automatically breaks to the fullest.

Brake assist

When driving over 30km/h, the system identifying danger prepares itself for braking and warns the driver by visual and auditive signs. Then it starts partial braking, so the speed is reduced and the driver gains some time to react. After the driver’s reaction the system still controls the situation and if needed increases the pressure in the braking system.

2.5 Traffic jam assist (ACC and Stop&go)

Traffic jam assist is based on the sensory together with the ACC Stop&go principle and on the lane maintenance assistant. If the system is activated, it constantly monitors what is happening around the vehicle, in particular the speed of vehicles ahead, by comparing it to its own. If the system at the speed of 60km/h detects a traffic jam, the driver can activate this function by pressing the button, so the vehicle automatically follows the vehicle ahead within the driving lane.

The system's components:

Stereo camera

Radar sensor

ESP 9th generation

2.6 Car park assist

Special ultrasound sensors are used for this function. They are placed on the edges of bumpers or fenders. After the driver activates this function, the sensors, when driving past parked vehicles, become active and search for as well as measure an adequate empty parking space. When found, the system takes over the steering wheel while the driver (depending on the system) manages braking and accelerating. The exit car park function can also be taken over by this system.

Car park assist

2.7 Lane Change Assist

The system of lane change assistance is based on two radar sensors of medium range which are invisibly inserted into rear view mirrors. The sensors monitor the area by and behind the vehicle. Data collected by the sensors are joint in the control computer creating the whole picture of the traffic behind. If the system perceives an approaching vehicle, or if the vehicle is already in the blind spot, the system alerts the driver by means of an orange warning sign in the area of side

mirrors. If the driver turns on an indicator, the system additionally warns the driver by an auditive signal.

The advantages of the system:

- Danger alert when changing lanes
- Car accident reduction
- Side collision prevention
- Prevention of car accidents due to distance misjudgment

2.8 Traffic-sign recognition system

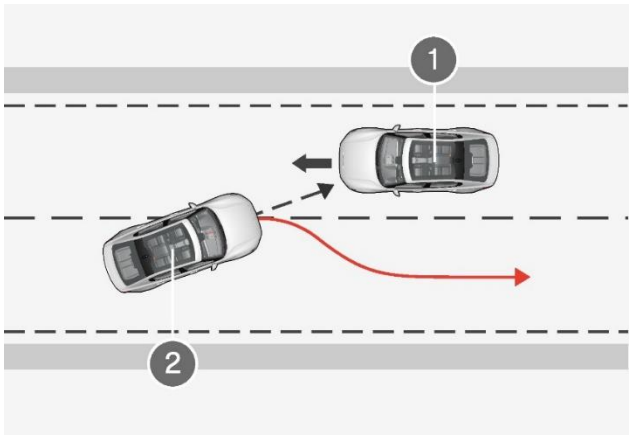
Traffic-sign recognition system uses a video camera and a traffic-sign recognition algorithm. When the system recognizes a certain traffic sign, it displays it on a combined instrument panel. In addition, it is possible to use warning functions (optic, acoustic, automatic brake) for instance prior to breaking the speed limit, overtaking where not allowed or ignoring the STOP sign. In combination with the navigation system, the assist system can benefit from information that the camera does not perceive (beginning and end of settlement, additional text signs- weather limitations).

Traffic sign detection

2.9 Vehicle avoidance assist

Vehicle avoidance assist is activated as soon as a possibility of collision is identified or the driver performs a manoeuvre to avoid a vehicle. As soon as the driver skids off the lane, the system helps to avoid the obstacle**.**

On the basis of the video camera and radar sensor data the system calculates the optimal travel direction taking into account the distance, width and other parameters of the situation. By managing the steering wheel it helps to bypass the obstacle.



Vehicle avoidance

2.10 Smart light management

Low beams assist system can switch the lights on or off according to the situation. High beams assist system enables the automatic change of low and high beams. If the system does not perceive another vehicle, it switches on high beams and thus enables better visibility.
On the basis of video data the high and low beams regulation can be made. Not only the length of the light beam, but also its width can be adjusted to the situation.

Smart light management

3. Influence on road safety

Numerous assist systems are built in modern vehicles. Some need to be additionally paid for while others will become compulsory equipment of newly type-approved vehicles from July 2022 and July 2024.

As established by the European car manufacturers association, 90 % of accidents happen due to human error. Assist systems along with safe drivers and safe infrastructure are an essential part of casualty-free future.

ICT Milan portal 01 net states if 70% of vehicles stuck in Milan traffic jams were equipped with the systems for inter-vehicle communication (V2V), they would need 63% less time for travel. If they also had the communication with the infrastructure (V2I), they would need additional one third less. Besides, in the first case there would be 400 tons less of CO2 emissions and in the second case 2700 tones less annually. According to some findings the assist systems reduce the possibility of accidents by 40%. In-built systems can lower the insurance premium up to 15%. The Insurance company Triglav, for instance, has been offering discounts since 2019.

4. Conclusion

Traffic safety is a topical issue taking into account the fact that many lives are lost on roads every year. What is more, there are people permanently disabled because of being involved in car accidents.

I am glad the above mentioned systems that influence traffic safety are developing and improving very quickly. The legislators also see the need to make the use of at least the basic systems obligatory in every vehicle. The direct consequence of the technical advancement in traffic will definitely be greater safety of all traffic participants.

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Biljana Kljajić dipl.ing.tehnologije - master

13. Prednosti i nedostaci u početku korišćenja prve dionice autoputa Bar-Boljare sa posebnim osvrtom na paljenje automobila

Predgovor

Kako je Crna Gora dobila prve kilometre autoputa koji je početkom korišćenja pokazao svoje prednosti i mane odlučio sam da se u ovom radu pozabavim njima i time dam doprinos njhovog boljeg sagledavanja.

Autoput Bar-Boljare je transferzalni pravac u smjeru sjeveroistok – jugozapad koji ima glavnu funkciju u prostornoj, privrednoj i demografskoj integraciji Crne Gore povezivanjem Sjevernog, Središnjeg i Južnog regiona. Ovaj autoput će omogućiti kvalitetne veze sa autoputnim pravcima u regionu koji su dio evropske mreže, što će, izvjesno je, imati značajne pozitivne dodatne efekte za Crnu Goru kao što su ravnomjerniji razvoj sjevera i juga države, iskorišćavanje prirodnih bogatstava, razvoj turizma, bolje saobraćajno povezivanje i ukupan ekonomski razvoj. Pored navedenih razloga, Studijom opravdanosti izgradnje autoputa Bar-Boljare izgradnja dionice Smokovac-Uvač-Mateševo definisana je i izabrana kao prioritetna, najprije zbog umanjenja ili eliminacije poznatih saobraćajno- bezbjedonosnih rizika na dionici postojećeg magistralnog puta Podgorica – Kolašin. Ukupna dužina autoputa od Smokovca do Mateševa je 41 km, sa 20 mostova i 16 dvocijevnih tunela i 4 petlje. Najduži most je Moračica dužine 960m, a najduži tunel je Vjeternik, prosječne dužine 2975m. Urađene su dvije saobraćajne trake po smjeru sa saobraćajnim trakama za sporu vožnju na dionicama sa većim podužnim nagibima, kao i saobraćajne trake za prinudno zaustavljanje vozila. Kako su geomorfološke karateristike terena duž cijele trase veoma složene i promjenjive, autoput je velikim svojim dijelom položen na objektima, kako tunelima, tako i mostovima. Od ukupne dužine trase oko 17,5 km je otvorena trasa. Na dužini od 13,9 km predviđena je traka za spora vozila, zbog uzdužnog nagiba od 5,6%. Širina kolovoza sa dvije saobraćajne trake iznosi 7,7m po jednom smjeru. Širina kolovoza sa tri saobraćajne trake iznosi 11,2m po jednom smjeru. Maksimalna brzina kretanja ograničena je na 100 kilometara na sat. Radovi na izgradnji autoputa Bar – Boljare zvanično su počeli 11.05.2015 godine a završeni 13.07.2022godine.

Ključne riječi : autoput, mostovi, tuneli, kolovoz

1. Uvod

Autoput, kao put najvišeg ranga sa aspekta tehničkih karakteristika, inteligentnih transportnih sistema za upravljanje saobraćajem, signalizacijom i bezbjedonosnom opremom puta, predstavlja najbezbjedniju kategoriju puta.

Izgradnjom autoputa se smanjuje vrijeme putovanja, pa se od Podgorice do Kolašina umjesto dosadašnjih 90 minuta, stiže za oko 30 do 40 minuta, što smanjuje i troškove. Putovanje se odvija savremenim i bezbjednim putem umjesto dosadašnjeg prolaska kroz kanjon Morače koji u današnje vrijeme predstavlja turističku atrakciju a nikako saobraćajnu žilu kucavicu jedne države.

Put je jedan od faktora bezbjednosti saobraćaja. Pitanje bezbjednosti saobraćaja na putevima je veoma kompleksno, u smislu uticaja više faktora koji utiču na nivo bezbjednosti. Put, kao jedan od faktora bezbjednosti saobraćaja je veoma bitan u ukupnom uticaju svih faktora na bezbjednost saobraćaja. Ukoliko imamo u vidu činjenicu da je u prošloj godini na crnogorskim putevima u saobraćajnim nezgodama smrtno stradalo 48 osoba, iako je stanje po pitanju bezbjednosti saobraćaja na putevima u Crnoj Gori posljednih godina unaprijeđeno, podatak da na 100000 stanovnika imamo 7,7 poginulih, svrstava Crnu Goru u red država koje se po pitanju bezbjednosti saobraćaja na putevima nalaze u sredini, tj. postoji značajna prostor za unapređenje u ovoj oblasti. Kvalitetni i bezbjedni putevi su jedan od načina da se to stanje unaprijedi.

Bezbjednost saobraćaja na putevima možemo sagledati kroz finansijsku prizmu, odnosno troškove koje saobraćajne nezgode sa materijalnom štetom, povrijeđenim ili smrtno stradalim uzrokuju jednom društvu.Ti troškovi su veoma veliki, npr. ako uzmemo u obzir da je prosjek starosti ljudi koji stradaju u svijetu u saobraćaju 23 godine, i ako znamo da je osoba koja je stradala mogla 40 godina stvarati i privređivati, uplaćivati u penzioni fond, socijalni fond, zdravstveni fond, vraćati državi ono što je država uložila u njegovo školovanje, pa ako uzmemo troškove uviđaja poslije nezgode, zatvaranje puta pri čemu nekoliko sati stotine, možda i hiljade ljudi čeka da se saobraćaj pusti, dolazimo do iznosa od oko 400.000 eura po jednom smrtno stradalom licu. Iako i jedno smrtno stradalo lice nema cijenu, složićemo se da su ovi troškovi više nego visoki pa je neophodno imati u vidu i ove podatke kada se razgovara o isplativosti i potrebi izgradnje autoputa.

Očekuje se da autoput podstakne privlačenje kako putničkih tako i teretnih saobraćajnih tokova.

Izgradnjom prioritetne dionice autoputa na teritriji Crne Gore, kao i dionice Surčin – Čačak na teritoriji Srbije postignuto je da se postojeći prevoz putnika i tereta u drumskom saobraćaju odvija na kvalitetniji, komforniji, pouzdaniji i bezbjedniji način.

Ono što je prevoznicima bitno jeste kontinuitet, pa informacije koje dobijaju od kolega iz Srbije i opredjeljenje vlada Crne Gore i Srbije da se nastavi sa izgradnjom cjelokupne trase autoputa Podgorica-Beograd, značajno ohrabruje crnogorske prevoznike što će kroz konkurentnost crnogorskih prevoznika na međunarodnom transportnom tržištu imati pozitivne efekte na ukupnu privredu i razvoj Crne Gore.

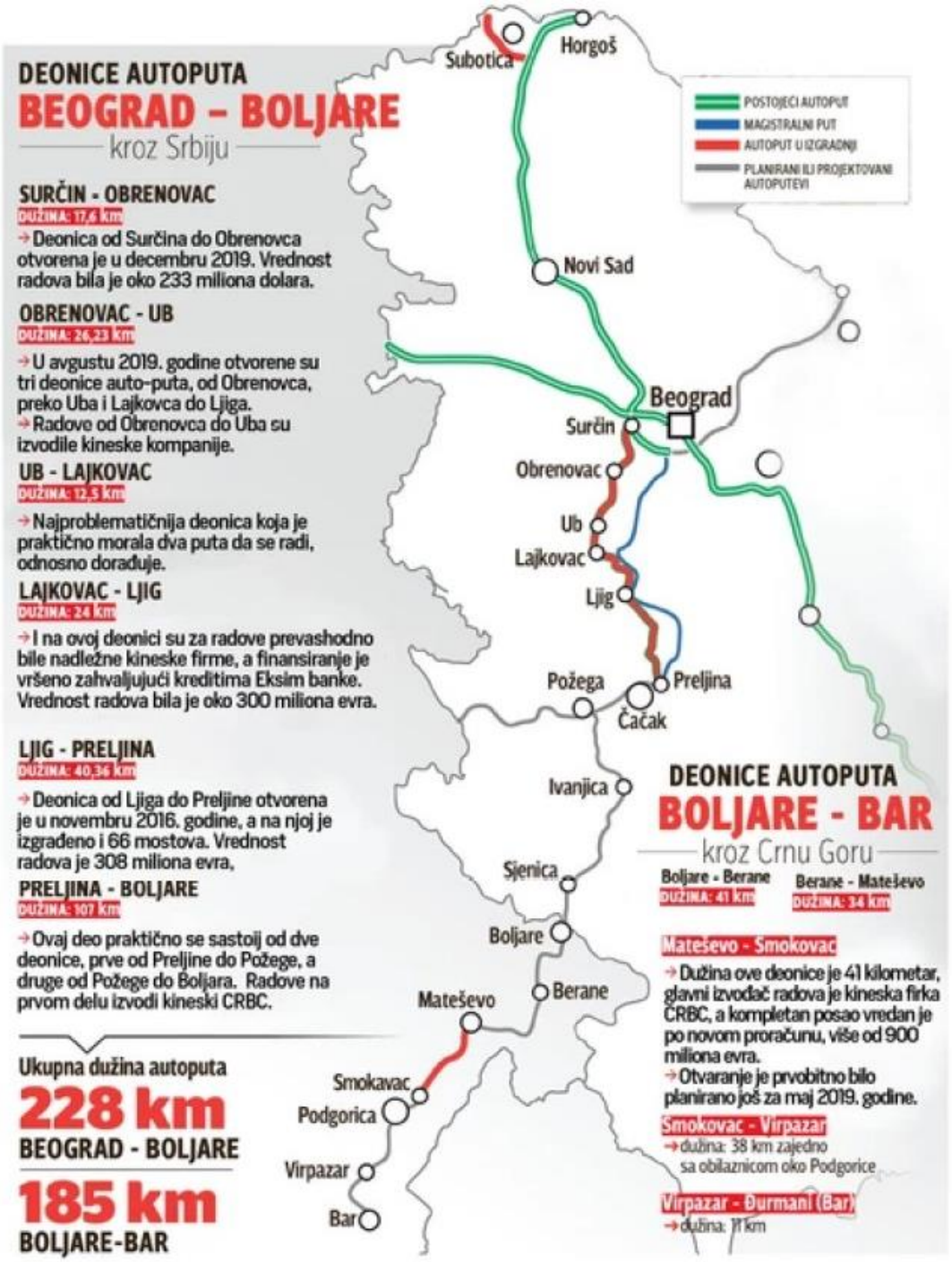
2. Prednosti koje se dobijaju otvaranjem prve dionice autoputa Bar – Boljare

Autoput Bar-Boljare (slika 1) ima glavnu funkciju da integriše Crnu Goru prostorno, privredno i demografski povezivanjem Sjevernog, Središnjeg i Južnog regiona. Ovaj autoput će omogućiti kvalitetne veze sa autoputnim pravcima u regionu (slika 2) koji su dio evropske mreže, što će, izvjesno je, imati značajne pozitivne dodatne efekte za Crnu Goru kao što su ravnomjerniji razvoj sjevera i juga države, iskorišćavanje prirodnih bogatstava, razvoj turizma, bolje saobraćajno povezivanje i ukupan ekonomski razvoj. Pored navedenih razloga, Studijom opravdanosti izgradnje autoputa Bar-Boljare izgradnja dionice Smokovac-Uvač-Mateševo definisana je i izabrana kao prioritetna (statistika će vrlo brzo pokazati koliko je to dobra odluka) , najprije zbog umanjenja ili eliminacije poznatih saobraćajno- bezbjedonosnih rizika vrijeme putovanja se umjesto dosadašnjih 90 minuta, smanjuje na 30 do 40 minuta, na dionici postojećeg magistralnog puta Podgorica – Kolašin. Izbjegnut je jedan od najtežih terena i najopasnija dionica u ovom delu Evrope. Puštanjem u saobraćaj ove dionice rastojanje između Beograda i Bara se smanjilo na 490 km od čega je 150 km autoput

Ova dionica autoputa je pokrivena sa 566 nadzornim kamerama što je već dalo rezultate u otkrivanju prekršaja od strane korisnika i mogućih nepravilnosti.

Koliko je važna novoizgrađena dionica govori i podatak da je samo u prvom danu taj auto-put prešlo oko 18.000 vozila.Očekivanja Monteputa su da će se dnevni prihod od autoputa kretati od 25.000 do 30.000 EUR. Ukoliko se projekcije Monteputa obistine, država bi na godišnjem nivou, od putarine prihodovala između devet i deset mil EUR, a što bi na mjesečnom nivou bilo oko 800.000 EUR.

Slika 1. Prioritetna dionica autoputa Bar - Boljare



Slika 2. Dionice autoputa Beograd-Bar

3. Nedostaci koji su se pojavili u prvim danima eksploatacije dionice autoputa Smokovac -Mateševo

Nažalost, da ne bi sve bilo bajkovito i savršeno, postoje i nedostaci koji su manje ili više zabrinjavajući. Jedan od glavnih je upravo ta razlika u nadmorskoj visini, gdje nizbrdica ka Podgorici u povratku postaje uzbrdica ka Kolašinu. Dokaz koliki je to zapravo problem je i činjenica da skoro ne prođe dan a da se neki auto ne zapali u zaustavnoj traci. Dnevno 20 do 50 vozila ostane u kvaru, najčešće prokuva a za prvih pet dana korišćenja autoputa 5 automobila se zapalilo. Pretpostavljam da vozači tih automobila forsiraju motor više nego što treba, ne prate davač temperature rashladne tečnosti i ne znaju u kakvom je stanju motor i izduvna grana njihovog vozila.

Dodatni minus tom usponu su dali i vozači kamiona koji tvrde da radije voze starim putem, jer pored putarine koja za kamion iznosi oko 17 eura u jednom smjeru, potrošnja goriva u tim uslovima prevazilazi nivo isplativosti.

Takođe, ističem i problem koji se tiče (ne)protočnosti naplatnih rampi i nepreglednih kolona koje se stvaraju vikendom. Naplatne rampe Mateševo i Smokavac dugoročno gledano manje su bitni ulazi/izlazi, jer produžetkom autoputa ka Baru i Beranama te petlje će koristiti većinom vozači iz Podgorice i Kolašina ali trenutno su to uska grla i njihove dvije ili tri rampe jednostavno nijesu dovoljne da opsluže saobraćaj koji se skuplja u taj lijevak, uz sav trud ljudi koji tamo rade.

Nepoštovanje saobraćajnih propisa, bahato ponašanje, saobraćajno neznanje i nevaspitanje su zabilježile nadzorne kamere a te radnje se se mogu svrstati u rubliku vjerovali ili ne : slučaj vozača koji je 6 km vozio u kontra pravcu, nekoliko prekoračenja brzine preko 200km/h, cigaret pauza i doručak na saobraćajnoj traci za prinudno zaustavljanje, skok padobranom sa mosta Moračica i odmor vozača na ležaju na krovu automobila ispred tunela u trajanju od 45 minuta. Ovi prekršaji su procesuirani uz krivične prijave i predati nadležnim organima. Ovdje mogu dodti i neprofesionalnu intervenciju ekipe za održavanje autoputa koja je bez usmjerivača, treptača, znaka za ograničenje brzine i zatvaranja saobraćajne trake na kojoj se nalazilo njihovo vozilo vršila uklanjanje zemljanog materijala nanijetog u toku obimnih padavina.

Dionica Smokovac - Uvač - Mateševo svečano je otvorena 13. jula za saobraćaj, ali bez benzinske pumpe.Ministarstvo kapitalnih investicija (MKI) još nije pripremilo koncesioni akt na osnovu kojeg bi se izabrao koncesionar za gradnju benzinske pumpe na prioritetnoj dionici auto-puta.Prostornim planom predviđena je gradnja dvostrane pumpe na lokalitetu Gornje Mrke. Prostornim planom definisano je da na auto-putu od Bara do Boljara bude izgrađeno ukupno 11 benzinskih pumpi, u okviru kojih će biti parkinzi, informativno-turistički punktovi, služba prve pomoći.

3.1. Uzroci paljenja automobila na prioritetnoj dionici Smokovac Mateševo autoputa Bar -Boljare i radnje koje treba preduzeti ako dođe do paljenja

Stručnjaci se slažu da je glavni krivac za te prizore duž autoputa takozvani dizel partikularni filter (DPF) sistem za prečišćavanje izduvnih gasova dizel motora (slika 3). DPF filter je keramički filter sa hiljadama sićušnih kanala koji njegovom poprečnom presjeku daju izgled saća. Unutrašnjost „saća“ pokriva sloj hemijskog katalizatora koji sadrži male količine plemenitih metala,obično paladijuma (Pd) ili platine (Pt).

Dizel motor stvara niz čestica tokom procesa sagorijevanja. Sastav čestica koji se tom prilikom manifestuje zavisi od različitih elemenata, uključujući starost i tip motora,sastav goriva i sl. Čestice crnog ugljenika (čađ) nastaju kao rezultat nepotpunog sagorevanja dizel goriva. Prilikom nepotpunog sagorijevanja dizel goriva nastaju štetni gasovi (nanočestice) koji izazivaju zagađenje vazduha i životne sredine. Osim vode (H_20) i ugljen diokosida (CO_2) u izduvnom

sistemu se nalaze i sledeći gasovi: CO – otrovan gas bez boje i mirisa, HC – nesagorjeli ugljovodonici koji pridonose stvaranju smoga, NOx – oksidi azota aktivni pri nastajanju kisjelih kiša.

Slika 3. Dizel partikularni filter (DPF)

Svrha ovog filtera je da smanji emisiju štetnih izduvnih gasova, tako što čestice čađi zadržava u sebi. To je u suštini mehanizam za „hvatanje“ koji zadržava čađ dok putuje kroz izduvni sistem vozila i sprečava ispuštanje čestica čađi iz auspuha. DPF filter može da prikupi do 95% ovih štetnih čestica (slika 4). Da bi se smanjila količina čađi i čestica,mora se podići temperatura u komori za sagorevanje, a to se obično postiže kada motor radi pod opterećenjem. Međutim,veoma visoke temperature sagorevanja nijesu dobre. Ako temperatura sagorjevanja pređe 1800 °C, počinju da se stvaraju oksidi azota (NOx) , a oni su još štetniji za prirodu od čađi. Suprotno tome, niske temperature sagorjevanja tokom dužeg rada motora u praznom hodu, proizvode previše čađi, koja blokira DPF. Vozila opremljena DPF sistemom prate količinu čađi u filteru preko senzora pritiska. On prati pritisak gasova koji ulaze i izlaze iz filtera, što ukazuje na količinu čađi nakupljene u DPF-u. Kada je DPF čist, razlika je zanemarljiva, a kako se filter postepeno začepljuje, razlika u pritisku postaje sve značajnija. Kada postane prevelika, automatski se pokreće „ciklus regeneracije“. Većina ciklusa regeneracije se izvodi a da ih vozač uopšte i nije svijestan. Podiže se temperatura u filteru na oko 600 °C, ubacuje se dovoljno kiseonika za sagorjevanje (neki sistemi će ubrizgati i dodatno gorivo u cilindar), vreli gasovi ulaze u oksidacioni katalizator DPF-a, čime se temperatura podiže dovoljno da podstakne ugljenik da reaguje sa viškom kiseonika. Drugi sistemi se za podizanje temperature oslanjaju na grejni dio motora (katalizator) postavljen neposredno prije DPF, a kako god da se ciklus izvodi, može da proizvede neželjene posledice.

Pošto čađ odmah utiče na izduvni sistem i njegovu sposobnost da uklanja gas iz motora, to onda sprečava motor da radi punom snagom. Zato će vozači, kada osjete da im se motor guši,

na uzbrdici početi više da pritiskaju gas. Motor će još brže da sagorijeva gorivo, stvarajući još više čađi i još više gušeći filter koji neće uspijevati da se „regeneriše“. Temperatura čitavog izduvnog sistema počeće vrtoglavo da raste, što može da prouzrokuje oštećenje svih ostalih dijelova motora ili karoserije, njihov kvar, ili čak požar. I sistem za dovod goriva će se opteretiti i doći u rizik da popusti, što takođe može dovesti do požara. Čak i ako regeneracija radi kako treba, tokom vremena će se talog pepela nakupiti u filteru i na kraju ga zagušiti. Zbog toga treba redovno održavati DPF makar jednom godišnje, a naročito pred autoput, kojim na dionici od 41 km treba savladati uspon od 1000 m i dovesti automobil do granica njegovih mogućnosti.

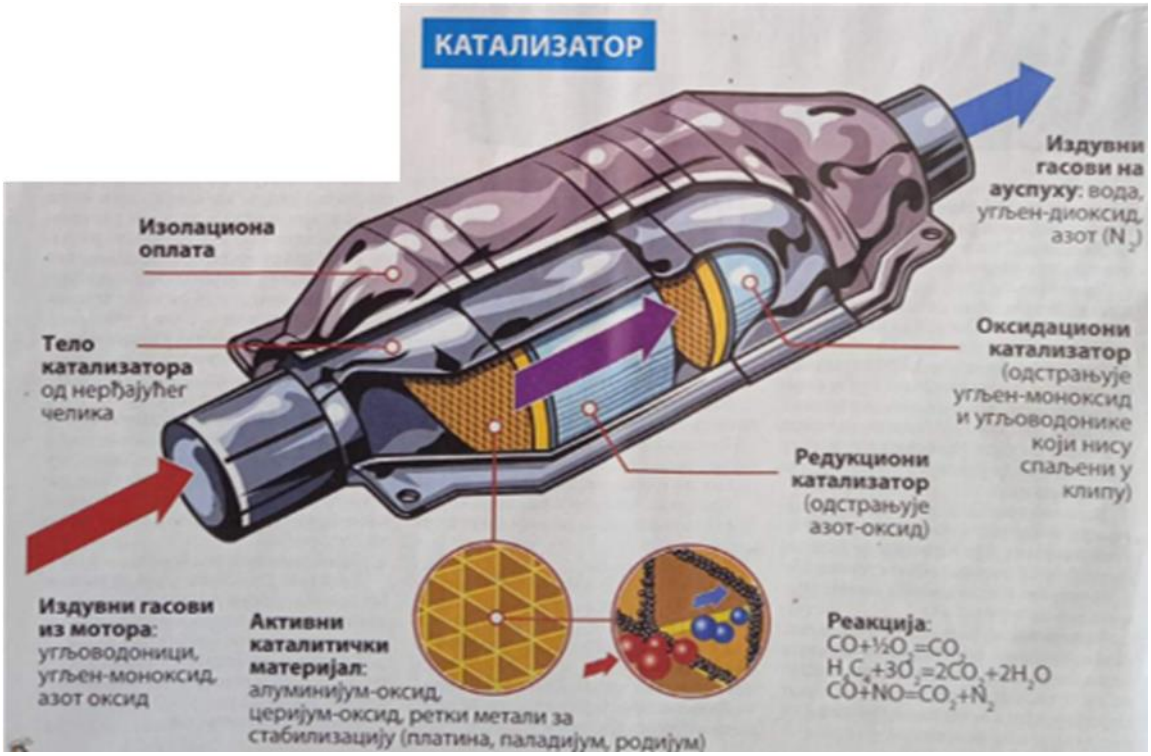
Slika 4. PDFfilter sa nakupljenim česticama čađi

Na motorima na benzin, gas i propan za prečišćavanje izduvnih gasova ne koristi se DPF već katalizator (Slika 5). Postoje izvjesne sličnosti između katalizatora i DPF-ova, koriste keramički ili metalni dio kroz koji prolaze izduvni gasovi, ali osnovna razlika je u tome što je DPF u suštini filter koji sakuplja čađ te ga je potrebno servisirati. Za razliku od njega katalizator mijenja hemijski sastav izduvnog gasa, umjesto da ga filtrira: gasovi prolaze kroz katalizator a reakcija se odvija na površini keramičkog bloka obloženog mješavinom platine, paladijuma ili rodijuma.

Katalizatori uklanjaju prisustvo štetnih gasova u izduvnim gasovima pretvarajući ih u relativno bezopasne gasove poput vode i ugljen dioksida. Stoga ih nazivamo i trostepenim katalizatorima. Upotreba katalizatora je najefektivnija metoda uklanjanja štetnih gasova, njihova efikasnost iznosi oko 90%. Katalizator postiže maksimalnu funkcionalnost kada motor radi sa odnosom goriva i vazduha u smesi u stehiometrijskom odnosu 14,7:1 (lambda faktor = 1) – odnosno sa 1 gramom goriva na 14,7 grama vazduha. Tada je odnos vazduha i goriva takav da se svaki molekul goriva može spojiti sa odgovarajućom molekulom kiseonika iz vazduha, odnosno smanjuje se mogućnost pojave neizgorenih gasova u izduvnim gasovima. Takođe smanjuje se i mogućnost pojave viška molekula kiseonika koje se pri visokim temperaturama i pritiscima tokom procesa sagorevanja spajaju sa azotom iz vazduha i stvaraju štetne azotne okside. Katalizatore razlikujemo po materijalu od kojih je izrađeno aktivno jezgro katalizatora odnosno monolit. Postoje dvije vrste aktivnog jezgra katalizatora i po njima katalizatore dijelimo na:
METALNE – jezgro od metala presvučenog aktivnim slojem

KERAMIČKE – jezgro od keramike presvučene aktivnim slojem

Metalni katalizatori su kvalitetniji, otporniji na toplotna opterećenja, stvaraju manji otpor prolasku izduvnih gasova, ali su i skuplji. Aktivna površina je prekrivena tankim slojem platine, rodijum ili paladijum koji deluju kao katalizatori pri hemijskim reakcijama. Keramički katalizatori su jeftiniji i nalaze se na većini manjih vozila kao serijski ugrađeni katalizatori.



Slika 5. Katalizator

Ako su uslovi rada savršeni, katalizator se neće nikad zagušiti ili istrošiti, te bi, teorijski, trebalo da traje čitav životni vijek automobila. U stvarnosti, nesagorjelo gorivo koje stiže do već vrućeg katalizatora može da se zapali, dodatno poveća temperaturu u njemu i ošteti mu jezgro. Takođe,ako motor počne da pušta ulje u izduvni sistem, ono može brzo da prekrije površine u jezgru katalizatora slojem koji je veoma teško ukloniti i tako mu sabotira rad.

Slika 6. Slučajevi zapaljenih automobila na autputu

Ako dođe do požara (slika 6) potrebno je uraditi sledeće radnje:

- Zaustaviti vozilo na bezbjednom mjestu što prije i isključiti kontakt.

- Pobrinuti se da svi putnici napuste vozilo sa posebnom pažnjom ako ima djece.

- Odmah pozvati vatrogasce i policiju.

- Pokušati da ugasiti požar ali pažljivo, najbolje je koristiti vatrogasni aparat, a za manji plamen može da pomogne prekrivanjem ćebetom ili jaknom, posipanje pijeskom, polivanje vodom (zavisno od toga šta gori).

- Ako nema vatrogasnog aparata, treba zaustaviti kamion ili autobus (oni imaju protiv požarni aparat , kao i taksisti).

- Kad gori motor, ne podizati skroz haubu jer će to omogućiti dotok kiseonika i pojačati vatru. Ako imate PP aparat, haubu treba podići samo koliko može da se uvuče crijevo vatrogasnog aparata i tako počnite gašenje, potpuno otvoriti haubu i skroz ugasiti požar.

- PP aparatom ne treba ciljati u vrh plamena, već u ono što gori ispod plamena.

- Razliveni benzin ne gasiti vodom, jer će ga ona još više raširiti i povećat požar.

- Što prije počnete sa gašenjem vatre, biće lakše da se obuzda.

- Uputstvo o korišćenju PP aparata pročitati po kupovini. Tako se ne gubi vrijeme na čitanje uputstva.

Rijetko se dogodi da se automobil sam zapali. Automobili proizvedeni u ovom milenijumu zapale se najčešće zbog greške u održavanju. To je propust majstora ili vlasnika. Dva najopasnija uzroka požara su:

1. Curenje goriva (dizel i benzin)

Automobil može da zapali, tačnije ne gorivo već njegova isparenja. Curenje goriva oko motora može dovesti do požara. Dovod goriva se sastoji od cijevi, filtera goriva, pumpe, brizgaljke i svaki spoj ima gumice i dihtunge. Ako curi bilo koji od njih, gorivo će kapati i isparavati u motornom prostoru, a zbog visokih temperatura će doći do zapaljenja.

2. Neispravna instalacija

Ako je instalacija oštećena mehanički u toku drugih radova na vozilu pri čemu se žice ogole i dolazi do kratkog spoja i varničenja koji izazivaju požar. Oko instalacija postoji dosta plastičnih djelova koji se tope i brzo gore. U instalaciji nikad nije jedna ili dvije žice već čitav snop.

4. Zaključak

Dijeluje da nikada nije bilo toliko slučajeva zapaljenih automobila kao ovog ljeta, kako u gradovima, tako i na otvorenom putu. Požari su ljeti na žalost redovna pojava. Da ljetnje vrućine ne postanu mnogo „vrelije“ trebalo bi preduzeti korake koji bi mogli da spriječe da u automobilu bukne vatra. Najčešće se upravo visoke temperature smatraju glavni uzročnikom požara, ali pravi krivac su ustvari različite neispravnosti i greške, pa ne treba krenuti na put prije nego što dobro provjerite svoje vozilo. Visoke temperature mogu da doprinesu, ali u automobilu svakako ima i zapaljivih materijala i potencijalnih izvora vatre i to uvijek treba imati u vidu.

Osim neispravnosti, požari nastaju zbog nesmotrenosti:

- Sa upaljenom cigaretom ili upaljačem ne prilaziti čepu rezervoara kao ni motorskom prostoru.

- Ne sipajte ulje kad je vruć motor jer može da se desi da ga prospete na vrelu izduvnu cijev.

- Osnovno pravilo vožnje na nizbrdici, mjenjač ni po koju cijenju ne izbacivati iz brzine,već da se u određenom stepenu prenosa (u zavisnosti od automobila i same nizbrdice) koči motorom, a da se radna kočnica koristi samo u slučaju kad se vozilo kreće prevelikom brzinom i to dozirano. Samo kad mora i kratko.

Dio izgrađenog autoputa daje nam nadu da će početi da se rade i ostali djelovi, čime će se postići razvoj svijesti ukupnog stanovništva o značaju saobraćaja na razvoj jednog društva. Autoput Bar-Bolojare i Jadransko Jonski autoputa kroz Crnu Goru omogućava našim građanima da do bilo koje tačke Evrope mogu doći savremenim putevima na najudobniji i nabezbjedniji način i u najkraćem vremenskom periodu. Dobra povezanost otvara nove mogućnosti za nauku, obrazovanje, biznis, turizam, proizvodnju, rešavanje zdravstvenih problema građana i sve ono što nameću savremeni tokovi današnje civilizacije.

Pravilno korišćenje tehničkog napretka znači da je on na dobrobit i u službi građana, a nepravilno može dovesti do ugrožavanja bezbjednosti onih koji su tu nepravilnost izazvali i učesnika koji su se slučajno zatekli na tom mjestu u trenutku izazivanja nepravilnosti.

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13. Advantages and deficiencies in the initial use of the first section of the Bar-Boljare highway with a special focus on burning cars

Preface

As Montenegro gained the first kilometres of the highway that showed its pros and cons at the beginning of use, I decided to address them in this work and contribute to their better view.

The Bar-Boljare Highway is a transferal route in the direction of the Northeast – Southwest, which has the main function in the spatial, economic and demographic integration of Montenegro by connecting the North, Central and Southern regions. This highway will enable quality connections to highway routes in the region that are part of the European network, which is reportedly will have significant positive additional effects for Montenegro, such as more balanced development of the north and south of the state, exploitation of natural resources, development of tourism, better transport connectivity and overall economic development . In addition to these reasons, the Bar-Boljare Highway Justification Study defines and selected the Smokovac-Uvač-Mateševo section as a priority, first of all due to the reduction or elimination of known traffic and safety risks on the section of the existing highway Podgorica – Kolašin. The total length of the highway from Smokovac to Mateshevo is 41km, with 20 bridges and 16 double tunnels and 4 loops. The longest bridge is the 960m Moračica, and the longest tunnel is Vjeternik, an average length of 2975m. Two traffic lanes were driven in a direction with traffic lanes for slow driving on sections with larger longitudinal slopes, as well as traffic lanes for forcibly stopping vehicles. Since the geomorphological terrain along the entire route is very complex and variable, the highway is largely laid on buildings, both tunnels and bridges. Of the total length of the route, about 17.5km is an open route. At a length of 13.9 km, the lane for slow vehicles is envisaged, due to a longitudinal tilt of 5.6%. The maximum speed of movement is limited to 100 km per hour. Construction of the Bar – Boljare highway officially began on 11.05.2015 and was completed on 13.07.2022.

Keywords : autoput, bridges, tunnels, Augus

1. Introduction

The highway, as a top-level road from the technical characteristics aspect , intelligent transportation system for traffic management, signalization and road safety is the most secure category of road.

And theconstruction ofthe highway witha downgradeis the time of the journey, so from Podgorica to Kolašin instead of the previous 90 minutes, it arrives in about 30 to 40 minutes, which also lowers the cost. The journey takes place on a modern and safe road instead of passing through moraca canyon, which these days is a tourist attraction and by no means a traffic vein of a state.

The road is one of the safety factors for traffic. The issue of traffic safety on the roads is very complex, in terms of the impact of several factors affecting the level of security. The road, as one of the factors of traffic safety, is very important in the overall impact of all factors on traffic safety. Given the fact that 48 people died on Montenegrin roads in traffic accidents last year, even though the state of traffic safety on the roads in Montenegro has improved in recent years, the data that we have 7.7 deaths per 100,000 inhabitants puts Montenegro in line with the security of traffic on the roads in the middle, i.e. there is a significant simpler for improvement in this area. Quality and safe roads are one way to improve the condition.

Befficiency of traffic on the roads can be seen through the financial prism, i.e. the costs that traffic accidents with material damage, injury or fatality cause to a society. These costs are very high, for example, if we consider that the average age of people who die in the world in traffic is 23 years, and if we know that the person who died could have created and contributed for 40 years, paid into a pension fund, a social fund, a health fund, returning to the state what the state has invested in its education, So if we take the cost of the inspection after the accident, the road closure, where for several hours hundreds, maybe thousands of people are waiting for traffic to be released, we come up with an amount of about 400,000 euros per fatal person. Although even one mortal person has no price, we will agree that these costs are more than high, so it is necessary to keep in mind this data when discussing the cost-effectiveness and need to build a highway.

The highway is expected to encourage the attraction of both passenger and freight traffic flows.

By building a priority section of the highway on the territiria of Montenegro, as well as the Surčin – Čačak section on the territory of Serbia, it has been achieved that the existing transport of passengers and cargo in road traffic takes place in a better, more comfortable, reliable and safe manner.

What matters to the carriers is continuity, so the information they receive from colleagues from Serbia and the determination of the governments of Montenegro and Serbia to continue building the entire Podgorica-Belgrade highway route significantly encourages Montenegrin carriers, which through the competitiveness of Montenegrin carriers on the international transport market will have positive effects on montenegro's overall economy and development.

2. Advantages gained by opening the first section of the Bar - Boljare highway

The Bar-Boljare Highway (image 1.) has the main function to integrate Montenegro with spatial, economic and demographic connectivity of the Northern, Central and Southern Regions. This highway will provide quality connections to highway routes in the region (image 2) that are part of the European network, which is reportedly will have significant positive additional effects for Montenegro, such as more balanced development of the north and south of the state, exploitation of natural resources, development of tourism, better transport connectivity and overall economic development . In addition to these reasons, the Bar-Boljare Highway Justification Study defines and selected the Smokovac-Uvač-Mateševo section as a priority (statistics will very soon show how good a decision it is) , firstly due to the reduction or elimination of known traffic and safety risks, the travel time instead of the previous 90 minutes, is reduced to 30 to 40 minutes, on the stock of the existing main road Podgorica – Kolašin. One of the most difficult terrains and the most dangerous stock in this part of Europe has been avoided. By releasing this section , the distance between Belgrade and Bar has been reduced to 490 km of which is 150 km of the highway

This section of the highway is covered by 566 surveillance cameras, which has already yielded results in the detection of violations by users and possible irregularities.

How important the newly built section is also the fact that in the first day alone, about 18,000 vehicles crossed the highway. Monteput's expectations are that daily revenue from the highway will range from EUR 25,000 to EUR 30,000.

Image 1. Priority section of the Bar - Boljare highway

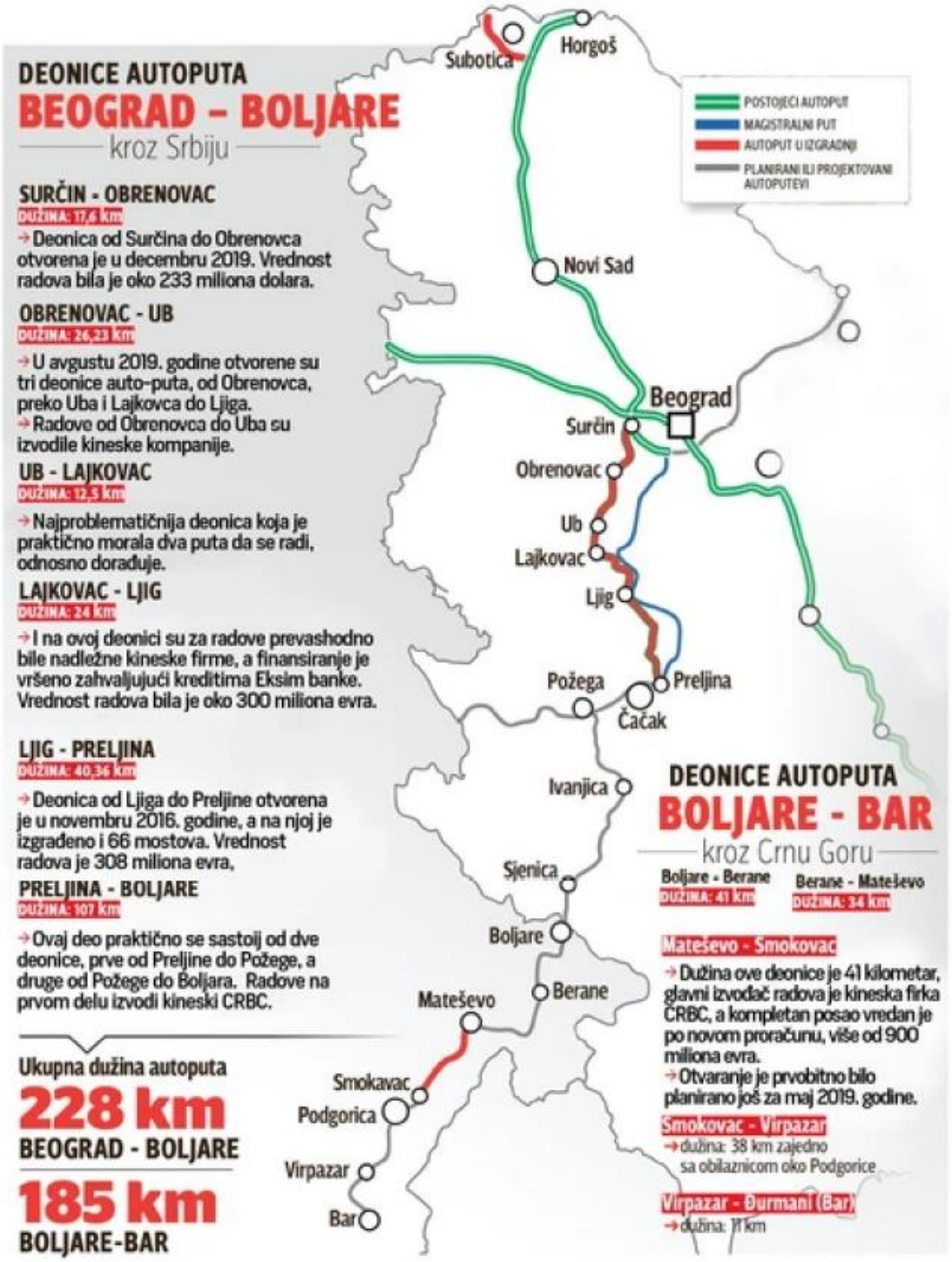

Image 2. Shares of Highway Belgrade-Bar

3. Defects that appeared in the first days of exploitation of the smokovac-mateševo highway section

Unfortunately, in order not to make everything fairytale and perfect, there is also a lackof aca that is more or less worrying. One of the main ones is precisely this difference in altitude, where the downhill road to Podgorica on the way back becomes a hill towards Kolašin. Proof of the real problem is the fact that almost a day doesn't go by without a car setting fire to a stop lane. Every day, 20 to 50 vehicles remain broken down, usually boiling over, and in the first five days of use of highway 5 cars caught fire. I guess the drivers of those cars force the engine more than they need to, they don't monitor the temperature giver of the coolant and they don't know the condition of the engine and the exhaust branch of their vehicle.

An additional minus of that rise is the dal and truck drivers who claim to prefer to drive on the old road, because in addition to the toll, which is around 17 euros in one smjera, fuel consumption in these conditions exceeds the level of profitability.

I also point out the problem concerning the (in)flow of toll ramps and vast columns that are created on weekends. In the long run, the toll ramps Mateševo and Smokavac are less important entrances/exits, because by extending the highway to Bar and Berane, these loops will be used mostly by drivers from Podgorica and Kolašin but at the moment they are bottlenecks and their two orthree ramps are simply not enough toserve the traffic that is collected in that funnel evacuation, with all the efforts of the people who work there.

Non-compliance with traffic regulations, bahato behaviour, traffic ignorance and rudeness have been recorded by surveillance cameras and these actions can be classified as ruble believe it or not : the case of a driver who drove 4 miles in the opposite direction, several speeding speeds over 200km/h, a cigarette pause and breakfast in the traffic lane for forced stop, parachute jump from the Moračica Bridge and rest of the driver on the roof of the car in front of the tunnel These violations were prosecuted with criminal charges and handed over to the competent authorities. Here I can come the unprofessional intervention of the highway maintenance team, which without the routers, blinkers, signs for speed limiting and closing of the traffic lane on which their vehicle was located, performed the removal of ground material applied during heavy rainfall.

Smokovac - Uvač - Mateševo section was inaugurated on July 13th for traffic, but without a gas station. The Ministry of Capital Investments (MKI) has not yet prepared a concession act under which to select a concessionaire to build a gas station on the priority section of the highway. The spatial plan envisions the construction of a two-sided pump on the site of Gornje Mrke. The spatial plan defines that a total of 11 petrol stations will be built on the highway from Bar to Boljare, which will include parking lots, information and tourist checkpoints, first aid services.

3.1. Causesof car crash on priority section smokovac Mateševo highway Bar - Boljare and actions to be taken if ignition occurs

Experts agree that the mainculprit for these scenes along the highway is the so-called diesel emissions filter (DPF) withthe same emissions refinement of diesel engines (image 3). The DPF filter is a ceramic filter with thousands of tiny channels that give its cross-section the appearance of a watch. The interior of the "honeycomb" covers a layer of chemical catalyst containing small amounts of precious metals, usually palladium (Pd) or platinum (Pt).

The diesel engine creates a series of particles duringthecommage process. The composition of the particles that manifest on this occasion depends on different elements, including age and type of engine, fuel composition, etc. Black carbon particles (soot) resulting from incomplete burning of diesel fuel. Incomplete burning of diesel fuels produces harmful gases (nanoparticles) that cause air and environmental pollution. In addition to water (H_20) and

carbon dioxide (CO_2) in the exhaust system are the following gases: CO – toxic gas without color or smell, HC – non-burning hydrocarbons that contribute to the formation of smog, NOx – nitrogen oxides active in the formationof rain.

Image 3. Diesel Particular Filter (DPF)

The purpose of this filter is to reduce emissions of harmful emissions by keeping soot particles inside. It's essentially a "capture" mechanism that retains soot as it travels through the vehicle's exhaust system and prevents the release of soot particles from the exhaust. The DPF filter can collect up to 95% of these harmful particles (image 4). To reduce the amount of soot and particulates, the temperature must be raised in the combustion chamber, which is usually achieved when the engine is running under load. However, very high combustion temperatures are not good. If the burn temperature exceeds 1800 °C, nitrogen oxides (NOx) begin to form , and they are even more harmful to nature than soot. In contrast, the low temperatures of burning during the engine's longer operation on an empty walk produce too much soot, which blocks the DPF. Vehicles equipped with the DPF system track the amount of soot in the filter through pressure sensors. On monitors the pressure of gases entering and exiting filters, indicating the amount of soot accumulated in the DPF. When the DPF is clean, the difference is negligible, and as the filter gradually shuts down, the pressure difference becomes more significant. When it becomes too large, the "regeneration cycle" automatically starts. Most regeneration cycles are performed without being aware of them at all. The temperature in the filter is raised to around 600 °C, enough oxygen is injected to burn (some systems will inject additional fuel into the cylinder), hot gases enter the DPF's oxidation catalyst, thereby raising the temperature enough to encourage carbon to react with excess oxygen. Other temperature-raising systems rely on the heating part of the engine (catalyst) set immediately by pre DPF, and however the cycle is performed, it can produce unintended consequences.

Since soot immediately affects the exhaust system and its ability to remove gas from the engine, it prevents the engine from working at full power. That's why when drivers feel their engine suffocating, they'll start pressing the throttle more on the hill. The engine will build up

fuel even faster, creating even more soot and even more suffocating filters that won't be able to "regenerate." The temperature of the entire exhaust system will start to rise dizzyingly, which can cause damage to all other parts of the engine or bodywork, their malfunction, or even the fire. The fuel supply system will also be overloaded and at risk of relenting, which can also lead to a fire. Even if the regeneracis working properly, over time the ash sediment will accumulate in the filter and eventually choke it. Because of this, the DPF should be maintained regularly at least once a year, especially in front of the highway, which has a 4.1 km section to overcome the USpon of 1000 m and bring the car to the limits of its possibilities.

Image 4. PDFilter with accumulated soot particles

On gasoline, throttle and propane engines, dpf is not used to purify the hollow gases, but a catalyst (image 5). There are certain similarities between catalysts and DPFs, they use a ceramic or metal part toroz that passes exhaust gases, but the basic difference is that DPF is essentially a filter that collects soot and needs to be serviced. Unlike it, the catalyst changes the chemical composition of the hollow gas, instead of filtering it: gases pass through the catalyst and the reaction takes place on the surface of a ceramic block coated with a mixture of platinum, palladium or rhodium.

Catalysts remove the presence of harmful gases in emissions by converting them into relatively harmless gases such as water and carbon dioxide. Therefore, we call them three-stage catalysts. The use of catalysts is the most effective method of removing harmful gases, their efficiency is about 90%. The catalyst achieves maximum functionality when the engine works with the fuel-to-air ratio in the mixture in stechiometric ratio of 14.7:1 (lambda factor = 1) – that is, from 1 gram of fuel to 14.7 grams of air. Then the air-to-fuel ratio is such that each fuel molecule can be combined with the appropriate oxygen molecule from the air, i.e. reducing the possibility of unburnt gases appearing in exhaust gases. It also reduces the possibility of excess oxygen molecules that, at high temperatures and pressures during the combustion process, merge with nitrogen from the air and create harmful nitrogen oxides. We distinguish catalysts by the material from which the active core of the catalyst or monolith is made. There are two types of active core catalysts and according to them we share catalysts on:

METAL – metal core coated with an active layer

CERAMIC – ceramic core coated with active layer

Metal catalysts are better quality, more resistant to thermal loads, create less resistance to the passage of exhaust fumes, but they are also more expensive. The active surface is covered with a thin layer of platinum, rhodium or palladium that acts as catalysts for chemical reactions. Ceramic catalysts are cheaper and are found on most smaller vehicles as serial built-in catalysts.

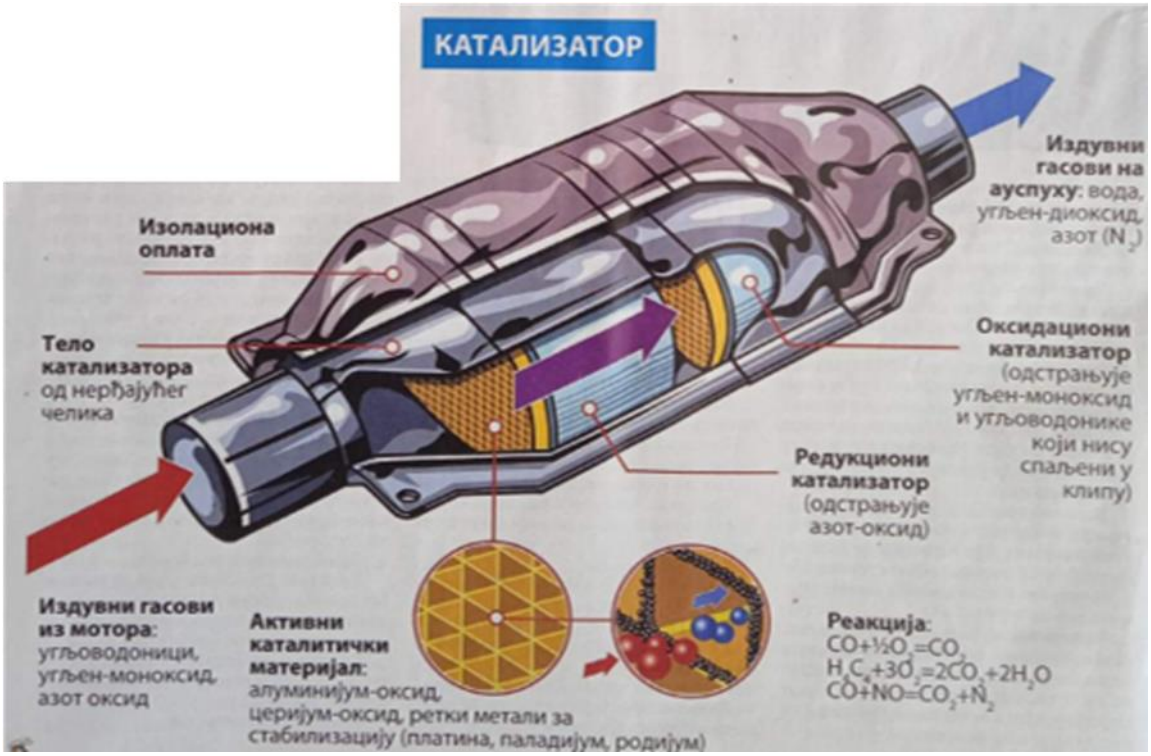

Image 5. Catalyst

Andwho are the perfect working conditions, the catalyst will never be stifled or worn out, and, in theory, it should last a lifetime of cars. In reality, un burnable fuel that reaches an already hot catalyst can ignite, further increase the temperature in it and damage its core. Also, if the engine starts releasing oil into the exhaust system, it can quickly cover the surfaces in the catalyst core with a layer that is very difficult to remove and thus sabotage its operation.

Image 6. Cases of burning cars on the road

If a fire occurs (image 6) the following actions need to be done :

- Stop the vehicle in a safe place as soon as possible and turn off the contact.

- Make sure that all passengers leave the vehicle with special care if there are children.

- Call the fire department and the police immediately.

- Try to extinguish the fire but carefully, it is best to use a fire extinguisher, and for a smaller flame it can help by covering with a blanket or jacket, sprinkling with sand, pouring water (depending on what is burning).

- If there is no fire extinguisher and the truck or bus should be stopped (they have a fire extinguisher, as do taxi drivers).

- When the engine is on fire, do not lift the hood completely because it will allow oxygen to flow and intensify the fire. If you have a PP apparatus, the hood should be lifted only as much as it can to retract the hose of the fire extinguisher and thus start extinguishing, completely open the hood and completely extinguish the fire.

- The PP apparatus should not aim at the top of the flame, but at what burns under the flames.

- Do not extinguish spilled gasoline with water, because it will spread it even more and increase the fire.

- The sooner you start putting out the fire, the easier it'll be to restrain yourself.

- Instructions on the useof PP appliances upon purchase. That way you don't waste your time reading the instructions.

It's rare for a car to catch fire on its own. Cars produced during this millennium are caught fire most often because of maintenance errors. It's a failure of a handyman or an owner. The two most dangerous causes of the fire are:

3. Fuel leak (diesel and petrol)

The car can ignite, more precisely not fuel but its evaporation. A fuel leak around the engine can lead to a fire. The fuel supply consists of a pipe, a fuel filter, a pump, a pen and each connection has rubber bands and dihtungas. If any of them leak, the fuel will drip and evaporate in the engine compartment, and due to high temperatures, ignition will occur.

4. Incorrect installation

If the installation is damaged mechanically during other work on the vehicle, where the wires are stripped and there is a short circuit and deceptions that cause a fire. Around the installations there are quite a lot of plastic parts that melt and burn quickly. In the installation there is never one or two wires, but the entire stack.

4. Conclusion

He says there have never been as many cases of burning cars as this summer, both in cities and on the open road. Fires are unfortunately a regular occurrence in the summer. If the summer heat didn't get much hotter, steps should be taken that could prevent a fire from catching fire in the car. Typically, high temperatures are considered the main cause of the fire, but the real culprit is actually various defects and mistakes, so you shouldn't go on the road before checking your vehicle properly. High temperatures can contribute, but there are certainly flammable materials and potential sources of fire in the car, and that should always be taken into account.

In addition to malfunctions, fires occur due to recklessness:

- With a cigarette or lighter on, don't go near the tank cork or the engine space.

- Don't pour oil when it's a hot engine because it may happen to spill it onto a hot hollow tube.

- Basic rule of driving downhill, changer at no price, not to eject from speed, but to a certain degree of transmission (depending on the car and the downhill itself) brakes with the engine, and that the brake is used only when the vehicle is moving at excessive speed and dosed. Only when it has to be short.

Part of the built highway gives us hope that other parts will start to be done, thereby achieving the development of awareness of the overall population about the importance of traffic to the development of a society. The Bar-Boljare highway and the Adriatic Ionsk highway and highway through Montenegro enable our citizens to reach any point in Europe that can reach modern roads in the most comfortable and secure way and in the shortest time period. Good connectivity opens up new possibilities for science, education, business, tourism, manufacturing, solving citizens' health problems and all that is imposed by the modern streams of today's civilisation.

The proper use of technical progress means that it is for the benefit of the citizens and in the service of the citizens, and improperly can endanger the safety of those who caused this irregularity and learnfromthose who accidentally found themselves in the place at the time of the improper sti.

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14. VARNA VOŽNJA Z E-SKIROJEM

POVZETEK

V zadnjem času se na naših kolesarskih potek, stezah in nenazadnje tudi cestah pogosto srečamo z novodobnimi prevoznimi sredstvi in njihovimi pretežno mladimi uporabniki - e-skiroisti. Električni skiro je postal nepogrešljiva vez med javnim potniškim prometom ter mestno mobilnostjo. Njegov doprinos je toliko bolj pomemben saj upošteva vsa načela trajnostne mobilnosti, sploh kadar je možna javna izposoja. Vendar ali smo primerno usposobljeni in ozaveščeni o varni uporabi tega lahkega motornega vozila, kakor ga definira Zakon o motornih vozilih? Lanskoletna novela zakona o motornih vozilih podaja pravila uporabe novega e-skiroja. Prispevek analizira poznavanje zakonodaje s področja uporabe e-skirojev ter samo usposobljenost voznikov kadar se prvič srečujejo s tovrstnim vozilom.

Ključne besede: električni skiro, Zakon o motornih vozilih, usposobljenost uporabnikov.

1 UVOD

Pri električnih skirojih gre za relativno novo in še ne dobro poznano prevozno sredstvo, ki pa se z leta v leto bolj uporablja v mestnem prometu. Tako njegovi začetki segajo že v konec 19. stoletja, njihova uporaba pa je v porastu zadnjih nekaj let. Vedno več zaprtih mestnih središč, gneča v mestnem prometu ter povečanje prometa so na nek način dobro vplivali na zavest ljudi, saj se jih mnogo odloči izbrati hitrejši in pravzaprav tudi okolju prijaznejši način prevoza. Električni skiroji predstavljajo možnost dostopa do zaprtih mestnih središč in s tem pripomorejo k čistemu okolju. Vožnja z njimi je praktična, hitra in enostavna. Težava pa nastane na področju varnosti, saj se pojavijo številne nejasnosti.

2 ELEKTRIČNI SKIRO

Skiro kot igrača ali kot prevozno sredstvo ni nekaj novega, sajjih najdemo v raznovrstnih prodajalnah že vrsto let. Sprva so bili leseni in primerni le za otroke, saj so bili mišljeni ravno za igro otrok ter vožnjo po dvoriščih in igriščih. Sčasoma je zanimanje zanje upadlo, a se je njihova uporaba v zadnjih nekaj letih ponovno močno povečala. Seveda se današnji skiroji popolnoma razlikujejo od svojih predhodnikov.

Tako dandanes poznamo različne izvedbe skirojev, v zadnjem času posebej raste priljubljenost električnim skirojem. Ti imajo vgrajen elektromotor, ki jim omogoča lasten pogon. Ravno zaradi tega morajo imeti slednji tudi dodatne varnostne komponente, ki nam omogočajo varno vožnjo.

2. 1 SESTAVA E-SKIROJA

Osnova e-skiroja je sestavljena iz pokončne in ležeče kovinske konstrukcije. V enem izmed teh dveh delov je po navadi vgrajena pogonska baterija. Na to konstrukcijo sta pritrjeni dve kolesi, eno spredaj in eno zadaj. Elektromotor je lahko nameščen tako na zadnje kot tudi na sprednje kolo. Na obe kolesi sta pritrjeni učinkoviti zavori, nožna ali ročna, ki sta po navadi v kombinaciji. Na vrhu pokončnega dela skiroja sta nameščena dva ročaja. Na konstrukcijo je nameščen sistem osvetlitve spredaj in zadaj ter stranske označbe, ki služijo večji vidljivost in varnosti uporabnika, kontrolna enota/ LCD-zaslon, s katero kontroliramo hitrost in stanje baterije.[9]

2. 1. 1 BATERIJA IN ELEKTROMOTOR

Baterija in elektromotor sta dva najpomembnejša dela e-skiroja, saj brez le-teh električni skiro ne bi bil to kar je. Baterija vpliva na veliko lastnosti električnega skiroja, vse od cene do zmogljivosti. Klasična svinčena baterija je najpogosteje uporabljena v električnih skirojih nižjega cenovnega razreda, litij-ionska pa je uporabljena v nekoliko dražjih skirojih. Baterija je nameščena v okvir skiroja, in sicer so po navadi nameščene v ležečo konstrukcijo skiroja, redkeje pa tudi v pokončno. Baterije so prilagojene za vgradnjo v e-skiro tako kot po obliki tudi po moči, velikosti in vzdržljivosti oziroma dometu (številu kilometrov, ki ga e-skiro naredi z enim polnjenjem baterije). Baterije pri e-skirojih imajo povprečno moč od 7,5 Ah do 14,7 Ah in se polnijo od 3 do 4 ure. Te baterije imajo življenjsko dobo približno od 400 do 1200 ciklov.

Povprečna teža vgrajenih baterij je od 2 do 4 kg. S polno baterijo se je možno voziti kar do 5 h. Li-ionske baterije nimajo spominskega efekta, kar pomeni, da se baterija ne napolni do konca, če predenj ni baterija popolnoma izpraznjena. Litijeve baterije je prvič predlagal M. Stanley Whittingham, ko je delal za Exxon v 70-ih letih. Za elektrode je uporabil titanijev (IV) sulfat in kovinski litij.

Slika 1: Baterija e-skiroja

Vir: delectric.si

Slika 2: Elektromotor

Vir: delectric.si

[9] Motorno vozilo, 2011, 356.

3 ZAKONODAJA

Pomena varne udeležbe v cestnem prometu se zavemo šele ko je to že prepozno. Vsi udeleženci v prometu morajo biti zaščiteni pred hudimi poškodbami ali celo smrtjo. Način, s pomočjo katerega dosežemo omenjeno zaščito, predstavlja urejena zakonodaja s področja cestnoprometnih predpisov, motornih vozil in cest. Seveda je zakonodaja premalo, da bi zagotovila varnost v vsakem primeru. Nesreče so se in se bodo dogajale na cestah, dokler bo prisoten človeški faktor. Kot že omenjeno, dosežemo najvišjo stopnjo varnosti, kadar so dejavniki voznik, vozilo in cesta v najboljših odnosih in idealnih pogojih. Za to pa poskrbi ustrezna in primerna zakonodaja ter njeno izvrševanje s strani pristojnih organov.

3. 1 PRETEKLE NEJASNOSTI V ZAKONODAJI

Do lanskega leta je bila uporaba vsakovrstnih skirojev, tako tistih na lasten pogon kot baterijskih, tako imenovano sivo območje. Zaradi neobstoječe zakonodaje na tem področju, *Zakon o pravilih cestnega prometa* tovrstna vozila v 97. členu prepoveduje.Policija tako ni imela ustrezne zakonske podlaga, da bi uporabnike opozarjala na pravila vožnje in posledično ni mogla izdajati sankcij ob nepravilni vožnji z e-skiroji. To pa še ne pomeni, da se e-skiroji v prometu niso uporabljali. Vse več je voznikov e-skirojev predvsem v mestnih središčih, kjer je njihova uporaba najbolj praktična. E-skiro je lahko in relativno hitro prevozno sredstvo, ki nam omogoča premagovanje večjih razdalj. Glavna vrlina tega vozila je prav njegov elektro pogon, ki energijo črpa iz baterije in omogoča premagovanje razdalj do 40 kilometrov z enim polnjenem baterije. Posledično so se v letu 2019 in 2020 pojavljale nepotrebne nesreče pri vožnji z e-skirojem. Velik doprinos k reševanju neobstoječe zakonodaje lahko prištejemo Javni agenciji Republike Slovenije za varnost prometa, ki je opozarjala na nujno potrebo po zakonodaji glede lahkih motornih vozil.

3. 2 ZAKONODAJA S PODROČJA LAHKIH MOTORNIH VOZIL

Zaradi vse več in vse težjih poškodb uporabnikov in udeležencev v trkih, vprašanj (odškodninske) odgovornosti ter splošne nujnosti regulative, je Vlada RS vendarle pristopila k reševanju problematike in decembra 2020 poslala v sprejem v državni zbor predlog novele zakona, ki po sprejemu vsaj deloma ureja tudi to področje.
Novela zakona je bila sprejeta 16. 7. 2021 kot dopolnitev *Zakona o predpisih v cestnem prometu.* Ta tako uvršča električne skiroje med lahka motorna vozila, med katera štejemo vse skiroje na motorni pogon, pri katerih konstrukcijsko določena hitrost ne presega 25 km/h ter niso širša od 80 cm, rolke na električni pogon, segwaye na električni pogon itd. Prav tako določa obvezno uporabo čelade do 18. leta starosti. Vozniki lahkih motornih vozil morajo voziti po kolesarskem pasu, kolesarski stezi ali kolesarski poti, zgolj izjemoma pa ob desnem robu smernega vozišča, vendar tudi to samo v naselju. Uporaba v cestnem prometu ni dovoljena. Obvezna je uporaba sprednje in zadnje luči ter odsevnikov.Vozniki e-skirojev morajo upoštevati, da je ob zaviranju, sploh pri višjih hitrostih, e-skiro nestabilen. Kolesa e-skiroja so majhna in občutljiva na razne neravnine in ovire na vozni površini, zato so lahko prej podvrženi padcem.Vozniki motornih

vozil morajo pri prehitevanju e-skirojev dosledno upoštevati minimalno bočno razdaljo, ki znaša 1,5 m in prehitevanje izvesti le tedaj, ko je to povsem varno.[10]

Novela zakona po novem obravnava tudi klasične skiroje, ki nimajo lastnega pogona ter jih uvršča med posebna prevozna sredstva, ki se smejo v cestnem prometu uporabljati le na pločnikih, poteh za pešce, kolesarskih poteh in območjih umirjenega promet. Uporaba na cestišču je izrecno prepovedana. Pri uporabi posebnih prevoznih sredstev hitrost vožnje ne sme preseči hitrosti, s kakršno se gibljejo pešci, kar je pb. 4 – 5 km/h.

Novela posega tudi v Zakon o voznikih, in sicer določa, da sme lahko motorno vozilo voziti le oseba, starejša od 14 let ali oseba, ki je starejša od 12 let in ima s seboj kolesarsko izkaznico. Določbe, ki veljajo za kolesarje, se smiselno uporabljajo tudi za voznike lahkih motornih vozil.[11]

Tehnična brezhibnost vozila je tista, ki je z vidika varnosti ključna za varno udeležbo v prometu. Kadar je govora o električnih skirojih, je pomembna komponenta tega lahkega motornega vozila predvsem njegova konstrukcijska stabilnost in izdelava. E-skiro sestavlja elektromotor, ki poleg baterije ter elektronike predstavlja pogonski sklop vozila. Izredno pomembni karakteristiki e-skiroja so tudi učinkovite zavore in odsevni elementi. Zavore morajo delovati ob vsakem trenutku in uporabniku omogočiti hitro ter učinkovito zaustavitev vozila.
Nova zakonodaja na področju lahkih motornih vozil, kamor uvrščamo e-skiroje, zapoveduje tudi uporabo luči in odsevnikov. E-skiro mora imeti ob zmanjšani vidljivosti in ponoči poleg prednje bele luči prižgano tudi rdečo pozicijsko luč na zadnji strani. Obvezna je uporaba tudi bočnih oranžnih ali rumenih odsevnikov ter rdečega zadnjega odsevnika. E-skiro je lahko motorno vozilo, katerega uporaba je omejena na kolesarske poti in predvsem mestno vožnjo, zato je njegova vidljivost in tehnična brezhibnost nujna za varno udeležbo v prometu. Vsak voznik in uporabnik e-skiroja je dolžan sam poskrbeti za varnost prevoznega sredstva.[12]

4 POLIGON SPRETNOSTNE/VARNE VOŽNJE

V sklopu raziskovalnih nalog, so dijaki četrtega četnika logističnega tehnika pripravili spretnostni poligon. Priprava ovir za poligon spretnostne vožnje za e-skiroje je potekala postopoma. Načrt izdelave poligona smo izdelali s pomočjo pregledovanja literature na internetih straneh, kjer smo dobili idejo, kako bi poligon lahko izgledal. V mislih smo imeli predvsem vožnjo z e-skirojem, kjer je potrebno izpostaviti ravnotežje, varno zaviranje ter vožnjo skozi različne podlage in neravnine. Ovire smo si najprej narisali s pomočjo tehničnega risanja in si tako zastavili okvirne velikosti posamezne ovire. Nadaljnjo smo s pomočjo tehnične dokumentacije zadeve izdelali v šolskih delavnicah. Ker vseh ovir nismo mogli izdelati, smo za posamezne ovire uporabili gumijaste stožce, ki smo jih naročili pri podjetju ELCI, Preddvor, d. o. o. Po končani izdelavi posameznih ovir, smo si skicirali različne postavitve poligona in s preizkušanjem našli najprimernejšo.

[10] Povzeto po: https://cekin.si/varni-v-prometu/zakonodaja-o-e-skirojih.html dostop 6. 6. 2022
[11] Povzeto po: https://www.uradni-list.si/glasilo-uradni-list-rs/vsebina?urlurid=20212630, dostop 10. 6. 2022
[12] Povzeto po: http://www.pisrs.si/Pis.web/pregledPredpisa?id=ZAKO5793, dostop 11. 6. 2022

Poligon smo izvedli na zunanjem šolskem igrišču (okvirnih mer 40 na 20 metrov),kjer je podlaga (asfalt) najbolj primerna in predstavlja dejansko podlago za vožnjo e-skiroja v mestnem prometu.Poligon je bil sestavljen iz 9 ovir. Ovire so podrobno predstavljene v nadaljevanju. Za izvedbo smo imeli na voljo dva električna skiroja, ki so nam ju posodili dijaki Srednje šole za storitvene dejavnosti in logistiko. Oba e-skiroja sta bila standardizirana z največjo hitrostjo 25 km/h. Eden je bil znamke Xiaomi Mi Scooter Pro 2, z največjo močjo elektromotorja 600 W in dometom do 45 km. Ta model ima na voljo tudi tri stopnje hitrosti: hoja (5 km/h), drive (od 10 do 15 km/h) in sport (od 20 do 25 km/h). Drug model je bil XiaomiEssential 365 z največjo močjo elektromotorja 250 W in dometom 20 km. Prav tako je imel na voljo tri hitrostne stopnje.

Za mladoletne uporabnike poligona smo imeli na voljo dve čeladi, ki smo ju pred vsako uporabo razkužili.

Za vsako oviro smo predvidevali možne napake, ki jih lahko naredijo kandidati. Te napake smo tudi točkovali:

- premaknjen količek/stožec (5 točk),
- podrt količek/stožec (10 točk),
- dotik tal z stopalom (10 točk),
- neprevožena ovira (20 točk).

Pred vožnjo na poligonu so kandidati izpolnili anketo o poznavanju zakonodaje s področja uporabe e-skirojev. Za vožnjo skozi poligon so kandidati imeli en poizkus in neomejen čas vožnje. Med izvedbo voženj po poligonu smo spremljali vsakega kandidata tako, da smo beležili napake, ki jih je naredil in merili čas celotne vožnje.

4. 1 OPIS OVIR

Prva ovira je predstavljala startno mesto, ki je bilo označeno z dvema stožcema velikosti 50cm, ki sta bila oddaljena 1m.Naloga kandidatov je bila, da pravilno speljejo skozi stožce.
Sledile so ovire, ki so simulirale vožnjo slaloma med palicami in stožci. Na razdalji 1,5 m od starta smo razporedili pet palic, višine 160cm, ki so bile trdno privijačene v jeklene nosilce. Palice so bile na razdalji 210cm. Naloga kandidatov je bila vožnja/slalom med postavljenimi palicami. Podobna ovira je bila postavljena s stožci, kjer smo na dolžini celotne ovire 720 cm razporedili pet parov stožcev v razmaku 180 cm. Vsak drugi par stožcev je bil zamaknjen za 2 stožca v nasprotno smer. To pomeni, da stožci niso stali eden za drugim, temveč so bili drug ob drugem. Za oviro smo uporabili srednje velike stožce višine 40cm.

*Slika 3: Slalom med palicam*Vir: Lasten

Ostale ovire so bile vezane na vožnjo skozi različne podlage. Pripravili smo vožnjo čez grbine, ki je simulirala neravno podlago. Za to oviro smo konstruirali palico, na kateri so bile privijačene grbine, vsaka je bila visoka 4cm. V vrsti je ena za drugo potekalo pet grbin.

*Slika 4: Grbina*Vir: Lasten

Med podobne ovire, ki analizirajo obvladovanje neravnin in menjavo različnih podlag, lahko štejemo tudi gugalnico ter vožnjo skozi kratko ožino. Pri slednji smo izdelali dve deščici velikosti 60cm x 8cm x 0,8cm, ki smo jih namestili v razmaku 10cm. Kandidat je moral pri tej oviri prevoziti kratko ožino, brez da bi se pri tem dotaknili katere od deščic ali stopil na tla.

Slika 5: Ovira – GUGALNICA. Vir: Lasten

Poligon smo zaključili z naglim zaviranjem. Za to oviro smo uporabili štiri stožce: dva srednje visoka (40 cm) in dva visoka (60 cm). Spredaj smo postavili srednje velika stožca, ki sta bila drug od drugega odmaknjena 100cm; 40cm za njima smo postavili velika stožca, ki sta bila prav tako odmaknjena 100cm drug od drugega. Na oba para stožcev smo prečno postavili leseno palico, dolgo 200cm.To oviro so morali izvesti najprej s pospeševanjem, ki je trajalo približno 12m, nakar so morali kontrolirano zavirati do prve prečne palice, katero so morali podreti in se varno vstaviti pri drugi palici.

Slika 6: Naglo zaviranjeVir: Lasten

4. 2 ANALIZA VOŽENJ

Pri izvedbi poligona smo si zadali sistem točkovanja napak, kot je dotik tal, premaknjen ali podrt stožec/palica, neprevožena ovira. Za takšen način točkovanja smo se odločili, ker varna vožnja pomeni obvladovanje vozila. In vsaka napaka lahko povzroči nesrečo. Za analizo smo točke razporedili v štiri skupine. Tako je od 0 do 25 »kazenskih točk« prejelo 8 udeležencev poligona.To pomeni, da je zgolj 8 od 66 kandidatov vožnjo opravilo odlično in so se le parkrat dotaknili ovire ali stopili na tla. Poligon je brez napake in posledično brez kazenskih točk opravil le en udeleženec.38 kandidatov je za vožnjo prejelo med 25 in 50 kazenskih točk. Med 50 in 75 kazenskih točk je prejelo 16 kandidatov. Štirje kandidati so poligon opravili s 75 kazenskimi točkami. Kandidati so se na poligonu odrezali relativno slabo, saj so povprečno zbrali 45 kazenskih točk oziroma točk za napake. V realni vožnji bi to pomenilo več dotikov ovir, ki lahko predstavljajo pešce, kolesarje ali druge ovire v prometu. Poudariti je treba, da je najpogostejšo napako predstavljal dotik tal, ki je pomagal ohraniti ravnotežje v določenih voznih razmerah. To seveda ni napaka, ki bi ogrožala varnost voznikov e-skiroja ali ostalih udeležencev, je pa to pokazatelj, da je ravnotežje res najzahtevnejša spretnost pri vožnji s tovrstnim lahkim prevoznim sredstvom.

Prav tako smo kandidate skozi celoten poligon merili čas vožnje. Opazili smo, da so kandidati, ki so bili manj spretni, poligon opravljali dlje in v večini primerov tudi z več napakami, kakor tisti, ki so bili e-skirojev že obvladali. Pri slednjih je bilo moč opaziti hitrejše reakcije ter spretnost. Povprečen čas opravljanja poligona pri 66 kandidatih je znašal 47,4 sekunde. Analiza je pokazala, da je 38 kandidatov poligon opravilo v času med 45 in 60 sekundami. 23 kandidatov je za vožnjo skozi poligon potrebovalo med 30 in 45 sekund, kar je zelo dober čas. 4 kandidati so za vožnjo skozi poligon potrebovali kar eno minuto ali več. Ti kandidati so poligon prevozili brez prehodnih izkušenj, kar se pozna tudi na spretnostnem področju. Povprečen čas vožnje skoz poligon je pokazatelj, da skozi različne ovire, kot so sprememba vozne podlage, manevriranje skozi ovire in premagovanje naklonov, nikakor ne moremo voziti z maksimalno hitrostjo e-skiroja, ki je 25 km/h. Hitrost vožnje je treba prilagoditi voznim razmeram v realnem prometu, kar pa omogočajo tudi e-skiroji, ki imajo več stopenj hitrosti vožnje.

5 ZAKLJUČEK

E-skiroja ne moremo enačiti z e-kolesom, kjer je tehnična izvedba bistveno drugačna in posledično vožnja varnejša. Predpostavka, o lažji vožnji s kolesom v primerjavi z e-skirojem, se nam je potrdila tudi pri izvedbi poligona. Električno skiro se po lansko leto sprejeti zakonodaji uvršča med lahka motorna vozila, za katere se zahteva minimalna starostna meja štirinajst let in opravljen kolesarski izpit. Posledično to omogoča regulacijo in nadzor nad nepravilno uporabo in vožnjo tovrstnih vozil.

Na podlagi analize poligona bi predlagali poligon varne vožnje pred nakupom ali vožnjo s skirojem, saj bi potencialni uporabniki na ta način bolje spoznali specifike vožnje in se na kasnejšo vožnjo v mestnih središčih med množico ljudi tudi lažje in boljše pripravili. Pri tem bi bili seznanjeni tudi z zakonodajo na področju e-skirojev. Zakonodajo bi bilo s področja razumevanja in lažjega tolmačenja potrebno razumljivejše oziroma podrobnejše zapisati. Med izvajanjem poligona smo zaznali velik problem pri previsoki hitrostni omejitvi za tovrstna

vozila. Pri maksimalni hitrosti (25 km/h) se je zelo težko varno ustaviti, prevoziti in obvoziti raznovrstne ovire in menjati različne vozne površine. Poligon je pokazal, da za varno manevriranje z e-skirojem potrebujemo velike prostora, ki pa je lahko v realnem prometu omejen z ostalimi udeleženci. Naš predlog, da bi se hitrost (predvsem pri mestni vožnji s tovrstnim vozilom) omejila na 10 km/h, se tako zdi zelo utemeljen.

Električni skiroji predstavljajo veliko dodano vrednost trajnostni mobilnosti prebivalstva. Njihova prednost je v lahki, enostavni in majhni zasnovi. Uporaba tovrstnih vozil bo učinkovita le ob ozaveščanju njegovih uporabnikov o varni uporabi in veljavni zakonodaji. E-skiroji so že prisotni v cestnem prometu od nas pa je odvisno, ali jih bomo uporabljali varno in pravilno.

6. VIRI IN LITEREATURA

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14. SAFE DRIVING WITH E-SCOOTERES

SUMMERY

The use of e-scooters has risen in the last few years and with that numerous issues appeared, such as: knowing and obeying general traffic regulations, as well as inexperience while driving. Because of that we have asked ourselves some questions about the legislation involving e-scooters, driving them and the problems connected to them. E-scooter presents an important link within permanent mobility. With our questionnaire we have learned about awareness of the drivers, regarding the law as well as their options about safety and difficulties driving e-scooters, which we have tested on out track. With the help of our track we realised the most common mistakes and problems which accrue while driving and with a later analysis searched for solutions.

Key words: electrics scooter, the Law on motor vehicles, the competence of the drivers.

1 INTRODUCTORY

E-scooters represent a relative new means of transportation which is mainly use in the city mobility. Its beginnings go as far as the end of the 19th century but the real breakthrough for e-scooter is now. There are more and more closed city centres, more congestions and more traffic which has led to the use of alternative means of transport and e-scooter is one of them. E-scooter represents an easy way of accessing the city centres and also means a clean way of transportation. With an electric scooter you can travel fast, fun and easy. The down size of this fast, fun and easy transport vehicle is the safety issue, where we have acknowledged many negative outcomes.

2 ELEKTRIC SCOOTER

Scooter as a toy or means of transport is not a new invention. We can find different sorts of toys and vehicles in stores and shops for many years. At firs scooters ware made of wood and sold as toys for children's play. Through the years they lost their attraction, but have gain popularity in the last decade. Although the new scooters are very different from their predecessors. The numbers of sold e-scooters rises by the year.

Today there is an emphasis on the electrics scooters, who have their own electric engine and are popular because they reach speeds up to 25km/h or even more. But that is also the reason that they need extra components regarding safety issues.

2. 1 THE STRUCTURE OF E-SCOOTER

The basics of an electric scooter is an upwards and horizontal metal construction. One of those components also contains the battery pack. The are two wheels, one on each side of the scooter. The electric motor can be attach to the front or the to the beck wheel. Both of the wheels must have an efficient break system. The breaks must be a combination of manual and foot break. To the upward part of the e-scooter there are attached two handles, for manoeuvring. The system is also required to have lighting on the front and back side, and visual markings on the sides of the electric scooter. There is also a control panel or LCD screen mounted on the handle bars, which enables the monitoring of the speed and the charging levels of the battery.[13]

2. 1. 1 BATTERY AND ELECTRO MOTOR

The battery and the electro motor are the two most important parts of an electric scooter. This two parts make the character of the e-scooter. The battery has an important part on the performance of the e-scooter, from the range to the price of the vehicle. The classical lead battery is mostly used in the low price range of e-scooters, meanwhile the Li-ion battery is mostly used for the higher price electric scooters. The battery is placed in the frame of the e-scooter. Battery pack is designed to fit in with the frame work of the e-scooter and differ from power, size and range (the number of kilometres we can make with one charging of the battery). The batteries which are in the e-scooters have the power between 7,5 Ah to 17, 7 Ah. The time it takes to be fully charged ranges from 3 to 4 hours. A life time of this kind of batteries is between 400 and 1200 cycles.

The average weight of the Li-ion battery is between 2 to 4 kilograms. When the battery is fully charge the e-scooter can drive for maximum of 5 hours. Li-ion batteries are nowadays the most efficient kind of batteries, because of their components. Lithium has the highest electric

Picture1: The battery of an e-scooter

Source: delectric.si

Picture 2: Electric motor

Source: delectric.si

[5] Motorno vozilo, 2011, 356.

potential. The lithium battery was introduced by M. Stanley Whittingham in the 70thes when he worked for the company Exxon. The first lithium battery used titanium sulphate and steel lithium for cathodes.

3 THE LEGISLATION

We usually became aware of the meaning of road safety when it is too late. All participants must be protected from serious injuries or dead situation no matter if they are drivers, passengers or even electric scooter users. The best way to protect all participants is to have good and efficient legislation on the fields of road traffic regulations, motor vehicles and roads. We are all aware that just correct legislation is not enough. Accidents will be happening on our roads as long as we are in charge of our vehicles and use roads for cycling, walking and other activities. All three factors must be in perfect order and cohesive with each other – driver, road and vehicle. To achieve such a state, we must educate and make all participants aware that their behaviour has an important role in traffic. Have efficient legislation, supervision and good road infrastructure.

3. 1 PREVIOUS OBSTACLES IN THE LEGISLATION

Up to the previous year all use of any type of scooters, even those with no engine was so called grey area. That was because the Road traffic regulation, specifically the 97th article of this law did not allow the use of e-scooters on the roads and pavements. Therefor the police had no jurisdiction on warning the users on the incorrect usage of this kind of vehicles. There were also no fines for the reckless user of electric scooters. But that doesn't mean that the e-scooters were not on the roads. On the opposite, every year we can encounter more and more e-scooters especially in the city centres. The city centres are full of this practical, light weight and easy to use vehicle. The advantages of the e-scooter come most in hand in the restricted city areas. Therefore, the number of accidents related to electric scooters has increased especially in the last few years. Thanks to the Public agency for road safety that has changed in the last year.

3. 2 ROAD TRAFFIC LEGISLATION

Because of the increase of traffic related accident which included e-scooters and also the questions of the payment of the compensation costs the Slovenian government approached the problem of non-existing legislation. In the December of 2020 the government presented the amendment to the law that has helped to regulate this issue.
The amendment of the law was accepted on the 16th of July in 2021 as a replenishment to the Road traffic law regulation. This law places e-scooters as light weight vehicles which do not reach speed more than 25kilometers per hour are not wider than 80 centimetres. The law also determinates the use of a helmet for users under the age of 18. The e-scooter can only be used on the cycle lane or road. In the settlements e-scooters can be use on the right side of the road. Any other use of e-scooters in the main roads are strictly forbidden. Every e-scooter must be equipped with lights and breaks. The users must take into account of the vehicle being unstable, especially when used at high speeds. The wheels are small and sensitive to any kind of change of surface

areas. The drivers of other motor vehicles must take into account, that when overpassing an electric scooter, they have to keep the minimal sideways distance of 1, 5 metre, to make sur the overpassing will be safe.[14]
The amendment of the law undertakes in to account the classical scooters, with no motor and places them in a new category or special means of transport, which can be used only on the pave walks, walking ways and cycling paths. Any use in roads is strictly forbidden. With this category the maximal speed must not exceed the one of the pedestrian which is between 4 to 5 km/h.

The amendment of the new law can also be find in the Law on drivers, where there is specified that only one person can be driving the e-scooter. The driver must be older than 12 years with a cycling card at hand or older than 14 years. All the provisions that apply for the cyclists are also used for drivers of light motor vehicles.[15]

Flawlessness technical characteristics of a vehicle is the one that provides safe driving. When we are referring to electric scooters the main component that has to be flawless is constructional stability and driveshaft components. All the parts of an electric scooter must be in perfect working condition so the driver can rely on them. One part is particular crucial in this aspect, efficient brake system, which must be reliable at all times. The new legislation therefore also demands the use of breaking lights. Electric scooters must have a front weight light and a red light on the rear side. Mandatory is the use of orange or yellow sideways lights. The law also emphasizes that each user is responsible for the safety of its one vehicle, in this case an e-scooter.[16]

4 SAFE OBSTACLE COURSE FOR E-SCOOTERS

As a part of a research paper the fourth year students of logistical technician prepared a safe obstacle course for electric scooters. The preparation of the obstacles was a slow process. With the help of literature and different web pages we prepared individual obstacles and got an idea, have the hole obstacle course would look like. When we were preparing the obstacle course we had in mind the use of e-scooters, that means we needed to include obstacles for the use of balance, safe breaking and driving from different surfaces in the course. First we drew the obstacle course where we sat the size of the hole course. Then we made the specifically obstacle with the help of the school work shops. Because all the obstacle can't be handmade we ordered and bought some parts form a company ELCI, Preddvor, d. o. o., which is the supplier of road traffic signs. When all the obstacles where finished we laid out different courses and picked the most suitable one.

The obstacle course was laid out in the school playground (masseur 40 on 20 meters), where the grounding is asphalt which is the most suitable for driving an e-scooter and represents actual grounding in the city centres. The obstacle course was made of nine obstacles. The obstacles are presented further on. For the driving test we had two different electric scooters available. All the

[14] Summarized: https://cekin.si/varni-v-prometu/zakonodaja-o-e-skirojih.html dostop 6. 6. 2022
[15] Summarized: https://www.uradni-list.si/glasilo-uradni-list-rs/vsebina?urlurid=20212630, last access 10. 6. 2022
[16] Summarized: http://www.pisrs.si/Pis.web/pregledPredpisa?id=ZAKO5793, last access 11. 6. 2022

e-scooters were standardised for the top speed of 25km/h. One was Xiaomi Mi Scooter Pro 2, with the max. power of the electric motor 600 W and the range of 45km. This model is acquired with three different speed levels: walking (5km/h), drive (from 10 to 15 km/h) and sport (form 20 and 25km/h). The second model was Xiaomi Essential 365, with the top power of the electric motor 250 W and range 20 kilometres. This model also has three different speed levels.

For the drivers who are underage we had two helmets available, which we disinfected before use.

For every obstacle we predicted possible mistakes, that a candidate can make. This mistakes were marked:

- moved marking pole/ cone (5 points),
- knocked down marking pole/cone (10 points),
- touch of the grown with feet (10 points),
- not finishing the obstacle (20 points).

Before driving through the obstacle course we survived the candidates. The survey was about legislation of the e-scooter. The candidates had one attempt on the course and unlimited time. During the obstacle course we accompanied the candidates and made marks for points and timed the driving.

4. 1 DESCRIPTION OF THE OBSTACLES

The first obstacle was the starting point, which was marked with two cones 50 cm high, which were placed 1m apart. The assignment of the candidates was to drive through the cones without touching them. Obstacles that were further on were imitating slalom between cones and poles. 1,5 metres form the starting place we placed five poles which were 160cm high. The poles were placed on metal beans and were 210cm apart. The assignment of the candidates was to drive safe between the poles and not bumping or hitting them. A similar obstacle was made with cones, where five per of cones were places 180 cm apart. For this obstacle we used 40 cm high cones, which were placed in per of two one next to each other.

Picture 3: Slalom between poles
Source: Ksenja Rožanski Filder

Other obstacles were based on preparing candidates for different driving surfaces. One of those obstacles was driving over humps, which simulates uneven surface. We prepared this obstacle with one flat bar on to which we placed 4cm high humps. The bar contained five humps in a row.

Picture 4: Obstacle humps

Source: Ksenja Rožanski Fidler

Other surface chances obstacles were swing and driving through a short strait. The strait was made by using 60cm x 8 cm x 0,8cm boards which we placed 10cm apart. The job of the candidates was to drive through the boards without driving on one of them or putting their foot on the ground.

Picture 5: Obstacle – swings.

Source: Ksenja Rožanski Fidler

The obstacle course was finished with breaking in a hurry. For this obstacle we used four cones, two 40cm and two 60cm high. The small cones were put in the front 100cm apart and on them we put a pole 200cm long. The second per of cones were in the back also 100cm apart and with a pole on them. The aim of the obstacle was to drive fast for approximate 12m then break so the first pole on the smaller cones was knocked down. The obstacle finished when the candidate came to a full stop in front of the second pole and kipping the pole on the cones.

Picture 6: Fast breaking

Source: Ksenja Rožanski Fidler

4. 2 DRIVING ANALYSIS

For the analysis of the obstacle course we set out a scoring system of points which the candidates gained when they made a mistake. Like touching the ground or moving a cone or pole. The most points were given when the obstacle was not driven through. We decided for this kind of scoring system, because safety driving means knowing have to handle the vehicle and every mistake can cause an accident.

For the analysis the points were divided them in to four groups. The first group finished the obstacle course with the least mistakes. The least points, from 0 to 25 penalty points got 8 candidates. That means that only 8 from 66 candidates got an excellent score point and could pass the obstacle course without an accident or just a small mistake, like touching the ground or a pole/cone. Only one of the drivers of an e-scooter past without any penalty points. 38 candidates got from 25 to 50 penalty points. 16 candidates scored from 50 to 75 penalty points. Within the last group 4 of the 16 candidates got the worst score that is 75 penalty points. In the driving real situation like driving through the city centre that would mean hitting other candidates in the traffic. Like passengers, cyclists or other obstacles – traffics signs. It has to be pointed out that the most common mistake was touching the ground, which is a sing of unbalance. This is not a mistake that cases a threat to other participants in traffic but represents the lack of balance and unexperienced of the drivers of e-scooters. Also we have proven that the most difficult competence needed when driving an electric scooter is maintaining balance.

A part of the analysis was measuring the time it took for the drivers to finish the obstacle course. We have noticed that the candidates who are less skilful took longer to finish the course and gained more penalty points. The younger drivers had more experience with driving the e-scooter and were faster on the obstacle course. They also got less penalty points. The average time of finishing the obstacle course was 47,4 seconds. The analysis has shown that 38 candidates finished the obstacle course between 30 and 45 seconds. 23 candidates made through the obstacle course in 30 to 45 seconds, which is a relative good timing. 4 candidates had the time of one minute or more. These candidates drove through the obstacle course with no previous driving experience with e-scooter. The overall results of the obstacle course had shown that the maximal speed which is 25km/h is not appropriate for driving in traffic, where we have different surfaces, other passengers and obstacles. The speed limit must be adjusted to the driving conditions and e-scooters which are equipped with more speed levels are more usable in traffic.

5 CONCLUSION

E-scooter cannot be in the same level as an e-bike. The e-bike has a different technical layout and driving with e-bike is much safer. This assumption has been confirmed with testing our obstacle course, where the results are not encouraging. The recently accepted legislation on the light motor vehicles which includes e-scooters makes driving with them more regulated and gives the police a control over the unsafe driving. The legislation also demands a minimal age of 14-teen years for the drivers and a valid bike card.

On the base of the evaluation of the obstacle course we propose a safe obstacle course training, before purchasing an electric scooter. The training can also take place in elementary school in the final classes. Children are those who will certainly encounter this means of transport. The training will provide a better understanding on the technical point of the e-scooter and some specifics on driving with this vehicle. With the physical training the legislation would also be presented to them. We also recommend that the legislation should be rewritten in a more suitable and less complicated manner. The obstacle course has indicated that the maximal speed of 25km/h is not suitable for driving through city centres. When driving in a crowded place and on different surfaces this speed is not safe and can cause severe accidents. One issue that also has to be addressed is the area which is required when manoeuvring an e-scooter. This is often limited when driving in a busy city centre. Our proposal that the maximal speed from 5 to10km/h in a city centre is very much possible.

The electric scooters represent an added value to city mobility and therefore must be acknowledged as an equal means of transport like bicycles or e-bicycles. Their upper hand lies in light, easy to use and small design. Their use would be safe and efficient only when the users will be well educated on the proper use of this vehicle and its legislation. The electric scooters are already in use and it is up to us whether we will use them safely and correctly.

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15. IDEJNO RJEŠENJE POVEĆANJA SIGURNOSTI NA RASKRIŽJU SVETICE ULICE – ULICE KNEZA BRANIMIRA – ULICE DONJE SVETICE

Sažetak:

Prometnim elaboratom „Idejno rješenje povećanja sigurnosti na raskrižju Svetice ulice – Ulice kneza Branimira – Ulice Donje Svetice“ definirana je i analizirana mogućnost povećanja sigurnosti u cestovnom prometu svih sudionika s naglaskom na djecu koja prolaze raskrižjem na putu prema školi i obratno. Raskrižje Svetice ulice – Ulice kneza Branimira – Ulice Donje Svetice nalazi se u Gradskoj četvrti Peščenica – Žitnjak.

Kroz terenska istraživanja učenika Škole za cestovni promet i njihovih nastavnika stečen je uvid u stvarno stanje motoriziranog i nemotoriziranog prometa promatrane zone obuhvata elaborata, odnosno samog raskrižja pomoću kojeg se može analizirati stanje sigurnosti prometa.

Ključne riječi:

- sigurnost prometa
- pješaci
- prometne nesreće

IDEJNO RJEŠENJE POVEĆANJA SIGURNOSTI NA RASKRIŽJU SVETICE ULICE – ULICE KNEZA BRANIMIRA – ULICE DONJE SVETICE

1. Cilj i svrha izrade elaborata

Prometnim elaboratom „Idejno rješenje povećanja sigurnosti na raskrižju Svetice ulice – Ulice kneza Branimira – Ulice Donje Svetice“ definirana je i analizirana mogućnost povećanja sigurnosti u cestovnom prometu svih sudionika s naglaskom na djecu koja prolaze raskrižjem na putu prema školi i obratno. Raskrižje Svetice ulice – Ulice kneza Branimira – Ulice Donje Svetice nalazi se u Gradskoj četvrti Peščenica – Žitnjak.

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Cilj elaborata je kroz detaljnu analizu postojećeg stanja, pregledom tehničkih značajka raskrižja i sigurnosnih uvjeta za nesmetano odvijanje motoriziranog i nemotoriziranog prometa utvrditi nedostatke na raskrižju, te prikupljenih terenskih podataka predložiti mjere za povećanje sigurnosti na raskrižju.

2. Analiza postojećeg stanja

Kako bi se pristupilo izradi novih regulacijskih i organizacijskih rješenja na prometnim čvorištima, a sa svrhom povećanja sigurnosti i protočnosti prometa nužno je dobiti podatke o veličini i intenzitetu kao i anomalijama prometnog toka a osnova za dobivanje tih podataka je detaljno i svrsishodno brojanje prometa. Brojanje prometa na raskrižju D. Svetice – Branimirova ulica obavili su učenici četvrtih razreda Škole za cestovni promet koji se obrazuju u obrazovnom programu Tehničar cestovnog prometa uz nadzor svojih predmetnih nastavnika. Učenici su stekli osnovne kompetencije u području sigurnosti i planiranja prometa tijekom svog obrazovanja, a kroz predmet Prometna tehnika 2 čije ishode učenja trenutno savladavaju do sada su imali priliku brojati promet, analizirati postojeće stanje te predlagati buduća rješenja na prometnim površinama u cilju povećanja sigurnosti i maksimiziranja propusne moći prometnice.

Raskrižje Ulice Donje Svetice - Ulice kneza Branimira – Svetice ulica je četverokrako raskrižje u jednoj razini. Raskrižje je regulirano prometnim svjetlima s glavnim smjerom istok - zapad i obratno, a u slučaju nestanka električne energije, odnosno kvara na prometnim svjetlima prometom na raskrižju upravlja se pomoću prometnih znakova te je glavni smjerom istok – zapad.

Analiza postojećeg stanja na raskrižju Donje Svetice – Ulica kneza Branimirova ulica obavljena je statičkim brojanjem prometa, metodom brojanja prometa na raskrižju na kojem su brojači/učenici brojali motorizirani i nemotorizirani promet i njihove smjerove kretanja. Dobiveni podaci uneseni su u prometni plan za navedeno raskrižje. Zbog veličine motoriziranog prometa kao i zbog zahtjevnosti raskrižja na svakom privozu raskrižja promet su brojala po tri učenika koji su dobivene rezultate upisivali u unaprijed pripremljene tablice.

Brojanje prometa obavljeno je dana 10.12.2021. u tri termina vršnog opterećenja na navedenom raskrižju (7:30 -9:30, 12:30 – 14:30 i 16:30 – 18:30). U vrijeme brojenja prometa vrijeme je bilo oblačno s prosječnom vidljivosti, temperatura je bila 1°C tijekom jutarnjeg i večernjeg termina i 2 °C tijekom popodnevnog termina. Zbog niskih temperatura i vlage kolnici su bili vlažni i skliski. Tijekom brojenja prometa na raskrižju nisu zamijećene prometne gužve i zastoji prometa. Analizom brojenja prometa na temelju najvećeg prometnog opterećenja motoriziranih vozila utvrđen je jutarnji vršni sat između 07:15 i 08:15 sati te popodnevni vršni sat između 16:00 i 17:00 sati.

Kako bi se precizno odredila vremenska neravnomjernost u prometnom toku brojenje prometa provedeno je u vremenskim intervalima po 15 minuta. Struktura vozila koja se bilježila na brojački listić podijeljena je u pet osnovnih kategorija za motorizirana vozila: biciklisti i romobilisti, motocikli, osobni automobili, teretna vozila i autobusi.

Brojenjem prometa utvrđeno je da su najviše opterećeni smjerovi istok – zapad i zapad – istok što je s obzirom na dnevne aktivnosti građana grada Zagreba u zadovoljavanju svojih dnevnih potreba bilo i očekivano. Provedenom analizom postojećeg prometa na raskrižju utvrđeno je da znatan broj vozila prolaze raskrižjem na nedopušten način, odnosno na crveno svjetlo, a posebno se ističe veliki broj vozila koji s privoza na raskrižju skreću lijevo.

1. termin – 7:30 – 9:30 sati

Tablica 1. Rezultati brojenja prometa u prvom terminu – privoz sjever

PRIVOZ SJEVER		
SMJER	**BROJ VOZILA**	**PROLASCI NA CRVENO**
RAVNO	1092 vozila	32
LIJEVO	57 vozila	1
DESNO	379 vozila	10

Tijekom prvog brojanja prometa u vremenu od 7:30 do 9:30 na privozu sjever uočena su ukupno 43 prolaska vozila kada je bilo upaljeno crveno svjetlo na semaforu.

Tablica 2. Rezultati brojenja prometa u prvom terminu – privoz istok

PRIVOZ ISTOK		
SMJER	**BROJ VOZILA**	**PROLASCI NA CRVENO**
RAVNO	1453 vozila	20
LIJEVO	689 vozila	35
DESNO	45 vozila	-

Iz tablice 2. odnosno privoz istok, s ukupno 689 lijevih skretača od kojih je 35 skretanje obavilo na crveno svjetlo, što je 5% od ukupnog broja lijevih skretača. Dodatnu pažnju privukla su i vozila koja naglo ubrzavaju u trenutku paljenja žutog svjetla na semaforu.

Tablica 3. Rezultati brojenja prometa u prvom terminu – privoz zapad

PRIVOZ ZAPAD		
SMJER	**BROJ VOZILA**	**PROLASCI NA CRVENO**
RAVNO	1163 vozila	10
LIJEVO	373 vozila	18
DESNO	96 vozila	-

Privoz zapad (tablica 3.) imao je ukupno 373 lijeva skretača od kojih je 18 skretanje obavilo na crveno svijetlo, što iznosi 4,8% od ukupnog broja lijevih skretača.

Tablica 4. Rezultati brojenja prometa u prvom terminu – privoz jug

PRIVOZ JUG		
SMJER	**BROJ VOZILA**	**PROLASCI NA CRVENO**
RAVNO	877 vozila	9
LIJEVO	130 vozila	42
DESNO	625 vozila	5

Iz tablice 4. vidljivo je ukupno 130 lijevih skretača od kojih je 42 skretanje obavilo na crveno svijetlo, što je 32%, odnosno svako treće vozilo prolazi tijekom upaljenog crvenog svjetla na semaforu.

2. termin – 12:30 – 14:30 sati

Tablica 5. Rezultati brojenja prometa u drugom terminu – privoz sjever

PRIVOZ SJEVER		
SMJER	**BROJ VOZILA**	**PROLASCI NA CRVENO**
RAVNO	963 vozila	15
LIJEVO	53 vozila	2
DESNO	401 vozila	10

Tijekom drugog brojenja prometa u vremenu 12:30 do 14:30 sati, također su primijećeni privozi s povećanim brojem prolazaka na crveno svjetlo. Na privozu sjever uočena su ukupno 37 prolaska vozila kada je bilo upaljeno crveno svjetlo na semaforu.

Tablica 6. Rezultati brojenja prometa u drugom terminu – privoz istok

PRIVOZ ISTOK		
SMJER	**BROJ VOZILA**	**PROLASCI NA CRVENO**
RAVNO	1892 vozila	4
LIJEVO	632 vozila	31
DESNO	48 vozila	-

Na istočnom privozu raskrižja, ukupno 632 lijeva skretča od kojih je 31 skretanje obavilo na crveno svjetlo, što je oko 5% od ukupnog broja lijevih skretača.

Tablica 7. Rezultati brojenja prometa u drugom terminu – privoz zapad

PRIVOZ ZAPAD		
SMJER	**BROJ VOZILA**	**PROLASCI NA CRVENO**
RAVNO	1936 vozila	6
LIJEVO	370 vozila	17
DESNO	79 vozila	-

Iz privoza zapad, ukupno je izbrojano 370 lijevih skretača od kojih je 17 skretanje obavilo na crveno svjetlo, što je 4,6% od ukupnog broja lijevih skretača.

Tablica 8. Rezultati brojenja prometa u drugom terminu – privoz jug

PRIVOZ JUG		
SMJER	**BROJ VOZILA**	**PROLASCI NA CRVENO**
RAVNO	843 vozila	39
LIJEVO	83 vozila	21
DESNO	740 vozila	29

Na privozu jug, zabilježeno je ukupno 83 lijeva skretača od kojih 21 skretanje obavilo na crveno svijetlo što je 37% od ukupnog broja lijevih skretača.

3. termin – 16:30 – 18:30 sati

Tablica 9. Rezultati brojenja prometa u trećem terminu – privoz sjever

PRIVOZ SJEVER		
SMJER	**BROJ VOZILA**	**PROLASCI NA CRVENO**
RAVNO	839 vozila	7
LIJEVO	22 vozila	16
DESNO	355 vozila	3

Za vrijeme trećeg brojanja prometa u vremenu od 16:30 do 18:30 su uočeni privozi s povećanim brojem skretanja ulijevo na crveno svjetlo. Na privozu sjever od ukupno 22 lijeva skretača 16 je skretanje obavilo na crveno svjetlo, što iznosi 73%.

Tablica 10. Rezultati brojenja prometa u trećem terminu – privoz istok

PRIVOZ ISTOK		
SMJER	**BROJ VOZILA**	**PROLASCI NA CRVENO**
RAVNO	1690 vozila	3
LIJEVO	477 vozila	32
DESNO	58 vozila	-

Na privozu istok, zabilježeno je ukupno 477 lijevih skretača od kojih je 32 skretanje obavilo na crveno svjetlo, što je 7,8% od ukupnog broja lijevih skretača.

Tablica 11. Rezultati brojenja prometa u trećem terminu – privoz zapad

PRIVOZ ZAPAD		
SMJER	**BROJ VOZILA**	**PROLASCI NA CRVENO**
RAVNO	1844 vozila	9
LIJEVO	425 vozila	43
DESNO	30 vozila	-

Na zapadnom privozu, zabilježena su ukupno 425 lijeva skretača od kojih je 43 skretanje obavilo na crveno svjetlo, što je 10% od ukupnog broja lijevih skretača.

Tablica 12. Rezultati brojenja prometa u trećem terminu – privoz jug

PRIVOZ JUG		
SMJER	**BROJ VOZILA**	**PROLASCI NA CRVENO**
RAVNO	950 vozila	8
LIJEVO	87 vozila	9
DESNO	757 vozila	13

Iz južnog privoza zabilježeno je ukupno 87 lijevih skretča od kojih je 9 skretanje obavilo na crveno svjetlo što je 10% od ukupnog broja lijevih skretača

3. Mjere za povećanje sigurnosti

S obzirom na veličinu prometnog raskrižja kao i na važnost prometnog toka te uočene probleme a u cilju sprječavanja prometnih nesreća predlažemo slijedeća prometna rješenja:

- na svim privozima produžiti trajanje zelenog dopunskog svjetla za skretanje ulijevo
- na svim privozima koji nemaju ugrađeno zeleno dopunsko svjetlo za skretanje ulijevo isto ugraditi s produženim trajanjem, kako bi što veći broj vozila na siguran način uspio proći raskriže za vrijeme slobodnog prolaska
- ugraditi žuto trepćuće prometno svjetlo koje upozorava vozače na prisutnost pješaka na obilježenom pješačkom prijelazu. Ovo svjetlo nužno je postaviti na način da vozači koji na raskrižju skreću na vrijeme uoče potrebu propuštanja pješaka na obilježenom pješačkom prijelazu
- u cilju zaštite pješaka nužno je ugraditi „brojače“ trajanja crvenog i zelenog svjetla za pješake kako bi pješak na vrijeme uočio preostalo vrijeme do paljenja crvenog svjetla odnosno kako bi na siguran način prešao ili odustao od prelaska. Obzirom na veličinu

raskrižja, odnosno kolnika koji pješak mora prijeći ovo rješenje je jedno od nužnih u cilju sprječavanja prometnih nesreća s pješacima

- nužno je uvesti video nadzor raskrižja kojim bi se nadziralo odvijanje prometa. Uvođenjem video nadzora bitno bi se smanjio broj vozača koji svojim vozilom prolaze kroz crveno svjetlo, kao i broj vozača koji raskrižje prolaze nedopuštenom brzinom kretanja ili rade bilo kakve radnje koje ugrožavaju sigurnost sudionika u prometu. Iako skupo rješenje uvođenje video nadzora povećalo bi sigurnost raskrižja i u segmentu motoriziranog prometa ali i nemotoriziranog prometa.
- u svrhu povećanja sigurnosti prometa na raskrižju, nužno je povećati vidljivost horizontalnih oznaka na kolniku i rasvjetu prometnice uz primjenu suvremenih rasvjetnih tijela koja osiguravaju bolju vidljivost na prilaznom dijelu raskrižju i u samom raskrižju a kojim se osigurava veća sigurnost sudionika prometa na navedenom raskrižju u uvjetima smanjene vidljivosti

4. Zaključak

Iz dobivenih rezultata brojenja prometa uočava se veliki problem prolaska vozila na crveno svjetlo u svim smjerovima, a posebno je izražen broj onih vozila koji s privoza na raskrižje skreću ulijevo. Prolazak vozila na crveno svjetlo predstavlja veliku opasnost za sigurnost svih sudionika u prometu i eksponencijalno povećava mogućnost od prometnih nesreće sa teškim ishodima. Osim problema s vozilima koji raskrižje prolaze na crveno svjetlo, tijekom analize raskrižja vizualnom metodom je uočeno prolazak velikog broja vozila kroz raskrižje neprimjereno velikom brzinama što dodatno ugrožava sigurnost svih sudionika u prometu kao i mogućnost događanja teških prometnih nesreća. Predložene i odgovarajuće mjere za povećanje sigurnosti prometa na određenom raskrižju ili nekoj drugoj analiziranoj prometnoj površini uobičajeno dolaze tek nakon prometnih nesreća s velikom materijalnom štetom, teže ozlijeđenim ili poginulim sudionicima. Upravo ovom analizom sigurnosti raskrižja, te proaktivnošću nadležnih službi trebalo bi preventivno pristupiti suzbijanju neželjenih događaja na raskrižju s osnovnim ciljem povećanja sigurnosti u prometu.

Literatura

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15. CONCEPTUAL SOLUTION FOR INCREASING SAFETY AT THE INTERSECTION OF SVETICE ULICE – ULICE KNEZA BRANIMIRA – ULICE DONJE SVETICE

Abstract:

The traffic study "Ideological solution for increasing safety at the intersection of Svetica Street - Kneza Branimira Street - Donje Svetice Street" defined and analyzed the possibility of increasing road traffic safety for all participants, with an emphasis on children passing through the intersection on their way to school and vice versa. The intersection of Svetice Street - Kneza Branimira Street - Donje Svetice Street is located in the Peščenica - Žitnjak City District.

Through field research of students of the Road Traffic School and their teachers, an insight was gained into the actual state of motorized and non-motorized traffic in the observed zone of the study, i.e. the intersection itself, which can be used to analyze the state of traffic safety.

Keywords:

- traffic safety
- pedestrians
- traffic accidents

CONCEPTUAL SOLUTION FOR INCREASING SAFETY AT THE INTERSECTION OF SVETICE ULICE – ULICE KNEZA BRANIMIRA – ULICE DONJE SVETICE

1. The aim and purpose of the elaboration

The traffic study "Ideological solution for increasing safety at the intersection of Svetica Street - Kneza Branimira Street - Donje Svetice Street" defined and analyzed the possibility of increasing road traffic safety for all participants, with an emphasis on children passing through the intersection on their way to school and vice versa. The intersection of Svetice Street - Kneza Branimira Street - Donje Svetice Street is located in the Peščenica - Žitnjak City District.

Through field research of students of the Road Traffic School and their teachers, an insight was gained into the actual state of motorized and non-motorized traffic in the observed zone of the study, i.e. the intersection itself, which can be used to analyze the state of traffic safety.

The goal of the study is to determine shortcomings at the intersection through a detailed analysis of the current situation, review the technical features of the intersection and safety conditions for the smooth flow of motorized and non-motorized traffic, and propose measures to increase safety at the intersection based on the collected field data.

2. Analysis of the current situation

In order to approach the creation of new regulatory and organizational solutions at traffic junctions, and with the purpose of increasing the safety and flow of traffic, it is necessary to obtain data on the size and intensity as well as anomalies of the traffic flow, and the basis for obtaining this data is a detailed and purposeful traffic count. Traffic counting at the D. Svetica - Branimirova ulica intersection was carried out by students of the fourth grade of the Road Traffic School who are studying in the Road Traffic Technician educational program under the supervision of their subject teachers. The students acquired basic competencies in the field of safety and traffic planning during their education, and through the school subject Traffic Techniques 2, the learning outcomes of which they are currently mastering, they had the opportunity to count traffic, analyze the current situation and propose future solutions on traffic areas in order to increase safety and maximize road capacity. The intersection of Donje Svetice Street - Kneza Branimira Street - Svetice Street is a four-way intersection on one level. The intersection is regulated by traffic lights with the main direction east - west and vice versa, and in the event of a power outage, i.e. a malfunction of the traffic lights, the traffic at the intersection is managed using traffic signs and the main direction is east - west.

The analysis of the current situation at the intersection of Donje Svetica - Ulica kneza Branimirova ulica was carried out by static traffic counting, using the method of traffic counting at the intersection where counters/students counted motorized and non-motorized traffic and their directions of movement. The obtained data were entered into the traffic plan for the mentioned intersection. Due to the volume of motorized traffic as well as the complexity of the intersection at each approach to the intersection, traffic was counted by three students who entered the obtained results into tables prepared in advance. Traffic counting was done on 10.12.2021. in three periods of peak load at the mentioned intersection (7:30 - 9:30, 12:30 - 14:30 and 16:30 - 18:30). At the time of the traffic count, the weather was cloudy with average visibility, the temperature was 1°C during the morning and evening hours and 2°C during the afternoon hours. Due to low temperatures and humidity, the pavements were wet and slippery. During the traffic count, no traffic jams or traffic jams were observed at the intersection. The analysis of traffic counts based on the highest traffic load of motorized vehicles determined the morning peak hour between 07:15 and 08:15 and the afternoon peak hour between 16:00 and 17:00. In order to precisely determine the temporal unevenness in the traffic flow, the traffic was counted in time intervals of 15 minutes. The structure of vehicles recorded on the number sheet is divided into five basic categories for motorized vehicles: cyclists and motorcyclists, motorcycles, passenger cars, trucks and buses. By counting the traffic, it was determined that the most loaded directions are east-west and west-east, which was expected considering the daily activities of the citizens of the city of Zagreb in meeting their daily needs. An analysis of the existing traffic at the intersection revealed that a significant number of vehicles pass through the intersection in an illegal manner, i.e. at a red light, and a large number of vehicles that turn left from the traffic at the intersection are especially noteworthy.

1st term – 7:30 – 9:30 a.m

Table 1. Traffic counting results in the first term - the northern approach

DELIVERY TO THE NORTH		
DIRECTION	**NUMBER OF VEHICLES**	**PASSING RED**
STRAIGHT	1092 vehicles	32
LEFT	57 vehicles	1
RIGHT	379 vehicles	10

During the first traffic count between 7:30 a.m. and 9:30 a.m., a total of 43 passing vehicles were observed on the north approach when the red light was on.

Table 2. Results of the traffic count in the first term - the eastern approach

DELIVERY TO THE EAST		
DIRECTION	**NUMBER OF VEHICLES**	**PASSING RED**
STRAIGHT	1453 vehicles	20
LEFT	689 vehicles	35
RIGHT	45 vehicles	-

From table 2, that is, the eastbound carriageway, with a total of 689 left-turners, of which 35 turned at a red light, which is 5% of the total number of left-turners. Additional attention was also attracted by vehicles that accelerate suddenly at the moment of turning on the yellow light at the traffic light.

Table 3. Results of the traffic count in the first term - the western approach

DELIVERY TO THE WEST		
DIRECTION	**NUMBER OF VEHICLES**	**PASSING RED**
STRAIGHT	1163 vehicles	10
LEFT	373 vehicles	18
RIGHT	96 vehicles	-

Privoz zapad (table 3) had a total of 373 left-turners, of which 18 turned at a red light, which is 4.8% of the total number of left-turners.

Table 4. Results of the traffic count in the first term - the southern approach

DELIVERY TO THE SOUTH		
DIRECTION	**NUMBER OF VEHICLES**	**PASSING RED**
STRAIGHT	877 vehicles	9
LEFT	130 vehicles	42
RIGHT	625 vehicles	5

Table 4 shows a total of 130 left turns, of which 42 turned at a red light, which is 32%, that is, every third vehicle passes during a red light on the traffic light.

2nd term – 12:30 – 2:30 p.m

Table 5. Results of the traffic count in the second term - the northern approach

DELIVERY TO THE NORTH		
DIRECTION	**NUMBER OF VEHICLES**	**PASSING RED**
STRAIGHT	963 vehicles	15
LEFT	53 vehicles	2
RIGHT	401 vehicles	10

During the second traffic count between 12:30 and 2:30 p.m., vehicles with an increased number of passing red lights were also observed. A total of 37 passing vehicles were observed on the north approach when the red light was on.

Table 6. Results of the traffic count in the second term - the eastern approach

DELIVERY TO THE EAST		
DIRECTION	**NUMBER OF VEHICLES**	**PASSING RED**
STRAIGHT	1892 vehicles	4
LEFT	632 vehicles	31
RIGHT	48 vehicles	-

On the eastern side of the intersection, a total of 632 left turns, of which 31 turned at a red light, which is about 5% of the total number of left turns.

Table 7. Results of the traffic count in the second period - the western approach

DELIVERY TO THE WEST		
DIRECTION	**NUMBER OF VEHICLES**	**PASSING RED**
STRAIGHT	1936 vehicles	6
LEFT	370 vehicles	17
RIGHT	79 vehicles	-

From westbound traffic, a total of 370 left turns were counted, of which 17 turned at a red light, which is 4.6% of the total number of left turns.

Table 8. Results of the traffic count in the second term - the southern approach

DELIVERY TO THE SOUTH		
DIRECTION	**NUMBER OF VEHICLES**	**PASSING RED**
STRAIGHT	843 vehicles	39
LEFT	83 vehicles	21
RIGHT	740 vehicles	29

On the south approach, a total of 83 left-turners were recorded, of which 21 turned at a red light, which is 37% of the total number of left-turners.

3rd term – 4:30 pm – 6:30 pm

Table 9. Results of the traffic count in the third term - the northern approach

DELIVERY TO THE NORTH		
DIRECTION	**NUMBER OF VEHICLES**	**PASSING RED**
STRAIGHT	839 vehicles	7
LEFT	22 vehicles	16
RIGHT	355 vehicles	3

During the third traffic count from 16:30 to 18:30, vehicles with an increased number of left turns on red lights were observed. On the approach to the north, out of a total of 22 left-turners, 16 turned at a red light, which is 73%.

Table 10. Results of the traffic count in the third term - the eastern approach

DELIVERY TO THE EAST		
DIRECTION	**NUMBER OF VEHICLES**	**PASSING RED**
STRAIGHT	1690 vehicles	3
LEFT	477 vehicles	32
RIGHT	58 vehicles	-

On the east approach, a total of 477 left turns were recorded, of which 32 turned at a red light, which is 7.8% of the total number of left turns.

Table 11. Results of the traffic count in the third term - the western approach

DELIVERY TO THE WEST		
DIRECTION	**NUMBER OF VEHICLES**	**PASSING RED**
STRAIGHT	1844 vehicles	9
LEFT	425 vehicles	43
RIGHT	30 vehicles	-

On the western approach, a total of 425 left-turners were recorded, of which 43 turned at a red light, which is 10% of the total number of left-turners.

Table 12. Results of the traffic count in the third term - the southern approach

DELIVERY TO THE SOUTH		
DIRECTION	**NUMBER OF VEHICLES**	**PASSING RED**
STRAIGHT	950 vehicles	8
LEFT	87 vehicles	9
RIGHT	757 vehicles	13

A total of 87 left turns were recorded from the southern port, of which 9 turned at a red light, which is 10% of the total number of left turns

3. Measures for increasing safety

Considering the size of the traffic intersection as well as the importance of the traffic flow and the observed problems, and in order to prevent traffic accidents, we propose the following traffic solutions:

a. on all approaches, extend the duration of the green supplementary light for turning left
b. on all approaches that do not have a green supplementary light for turning to the left, install the same with an extended duration, so that as many vehicles as possible can safely pass the intersection during free passage
c. install a yellow flashing traffic light that warns drivers of the presence of pedestrians at a marked pedestrian crossing. This light must be placed in such a way that drivers turning at the intersection can see the need to let pedestrians pass at the marked crosswalk.
d. in order to protect pedestrians, it is necessary to install "counters" for the duration of red and green lights for pedestrians so that the pedestrian can see the remaining time until the red light comes on, i.e. in order to safely cross or refuse to cross. Considering the size of

the intersection, i.e. the road that the pedestrian has to cross, this solution is one of the necessary solutions in order to prevent traffic accidents with pedestrians

e. it is necessary to introduce video surveillance of the intersection to monitor the flow of traffic. The introduction of video surveillance would significantly reduce the number of drivers who drive through a red light, as well as the number of drivers who drive through the intersection at an illegal speed or perform any actions that endanger the safety of road users. Although an expensive solution, the introduction of video surveillance would increase the safety of the intersection in the segment of motorized traffic as well as non-motorized traffic.
f. in order to increase the safety of traffic at the intersection, it is necessary to increase the visibility of horizontal markings on the roadway and road lighting with the use of modern lighting fixtures that ensure better visibility on the approach to the intersection and in the intersection itself, which ensures greater safety of traffic participants at the said intersection in conditions of reduced visibility.

4. Conclusion

From the obtained results of the traffic count, a big problem of vehicles passing red lights in all directions can be seen, and the number of vehicles that turn left from the driveway to the intersection is especially pronounced. Passing a vehicle at a red light represents a great danger for the safety of all road users and exponentially increases the possibility of traffic accidents with serious outcomes. In addition to the problem with vehicles passing the intersection on a red light, during the analysis of the intersection using the visual method, a large number of vehicles were observed passing through the intersection at inappropriately high speeds, which further endangers the safety of all road users as well as the possibility of serious traffic accidents. Proposed and appropriate measures to increase traffic safety at a certain intersection or other analyzed traffic surface usually come only after traffic accidents with great material damage, seriously injured or killed participants. It is through this analysis of the safety of the intersection, and the proactivity of the competent services, that a preventive approach should be taken to suppress unwanted events at the intersection with the basic goal of increasing traffic safety.

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III POGLAVLJE

Unapređenje organizacije transporta i logistika

ŠKOLA ZA CESTOVNI PROMET, ZAGREB

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16. ANALIZA STAJALIŠTA JAVNOG GRADSKOG PRIJEVOZA

Sažetak:

Osobe s različitim vrstama invaliditeta svakodnevno sudjeluju u prometu kao pješaci, vozači ili putnici. Nepristupačni prostori i neadekvatna arhitektonska rješenja predstavljaju prepreke osobama s invaliditetom i otežavaju im kretanje i sigurno sudjelovanje u prometnom sustavu. S obzirom na vrstu invaliditeta, osobe s invaliditetom za kretanje i orijentaciju koriste različita pomagala od vizualnih do audio pomagala, prilagođene automobile, invalidska kolica kao i pomagače. Društvo i zajednica poduzimaju mjere unaprjeđenja u promjenama odnosa prema osobama s invaliditetom u prometu. S obzirom da su osobe s invaliditetom jedna su od najugroženijih i najnezaštićenijih skupina sudionika u prometu, uvijek postoji mjesta za napredak i promjene s ciljem lakšeg uključivanja osoba s invaliditetom u prometni sustav.

Gradski ured za socijalnu zaštitu, zdravstvo, branitelje i osobe s invaliditetom u suradnji sa Zajednicom osoba s invaliditetom Hrvatske provodi projekt utvrđivanja pristupačnosti javnih ustanova osobama s invaliditetom kako bi senzibilizirali društvo o realnim potrebama osoba s različitim oblicima invaliditeta. Osim javnih ustanova u sklopu projekta utvrđivat će se i pristupačnost stajališta javnog prijevoza putnika osobama s invaliditetom. Dugogodišnja suradnja Škole za cestovni promet i Zajednice osoba s invaliditetom Hrvatske nastavila se kroz ovaj projekt u koji je bilo uključeno oko 30 učenika koji se obrazuju za smjer Tehničar cestovnog prometa.

Ključne riječi: osobe sa invaliditetom, stajališta javnog gradskog prijevoza, mapiranje

1. Uvod

Osobe s invaliditetom često nailaze na prepreke koje im otežavaju kretanje i ravnopravno sudjelovanje u društvu i prometu. Nepristupačni prostori i arhitektonska rješenja ne dopuštaju ili znatno otežavaju dolazak osobe s invaliditetom do cilja kao i nesmetano i sigurno sudjelovanje u prometu. Osobe s invaliditetom jedna su od najugroženijih i najnezaštićenijih skupina ljudi koja svakodnevno sudjeluje u prometu u ulozi pješaka, vozača ili putnika u javnom prijevozu. Napredak tehnologije uvelike može pomoći osobama s invaliditetom da u svakodnevnim životnim situacijama, a time i u prometu, svladaju prepreke. U novije vrijeme ističu se izumi koji olakšavaju život osobama s invaliditetom. Društvo i zajednica poduzimaju mjere napretka u promjenama odnosa prema invalidnim osobama u prometu, ali na tom području treba i dalje djelovati.

Odnos prema osobama s invaliditetom u prometu definiran je zakonskim aktima, ali i nepisanim pravilima ponašanja kojih bi se trebao pridržavati svaki sudionik u prometu. Prema Zakonu o sigurnosti prometa na cestama svi sudionici u prometu dužni su voditi računa o sigurnosti, razvijati solidarnost, humane i etičke odnose među sudionicima u prometu na cestama, štititi zdravlje i život drugih osoba, osobito djece, osoba s invaliditetom, starih i nemoćnih osoba i brinuti se o zaštiti životnoga okoliša. Prema navedenom zakonu nužno je postaviti prometne znakove o sudjelovanju osoba s invaliditetom, djece, starijih i nemoćnih osoba u prometu. Postavljanjem prometnih znakova vozač se upozorava na sudjelovanje navedenih skupina u prometu na tom dijelu ceste te je dužan voziti s osobitim oprezom i odgovarajućom brzinom kako bi vozilo mogao pravodobno zaustaviti u slučaju potrebe.

Osobe s invaliditetom svakodnevno sudjeluju u prometu u ulozi pješaka, vozača ili putnika pa su tako i dio javnog prijevoza.

2. Nacionalni plan izjednačavanja mogućnosti za osobe s invaliditetom

Republika Hrvatska kao članica Ujedinjenih naroda, Europske unije i Vijeća Europe te stranka svih ključnih međunarodnih instrumenata na području ljudskih prava i država koja uključuje najviše standarde u području socijalne i gospodarske sigurnosti građana, preuzela je obvezu zaštite i promicanja ljudskih prava osoba s invaliditetom u svrhu ravnopravnog sudjelovanja u građanskim, političkim, gospodarskim, društvenim i kulturnim područjima života. Osobe s invaliditetom sa značajnim udjelom u populaciji na svim razinama, od globalne do nacionalne, prepoznate su među najugroženijim društvenim skupinama ali i kao društveni resurs u kontekstu

društvenog napretka na svim područjima, posebice uzimajući u obzir mogućnost pozitivne diskriminacije te korištenja napredne tehnologije.

Izradi Nacionalnog plana 2021. - 2027. prethodila je analiza stanja svih područja djelovanja definiranih Nacionalnom strategijom izjednačavanja mogućnosti za osobe s invaliditetom od 2017. do 2020. godine. Analizom stanja utvrđene su srednjoročne razvojne potrebe i potencijali, što predstavlja osnovu za izradu novog strateškog okvira za izjednačavanje mogućnosti za osobe s invaliditetom.

Analizom stanja utvrđena je potreba daljnjeg poboljšanja kvalitete života osoba s invaliditetom, osnaživanje kapaciteta pružatelja usluga, izgradnja pristupačnog okruženja i komunikacijskih sustava i tehnologija te izgradnja inkluzivnog društva.

Područja Nacionalne strategije izjednačavanja mogućnosti za osobe s invaliditetom: obitelj, život u zajednici, odgoj i obrazovanje, zdravstvena zaštita, socijalna skrb, stanovanje, mobilnost, pristupačnost, profesionalna rehabilitacija, zapošljavanje, rad i mirovinsko osiguranje, pravna zaštita i zaštita od zlostavljanja, informiranje, komunikacija i podizanje razine svijesti, sudjelovanje u kulturnom životu, sudjelovanje u javnom i političkom životu, istraživanje i razvoj, rekreacija, razonoda i sport, rizične situacije i humanitarna krizna stanja, udruge osoba s invaliditetom u civilnom društvu, međunarodna suradnja.

U području Stanovanje, mobilnost i pristupačnost određene su srednjoročne razvojne potrebe i razvojni potencijali. Srednjoročne razvojne potrebe usmjerene su između ostalog na:

- pristupačnost javnog: cestovnog, zračnog, željezničkog i pomorskog prometa, osiguravanje pristupačnost stambenih objekata osobama s invaliditetom, pristupačnost sudova i ustanova za osobe lišene slobode, pristupačnost ustanova u kulturi pristupačnosti objektima i uslugama u turističkim odredištima, osiguravanje pristupačnosti sportskih građevina osobama s invaliditetom, osiguravanje i prilagodba dječjih igrališta, sportskih terena i parkova za djecu s teškoćama u razvoju i osobe s invaliditetom.

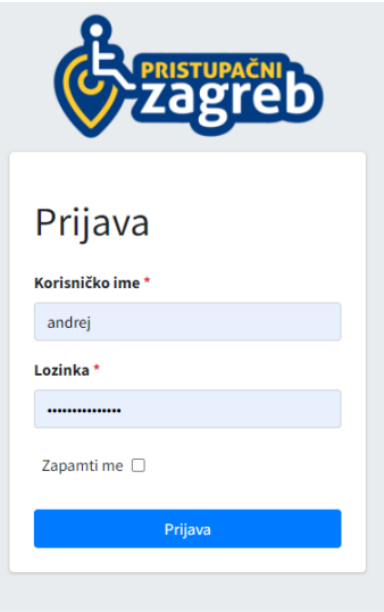
U razvojnim potencijalima i mogućnostima provedbe budućih projekata navedeno je da moraju sadržavati specifične mjere kojima se doprinosi poboljšanju fizičke pristupačnosti osobama s invaliditetom. Tako u izgrađenim i rekonstruiranim objektima i nabavljenim vozilima mora biti osiguran pristup javnom prijevozu bez visinskih razlika (bez stepenica), usluge prijevoza moraju biti što je moguće bliže bolnicama, školama, vrtićima, domovima zdravlja i sličnim objektima.

Kolodvori i stajališta moraju biti dostupni osobama s invaliditetom (pristupne rampe i liftovi) te imati odgovarajući zaklon (nadstrešnice i čekaonica), mora biti osigurano zvučno i vizualno, a po potrebi i taktilno obavještavanje putnika o dolasku vozila itd. Dio koji su učenici Škole za cestovni promet provodili odnosio se upravo na mapiranje stajališta javnog gradskog prijevoza.

3. Web aplikacija – Pristupačni Zagreb

Gradski ured za socijalnu zaštitu, zdravstvo, branitelje i osobe s invaliditetom u suradnji sa Zajednicom osoba s invaliditetom Hrvatske provodi projekt utvrđivanja pristupačnosti javnih ustanova osobama s invaliditetom kako bi senzibilizirali društvo o realnim potrebama osoba s različitim oblicima invaliditeta. Osim javnih ustanova u sklopu projekta utvrđivat će se i pristupačnost stajališta javnog prijevoza putnika osobama s invaliditetom. Dugogodišnja suradnja Škole za cestovni promet i Zajednice osoba s invaliditetom Hrvatske nastavila se proviđenjem aktivnosti mapiranja pristupačnosti stajališta JPG-a. Mapiranje je provodilo oko 30 učenika koji se obrazuju za zanimanje Tehničar cestovnog prometa.

Za potrebe mapiranja osmišljena je web aplikacija – Pristupačni Zagreb, u koju su učenici pratili upute te ispunjavali potrebne informacije o stajalištima.



Slika 1. Prijava u web aplikaciju Pristupačni Zagreb

Kako bi započeli mapiranje potrebno je logirati se na web aplikaciju sa svojim korisničkim imenom i lozinkom. Svaki učenik koji je sudjelovao dobio je svoje korisničko ime i lozinku a ukoliko su radili u paru, bilo je dovoljno da se prijavi samo jedan od njih. Nakon prijave, na ekranu se prikaže popis svih stajališta javnog prijevoza. Svakoj grupi učenika bilo je dodijeljeno

područje koje je potrebno proći. Zadatak učenika bio je proći zadano područje te obuhvatiti sva autobusna i tramvajska stajališta koja se nalaze unutar njega.

Prilaz stajalištu, odnosno oznake vezane uz prilaz stajalištu vežu se uz pješački prijelaz uz samo stajalište. Prilikom prilaza stajalištu bilježi se ima li prilaz:

- Semafor (Postoji li semafor kao regulacija prometa?)
- Zvučni semafor (Postoji li uređaj za zvučnu signalizaciju na semaforu?)
- Taktilne staze (Postoje li taktilne staze na pješačkom prijelazu?)
- Rezervirano parkirališno mjesto (Postoji li u okolici parkirališno mjesto rezervirano za osobe sa invaliditetom?)

Oznake vezane za pješački pothodnik odnose se samo ukoliko se stajalištu pristupa iz pothodnika.

- Stepenice (Pristupa li se stajalištu preko stepenica?)
- Rampa (Pristupa li se stajalištu preko rampe?)
- Podizna platforma (Postoji li vertikalno podizna platforma u pothodniku?)
- Dizalo (Postoji li ugrađeno dizalo u pothodniku?)

Nakon mapiranja pristupa stajalištu, mapira se samo stajalište te njegove karakteristike.

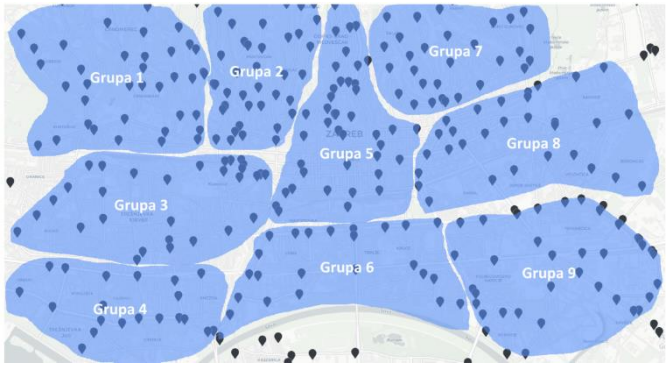
- Pristupačna širina stajališta (Pristupačna širina stajališta definira se kao minimalni potrebni razmak od 90cm koji mora postojati kako bi osigurali prolazak invalidskih kolica. Ukoliko se uoči prepreka (stup, koš za smeće) koja je postavljena na način da kolica ne mogu proći, tada ne postoji pristupačna širina stajališta.)
- Taktilna staza (Postoji li taktilna staza na stajalištu?)
- Prometni znak (Postoji li prometni znak koji označava stajalište?)
- Display (Postoji li elektronički display za vozni red?)
- Prilagođena visina nogostupa (Prilagođena visina nogostupa definira se kao standardna visina od 20-30cm. Nogostup mora postojati kako bi se ispravno postavila rampa iz vozila preko koje je omogućen ulaz invalidskih kolica u vozilo.)
- Nadstrešnica (Postoji li nadstrešnica na stajalištu?)

Slika 2. Vertikalno podizna rampa

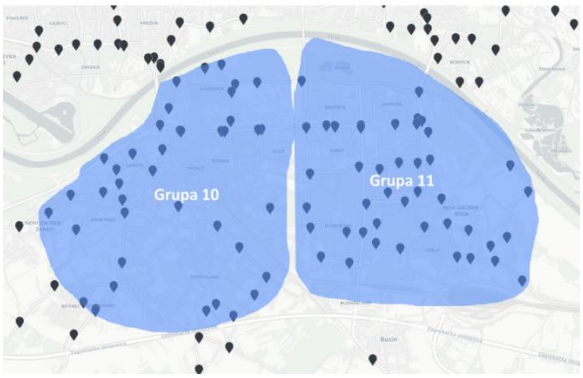
Slika 3. Taktilne staze

4. Mapiranje stajališta javnog gradskog prijevoza

Mapiranje stajališta javnog gradskog prijevoza provodilo je oko 30 učenika, mapiranje se provodilo radnim danima u jutarnjim satima. Učenici su bili podijeljeni u 11 grupa, prema geografskoj podjeli prikazanoj na slici 4. i 5.. Prvi dio mapiranja stajališta provodi se kako je vidljivo na slikama širi centar grada Zagreba, u kojem je vrlo gusta mreža javnog gradskog prometa.

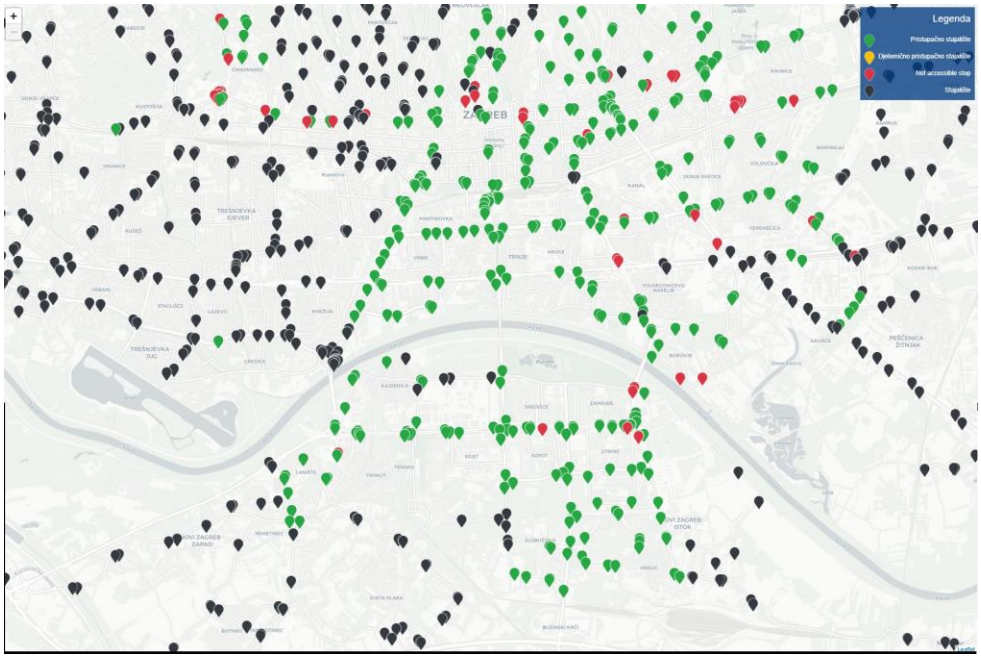


Slika 4. Podjela grupa 1 – 9



Slika 5. Podjela grupa 10 i 11

Učenici su u pet fizičkih obilazaka stajališta mapirali preko 450 stajališta javnog gradskog prijevoza. Tijekom samog mapiranja učenici su koristili svoje mobilne uređaje te su bili označeni reflektirajućim prslucima Škole.



Slika 6. Mapirana stajališta

Na slici 6. prikazana su mapirana stajališta koja su prema te su prema legendi zeleno označena pristupačna stajališta, žutom djelomično pristupačna a crvenom ne pristupačna stajališta za osobe sa invaliditetom.

Slika 7. Učenici tijekom aktivnosti mapiranja stajališta

5. Zaključak

Osobe s invaliditetom svakodnevno su sudionici u prometu u ulozi pješaka, putnika i vozača. Sudjelovanje u prometu osobama s invaliditetom nije jednostavno, jer prometne površine i arhitektonska rješenja nisu uvijek adekvatno izvedeni niti prilagođeni za pristup osobama s invaliditetom. Osobama s invaliditetom treba biti osigurana pristupačnost prema propisima koja će omogućiti veći stupanj mobilnosti i lakše kretanje. Prometne površine moraju biti prilagođene osobama sa svim vrstama invaliditeta po principu „univerzalnog dizajna“ primjenom sustava putnog informiranja, senzorskih tehnologija u cestovnom prometu vezanih za vozila i pješačke prijelaze, komunikacijskih i navigacijskih tehnologija. Drugim riječima, prometnice se grade s upuštenim rubnjacima, na raskrižjima se postavljaju zvučni semafori, postavljaju se taktilne površine za osobe s vizualnim invaliditetom, zvučne i vizualne najave u javnim prijevoznim sredstvima, te se uvode niskopodni autobusi i posebna kombi vozila za osobe s invaliditetom. Iako u svakodnevnom životu postoje brojni nedostatci i prepreke koje u urbanim sredinama ometaju sudjelovanje osoba s invaliditetom u prometu, postoje ljudi koji uporno rade na tome da se olakša kretanje osobama s invaliditetom i da se javnost što više senzibilizira. Provođenjem ovakvih aktivnosti i projekata pristupačnost stajališta i ostalih prometnih površina zasigurno će biti od velike koristi za osobe sa invaliditetom.

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16. ANALYSIS OF PUBLIC CITY TRAFFIC STOPS

People with different types of disabilities participate in traffic every day as pedestrians, drivers or passengers. Inaccessible spaces and inadequate architectural solutions represent obstacles for people with disabilities and make it difficult for them to move and safely participate in the transport system. Depending on the type of disability, people with disabilities use different aids for movement and orientation, from visual to audio aids, adapted cars, wheelchairs, and helpers. Society and the community take measures to improve the changes in attitudes towards people with disabilities in traffic. Given that people with disabilities are one of the most vulnerable and unprotected groups of road users, there is always room for progress and changes with the aim of easier inclusion of people with disabilities in the transport system.

The City Office for Social Protection, Health, Veterans and Persons with Disabilities, in cooperation with the Croatian Association of Persons with Disabilities, is implementing a project to determine the accessibility of public institutions to persons with disabilities in order to sensitize society to the real needs of persons with various forms of disabilities. In addition to public institutions, the accessibility of public transport stops for people with disabilities will also be determined as part of the project. The long-term cooperation between the Road Traffic School and the Association of Persons with Disabilities in Croatia continued through this project, in which about 30 students were involved, who are studying for the Road Traffic Technician course.

Keywords: people with disabilities, public city transport stops, mapping

5. Introduction

People with disabilities often encounter obstacles that make it difficult for them to move and participate equally in society and traffic. Inaccessible spaces and architectural solutions do not allow or make it much more difficult for a person with a disability to reach their destination, as well as for unhindered and safe participation in traffic. People with disabilities are one of the most vulnerable and unprotected groups of people who participate in traffic every day as pedestrians, drivers or passengers in public transport. Advances in technology can greatly help people with disabilities to overcome obstacles in everyday life situations, and thus also in traffic. Recently, inventions that make life easier for people with disabilities stand out. Society and the community are taking measures to improve the attitude towards disabled people in traffic, but there is still work to be done in this area.

The attitude towards people with disabilities in traffic is defined by legal acts, but also by unwritten rules of conduct that every traffic participant should adhere to. According to the Road Traffic Safety Act, all road users are obliged to take care of safety, develop solidarity, humane and ethical relations among road users, protect the health and life of other people, especially children, people with disabilities, old and infirm people and take care of environmental protection. According to the aforementioned law, it is necessary to place traffic signs on the participation of persons with disabilities, children, the elderly and infirm persons in traffic. By placing traffic signs, the driver is warned about the participation of the mentioned groups in the traffic on that part of the road, and he is obliged to drive with special caution and at the appropriate speed in order to be able to stop the vehicle in time if necessary.

People with disabilities participate in traffic every day in the role of pedestrians, drivers or passengers, so they are part of public transport.

6. National plan for equalizing opportunities for people with disabilities

The Republic of Croatia, as a member of the United Nations, the European Union and the Council of Europe and a party to all key international instruments in the field of human rights and states that includes the highest standards in the field of social and economic security of citizens, has undertaken the obligation to protect and promote the human rights of persons with disabilities for the purpose of equal participation in civil, political, economic, social and cultural areas of life. People with disabilities, with a significant share of the population at all levels, from global to national, are recognized among the most vulnerable social groups, but

also as a social resource in the context of social progress in all areas, especially taking into account the possibility of positive discrimination and the use of advanced technology.

The preparation of the National Plan 2021 - 2027 was preceded by an analysis of the state of all areas of activity defined by the National Strategy for Equalizing Opportunities for Persons with Disabilities from 2017 to 2020. The analysis of the situation determined medium-term development needs and potentials, which is the basis for creating a new strategic framework for equalizing opportunities for people with disabilities.

The analysis of the situation determined the need to further improve the quality of life of people with disabilities, strengthen the capacity of service providers, build an accessible environment and communication systems and technologies, and build an inclusive society.

Areas of the National Strategy for equalizing opportunities for people with disabilities: family, community life, upbringing and education, health care, social care, housing, mobility, accessibility, professional rehabilitation, employment, work and pension insurance, legal protection and protection from abuse, information , communication and awareness raising, participation in cultural life, participation in public and political life, research and development, recreation, leisure and sports, risky situations and humanitarian crises, associations of persons with disabilities in civil society, international cooperation.

In the area of Housing, mobility and accessibility, medium-term development needs and development potentials have been determined. Medium-term development needs are focused, among other things, on:

- accessibility of public: road, air, rail and sea transport, ensuring the accessibility of residential buildings to persons with disabilities, accessibility of courts and institutions for persons deprived of liberty, accessibility of institutions in the culture of accessibility to facilities and services in tourist destinations, ensuring the accessibility of sports buildings to persons with disabilities, provision and adaptation of children's playgrounds, sports fields and parks for children with developmental disabilities and persons with disabilities.

In the development potentials and implementation possibilities of future projects, it is stated that they must contain specific measures that contribute to the improvement of physical accessibility for people with disabilities. Thus, in built and reconstructed buildings and acquired vehicles, access to public transport must be ensured without height differences (no stairs),

transport services must be as close as possible to hospitals, schools, kindergartens, health centers and similar facilities. Roundabouts and stops must be accessible to people with disabilities (access ramps and elevators) and have adequate shelter (canopies and waiting room), audible and visual and, if necessary, tactile notification of the arrival of vehicles, etc. must be provided. The part that the students of the School for road traffic carried out related precisely to the mapping of public city transport stops.

7. Web application - Access Zagreb

The City Office for Social Protection, Health, Veterans and Persons with Disabilities, in cooperation with the Croatian Association of Persons with Disabilities, is implementing a project to determine the accessibility of public institutions to persons with disabilities in order to sensitize society to the real needs of persons with various forms of disabilities. In addition to public institutions, the accessibility of public transport stops for people with disabilities will also be determined as part of the project. The long-standing cooperation between the School for Road Traffic and the Association of Persons with Disabilities in Croatia continued with the provision of accessibility mapping activities of JPG's position. The mapping was carried out by about 30 students who are studying for the profession of Road Traffic Technician.

For the purposes of mapping, a web application was designed - Accessible Zagreb, in which students followed the instructions and filled in the necessary information about the bus stops.

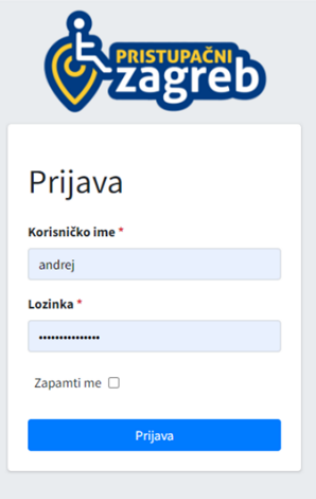

Figure 1. Login to the web application Accessible Zagreb

In order to start mapping, you need to log in to the web application with your username and password. Each participating student received their own username and password, and if they

worked in pairs, it was enough for only one of them to log in. After logging in, a list of all public transport stops is displayed on the screen. Each group of students was assigned an area to go through. The students' task was to go through the given area and cover all the bus and tram stops located within it.

The approach to the stop, i.e. the signs related to the approach to the stop, are attached to the pedestrian crossing next to the stop itself. When approaching the stop, it is noted whether the approach has:

- Traffic light (Is there a traffic light as traffic regulation?)
- Sound traffic light (Is there a device for sound signaling at the traffic light?)
- Tactile paths (Are there tactile paths at the pedestrian crossing?)
- Reserved parking space (Is there a parking space reserved for people with disabilities in the area?)

Signs related to the pedestrian underpass apply only if the stop is accessed from the underpass.

- Stairs (Is the station accessible via stairs?)
- Ramp (Is the stop accessible via a ramp?)
- Lifting platform (Is there a vertical lifting platform in the tunnel?)
- Elevator (Is there a built-in elevator in the underpass?)

After mapping the access to the stop, only the stop and its characteristics are mapped.

- Accessible width of the stand (Accessible width of the stand is defined as the minimum necessary distance of 90 cm that must exist to ensure the passage of a wheelchair. If an obstacle (pole, trash can) is seen that is placed in such a way that the wheelchair cannot pass, then do not there is an accessible width of stance.)
- Tactile path (Is there a tactile path at the stop?)
- Traffic sign (Is there a traffic sign indicating a stop?)
- Display (Is there an electronic display for the timetable?)
- Adapted sidewalk height (Adjusted sidewalk height is defined as a standard height of 20-30 cm. The sidewalk must exist in order to properly place a ramp from the vehicle through which wheelchair access is enabled.)
- Canopy (Is there a canopy at the stop?)

Figure 2. Vertical lifting ramp

Figure 3. Tactile paths

8. Mapping public city traffic stops

About 30 students carried out the mapping of public city transport stops, the mapping was carried out on weekdays in the morning hours. The students were divided into 11 groups, according to the geographical division shown in Figures 4 and 5. The first part of the mapping of the positions is carried out as the images show the wider center of the city of Zagreb, which has a very dense network of public transport.

Figure 4. Division of groups 1 – 9

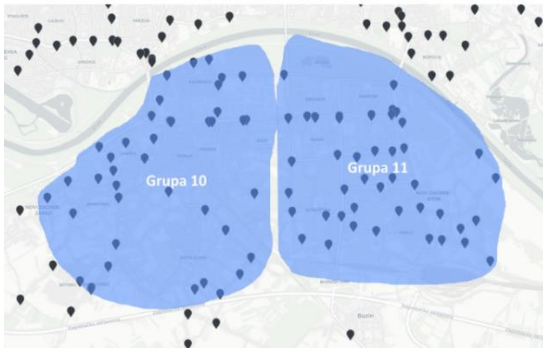

Figure 5. Division of groups 10 and 11

Students mapped over 450 public transport stops in five physical tours of the stops. During the actual mapping, the students used their mobile devices and were marked with the School's reflective vests.

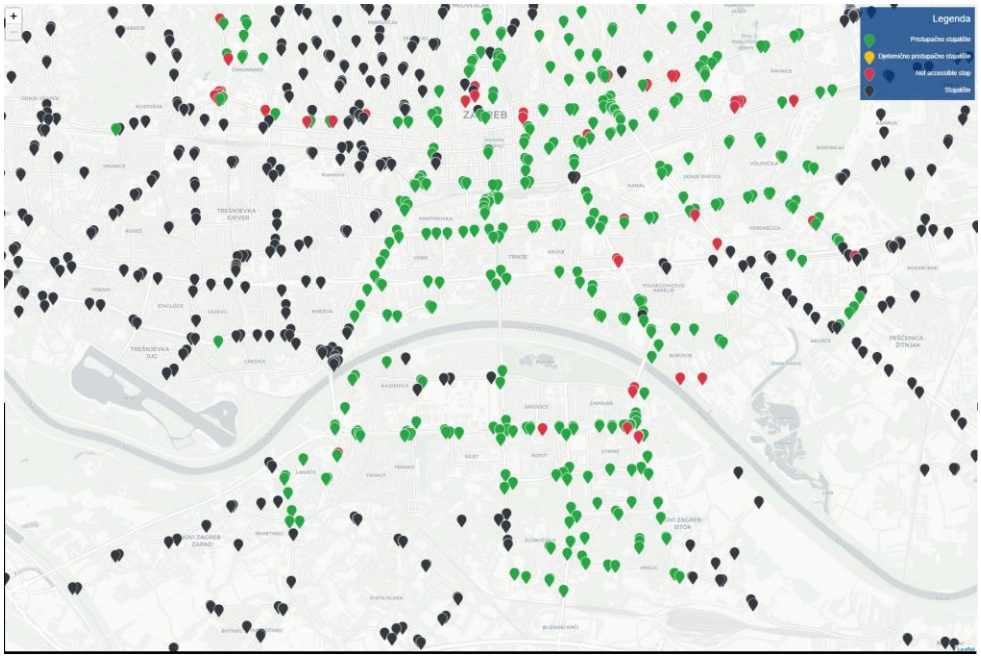

Figure 6. Mapped stops

Figure 6 shows the mapped stops that are, according to the legend, accessible stops marked in green, partially accessible in yellow, and not accessible for people with disabilities in red.

Figure 7. Students during the position mapping activity

9. Conclusion

People with disabilities are daily participants in traffic in the role of pedestrians, passengers and drivers. Participation in traffic for people with disabilities is not easy, because traffic surfaces and architectural solutions are not always adequately constructed or adapted for access by people with disabilities. Persons with disabilities should be provided with accessibility according to regulations that will enable a greater degree of mobility and easier movement. Traffic surfaces must be adapted to people with all types of disabilities according to the principle of "universal design" using road information systems, sensor technologies in road traffic related to vehicles and pedestrian crossings, communication and navigation technologies. In other words, roads are built with lowered curbs, sound traffic lights are installed at intersections, tactile surfaces are installed for people with visual disabilities, sound and visual announcements are made in public transportation, and low-floor buses and special vans for people with disabilities are introduced. Although in everyday life there are numerous shortcomings and obstacles that hinder the participation of people with disabilities in traffic in urban areas, there are people who persistently work to facilitate the movement of people with disabilities and to sensitize the public as much as possible. By implementing such activities and projects, the accessibility of stops and other traffic areas will surely be of great benefit to people with disabilities.

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17. TRŽENJSKI PRISTOPI V AKCIJAH PROMETNE VARNOSTI

POVZETEK

Varnost v cestnem prometu povečujemo z različnimi akcijami, kot so na primer akcije, ki opozarjajo na posledice vožnje pod vplivom alkohola, akcije nošenja kresničk, privezovanja z varnostnim pasom… S temi akcijami želimo vplivati na vedenja ljudi tako, da bo vedenje, ki je škodljivo za posameznika ali za družbo, postalo varnejše, bolj zdravo, družbeno sprejemljivo…

V prispevku bom pojasnila, da morajo biti tudi akcije varnosti v cestnem prometu izpeljane po principih trženja, saj z njimi skušamo vplivati na vedenje ljudi, podobno kot to delamo pri trženju izdelkov ali storitev, zato moramo upoštevati ista pravila trženjskega spleta.

V nadaljevanju bom predstavila še primere dobrih praks trženjskih akcij na področju prometa, ki so jih pripravile slovenske trženjske agencije.

KLJUČNE BESEDE: trženje, trženjski splet, trženjska akcija, varnost v prometu

KAJ JE TRŽENJE?

Trženje je veda, ki definira ter raziskuje ciljne trge in uporabnike ter skuša z njimi vzpostavljati poslovne odnose. Trženje povezuje ponudnika in porabnika izdelka ali storitve. Termin trženje se pogosto neupravičeno zamenjuje z oglaševanjem, reklamo, promocijo ali propagando. Poslovno komuniciranje je del trženja, vendar pa je trženje veliko več.

Osnove trženjske teorije so definirane s trženjskim spletom. Trženjski splet je kombinacija instrumentov trženja, ki jo poznamo pod angleško kratico 4P (product, placement, promotion, price). Ti instrumenti trženja so izdelek, prodajna cena, tržna pot in tržno komuniciranje.

Gre za celostni koncept, ki poudarja, da je trženje menjava, pri kateri obe strani pridobita.

TRŽENJE ZA VEČJO VARNOST V CESTNEM PROMETU

Tudi trženjske akcije za povečanje varnosti v prometu morajo temeljiti na uporabi instrumentarija, kot ga uporabljamo za trženje izdelkov in storitev, torej moramo upoštevati trženjski splet po Kotlerjevi teoriji 4P, ki temelji na štirih instrumentih trženja. To so: izdelek, prodajna cena, tržna pot in tržno komuniciranje.

IZDELEK

Ko govorimo o akcijah varnosti v cestnem prometu, s katerimi skušamo vplivati na vedenje ljudi, je »izdelek« želeno vedenje oziroma posledična korist, ki jo s tem vedenjem pridobimo.

CENA

Cena pri vedenjskih akcijah večinoma ni denarna, ampak gre za nematerialne vložke udeležencev kot so čas, trud, manjše udobje, nelagodje… Ko govorimo o ceni, moramo znati opredeliti tako vložke kot koristi novega vedenja. Če želimo biti uspešni, moramo doseči to, da bodo koristi večje od vložka.

Po Hastingsu (Hastings 2007, 74-75) obstajajo štiri kombinacije vložkov in koristi:

- majhen vložek in velika osebna korist (ker gre za neposredno korist, za katero ni potrebnega večjega napora, bo sprememba relativno lahka),
- majhen vložek in družbena korist (kljub temu, da gre za majhen vložek, se ljudje, ker nimajo neposredne osebne koristi, obnašajo tako le, če uspejo prepoznati splošno družbeno korist ter se zavedati njenega pomena in možnosti lastnega vpliva na to),
- velik vložek in velika osebna korist (kljub jasni osebni koristi je zaradi velikega osebnega angažiranja sprememba v vedenju zahtevna in potrebuje podporne dejavnosti),

- velik vložek in družbena korist (ker ni neposredne osebne koristi in je potrebno veliko angažiranje, ne pride do sprememb brez močnega družbenega ali moralnega pritiska ali pa z umetnim dvigom vložka, npr. uvedba dajatev, kazni…).

Pri akcijah varnosti v prometu moramo jasno identificirati vložek posameznika, ki je potreben za spremembo njegovega vedenja in ga uravnovesiti s koristmi, ki jih pridobimo z novim vedenjem. To lahko dosežemo z:

- zmanjšanjem napora za opuščanje starega vedenja,
- olajšanjem prevzema novega vedenja,
- povečanjem koristi spremenjenega vedenja (Kotler in drugi 2002, 220).

TRŽNA POT

V komercialnem marketingu je tržna pot pogosto mišljena kot kanal distribucije, torej medijski kanal, preko katerega komuniciramo. Ko gre za socialni marketing, pa pot lahko razumemo tudi kot prostor, kjer se bo izvajalo želeno vedenje in pomembno je, da vzpostavimo takšno okolje, da udeležencem njihovo odločitev za novo vedenje čim bolj olajšamo, naredimo čim bolj dostopno in privlačno.

KOMUNICIRANJE

Za komunikacijo lahko izberemo različne kanale, kot so: oglaševanje v množičnih medijih in na plakatih, tiskani materiali (brošure, zloženke, posterji, nalepke…), promocijski predmeti (majice, kape, svinčniki, značke…), predstavitve (delavnice, seminarji…), popularni mediji (pesmi, filmi, stripi, promocija lokalnih zvezd…), odnosi z javnostmi (javni dogodki, ki prinesejo omembe v medijih…), uporaba novih tehnologij (PPC kanali, povečanje organskega pozicioniranja na iskalnikih, oglaševanje s pasicami, družabna omrežja, vplivnostni marketing...).

PRIMERI DOBRIH PRAKS TRŽENJSKIH AKCIJ VZGOJE V CESTNEM PROMETU

Podjetja se vedno bolj zavedajo, da se od njih pričakuje družbena angažiranost in da skozi to dvigujejo svoj ugled in pomen bolj, kot to lahko dosežejo z običajnimi trženjskimi prijemi. Napredne marketinške tehnologije vedno bolj vključujejo digitalne vplive na potrošnike, le ti pa so pogosto posredni.

BIG BANGOVA AKCIJA VARNO V PROMETU

Big Bang je eden od največjih slovenskih prodajalcev telefonov in slušalk. V kreativnem studiu Trampolin so v sodelovanju z zavodom Vozim zanje zasnovali akcijo, ki v skladu z družbeno odgovorno filozofijo podjetja ozavešča problematiko uporabe telefonov in slušalk v prometu, saj uporaba telefonov in slušalk med hojo ali vožnjo v prometu namreč bistveno poveča verjetnost za nesreče, saj se zmanjša naša pozornost na dogajanje v okolici in beležimo zlasti med mladimi veliko število prometnih nesreč, kjer je na potek vplivala uporaba telefonov ali slušalk.

Slika1: Big Bangova akcija Varno v prometu

Odziv na akcijo je bil zelo dober. K širjenju sporočila akcije je zagotovo prispevalo tudi to, da so se povezali s številnimi prijatelji podjetja Big Bang – med njimi so KK Cedevita Olimpija, NK Bravo, RK Celje Pivovarna Laško, NŠ Mura, vplivneži in druge organizacije, ki so se z njihovim stališčem poistovetili in želijo biti del spremembe. (https://www.marketingmagazin.si/opazeno/opazili-smo-big-bang-poziva-k-varnosti-v-prometu)

POZIV AGENCIJE FORMITAS ZA PREHOD S CESTE NA SPLET

S pozivom »S ceste na splet« nas želijo v agenciji Formitas ozavestiti, da veliko poti lahko nadomestimo z uporabo spleta, s tem pa razbremenimo promet, kar bo ena od ključnih nalog sodobne družbe iz več vidikov: finančnega, energetskega, okoljskega, varnostnega… (https://www.marketingmagazin.si/opazeno/opazili-smo-prometni-nered-v-sloveniji)

Slika 2: Formitasov poziv S ceste na splet

MAJER McCANN O PROBLEMATIKI TRANZITNEGA TRANSPORTNEGA PROMETA

Na problem tranzitnega tovornega prometa, na njegov škodljiv vpliv na okolje in hkrati na možno rešitev v agenciji Majer McCann opozarjajo z off-line interaktivnim vizualom. Bralca vabijo k aktivnemu sodelovanju, ko s pregibom strani preloži tovor iz dveh tovornjakov na železniški vagon, in tako s prehodom iz cestnega na železniški promet zmanjša emisije. (https://www.marketingmagazin.si/opazeno/opazili-smo-prometni-nered-v-sloveniji)

Slika 3: McCannov vizual za zmanjšanje tranzitnega cestnega tovornega prometa

Katja Gaspari Leben in Aleš Kočevar sta na plakat zapisala: »Z avtomobilom na s ni treba zbiti, da bi nas ubili«. O svojem pogledu na prometno problematiko pa sta izjavila: »Večina nevarnost vožnje z avtomobilom povezuje zgolj s prometnimi nesrečami, le redkokdaj pa se zavemo razsežnosti, ki jih za naše zdravje pomenijo avtomobilski izpušni plini. Zato sva v razmislek o nujnosti sodobnih, ljudem in okolju prijaznejših prometnih rešitev javnost dregnila s provokativnim sporočilom, ki opominja, da onesnaženje zraka in okolja tiho, a zanesljivo ogroža naša življenja.« (https://www.marketingmagazin.si/opazeno/opazili-smo-prometni-nered-v-sloveniji)

Slika 4: Opozorilo Katje Gaspari Leben in Aleša Kočevarja o ogrožanju zdravja s prometnim onesnaženjem zraka

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17. MARKETING APPROACHES IN TRAFFIC SAFETY ACTIONS

ABSTRACT:

We continue road safety with various campaigns, such as campaigns that warn of the consequences of driving under the influence of alcohol, campaigns that encourage wearing reflective objects, wearing a seat belt... With these campaigns we want to influence the behavior of people in such a way that the behavior that it is harmful for an individual or for the society becomes safer, healthier, socially acceptable...

In this article I state that road safety campaigns must also be carried out according to the principles of marketing, because with them we try to have an influence on people and their behavior, similarly to what we do when marketing products or services, therefore, we must follow the same rules of marketing.

The article continuous with the presentation of examples of good practices of marketing campaigns in the field of transport, which were carried out by Slovenian marketing agencies.

KEY WORDS: marketing, marketing mix, marketing campaign, traffic safety.

WHAT IS MARKETING?

Marketing is a science that defines and researches target markets and users and tries to establish business relations with them. Marketing connects the provider and the consumer of a product or service. The term marketing is often unjustifiably confused with advertising, publicity, promotion or propaganda. Business communication is part of marketing, but marketing is much more.

The basics of marketing theory are defined by the marketing mix. The marketing network is a combination of marketing instruments, known by the English acronym 4P (product, price, place, promotion). These marketing instruments are product, selling price, place and marketing promotion.

It is a holistic concept that emphasizes that marketing is a win-win exchange.

MARKETING FOR GREATER SAFETY IN ROAD TRAFFIC

Marketing campaigns to increase traffic safety must also be based on the use of instruments, as we use for marketing products and services, so we must consider the marketing mix according to Kotler's 4P theory, which is based on four marketing instruments. These are: product, selling price, place and promotion.

PRODUCT

When we talk about road safety actions, with which we try to influence people's behaviour, the "product" is the desired behaviour or the resulting benefit that we obtain from this behaviour.

PRICE

The price of behavioural campaigns is mostly not monetary, but rather the immaterial contributions of the participants, such as time, effort, less comfort, discomfort... When we talk about the price, we must be able to define both the contributions and the benefits of the new behaviour. If we want to be successful, we must achieve that the benefits are greater than the investment.

According to Hastings (Hastings 2007, 74-75), there are four combinations of inputs and benefits:

- a small investment and a large personal benefit (since it is a direct benefit that does not require much effort, the change will be relatively easy),

- a small contribution and social benefit (despite the fact that it is a small contribution, since there is no direct personal benefit, people behave in this way only if they manage to recognize the general social benefit and are aware of its importance and the possibility of their own influence on it),

- a large investment and a large personal benefit (despite the clear personal benefit, due to the large personal engagement, a change in behaviour is demanding and needs support activities),

- high stake and social benefit (since there is no direct personal benefit and a lot of engagement is required, changes do not occur without strong social or moral pressure or by artificially raising the stake, e.g. introduction of duties, penalties...).

In traffic safety campaigns, we must clearly identify the input of the individual that is needed to change his behaviour and balance it with the benefits that we gain from the new behaviour. We can achieve this by:

- by reducing the effort to abandon old behaviour,

- by facilitating the adoption of new behaviour,

- by increasing the benefits of the changed behaviour (Kotler et al. 2002, 220).

PLACE

In commercial marketing, the marketing channel is often thought of as a distribution channel, i.e. a media channel through which we communicate. When it comes to social marketing, the journey can also be understood as a place where the desired behaviour will be implemented, and it is important to establish such an environment to make the decision for the new behaviour as easy as possible for the participants, as accessible and attractive as possible.

PROMOTION

We can choose various channels for promotion, such as: advertising in the mass media and on posters, printed materials (brochures, leaflets, posters, stickers...), promotional items (t-shirts, caps, pencils, badges...), presentations (workshops, seminars...), popular media (songs, movies, comics, promotion of local stars...), public relations (public events that bring mentions in the media...), use of new technologies (PPC channels, increasing organic positioning on search engines, banner advertising, social networks, influencer marketing...).

EXAMPLES OF GOOD PRACTICES OF MARKETING AND EDUCATION ACTIONS IN ROAD TRAFFIC

Companies are increasingly aware that social engagement is expected of them and that through this they raise their reputation and importance more than they can achieve with conventional marketing techniques. Advanced marketing technologies increasingly include digital influences on consumers, but these are often indirect.

BIG BANG PROMO SAFE IN TRAFFIC

Big Bang is one of the largest Slovenian sellers of phones and headphones. In the creative studio Trampolin, in cooperation with the Vozim zanje institute, they designed a campaign that in accordance with the company's socially responsible philosophy raises awareness of the issue of using phones and headphones in traffic, because the use of phones and headphones while walking or driving in traffic significantly increases the likelihood of accidents, since our attention to what is happening in the surroundings decreases and we record a large number of traffic accidents, especially among young people, where the use of phones or headphones influenced the course.

Figure 1: Big Bang's campaign Safe in traffic

The response to the campaign was very good. The fact that they connected with many friends of Big Bang - among them KK Cedevita Olimpija, NK Bravo, RK Celje Pivovarna Laško, NŠ Mura, influencers and other organizations that agreed with their point of view - certainly contributed to the spread of the campaign's message. identified and want to be part of the change. (https://www.marketingmagazin.si/opazeno/opazili-smo-big-bang-poziva-k-varnosti-v-prometu)

CALL FOR THE FORMITAS AGENCY TO TRANSITION FROM THE ROAD TO THE WEB

With the call "From the road to the web", the Formitas agency wants to make us aware that many routes can be replaced by the use of the Internet, thereby relieving traffic, which will be one of the key tasks of modern society from several aspects: financial, energy, environmental, safety... (https://www.marketingmagazin.si/opazeno/opazili-smo-prometni-nered-v-sloveniji)

Figure 2: Formitas' call From the road to the web

MAJER McCANN ON THE PROBLEMS OF TRANSIT TRANSPORT TRAFFIC

The Majer McCann agency draws attention to the problem of transit freight traffic, its harmful impact on the environment and, at the same time, a possible solution with an off-line interactive visual. The reader is invited to actively participate as he transfers the cargo from two trucks onto a rail car by folding the pages, thus reducing emissions by switching from road to rail transport. (https://www.marketingmagazin.si/opazeno/opazili-smo-prometni-nered-v-sloveniji)

Figure 3: McCann's visual for reducing transit road freight traffic

Katja Gaspari Leben and Aleš Kočevar wrote on the poster: "You don't have to hit us with a car to kill us". Regarding their view of traffic issues, they stated: "Most people associate the danger of driving a car only with traffic accidents, but we rarely realize the extent to which car exhaust gases mean to our health. That's why we urged the public to think about the necessity of modern transport solutions that are more friendly to people and the environment with a provocative message reminding that air and environmental pollution quietly but surely threatens our lives." (https://www.marketingmagazin.si/opazeno/opazili-smo-prometni-nered-v-sloveniji)

Figure 4: Katja Gaspari Leben and Aleš Kočevar's warning about the threat to health from traffic air pollution

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Mr.sci.Emilija Martinčević, dipl.ing.saob. i kom.
Sabahudin Solak, dipl.ing.saob. i kom.

18. PROGNOZE KRETANJA TRENDOVA E-USLUGA U POSLOVANJU BH POŠTANSKIH OPERATORA

SAŽETAK

Planiranje je temeljna značajka savremenog društva i jedan od osnovnih preduslova brzog napretka. Bez sistemskog planiranja, razvoj je sporadičan i prepušten slučajnosti. Svrha planiranja je utvrditi scenarije, ciljeve i aktivnosti kako bi se osigurala podloga za stalno unapređenje i razvoj tržišta poštanskih usluga u BIH u budućem razdoblju. Pritom je za kvalitetno planiranje potrebno dugoročno sagledati postavljene ciljeve, koji se moraju rangirati po važnosti, kako bi se njihovo izvršavanje moglo vremenski koordinirati i uskladiti.

Utjecaj informacijsko-komunikacijskih tehnologija na poštanski sistem moguće je promatrati kroz dva područja odnosno kao utjecaj na fizičku komponentu i kao utjecaj na informacijsku komponentu. e-poštanske usluge (elektroničke poštanske usluge) su usluge davatelja poštanskih usluga krajnjim korisnicima putem informacijsko komunikacijskih kanala, poput Interneta kao glavnog kanala dostave e-poštanskih usluga. ICT tehnologije znatno su promijenile načine komunikacije i time utjecale na smanjenje količina tradicionalnih pismonosnih pošiljaka. Kao odgovor, davatelji poštanskih usluga diversifikacijom usluga nude krajnjim korisnicima nove e-poštanske usluge.

Strategija odražava politiku Bosne i Hercegovine u području razvoja tržišta poštanskih usluga, te je usklađena s opštom vladinom politikom u pogledu zaštite slobode tržišnog natjecanja, promicanja interesa privrede, građana i korisnika poštanskih usluga, osiguranja dostupnosti i održivosti univerzalne usluge, razvoja novih poštanskih usluga, zaštite interesa korisnika usluga s posebnim potrebama te uloge poštanskih usluga u sinergiji s komunikacijskom i prometnom infrastrukturom i uslugama.

Ključne riječi: **ITC tehnologije, e-poštanske usluge, e-transfer**

1. Uslovi razvoja e-poštanske usluge

Strategija odražava politiku Bosne i Hercegovine u području razvoja tržišta poštanskih usluga, te je usklađena s opštom vladinom politikom u pogledu zaštite slobode tržišnog natjecanja, promicanja interesa privrede, građana i korisnika poštanskih usluga, osiguranja dostupnosti i održivosti univerzalne usluge, razvoja novih poštanskih usluga, zaštite interesa korisnika usluga s posebnim potrebama te uloge poštanskih usluga u sinergiji s komunikacijskom i prometnom infrastrukturom i uslugama.

U današnjem okruženju potrebno je promatrati sljedeće faktroe koji utječu na razvoj tržišta poštanskih usluga:

- ekonomske aktivnosti (razvoj ekonomije, struktura privrednih aktivnosti i broj firmi,
- populacija (broj stanovnika, broj kućanstava i starost stanovništva),
- digitalizacija (različiti oblici elektroničke komunikacije poput SMS-a, e-mail-a, društvenih mreža),
- cijene (na cijene utječe regulacija tržišta, izračun jedinične cijene troška, konkurencija, osjetljivost korisnika kao i troškovi korištenja tzv. ne-poštanskih kanala),
- ostali čimbenici (kulturalne razlike, razina obrazovanja, razina i struktura prihoda).

Pored navedenih faktora, nova ključna područja koja izravno utječu na budući razvoj tržišta poštanskih usluga su područja: e-trgovine, e-poštanskih usluga, izravne pošte u multimedijskom okruženju i održivog razvoja okoliša.

Utjecaj informacijsko-komunikacijskih tehnologija na poštanski sistem moguće je promatrati kroz dva područja odnosno kao utjecaj na fizičku komponentu i kao utjecaj na informacijsku komponentu. E-poštanske usluge (elektroničke poštanske usluge) su usluge davatelja poštanskih usluga krajnjim korisnicima putem informacijsko komunikacijskih kanala, poput Interneta kao glavnog kanala dostave e-poštanskih usluga. ICT tehnologije znatno su promijenile načine komunikacije i time utjecale na smanjenje količina tradicionalnih pismonosnih pošiljaka. Kao odgovor, davatelji poštanskih usluga diversifikacijom usluga nude krajnjim korisnicima nove e-poštanske usluge. E-poštanske usluge se dijele u četiri kategorije usluga[17], iako među njima postoji međusobna povezanost na usluge: e-pošta, e-trgovina, e-financijske usluge, e-vlada.

Vezano uz količine poštanskih pošiljaka, mogu se izdvojiti dva trenda. Na globalnom nivou, količina pismonosnihih pošiljaka u posljednjih nekoliko godina kontinuirano se smanjuje.

Realna je pretpostavka odnosno realno je za očekivati da će se taj trend nastaviti i u bliskoj budućnosti. Suprotno negativnim trendovima kretanja broja poštanskih pošiljaka, količina paketskih pošiljaka kontinuirano raste, prvenstveno zahvaljujući porastu e-trgovine i potrebe za fizičkom dostavom robe i proizvoda.

2. Definiranje e-poštanskih usluga prema UPU

Poticanje daljnjeg razvoja postojećih usluga u e-trgovini, tehnološkim napretkom te razvojem poštanskog tržišta stvaraju se nove prilike za razvoj e-usluga, a na koje mnogi davatelji poštanskih usluga do sada još nisu odgovorili. Stoga je upravo UPU-ova studija „Mjerenje razvoja poštanskih e-usluga“ imala za cilj odgovoriti na te potrebe i prikazati trendove u razvoju novih elektroničkih usluga u poštanskom sektoru.

[17] Measuring postal e-services development, Electronic Postal Services Programme, UPU,2012., http://www.upu.int/en.html, datum pristupa: 20.07.2016.

UPU na sljedeći način definira poštansku e-uslugu: usluga koju davatelji poštanskih usluga nude svojim krajnjim korisnicima putem informacijsko-komunikacijskih tehnologija. Internet je glavni kanal za konzumaciju e-poštanskih usluga, dok se drugi kanali elektroničkih komunikacija (npr. pokretni telefoni, pozivni centri ili televizijski kanali) u manjem dijelu također koriste u svrhu korištenja ovih usluga. Prema popisu iz UPU-ove studije, u sljedećoj tabeli poredane su e-usluge od interesa davatelja poštanskih usluga

Tabela 1: e-poštanske usluge od interesa davatelja poštanskih usluga

Usluge e-finacija	
Usluga	Opis usluge
Elektronsko izdavanje računa	Usluga pri kojoj korisnici primaju elektronske račune za proizvode i usluge pružene od pošte
Elektronsko upravljanje računima	Omogućuje korisnicima upravljanje njihovim finacijskim poštanskim računom elektronskim putem i izvršavanje popvezanih operacija
Elektronska doznaka	Omogućuje gotovinski transfer novca putem elektronskog naloga koje zamjenjuju one koji su u papirnom obliku
On – line placanje računa	Omogućuje plaćanje računa putem web stranice pošte, što podrazumjeva razvoj specijaliziranog on-line sistema plaćanja
Upravljanje računima	Korisnicima pruža mogućnost da putem specijaliziranog elektronskog računa obave on-line plaćanje i upravljaju računima
e-plaćanje računa za vodosnabdjevanje	Plaćanje računa za vodu putem online sistema
e-plaćanje računa za struju	Plaćanje usluga električne energije putem online sistema
e-plaćanje telefonskog računa	Plaćanje telefonskih usluga putem online sustava
Elektronski transfer novca	Usluga koja dozvoljava prijenos novčanih sredstava s računa pošiljatelja na račun primatelja kroz poštu.

Usluge e-trgovine	
Usluga	Opis usluge
Online trgovina filatelističkih proizvoda	Korisnici mogu kupiti filatelističke proizvode online putem; dostavljaju se na fizičku adresu
Online trgovina poštanskih proizvoda	Korisnici mogu kupiti poštanske proizvode online putem; dostavljaju se na fizičku adresu
Online trgovina ne-poštanskih proizvoda	Korisnici mogu kupiti ne-poštanske proizvode online putem; dostavljaju se na fizičku adresu
Pretplata na časopise	Korisnici se mogu pretplatiti na časopise oline putem; dostavljaju se na fizičku adresu
Web usluga i kontakt za	Usluga omogućuje korisniku sa elektronskim online računom

e-trgovinu	i jedinstvenim identifikatorom kontakata da upravlja i traži operacije vezane uz e-trgovinske transakcije
SSL-web certifikati	Pošta izdaje SSL certifikate za sigurnost web stranica

Usluge e-vlade	
Usluga	Opis usluge
Digitalni identitet	Pošta izdaje digitalni indentitet koji služi za zakonsku identifikaciju svojih korisnika. Digitalni identitet može biti osiguran jednostavnom elektronskom provjerom autentičnosti pomoću lozinke ili korištenjem sigurnijih tehnologija provjere autentičnosti koje koriste kriptografiju i infrastrukturu javnog ključa
Obnova vozačke dozvole	Korisnici mogu obnoviti svoje vozačke dozvole elektronskim putem
Online kupovina ulaznica za kulturne i/ili sportske dogadjaje	Usluga na poštanskoj web stranici omogućuje korinicima da kupuju i ispisuju ulaznice za kulturne i /ili sportske dogadjaje
Elektronska sveučilišna registracija	Studenti se mogu prijaviti na univerzitet koristeći poštanske elektronske sisteme registracije
Elektronska isplata mirovina	Korisnicima se isplaćuju mirovine korištenjem poštanskih elektronskih sistema plaćanja
Online prijava za putovnicu	Korisnici se mogu prijaviti za putovnicu putem poštanske web stranice
Elektronsko upravljanje ličničkim dosijeima za pacijente	Korisnici mogu upravljati svojim liječničkim dosijejima koristeći specijalizovane poštanske elektronske sisteme
Elektronske liječničke potvrde	Korisnici mogu izdavati elektronske liječničke potvrde putem poštanskih specijalizovanih elektronskih sistema
Elektronska naplata javnih zdravstvenih provizija	Korisnici mogu elektronskim putem platiti javne zdravstvene provizije
Elektronski dokumenti za izvoz	Korisnici mogu elektronskim putem dostaviti potrebne informacije nadležnim tijelima prije slanja predmeta u inozemstvo
Elektonski carinski dokumenti	Korisnici mogu elektronskim putem mogu dostaviti korisne informacije nadležnim tijelima prije uvoza ili izvoza predmeta.

Usluge e- pošte	
Usluga	Opis usluge
Pristupna tačka javnom Internetu u poštanskim uredima	Korisnici mogu prostupiti Internetu u poštanskim uredima

Elektronički poštanski kovčevdžić	Omogućuje slanje elektronskih poruka od autoriziranog pošaljiljatelja te isporuku i pohranu elektronskih poruka i informacija za autoriziranog primatelja. Definirano u člansku 14. konvencije UPU-a i člansku RL 256 R Pravilinka o pismonosnim uslugama.
Online direktna pošta	Isporuka oglasavajućih i/ili drugih promotivnih komunikacija od strane pošte elektronskim putem.
Registrirana e pošta	Siguran poštanski e servis koji pruža dokaz o slanju i isporuci elektronskih poruka. Siguran komunikacijski kanal za autorizirane korisnike definirano u člansku 14 Konvencije UPU-a i člansku RL 256 bis Pravilnika o pismonosnim uslugama. Postoji nacrt UPU funkcionalne sprecifikacije standarda (S 52).
Elektronska marka	Poštanska marka koja je elektronski plaćena i skinuta primjerice sa poštanske web stranice ili aplikacije pametnog telefona. Poštanska marka se nakon toga fizički ispisuje ili pohranjuje u elektronskom obliku . Prestavlja dokaz o prethodnom plaćanju vrijednosti poštanske usluge, Obično su elektronske marke imaju barcode ili RFID čitanje
Prilagodjenje elektronske marke	Elčektronske marke dizajnirane prema potrebama i preferencijama kupaca. Na primjer pošiljatelj može ugraditi vlastitu sliku u marku.
Elektonska poštanska certificirana marka	Pruža dokaz o elektronskom dogadjaju odredjenog oblika u odredjenom trenutku, uključuje jednu ili više strana. Definirano u člansku 14- Konvencije UPU-a i članku FI 256. Pravilnika o pismonosnim uslugama. Nacrt UPU funkcionalne specifikacije standarda (S43) Podržava ovu uslugu.
Elektronski potpis	Omogućuje digitalno potpisivanje dokumenata
E telegram	Omogućuje sastavljanje telegrama elektronski, npr putem e mail-a ili SMS-a. Telegram se isporučuje primatelju u fizičkom obliku.
e-telegram	Omohućuje sastavljanje telegrama elektronski, npr..putem e-mail ili SMS-a. Telegram se isporučuje primatelju u fizičkom obliku
e-razglednica	Omogućuje online kupovinu razglednice, koja se zatim isporučuje primatelju fizičkim ili elektronskim putem
Online burofax	Omogućuje prijenos tekstova ili ilustracija vjernih orginalu putem fax-a, kao je definirano članom RI.254. Pravilnika o pismonosnim uslugama.
Hibridna pošta (fizička u elektronsku)	Korisnicima omogućuje slanje orginalne fizičke poruke, koja se pretvara u elektronski oblik za isporuku primatelju. Definirano u članu.RI253. Pravilnika o pismonosnim uslugama.
Pretraživanje poštanskog broja	Korisnicima omogućuje pronalaska poštanskog broja online puta na način da korisnici unesu podatke poput adrese, naziva kompanije ili grada.
Provjera valjanosti poštanskih adresa	Omogućuje korisnicima provjeru adrese online putem. Adresa se pretražuje u bazi važečih adresa ulica.
Online promjena	Omogućuje korisnicima promjenu svoje poštanske adrese

adrese	elektronskim putem, uključujući i putem internetskog portala.
Online zadržavanje isporuke	Omogućuje korisnicima da putem e-mail-a , online aplikacije ili telefona zatraže suspenziju poštanskih isporuka na njihovoj adresi i zadržavanje njihove pošte za određeni period.
Praćenje i traženje	Omogućuje korisnicima elektronsko praćenje i traženje poštanske pošiljke.
Elektronska obavijest pošti o potrebi podizanja pisma	Korisnici mogu obavjestiti poštanskog operatora elektronskim putem (npr.SMS- u ili e-mail-om) o pismu kojeg operator treba preuzeti s određene fizičke adrese
Elektronska obavijest primatelju da će se pismo dostaviti	Pošta obavještava primatelja elektronskim putem (npr.SMS- u ili e-mail-om) o pismovnoj pošiljci koja će biti dostavljena na određenoj adresi.
Elektronska obavijest pošiljatelju da je pismo isporučeno	Pošta obavještava pošiljatelja elektronskim putem (npr.SMS- u ili e-mail-om) da je pismovna pošiljka dostavljena na određenoj adresi.
Elektronska obavjest pošti o potrebi podizanja paketa	Korisnici obavještavaju poštu elektronskim putem (npr.SMS- u ili e-mail-om) o zahtjevu za podizanje paketa s određene fizičke adrese.
Elektronska obavijest primatelju da će se paket dostaviti	Pošta obavještava primatelja elektronskim putem (npr.SMS- u ili e-mail-om) o paketnoj pošiljci koja će biti dostavljena na određenoj adresi.
Elektronska obavijest pošiljatelju da je paketna pošiljka dostavljena	Pošta obavještava pošiljatelja elektronskim putem (npr.SMS- u ili e-mail-om) da je paketna pošiljka dostavljena na određenoj adresi.
Online provjera sadržaja poštanskog kovčežića	Omogućuje korisnicima provjeru sadržaja njihovog fizičkog poštanskog kovčežića zaprimanjem elektronskih verzija svojih pisama ili primanjem obavijesti pošte o novim pošiljkama.
Web usluga i kontakt	Omogućuje korisnicima da se obrate pošti elektronskim putem radi neke usluge ili informacija putem web stranice, e-mail-a ili telefona
Aplikacije na mobilnim uređajima	Poštanske usluge dostupne putem aplikacija pametnih telefona.

3. Primjena e-poštanskih usluga u JP BH POŠTE

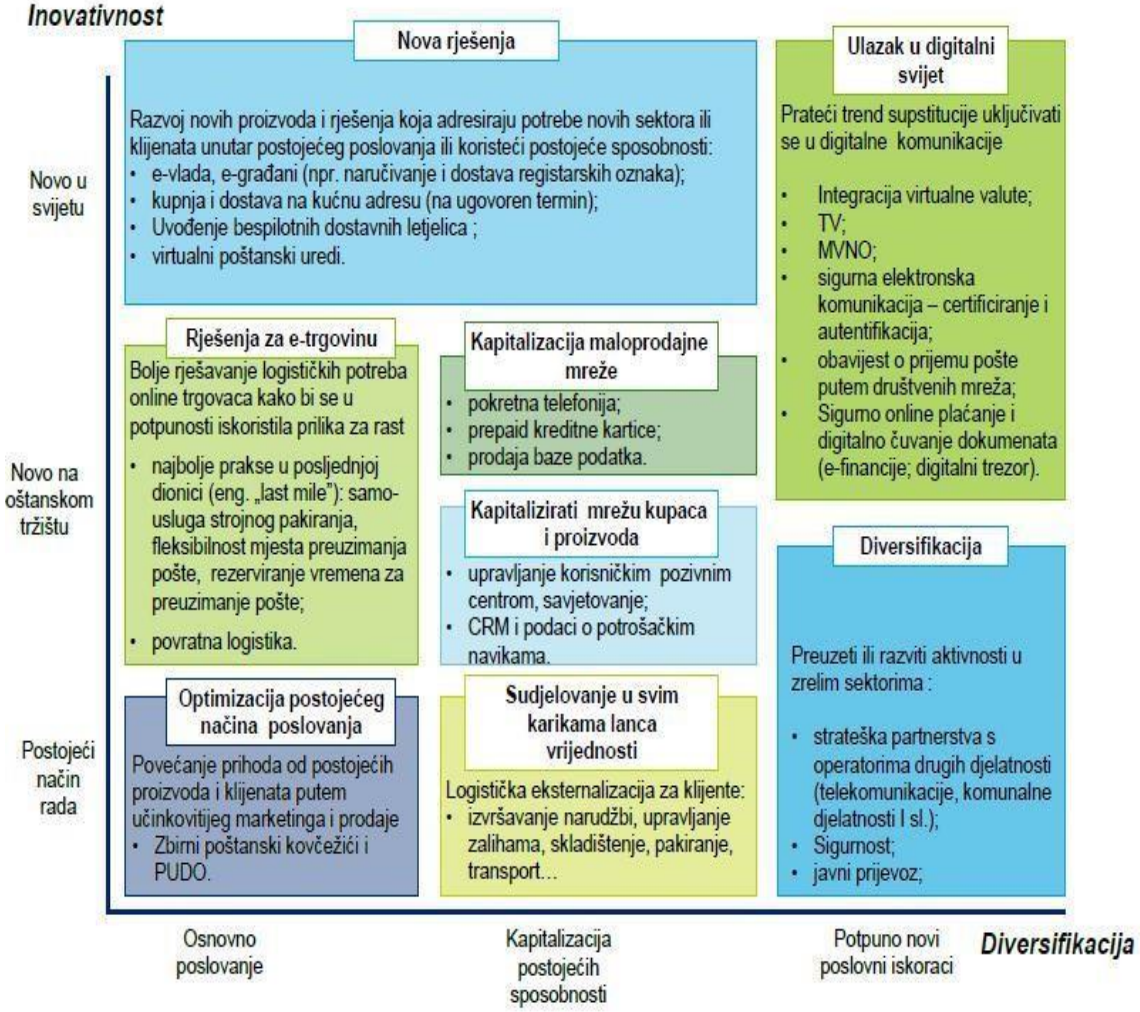
Definiranjem ciljeva te utvrđivanjem načina za njihovo ostvarenje, u postupku planiranja potrebno je predvidjeti i tzv. poštanske čimbenike koji imaju utjecaja na budući razvoj i trendove na tržištu poštanskih usluga.

Faktori se mogu podijeliti na:

- unutarnje (interne), na koje je moguće utjecati u smislu smanjenja njihova negativnog utjecaja (npr. djelotvornija organizacija, prikladnija struktura kadrova i dr.),
- vanjske (eksterne), na koje se općenito ne može utjecati, ali se mogu pratiti analizom dosadašnjih trendova, te predvidjeti budući utjecaj na tržište poštanskih usluga.

Unutarnji čimbenici koji imaju utjecaj na davatelje poštanskih usluga su:[18] proizvodi i usluge, ljudski potencijali, kvalitet usluga, marketing, primijenjena tehnologija, poštanska mreža.

U drugu grupu, odnosno vanjske čimbenike koji imaju utjecaj na davatelje poštanskih usluga izdvajaju se: zakonodavni okvir, tarife, konkurentsko okruženje, prometna infrastruktura, gospodarsko okruženje. U proteklom razdoblju davatelji poštanskih usluga zasnivali su svoje poslovanje prvenstveno na fizičkoj platformi za dostavu pismovnih pošiljaka i paketa između B2B, B2C, odnosno C2C korisnika. Elektroničke komunikacije, primjena Interneta i razvoj širokopojasnih pristupnih tehnologija i mreža nameću uspostavu drugačije platforme kako bi se unaprijedilo poslovanje i omogućio daljnji razvoj.



Slika 1. Primjer novih proizvoda i usluga razvijenih od strane davatelja poštanskih usluga širom svijeta sa mogućnosti primjene u JP BH Pošta[19]

[18] Porter, M. E.: "*Competitive Advantage: Creating and Sustaining Superior Performance*", 1998.

[19] *Strategija razvoja tržišta poštanskih usluga u Republici Hrvatskoj do 2020. godine,* Ministarstvo pomorstva, prometa i infrastrukture, Zagreb, 2014., str. 67.

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18. FORECASTS OF TRENDS OF E-SERVICES IN THE BUSINESS OF BH POSTAL OPERATORS

ABSTRACT

Planning is a fundamental feature of modern society and one of the basic prerequisites for rapid progress. Without systematic planning, development is sporadic and left to chance. The purpose of planning is to determine scenarios, goals and activities in order to provide a basis for constant improvement and development of the postal services market in Bosnia and Herzegovina in the future. At the same time, for quality planning, it is necessary to take a long-term view of the set goals, which must be ranked in order of importance, so that their execution can be coordinated and harmonized in time.

The influence of information and communication technologies on the postal system can be observed in two areas, namely as an influence on the physical component and as an influence on the information component. e-mail services (electronic postal services) are services provided by postal service providers to end users through information and communication channels, such as the Internet as the main delivery channel for e-mail services. ICT technologies have significantly changed the ways of communication and thereby influenced the reduction of the amount of traditional mail. In response, postal service providers offer new e-mail services to end users by diversifying their services.

The strategy reflects the policy of Bosnia and Herzegovina in the field of development of the postal services market, and is harmonized with the general government policy regarding the protection of freedom of market competition, the promotion of the interests of the economy, citizens and users of postal services, ensuring the availability and sustainability of the universal service, the development of new postal services, protection interests of service users with special needs and the role of postal services in synergy with communication and transport infrastructure and services.

Keywords: **ITC technologies, e-mail services, e-transfer**

1. Terms of e-mail service development

The strategy reflects the policy of Bosnia and Herzegovina in the field of development of the postal services market, and is harmonized with the general government policy regarding the protection of freedom of market competition, the promotion of the interests of the economy, citizens and users of postal services, ensuring the availability and sustainability of the universal service, the development of new postal services, protection interests of service users with special needs and the role of postal services in synergy with communication and transport infrastructure and services.

In today's environment, it is necessary to observe the following factors that affect the development of the postal services market:

- economic activities (economic development, structure of economic activities and number of companies,
- population (number of inhabitants, number of households and age of the population),
- digitization (various forms of electronic communication such as SMS, e-mail, social networks),
- prices (prices are affected by market regulation, unit price calculation, competition, user sensitivity, as well as the costs of using so-called non-postal channels),
- other factors (cultural differences, level of education, level and structure of income).

In addition to the above factors, new key areas that directly affect the future development of the postal services market are the areas of: e-commerce, e-mail services, direct mail in a multimedia environment and sustainable environmental development.

The influence of information and communication technologies on the postal system can be observed in two areas, namely as an influence on the physical component and as an influence on the information component. E-mail services (electronic postal services) are services provided by postal service providers to end users through information and communication channels, such as the Internet as the main delivery channel for e-mail services. ICT technologies have significantly changed the ways of communication and thereby influenced the reduction of the amount of traditional mail. In response, postal service providers offer new e-mail services to end users by diversifying their services. E-mail services are divided into four categories of services [20], although there is a mutual connection between them: e-mail, e-commerce, e-financial services, e-government.

Regarding the amount of postal items, two trends can be distinguished. On a global level, the amount of letter shipments has been continuously decreasing in the last few years.

It is a realistic assumption, that is, it is realistic to expect that this trend will continue in the near future. Contrary to the negative trends in the number of postal items, the amount of parcels is continuously growing, primarily thanks to the growth of e-commerce and the need for physical delivery of goods and products.

2. Defining e-mail services according to UPU

Encouraging the further development of existing services in e-commerce, technological progress and the development of the postal market create new opportunities for the development of e-services, which many postal service providers have not yet responded to. Therefore, the UPU study "Measuring the development of postal e-services" aimed to respond to these needs and show trends in the development of new electronic services in the postal sector.

[20]Measuring postal e-services development, Electronic Postal Services Programme, UPU, 2012, http://www.upu.int/en.html , access date: 20.07.2016.

UPU defines postal e-service as follows: a service that postal service providers offer to their end users through information and communication technologies. The Internet is the main channel for the consumption of e-mail services, while other channels of electronic communication (eg mobile phones, call centers or television channels) are also used to a lesser extent for the purpose of using these services. According to the list from the UPU study, e-services of interest to postal service providers are listed in the following table:

Table 1: e-mail services of interest to postal service providers

e-financing services	
Service	Service description
Electronic issuing of invoices	A service where users receive electronic invoices for products and services provided by the post office
Electronic account management	It enables users to manage their financial postal account electronically and perform related operations
Electronic remittance	It enables the cash transfer of money through electronic orders that replace those that are in paper form
Online bill payment	It enables the payment of bills through the website of the post office, which implies the development of a specialized on-line payment system
Account management	It provides users with the opportunity to make online payments and manage accounts through a specialized electronic account
e-payment of water bills	Water bill payment through the online system
e-payment of electricity bills	Payment of electricity services through the online system
e-payment of the telephone bill	Payment of telephone services through the online system
Electronic money transfer	A service that allows the transfer of funds from the sender's account to the recipient's account through the mail.

E-commerce services	
Service	Service description
Online shop of philatelic products	Users can purchase philatelic products online through; are delivered to a physical address
Online store of postal products	Users can purchase postal products online through; are delivered to a physical address
Online store of non-postal products	Users can purchase non-postal products online through; are delivered to a physical address
Subscription to magazines	Users can subscribe to oline magazines via; are delivered to a physical address
Web service and e-commerce contact	The service allows a user with an electronic online account and a unique contact identifier to manage and search operations related to e-commerce transactions.

SSL web certificates	The Post Office issues SSL certificates for website security

E-government services	
Service	Service description
Digital identity	The Post Office issues a digital identity that serves for the legal identification of its users. Digital identity can be secured by simple electronic authentication using a password or by using more secure authentication technologies that use cryptography and public key infrastructure
Renewal of driver's license	Users can renew their driving licenses electronically
Online purchase of tickets for cultural and/or sports events	The service on the postal website allows customers to buy and print tickets for cultural and/or sports events
Electronic university registration	Students can apply to the university using postal electronic registration systems
Electronic payment of pensions	Pensions are paid to users using postal electronic payment systems
Online passport application	Users can apply for a passport through the postal website
Electronic management of personal files for patients	Users can manage their medical files using specialized postal electronic systems
Electronic medical certificates	Users can issue electronic medical certificates through postal specialized electronic systems
Electronic collection of public health commissions	Users can pay public health commissions electronically
Electronic documents for export	Users can electronically submit the necessary information to the competent authorities before sending the item abroad
Electronic customs documents	Users can electronically submit useful information to competent authorities before importing or exporting items.

Email services	
Service	Service description
Access point to the public Internet in post offices	Users can access the Internet at post offices
Electronic mailbox	It enables the sending of electronic messages from the authorized sender and the delivery and storage of electronic messages and information for the authorized recipient. Defined in Article 14 of the UPU Convention and Article RL 256 R of the Letter Services

	Regulation.
Online direct mail	Delivery of advertising and/or other promotional communications by the post office via electronic means.
Registered e-mail	A secure e-mail service that provides proof of sending and delivery of electronic messages. A secure communication channel for authorized users defined in Article 14 of the UPU Convention and Article RL 256 bis of the Ordinance on Letter Carrier Services. There is a draft UPU functional specification of the standard (S 52).
Electronic stamp	A postage stamp that has been electronically paid for and downloaded, for example, from the postal website or smartphone application. After that, the postage stamp is printed physically or stored in electronic form. It represents the proof of the previous payment of the value of the postal service, usually the electronic stamps have a barcode or RFID reading
Customization of the electronic brand	Electronic brands designed according to customer needs and preferences. For example, the sender can embed his own image in the stamp.
Electronic postal certified stamp	It provides evidence of an electronic event of a certain form at a certain time, involving one or more parties. Defined in Article 14 of the UPU Convention and Article FI 256 of the Ordinance on Letter Carrier Services. The draft UPU functional specification standard (S43) supports this service.
Electronic signature	Enables digital signing of documents
It's a telegram	It enables the creation of telegrams electronically, for example via e-mail or SMS. Telegram is delivered to the recipient in physical form.
e-telegram	Enables the creation of telegrams electronically, for example via e-mail or SMS. Telegram is delivered to the recipient in physical form
e-postcard	It enables the online purchase of a postcard, which is then delivered to the recipient physically or electronically
Online burofax	It enables the transmission of texts or illustrations faithful to the original via fax, as defined in Article RI.254. Rulebook on letter services.
Hybrid mail (physical to electronic)	It allows users to send an original physical message, which is converted into an electronic form for delivery to the recipient. Defined in Article.RI253. Rulebook on letter services.
Postal code search	It allows users to find a postal code online by entering information such as an address, company name or city.
Validation of postal addresses	Allows users to verify their address online. The address is searched in the database of valid street addresses.
Online change of address	It enables users to change their postal address electronically, including through the Internet portal.

Online delivery hold	It allows users to request the suspension of postal deliveries to their address and retention of their mail for a certain period via e-mail, online application or telephone.
Tracking and tracing	It enables users to electronically track and search for postal items.
Electronic notification to the post office about the need to pick up the letter	Users can notify the postal operator electronically (e.g. SMS or e-mail) about a letter that the operator needs to pick up from a certain physical address.
Electronic notification to the recipient that the letter will be delivered	The post office informs the recipient electronically (eg SMS or e-mail) about the letter shipment that will be delivered to a specific address.
Electronic notification to the sender that the letter has been delivered	The post office informs the sender electronically (eg SMS or e-mail) that the letter has been delivered to a certain address.
Electronic notification to the post office about the need to pick up the package	Users notify the post office electronically (eg SMS or e-mail) about the request to pick up a package from a specific physical address.
Electronic notification to the recipient that the package will be delivered	The post office informs the recipient electronically (e.g. SMS or e-mail) about the package that will be delivered to a certain address.
Electronic notification to the sender that the parcel has been delivered	The post office informs the sender electronically (eg SMS or e-mail) that the parcel has been delivered to a certain address.
Online check of mailbox contents	It allows users to check the contents of their physical mailbox by receiving electronic versions of their letters or receiving mail notifications about new shipments.
Web service and contact	Allows users to contact the post office electronically for a service or information via website, e-mail or phone
Applications on mobile devices	Postal services available through smartphone applications.

3. Application of e-mail services in JPBHPOŠTE

By defining the goals and determining the way to achieve them, in the planning process it is necessary to foresee the so-called postal factors that have an impact on future development and trends in the postal services market.

The factors can be divided into:

- internal, which can be influenced in terms of reducing their negative impact (e.g. more effective organization, more suitable personnel structure, etc.),
- external (external), which generally cannot be influenced, but can be monitored by analyzing past trends, and predicting the future impact on the postal services market.

Internal factors that have an impact on postal service providers are: [21]products and services, human resources, service quality, marketing, applied technology, postal network.

The second group, i.e. external factors that have an impact on postal service providers, includes: legislative framework, tariffs, competitive environment, transport infrastructure, economic environment. In the past period, postal service providers based their business primarily on a physical platform for the delivery of letters and packages between B2B, B2C, or C2C users. Electronic communications, the use of the Internet and the development of broadband access technologies and networks require the establishment of a different platform in order to improve business and enable further development.

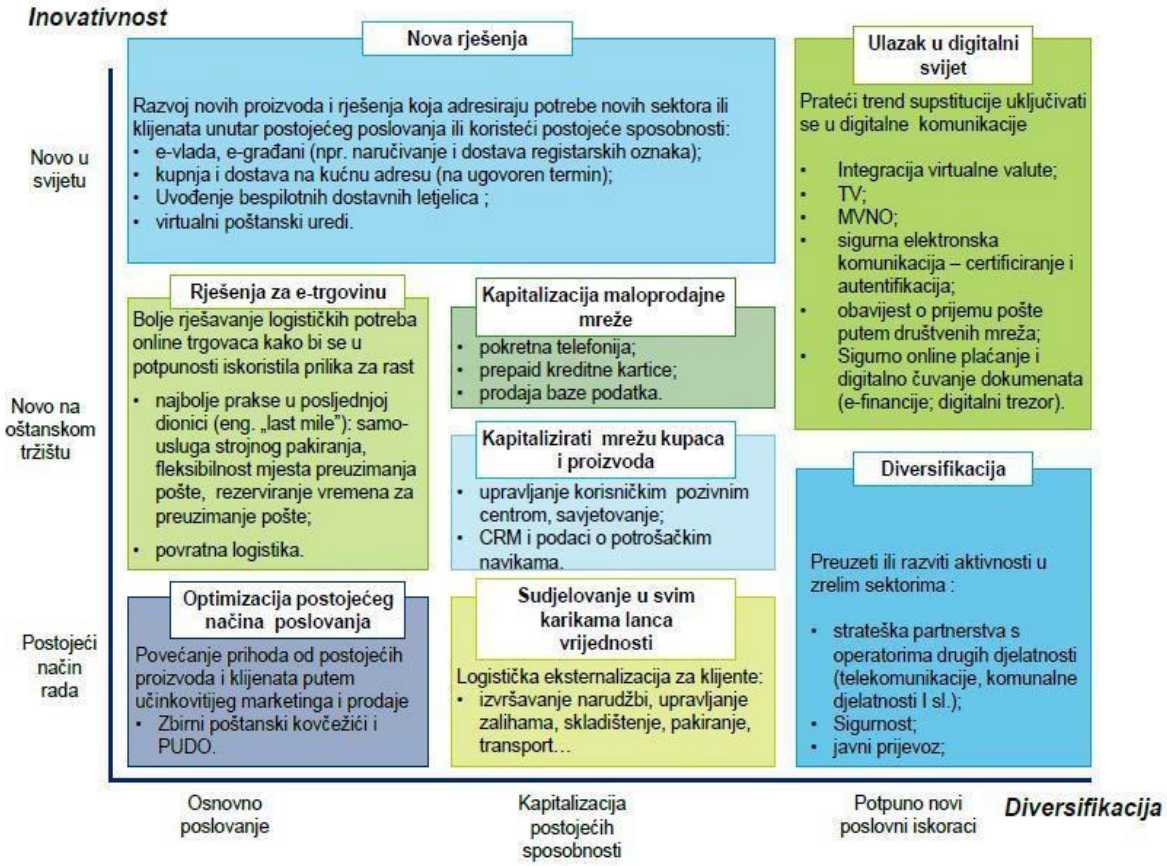

Figure 1. Example of new products and services developed by postal service providers around the world with the possibility of application in JP BH Pošta[22]

[21]Porter, ME: " *Competitive Advantage: Creating and Sustaining Superior Performance* ", 1998.

[22] *Strategy for the development of the postal services market in the Republic of Croatia until 2020,* Ministry of Maritime Affairs, Transport and Infrastructure, Zagreb, 2014, p. 67.

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19. ZASTOJI V CESTNEM PROMETU

POVZETEK

Promet je močno povezan s prebivalstvom. Če ne bi bilo prometa, se tudi človek ne bi mogel gibati iz kraja v kraj. S svojim premikanjem ustvarja nove prometne storitve in druge dejavnosti ter tako vpliva na nacionalno gospodarstvo.

Zastoji v prometu so pogosti pojav. Največkrat se le-ti pojavijo v dopoldanskih in popoldanskih urah, ko gredo v oz. iz službe. Zastoji so lahko posledica prometne nesreče, dela na cesti ali pa zaradi neupoštevanja hitrosti in varnostne razdalje med vožnjo.

Ključne besede: zastoji, fantomski zastoj, promet

1 UVOD

Promet je panoga, ki je močno povezana z nacionalnim gospodarstvom. Vpliva na družbeno delitev dela, kar se odraža v strukturi gospodarstva, predvsem na regionalnem gospodarskem razvoju posamezne države. V svoji proizvodnji ustvarja prometne storitve.

Prometni zamaški so mora večine voznikov po vsem svetu. Poleg nenačrtovanih zamud udeležencem v prometu povzročajo dodatno utrujenost in živčnost. Zastoji imajo tudi močan, negativen vpliv na gospodarstvo in družbo nasploh.

2 PROMET

V teoriji in praksi se na področju prometa pogosto srečujemo z različnimi termini, kot so prevoz, transport, promet, komunikacija …

Teoretiki opredeljujejo pojem promet iz različnih vidikov, ki imajo vsebinsko različne pomene. Pojem promet je predstavljen kot ekonomski termin, npr. denarni promet, blagovni promet. V logistiki pojem promet obsega prenos ljudi, stvari, informacij, denarja in energije iz enega mesta na drugo. Poleg tega pa zajema operacije v zvezi s prevozom blaga, potnikov in komunikacije.

Promet je sistem, ki je sestavljen iz podsistemov oz. prometnih panog, ki jih vrednotimo z enotnimi merili, kjer obravnavamo tehnični, tehnološki, organizacijski, ekonomski in pravni vidik.

Tehnični vidik predstavlja osnovni sloj, sestavljajo pa ga:
- transportna sredstva, s pomočjo katerih se opravljajo transportne operacije;
- poti, po katerih se gibljejo transportna sredstva;
- prometna vozlišča, v katerih se opravljajo začetno – končne pretovorne operacije;
- prometna infrastruktura.

Tehnološki vidik predstavlja osnovni proces za proizvodnjo prometnih storitev. Zajema tri faze, in sicer (Medeot, 2005):
- tehnologijo priprave prevoza,
- tehnologijo izvedbe prevoza,
- tehnologijo zaključevanja prevoza.

V tehnologiji priprave prevoza se pripravi prevozna sredstva, osebje, ki bo prevoz opravilo, in vsa ostala dela organizacije. Tehnologija izvedbe prevoza zajema vse operacije od trenutka natovarjanja tovora v prevozno sredstvo do trenutka predaje in raztovarjanja tovora. V tehnologiji zaključevanja prevoza se obračunajo stroški, rešujejo morebitne reklamacije in analizira se celoten transportni proces.

Organizacijski vidik se nanaša na zakonitosti, znanja, sposobnosti, organizacijo upravljanja in vodenja prometnih sistemov. Ima močan vpliv na organizacijo projektiranja, izgradnjo, proizvodnjo in vzdrževanje prometne infrastrukture.

Ekonomski vidik predstavlja promet kot del gospodarstva. Promet je namreč posebna dejavnost materialne proizvodnje, pri kateri človek deluje s prometnimi sredstvi na predmete dela (blago, potniki), in pri tem ustvarja novo prometno storitev, ki je del narodnega gospodarstva.

Pravni vidik se nanaša na upoštevanje nacionalne in mednarodne zakonodaje, ki urejata obveznosti, odgovornosti in pravice med sodelujočimi v procesih proizvodnje prometne storitve.

3 ZASTOJI V PROMETU

3.1 ZASTOJI

Prometni zastoj predstavlja stanje prometne infrastrukture, ob katerem se zaradi njene povečane uporabe začne zmanjševati hitrost prometnega toka, posledično pa podaljševati časi voženj ter nastajati kolone. V cestnem prometu se le-ti odražajo v upočasnitvi prometnega toka, v skrajnem primeru tudi v njegovi zaustavitvi (Beno, 2009).

Prometni zastoji so vse pogostejši del našega vsakdana. Razlog za to je, da se količina vozil nenehno povečuje, infrastruktura pa temu trendu ne more slediti. Nekateri prometni zastoji so posledica prometne nesreče, dela na cesti ali drugih izrednih dogodkov. Ker se v vsaki dan v službo vozim po avtocesti, se bom osredotočila na zastoje na teh cestah.

Slika 10: Zastoj zaradi dela na cesti

Vir: https://novice.svet24.si/clanek/novice/slovenija/62a1e00c9e55a/poleti-brez-gradbisc-na-primorskem-in-gorenjskem-kraku

Slika 11: Zastoj zaradi prometne nesreče

Vir: https://www.slovenskenovice.si/kronika/doma/foto-to-je-nesreca-ki-je-ohromila-dolenjko-avtocesta-bila-zaprta-tri-ure/

Slika 12: Zastoj zaradi vremenskih razmer

Vir: https://www.pomurec.com/vsebina/46398/Novih_20_cm_snega_na_vzhodu_drzave?_Temperature_do_-15

Avtocesta velja za najvarnejšo cesto, kjer je glede na število vozil in prevoženo razdaljo manj nesreč kot na ostalih cestah. Z vožnjo po avtocesti se lahko prihrani veliko časa. Z načinom vožnje vsak voznik vpliva na pretočnost in varnost na avtocesti. Ta bo bolj tekoč in bolj varen s pravilno izvedenimi manevri prehitevanja in vračanja na desni prometni pas. Toda nekateri vozniki uporabljajo levi prometni pas za vožnjo po avtocesti, pri tem pa pozabljajo, da je namenjen zgolj prehitevanju (Transport logistika, 2020).

Zaradi neupravičene uporabe levega prometnega pasu se hitrost vseh voznikov posledično zniža, v času prometnih konic pa se promet večkrat ustavi. Pretočnost prometa postane slabša in hitrost vozil se zmanjša, kar vodi do zastojev ter nestrpnost med vozniki.

3.2 FANTOMSKI ZASTOJI

Na avtocesti se pogosto pojavljajo zastoji, ki nastanejo iz nič. Na primer, ko se po avtocesti peljemo 130 km/h, pred nami nastane kolona in najprej zaviramo, se počasi premikamo meter za metrom, morda tudi ustavimo, nato pa, kot da se ni nič zgodilo zopet vozimo 130 km/h. Takim zastojem pravimo fantomski zastoji.

Slika 13: Fantomski zastoj

Vir: https://www.delo.si/novice/slovenija/stajerska-avtocesta-spet-prevozna-toda-zastoji-so-na-stevilnih-cestah/#!?logout

Fantomski zastoji izvirajo iz premajhne varnostne razdalje med avtomobili oziroma premalo konstantne hitrosti prometa oziroma ravnanja voznikov.

Ključna sestavina za nastanek fantomske kolone je hitrost ali, pravilneje, njeno pogosto, nenadno, naključno in močno spreminjanje smeri vožnje. Da se teza potrdi, so strokovnjaki naredili test tako, da so ustvarili svojo fantomsko kolono.

V krog postavili deset avtomobilov, voznike pa prosili, da vozijo, kar se da enakomerno s hitrostjo 50 km/h. Položaj je podoben počasni vožnji v prometni konici na kateri koli od prometno obremenjenih cest.

Vozniki so se sicer trudili držati dogovorjene hitrosti, ampak ker vozniško vedenje ni povsem brezhibno in ker ne morejo vsi ohranjati hitrosti pri natančno 50 km/h, vozijo enkrat malo hitreje, drugič malo počasneje. To je povzročilo spreminjanje razdalje med avtomobili in učinek elastike oziroma nenehno pospeševanje in zaviranje. Če vozila zadaj dohitevajo stoječo ali počasi premikajočo se kolono hitreje, kot uspe tistim na začetku kolone pospešiti, pride do vmes do ustavitve, torej kolone. Če je na cesti veliko avtomobilov, je dovolj, da že manjša skupina vozil z nenadnim ali močnejšim spreminjanjem hitrosti sproži verižno reakcijo in že čez nekaj trenutkov imamo stoječo kolono (Gregor, 2017).

Fantomskim zastojem se lahko izogne z vožnjo na ustrezni varnostni razdalji. To pomeni, da morajo vozniki pravočasno prilagajati hitrost vožnje prometnemu toku in spremljati dogajanje prometa tudi daleč pred seboj. Zelo pomembno je tudi, da čim manj vozijo po levem pasu, menjavo prometnih pasov pa izpeljejo brez vpletanja drugih vozil – torej da se ne vrivajo v kolono. Vozniki s takšno vožnjo ogrožajo vse udeležence v prometu. V skrajnem primeru pride v takšnih okoliščinah tudi do naleta vozil (Transport logistika, 2020).

3.3 FINANČNI VIDIK ZASTOJEV

Prometni zastoji in gneče povzročajo veliko gospodarsko škodo. Zaradi prometnih zamaškov vsako leto izpuhti več sto milijard dolarjev svetovnega bruto domačega proizvoda (BDP). Na Gospodarski zbornici Slovenije so izračunali, da naj bi samo zaradi zastojev pri prevozu blaga in ljudi na leto izgubili skoraj sto milijonov evrov.

Zastoji imajo večplastne učinke na gospodarstvo. Znižujejo produktivnost prebivalstva – ljudje, ki so na cesti, namreč niso v službi. Tudi če preživljajo »asfaltne urice« zunaj delovnega časa, so zaradi tega pogosto bolj utrujeni in zlovoljni. Gneča pomeni zamude pri transportu, kar zvišuje stroške podjetij in posledično sili k zvišanju končnih cen izdelkov, ki jih kupujejo potrošniki. Posledici sta torej oteženo poslovanje podjetij in tudi malenkost nižja potrošnja. Dolge kolone avtomobilov pomenijo večjo verjetnost okvare vozil, pri tem pa precej povečujejo porabo goriva in s tem količine škodljivih izpustov v ozračje (Bratanič, 2017).

Kljub vsem izračunom se bodo stroški zaradi zastojev v prihodnje še povečevali, predvsem zato, ker razvoj infrastrukture zaostaja za rastjo uporabe avtomobilov.

4 ZAKLJUČEK

Gneča in zastoji na cestah nemalokrat povzročajo nejevoljo udeležencev v prometu, hkrati pa tudi ogromno škodo v gospodarstvu.

Velikokrat nastanejo tako imenovani fantomski zastoji zaradi neustrezne vožnje voznikov, predvsem v času prometnih konic. Takrat hitrost zaradi povečanega števila vozil bistveno pade. Zato morajo vozniki večkrat celo nepričakovano ustaviti, kmalu za tem pa spet voziti tako, kot da se ni nič zgodilo. Gre za posledico vožnje na prekratki varnostni razdalji, poznega zmanjševanja hitrosti ob dohitevanju počasnejših vozil in menjave prometnih pasov (prehitevanje), zaradi katere so drugi vozniki prisiljeni zmanjšati hitrost.

Za rešitev problema nastanka fantomskega zastoja obstaja zelo preprosta rešitev: povečanje varnostne razdalje, vožnja s kar najbolj konstantno hitrostjo in ne prepogosta menjava voznih pasov. Rešitev je še v tehnologiji avtomobilov, in sicer v uporabi aktivnega tempomata. Ko varnostno razdaljo določi radarski tempomat in ko zavira in pospešuje samodejno, počne to veliko učinkoviteje kot človek.

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19. CONGESTION IN ROAD TRAFFIC

SUMMARY

Transport is strongly connected with population. If there were no traffic, we would not be able to move from one place to another. Through movement, one creates new transport services and other activities thus affecting national economy.

Traffic jams are a common occurrence. Most of the time, they appear in the morning and afternoon hours, when they go to or from work. Traffic jams can be the result of a traffic accident, road work or due to failure to observe the speed and safety distance while driving.

Key words: congestion, phantom congestion, traffic/transport

1 INTRODUCTION

Transport is strongly associated with national economy. It affects division of labour, reflected in structure of economy, especially in regional economic development of each country. It creates transport services in its production.

Traffic jams are a nightmare for most drivers around the world. In addition to unplanned delays, they cause road users additional fatigue and nervousness. Congestions also have a strong, negative impact on the economy and society in general.

2 TRANSPORT

In theory and practice, term transport can often refer to transport, traffic, communication, …

Theorists define the concept of transport from different aspects, which have different meanings. Term transport is presented as an economic term, e.g. money circulation, trade. In logistics, the concept of transport involves transfer of people, things, information, money and energy from one place to another. Furthermore, it covers operations related to transport of goods, passengers and communications.

Transport is a system consisting of subsystems/transport industries, evaluated by single criterion, where technical, technological, organizational, economic and legal aspects are to be taken into account.

Technical aspect is the basis consisting of:
- means of transport, by which transport operations are carried out;
- routes, where transport moves;
- transport hubs, where initial/final operations are performed;
- transport infrastructure.

Technological aspect is the basic process for production of transport services. It covers three phases, namely (Medeot, 2005):
- transport preparation technology,
- transport technology,
- transport termination technology.

Technology of transport preparation requires means of transport, personnel performing transport and other integral parts of organization. Transport technology covers all operations from the moment cargo is loaded into means of transport to the moment the cargo is handed over and unloaded. In termination technology, costs are calculated, possible complaints are resolved and entire transport process is analysed.

Organizational aspect refers to laws, knowledge, skills, organization and traffic/transport management. It has a strong influence on system of design, construction, production and transport infrastructure maintenance.

Economic aspect refers to transport as part of the economy. Namely, transport is special production activity, where one operates with means of transport on objects of work (goods, passengers) thus creating new transport service, which is part of national economy.

Legal aspect refers to national and international legislation governing obligations, responsibilities and rights between participants in the processes of production of transport services.

3 CONGESTION IN TRAFFIC

3.1 CONGESTION

Traffic congestion represents the condition of the transport infrastructure, when, due to its increased use, the speed of the traffic flow begins to decrease, and as a result, driving times increase and queues form. In road traffic, these are reflected in the slowing down of the traffic flow, in the extreme case, in its stopping (Beno, 2009).

Traffic jams are an increasingly frequent part of our everyday lives. The reason for this is that the amount of vehicles is constantly increasing, and the infrastructure cannot keep up with this trend. Some traffic jams are the result of a traffic accident, roadworks or other emergency events. Since I drive to work on the highway every day, I will focus on congestion on these roads.

Figure 14: Congestion due to road work

Source: https://novice.svet24.si/clanek/novice/slovenija/62a1e00c9e55a/poleti-brez-gradbisc-na-primorskem-in-gorenjskem-kraku

Figure 15: Congestion due to traffic accident

Source: https://www.slovenskenovice.si/kronika/doma/foto-to-je-nesreca-ki-je-ohromila-dolenjko-avtocesta-bila-zaprta-tri-ure/

Figure 16: Congestion due to weather conditions

Source: https://www.pomurec.com/vsebina/46398/Novih_20_cm_snega_na_vzhodu_drzave?_Temperature_do_-15

The highway is considered to be the safest road, where, given the number of vehicles and the distance traveled, there are fewer accidents than on other roads. Driving on the highway can save a lot of time. Every driver influences the flow and safety of the highway by the way they drive. This will be smoother and safer with correctly executed overtaking maneuvers and returning to the right traffic lane. But some drivers use the left lane to drive on the highway, forgetting that it's only for overtaking (Transport logistika, 2020).

Due to the unjustified use of the left traffic lane, the speed of all drivers is consequently reduced, and traffic stops several times during rush hours. The flow of traffic becomes worse and the speed of vehicles decreases, leading to congestion and impatience among drivers.

3.2 PHANTOM CONGESTION

There are often congestion on the highway that come out of nowhere. For example, when we are driving 130 km/h on the highway, a convoy forms in front of us, and first we brake, slowly move meter by meter, maybe even stop, and then, as if nothing had happened, we drive 130 km/h again. Such congestion is called phantom congestion.

Figure 17: Phantom congestion

Source: https://www.delo.si/novice/slovenija/stajerska-avtocesta-spet-prevozna-toda-zastoji-so-na-stevilnih-cestah/#!?logout

Phantom congestion originate from too little safety distance between cars or too little constant speed of traffic or the behavior of drivers.

The key ingredient for the formation of a phantom column is speed or, more correctly, its frequent, sudden, random and strong changes in driving direction. To confirm the thesis, the experts made a test by creating their own phantom column.

Ten cars were placed in a circle and the drivers were asked to drive as steadily as possible at a speed of 50 km/h. The situation is similar to driving slowly during rush hour on any of the busy roads.

The drivers did try to keep to the agreed speed, but since their driving behavior is not entirely flawless and since not everyone can keep the speed at exactly 50 km/h, they drive sometimes a little faster and sometimes a little slower. This caused the distance between the cars to change and the rubber band effect, i.e. constant acceleration and deceleration. If the vehicles behind catch up with a standing or slowly moving column faster than those at the beginning of the column manage to accelerate, there is a stop in between, that is, the convoy. If there are many cars on the road, it is enough for even a small group of vehicles to start a chain reaction with a sudden or stronger change in speed, and after a few moments we have a standing convoy (Gregor, 2017).

Phantom congestion can be avoided by driving at an appropriate safety distance. This means that drivers must adjust their driving speed to the traffic flow in time and monitor the traffic even far ahead. It is also very important that they drive in the left lane as little as possible, and that they change lanes without interfering with other vehicles - that is, that they do not squeeze into the convoy. Drivers who drive like this endanger all road users. In the extreme case, in such circumstances, vehicles collide (Transport logistika, 2020).

3.3 THE FINANCIAL ASPECT OF CONGESTION

Congestion cause a lot of economic damage. Hundreds of billions of dollars in global gross domestic product (GDP) are wiped out by traffic jams every year. The Chamber of Commerce of Slovenia has calculated that almost one hundred million euros are lost per year due to congestion in the transport of goods and people alone.

Congestion has multi-faceted effects on the economy. They reduce the productivity of the population - people who are on the road are not at work. Even if they spend "asphalt hours" outside of working hours, this often makes them more tired and grumpy. Congestion means delays in transport, which increases the costs of companies and consequently forces an increase in the final prices of products that consumers buy. The consequences are therefore a more difficult business for companies and also a slightly lower consumption. Long queues of cars mean a higher probability of vehicle breakdowns, and at the same time significantly increase fuel consumption and thus the amount of harmful emissions into the atmosphere (Bratanič, 2017).

Despite all the calculations, congestion costs will continue to increase in the future, mainly because the development of infrastructure lags behind the growth in car use.

4 CONCLUSION

Congestion on the roads often cause inconvenience to road users, and at the same time cause enormous damage to the economy.

So-called phantom congestion often occur due to inappropriate driving by drivers, especially during rush hour. Then the speed drops significantly due to the increased number of vehicles. As a result, drivers often have to stop unexpectedly, and shortly afterwards drive again as if nothing had happened. It is the result of driving at too short a safety distance, slowing down late when overtaking slower vehicles and changing lanes (overtaking) which forces other drivers to slow down.

There is a very simple solution to the problem of phantom traffic jams: increasing the safety distance, driving at as constant a speed as possible and not changing lanes too often. The solution lies in car technology, namely in the use of active cruise control. When the safety distance is determined by the radar cruise control and when it brakes and accelerates automatically, it does so much more efficiently than a human.

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EKONOMSKA ŠOLA MURSKA SOBOTA
SREDNJA ŠOLA IN GIMNAZIJA
NORŠINSKA ULICA 13, 9000 MURSKA SOBOTA

20. HLADNA LOGISTIKA JUŽNEGA IN TROPSKEGA SADJA

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POVZETEK

Globalizacija omogoča skoraj neomejen transport tropskega oziroma eksotičnega sadja iz vseh delov sveta. Ker je transport dolgotrajen, je za ohranitev svežine in kakovosti sadja potrebno vzdrževati hladilno verigo skozi celotno oskrbovalno verigo, vse do kupca, torej med prevozom skladiščenjem, pri prodaji in manipulacijah s sadjem. Hlajenje sadja upočasnjuje zorenje sadja in preprečuje kvar. Področje hladne logistike sadja ureja logistični standard IFS, katerega sestavni del je tudi standard HACCAP. Posebno pozornost je potrebno posvetiti prevozu, ki je večinoma dolgotrajen. Sadje se prevaža v hladilnih vozilih, ki imajo lahko vgrajene različne sisteme za vzdrževanje konstantne temperature. Ves čas je potrebno imeti tudi nadzor nad temperaturo v vozilu. Sadje skladiščimo v kondicioniranih skladiščih, kjer vzdržujemo nizke temperature, poleg tega pa atmosfero z nizko količino kisika in povečano količino ogljikovega dioksida, ter visoko zračno vlažnostjo. S tem upočasnimo proces zorenja sadja. V sodobnih hladilnicah pa imajo tudi sisteme za zorenje sadja - zorilne komore, v katerih dozorijo sadje, ko ga zmanjka na trgovskih policah. Proizvajalci sadja dostikrat posegajo tudi po raznih kemičnih in fizikalnih postopkih, s katerimi preprečijo kvar sadja, predvsem pri citrusih. Velikega pomena je tudi označevanje sadja s črtnimi kodami in 2D kodo ter s tem zagotavljanje sledljivosti le-tega, s čimer zagotovimo ustrezno varnost in kakovost za potrošnika.

Ključne besede: sadje, hladna veriga, transport, skladiščenje, sledljivost, označevanje sadja

1. UVOD

Kako je lahko sadje, ki ni sezonsko, vedno "sveže" na trgovskih policah?
Svetovna globalizacija omogoča skoraj neomejen transport blaga po svetu. Tako je tudi južnega in tropskega oziroma eksotičnega sadja, na naših policah vedno več. Pripeljejo ga z različnih koncev sveta, ga vmes shranjujejo, da se ne pokvari, in tako ravno prav zrelo prispe na naše police.
Za razliko od lokalno pridelanega sadja, ki praviloma dozori na rastlinah, večina eksotičnega sadja k nam pripotuje še nezrelega, dozorevajo pa ga v zorilnicah in skladiščih.
Zagotavljanje ustrezne kakovosti blaga v celotni logistični verigi je izrednega pomena, predvsem še tedaj, ko gre za pokvarljiva živila, kot je tudi sadje, kjer kvar lahko vpliva na zdravje ljudi. Skrb za ustrezno kakovost se začne že pri proizvajalcu in poteka vse do končnega cilja, to je do potrošnika. Hlajena in zamrznjena živila in drugi izdelki pri transportu zahtevajo posebno pozornost. Izziv je predvsem zagotavljanje ustrezne temperature v celotni verigi – od proizvajalca do prevzemnika. Zato so potrebna nenehna preverjanja temperature na bistvenih kontrolnih točkah in med prevozom. Cilj je, da pride hitro pokvarljivo blago, kot je sadje čim prej in v najboljšem stanju do potrošnika.

2. HLADNA VERIGA ZA ZAGOTAVLJANJE VARNOSTI ŽIVIL

V današnji, moderni družbi, sta zamrzovanje in hlajenje živil pogosto uporabljeni metodi konzerviranja hitro pokvarljivih živil. Proizvodnja zamrznjenih in hlajenih živil je ena izmed najhitreje rastočih panog v živilski industriji, med drugim tudi zaradi časovne stiske posameznika v vsakdanjem življenju. V dobi globalizacije nekatera živila potujejo preko celega planeta, preden pridejo do mize potrošnika.
Hladna logistika je posebna veja logistike, v kateri je treba ves čas, to je od proizvodnje, prevzema blaga, prevoza, skladiščenja, komisioniranja, distribucije, prodaje na trgu in dostave do končnega uporabnika, skrbeti za zahtevano temperaturo.
Hladna veriga pomeni vzdrževanje predpisane, dovolj nizke temperature živila, da ohranimo varnost in čim boljšo kakovost živila v celotni živilski verigi. Le-ta izdelkom omogoča dolgo ohranjati svežino in rok trajanja. Blago se v okviru hladne verige praviloma ohladi ali zamrzne že pri proizvajalcu ali pridelovalcu, nato pa se temperatura vzdržuje na celotni poti, v katero je kot zadnji člen vključen tudi potrošnik. Ohranjati bi jo moral tudi ta.
V okviru logistike hladne verige so pomembni predvsem transport, prevzem blaga in skladiščenje. Zahtevane temperaturne pogoje, ki jih na deklaraciji navaja proizvajalec živil, je treba zagotavljati na vseh stopnjah živilske verige. Vzdrževanje dovolj nizke temperature je ključni preventivni ukrep, ki preprečuje rast in preživetje mikroorganizmov v živilu in zagotavlja kakovost in varnost. Odstopanje od zahtevanega temperaturnega režima lahko privede do okužb in zastrupitev ter sproži kvar.
Živila, ki se prevažajo v zahtevanih temperaturnih pogojih, ohranjajo svoje značilne lastnosti znatno dalj časa od tistih, ki se prevažajo v temperaturno nekontroliranih pogojih. Lahko se začne proces predčasnega zorenja ali notranjega gnitja, ki pri predaji vizualno ni opazen, opazi ga šele kupec, ki po nakupu blaga v trgovini ugotovi, da to ni več kakovostno ali je celo neužitno. Tako sadje je na primer poškodovano (smokve, karambola), nagnito (pasijonka), plesnivo (citrusi), izsušeno (ananas), prezrelo (zmehčan kivi, pikaste banane), itd…
To pomeni, da je bila hladilna veriga prekinjena. Najpogostejši vzrok dostave ogretega blaga v trgovino je neupoštevanje navodil pri vzdrževanju ustreznega temperaturnega režima ali

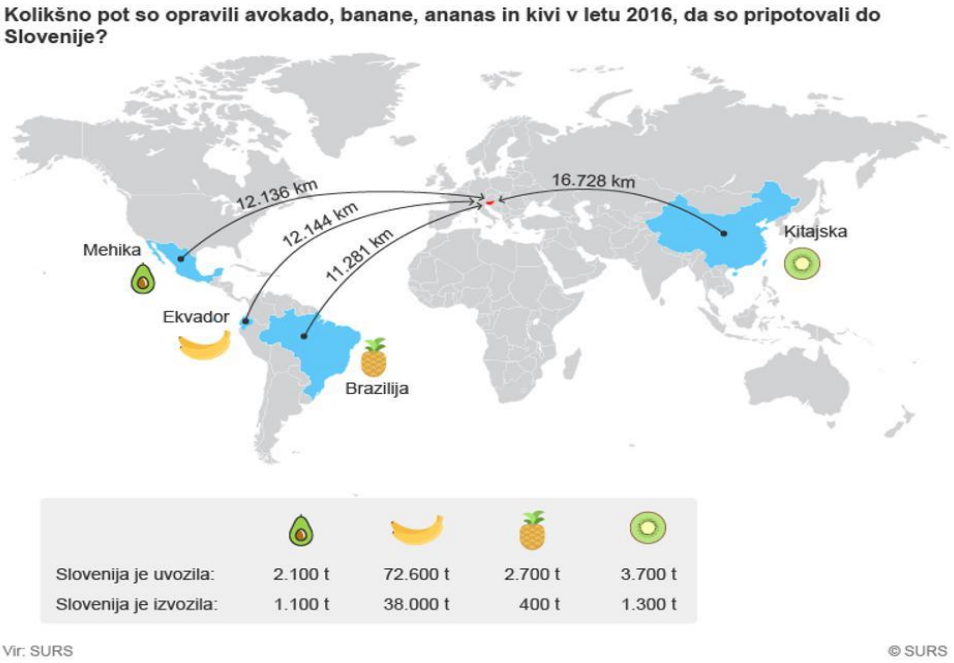
pomanjkanje znanja in izkušenj voznikov. Naročnik bi se moral držati predpisov in zahtevati temperaturni listič, na podlagi tega pa bi blago lahko zavrnil.
Tudi potrošnik je odgovoren za zagotavljanje hladne verige živil med nakupom, prevozom domov in shranjevanjem doma. Hranjenje živil pri potrošniku doma celo eden najbolj kritičnih členov hladne verige. Tega področja namreč ne urejajo zakoni in uredbe in je ravnanje potrošnikov odvisno predvsem od njegove ozaveščenosti.

3. STANDARD IFS IN HACCP SISTEM

Na področju hladne logistike veljajo stroga merila, ki jih striktno kontrolirajo inšpekcijske službe. Najbolje to področje ureja logistični standard IFS (International Food Standard). To je standard za ocenjevanje dobaviteljev živilskih proizvodov, ki zagotavlja sposobnost dobavitelja za izpolnjevanje kriterijev kakovosti in varnosti živil. Obsega skupen cilj trgovine, industrije za ustvarjanje preglednosti in tudi zaupanja vseh vključenih v logistični verigi.
Sestavni del standarda IFS je standard HACCAP (Hazard Analysis and Critical Control Point).
HACCP je mednarodno priznani, zakonsko predpisan sistem za vse, ki delujejo v prehranski verigi, torej za pridelovalce, proizvajalce, trgovce, gostince, ter za transport in skladiščenje živil. Nanaša se na izvajanje higienskih programov ter na nadzor in obvladovanje kritičnih kontrolnih točk v procesu ter zagotavlja najvišjo raven varnosti živil v hladni oskrbovalni verigi. Omogoča identifikacijo oziroma prepoznavanje, oceno, ukrepanje in nadzor nad morebitno prisotnimi dejavniki tveganja v živilih, ki lahko ogrožajo človeka. Cilj vzpostavljenega HACCP sistema je zagotoviti varna živila za potrošnika.

4. PREVOZ SADJA

Eksotično ali tropsko sadje k nam prihaja iz različnih koncev sveta, večinoma po morju s prekooceanskimi kontejnerskimi ladjami ali z letali. Banane prihajajo iz Ekvadorja, avokado iz Mehike, ananas iz Brazilije in kivi iz Kitajske, kar znaša skupno preko 50.000 kilometrov poti, da pride tropsko sadje na naše police.
Pot tropskega sadja na naše trgovske police se začne, ko ga na strogo zavarovanih in pregledanih plantažah oberejo še nedozorelega. Banane na primer od plantaž potujejo do pakirnic od dve do tri ure. Iz pakirnic jih nato takoj peljejo v pristanišče, kjer se natovorijo na kontejnerje ali ladje. Banane se morajo med potjo v treh dneh ohladiti na štirinajst stopinj. Tako ohlajen sadež lahko zdrži do enega meseca, čim pa temperatura naraste, se sproži proces zorenja. Pomembno je tudi pakiranje, da ne pride do poškodb sadežev, ki bi pospešile proces zorenja.



Slika 18: Pot eksotičnega sadja do nas (vir: SURS)

Pri transportu je treba vzdrževati živilu primerno temperaturo in jo zapisovati na termografe ali elektronske termometre, ki izmerke shranjujejo v pomnilniški modul za poznejšo analizo. Ob prevzemu ali predaji se izmeri prevzemna temperatura, ki mora ustrezati tisti, ki je določena za tak prevoz. Če se ob prevzemu oziroma predaji ugotovi, da je temperatura med prevozom odstopala od predpisane, ima naročnik kljub ustrezni prevzemni temperaturi pravico blago zavrniti.
Pred vsakim natovarjanjem sadja v hladilno komoro vozila, je najprej potrebno poskrbeti za čistočo v nakladalnem prostoru oziroma v hladilni komori. Pred natovarjanjem treba hladilno komoro najprej ohladiti oziroma jo pripraviti na zahtevano temperaturo. Blago je potrebno naložiti tako, da omogoči pravilno cirkulacijo zraka v hladilni komori. Tako je v vseh delih hladilne komore enaka temperatura. Temperatura v hladilni komori mora biti ves čas prevoza v območju, ki jo predpiše naročnik prevoza. Na razlagalnem mestu je potrebno poskrbeti tudi za to, da je blago čim manj izpostavljeno vplivom zunanjega okolja. V prevozniškem žargonu pravijo temu prevozi na »NON-STOP«, kar pomeni, da hladilni agregat nenehno vpihava predpisano temperaturo brez stopinje odstopanja.

4.1.Kontejnerski transport tropskega sadja

Večina tropskega sadja pride k nam po morju, s kontejnerskimi ladjami. Plovba je pogosto tramperska. V nasprotju z rednimi ladijskimi linijami, katerih konkurenčna prednost je hitrost, so tramperske ladje konkurenčne zaradi nizke cene, ki si jo lahko privoščijo lastniki, saj za zapolnitev transportnih zmogljivosti pošiljajo ladje od luke do luke brez v naprej znane poti.
Sadje se prevaža v mehansko hlajenih kontejnerjih oziroma reeferjih, ki imajo hladilne agregate za vzdrževanje konstantne temperature na daljših razdaljah. Mehansko hlajeni kontejnerji imajo na tleh rešetke, ki omogočajo enakomeren pretok hlajenega zraka. Hladilna naprava piha ohlajeni zrak v spodnji del kontejnerja, ki se preko rešetk razporedi po tleh in se dvigne navzgor skozi luknje v škatlah s sadjem. Zrak se potem vrne preko prostega prostora pod streho nazaj v hladilno enoto.

Ko pride ladja v Luko Koper, se hlajeni kontejnerji priključijo na električne priključke v pristanišču, kjer krajši čas čakajo na nadaljnji prevoz po cesti ali železnici do odjemalcev.

Hlajene kontejnerje na priključnih mestih v Luki Koper pregledujejo dvakrat dnevno in na osnovi parametrov ugotavljajo morebitne napake na hladilnih sistemih.Za daljše skladiščenje ali zorenje sadja pa imajo v Luki Koper tudi sodobno opremljena, računalniško nadzorovana kondicionirana skladišča z možnostjo reguliranja temperature in vlage ter kroženjem zraka. Poleg skladiščenja opravljajo v pristaniškem skladišču še dodatne storitve, kot je sortiranje in prebiranje, zorenje in paletiziranje banan, tehtanje, pakiranje in etiketiranje.

Slika **2**: Mehansko hlajeni kontejnerji v Luki Koper (vir: lasten)

4.2.Hladilna tovorna vozila

Velikokrat zaradi slabe opreme vozila, neustrezne hladilne naprave, ki so slabo ali neprimerno servisirane, neupoštevanja zakonodaje in predpisov ali nezadostne poučenosti prevoznikov o njih, ni zagotovljena ustrezna temperatura blaga.

Ker je sadje pokvarljivo živilo, ga je potrebno prevažati po standardih sporazuma ATP. Gre za sporazum o mednarodnem prevozu pokvarljivih živil in o specialnih vozilih za njihov prevoz. V skladu z določbami sporazuma ATP, se kot specialna vozila za prevoz pokvarljivih živil lahko uporabljajo tovornjaki, polpriklopniki, vagoni, kontejnerji ali druga vozila, ki imajo certifikat ATP.

V oskrbovalni verigi s sadjem je potrebno vzdrževati konstantno hladilno verigo pri temperaturi večinoma od 1°C do 5°C. Torej ga moramo prevažati s specialnimi vozili, kot so:

- **Izotermično vozilo:** je termično izolirano vozilo, ki ima karoserijo z izolacijskimi stenami, ki preprečujejo izmenjavo notranje in zunanje toplote.

- **Hladilno vozilo**: je izotermično vozilo, ki z določenim virom hladu omogoča, da se notranjost karoserije ogladi in se taka temperatura tudi vzdržuje najmanj 12 ur. Vozilo ima rezervoarje oziroma akumulacijske posode, namenjene hladilnemu agensu, s čimer se prepreči zguba hladnosti in preprečuje riziko neposrednega stika proizvodov s hladilnim sredstvom. Kot hladilno sredstvo se večinoma uporablja CO_2, katerega z zmanjševanjem tlaka spremenijo v suhi led, ki se injicira v akumulacijsko posodo.

- **Vozilo hladilnik:** je izotermično vozilo z individualno napravo, ki omogoča, da se temperatura znotraj karoserije zniža in se nato stalno vzdržuje. Hladilni agregat je nameščen nad voznikovo kabino vozila. Moderne hladilne naprave med vožnjo poganja dizelski motor, ko pa vozilo stoji, pa se sistem preklopi na elektriko.

Vsa vozila morajo imeti naprave za nadzor temperature v kabini vozila, pri čemer voznik lahko regulira temperaturo. Sistem ga hkrati, s pomočjo temperaturnih senzorjev, opozarja na morebitne napake. Vrata vozil se morajo hermetično zapirati, tla komore pa morajo biti rebrasta, da se omogoči stalno kroženje zraka.

Zakonodaja na področju transporta določa, da lahko prevoze hlajenega blaga izvajajo le prevozniki, ki izpolnjujejo naslednje pogoje: izolacija vozila s certifikatom, hladilna naprava s certifikatom o kakovosti in resničnosti podatkov, zapisovalnik s certifikatom in trajnim zapisom, kjer ostane zapis tudi pet let, sprotno vzdrževanje vozila in hladilne naprave, izobraževanje voznikov v zvezi s pravilnim ravnanjem s hladilno napravo, ustrezen servis.

4.3.Kritične točke prevoza

Najbolj kritične točke v hladni logistični verigi so sam prevoz, poleg tega pa tudi natovarjanje in raztovarjanje. Včasih se zgodi, da pride do velikih nihanj temperature v hladilni komori, kar je lahko posledica okvare hladilnega sistema, nepravilne nastavitve temperature ali daljšega odpiranja vrat. Pri tem igra ključno vlogo voznik vozila. Voznika je potrebno podučiti, kako rokovati s hladilnim agregatom, ki uravnava temperaturo v hladilni komori in s termometrom, ki ga uporablja za preverjanje višine temperature prevzetega blaga.
Čeprav do okvar hladilnega sistema naj ne bi prihajalo, se lahko v redkih primerih zgodi tudi to. Da so to res izjeme, je potrebno hladilne sisteme redno vzdrževati in kontrolirati.

4.4.Nadzor nad prevozom in sledenje

V celotni hladni verigi je za vzdrževanje ustrezne temperature potreben celovit nadzor, še posebej na najbolj kritičnih točkah v verigi. Sledenje cestnim tovornim vozilom je že zelo uveljavljeno v celotni logistiki, še posebej pa je pomembno pri prevozu temperaturno občutljivih izdelkov, kot je sadje.
Pri prevozih v hladni verigi mnoge stranke želijo imeti nadzor nad celotno potjo blaga. Želijo vedeti, kje je njihovo blago in ali je v hladilni komori želena temperatura. V prevozu v hladni verigi se vse bolj uveljavlja sistem stalnega nadzora, kjer stranka v vsakem trenutku ve, kje je njena pošiljka in kakšna je trenutna temperatura v hladilni komori. Temperatura v hladilni komori ne sme odstopati od predpisanih vrednosti. Kaj se z blagom dogaja od skladišča do lokacije razkladanja ne vemo brez kakovostnega sistema spremljanja. Sledenje prevoznika oziroma odgovornost prevoznika poteka od trenutka, ko blago preide na tovorno vozilo in vse do predaje blaga prejemniku. Pri prevozu sadja lahko temperaturo nadziramo z digitalnim termostat termometrom, ki vklaplja in izklaplja napravo na želeni temperaturi. Pri tem temperaturo spremljamo samo vizualno. Drug način je spremljanje temperature z zapisovalnikom, kjer lahko ob dostavi natisnemo podatke o temperaturi in priložimo listič k dobavnici. Temperaturni zapis na celotni transportni poti je tudi zahteva mednarodnega standarda IFS.
Transportna vozila - hladilniki za prevoz sadja so opremljena s sistemom daljinskega nadzora. vzpostavi pisna komunikacija med vozilom in pisarno ter obratno. Spletno spremljanje temperature blaga v realnem času in alarmiranje glede na izbrane kriterije je izjemnega pomena za neoporečnost sadja. Tako lahko v vsakem trenutku vidijo, kje se določeno vozilo nahaja, kakšna je trenutna temperatura hladilne komore, če so vrata komore odprta in podobno. V kolikor pride do odstopanj v temperaturi ali kdo odpira vrata, naprava v vozilu omogoča prenos opozorila oziroma alarm na računalnike v pisarni, na mobilne telefone in, kar je še pomembneje, neposredno vozniku.
Vozila hladilniki imajo vgrajene zapisovalce temperature. Ko voznik razloži blago, se iz zapisovalca temperature natisne listič s podatki o gibanju temperature v hladilni komori v času prevoza. Listič kot dokazno gradivo prejme prejemnik oziroma naročnik blaga, kopijo pa shranijo na sedežu podjetja skupaj z ostalimi dokumenti prevoza blaga.

5. SKLADIŠČENJE JUŽNEGA IN TROPSKEGA SADJA

Po končanem prevzemu se živila prepeljejo v skladišče, od tam pa praviloma v trgovino. Ko pripeljano živilo prevzame naročnik, mora hladno verigo zagotavljati on. Tudi med skladiščenjem je treba zagotavljati ustrezno temperaturo. Določeno sadje lahko shranimo za daljše obdobje, če poskrbimo za primerne razmere. To sadje oberemo nekaj dni prej, preden popolnoma dozori. Tako dosežemo, da bodo sadeži počasi zoreli in ostali užitni dlje časa.

Delovanje industrijskih hladilnic temelji zgolj na fizikalnih postopkih – uravnavanju temperature in sestave zraka v skladišču, ki upočasnjuje biološke procese v sadju, predvsem dihanje. Vsako upočasnjevanje dihanja prinese podaljševanje življenjske dobe ter ohranjanje kakovosti in zrelosti, kakršni sta bili po obiranju. To dosežejo z zniževanjem temperature čim bliže zmrzišču (to je pri temperaturi od 0 - 5 °C), z nizko količino kisika (medtem ko ga je v normalnem zraku nekaj nad 20 odstotkov, ga je v sodobnih skladiščih tudi manj kot pol odstotka), povečano količino ogljikovega dioksida, kar rastlinskemu tkivu zelo oteži dihanje in zračno vlažnostjo 95 odstotkov. Tako ustvarimo za rastlinsko tkivo zelo težke razmere, v katerih se biokemični procesi in s tem ciklus intenzivnega staranja upočasnijo. Sadež po obiranju še naprej diha, pri čemer porablja kisik in izloča ogljikov dioksid, za to pa porablja energijo. Intenzivnost dihanja je odvisna od temperature – primerna je čim nižja. Vsako zmanjšanje temperature za 10ºC namreč povzroči kar desetkratno zmanjšanje intenzivnosti biokemijskih procesov. Sadeži se tako ohranijo nekaj tednov ali celo nekaj mesecev. Primerna temperatura in vlažnost se med različnimi vrstami sadja in različnimi sortami močno razlikujeta.

5.1.Zorenje južnega sadja v zorilnicah

Ker pride veliko sadja k nam še nezrelega, je potrebno umetno ustvariti pogoje za njihovo zorenje, preden gredo na trgovske police. Ves čas v hladilnici tudi spremljajo, kako se sadje odziva na spremembe in kakšne metabolite proizvaja. To omogoča, da posamezne parametre v t. i. nadzorovani atmosferi sproti prilagajajo fiziološkemu stanju ploda.
V sodobnih hladilnicah ponekod uporabljajo tudi postopke, s katerimi neposredno vplivajo na rastlinski hormon staranja etilen, ki ga v zraku zaznamo kot vonj po zorenju sadja. Pri tem se uporablja plin metilciklopropen, naravna snov, ki se veže na receptorje za etilen, naravni zorilni plin, s čimer ga prehiti in še dodatno upočasnjuje zorenje. Gre za tehnologijo "smart fresh" - postopek, ki nima nobenih škodljivih učinkov.
Zorenje se uporablja predvsem za banane in poteka v zorilnicah s pomočjo plina etena oziroma etilena (C_2H_4). Etilen ima v naravi funkcijo rastlinskega hormona, ki povzroča metabolične procese v rastlinah in s tem zorenje.

Slika 3: Zorilnica banan (vir: https://www.google.si/search?q=zorilnica+banan)

Kontrolirano ga vpihujejo v zorilnice in s tem ustvarjajo pogoje za zorenje banan. Jeklenke zorilnega plina vsebujejo navadno 4 ali 5% etilena. Dovajanje etilena se vrši preko zorilnega registra. Nanj je priključena jeklenka z zorilnim plinom ter ventili, s pomočjo katerih se preko cevčic spojita jeklenka zorilnega plina in zorilnica. Ventilatorji ustvarjajo zadostno cirkulacijo zraka skozi palete z bananami. Proces zorenja zahteva poleg prisotnosti etilena tudi ustrezne temperaturne pogoje za začetek zorenja.
Temperatura ploda se meri z vbodnimi tipali in mora biti za začetek zorenja okoli 16°C. V ta namen so na izstopni strani ventilatorjev vgrajeni električni grelci, ki po potrebi segrevajo zrak v zorilnici.
Ob izpolnjenem temperaturnem pogoju se dovede etilen v zorilnico. V tem času je zorilnica zaprta in ima blokiran sistem prezračevanja, ki bi sicer izpihal etilen iz zorilnice. V tem času etilen opravi svojo funkcijo zorenja. Nato se vključi sistem prezračevanja, skladiščene banane pa se po programu ustrezno ohlajujejo pred dokončnim transportom na trgovske police.

6. POSTOPKI PREPREČEVANJA PROPADANJA SADJA

Med dolgo ladijsko potjo sadja, ki prihaja k nam z drugih koncev sveta, je veliko možnosti, da le-to propade in zgnije. Zato v državi pridelave sadja takoj po obiranju ali pred prevozom, sadje, predvsem citruse, pogosto obdelajo s fitofarmacevtskimi sredstvi in voski, da preprečijo kvar.
Kemično obdelavo sadja, ki se je uporabljala za preprečevanje fizioloških bolezni tkiva, so v EU s predpisi odpravili. Površinska obdelava je v Evropi dovoljena edino še za citruse, kot so limone, pomaranče, grenivke in mandarine.
Sredstva, ki so v ta namen dovoljena v Evropi, spadajo v dve skupini:

- **voskanje** citrusov je postopek, kjer na površino nanašajo rastlinske voske (kot so čebelji vosek, karnauba, šelak…), ki preprečujejo izgubo vode in dostop mikroorganizmov do hrane. Ti voski so aditivi, označeni s črko E in so za uporabo v živilih varni;

- **fitofarmacevtska sredstva** ali po domače pesticidi, ki so za zdravje nevarne snovi, zato so lupine citrusov, ki so obdelane z njimi strupene in neužitne. Določena količina teh sredstev lahko prodre tudi v sam plod, vendar v mejnih vrednostih ne predstavlja tveganja za zdravje. Zato so citrusi vključeni v program nadzora nad ostanki pesticidov, ki ga v Sloveniji zagotavlja Uprava RS za varno hrano, veterinarstvo in varstvo rastlin, tako na trgu kot pri uvozu.

Tudi **obsevanje** je ena od metod podaljševanja trajnosti sadja, saj povzroči razbitje DNK v celici tkiva, zaradi česar je odporno proti boleznim, okužbam, poškodbam. Ionizirajoče sevanje se izvaja z nizkimi odmerki gama žarkov ali X žarkov, kar pa je pri nas za uporabo na sadju prepovedano.

7. SLEDLJIVOST IN OZNAČEVANJE SADJA

Poleg zagotavljanja ustrezne temperature eksotičnega sadja, mora biti poskrbljeno tudi za sledljivost in pravilno označevanje sadja, saj to zagotavlja ustrezno varnost in kakovost za potrošnika.
Generalna skupščina Združenih narodov je leto 2021 razglasila za mednarodno leto sadja in zelenjave. Temu se je pridružila tudi GS1 Slovenija, ki je lani izpeljal aktivnosti za večjo varnost in transparentnost preskrbovalne verige sadja in zelenjave.
Od trenutka, ko sadje dozori, se začne dirka na poti do prodajnih polic. Preveč dozorelo sadje lahko izgubi okus in hranila ali celo postane nevarno za zdravje. Zato trgovci pogosto zavrnejo preveč dozorelo sadje, ki pogosto potuje iz države v državo. Pri tem je treba zagotoviti, da podatki o sadju (deklaracije) potujejo skupaj s sadjem, kar predstavlja osnovo za sledljivost.
Ključne prednosti pri izmenjavi podatkov prinaša uporaba standardov GS1 s črtnimi in 2D-kodami ter aplikacijskimi identifikatorji. Standardizirani procesi omogočajo partnerjem v oskrbovalni verigi večjo hitrost in zanesljivost zajema, lažje vodenje podatkov o sledljivosti, ki se avtomatsko beležijo, boljši nadzor nad stroški in upravljanjem zalog ter hitrejše postopke umika in odpoklica sadja, kar zagotavlja večjo varnost. Sledljivost se začne s pravilno označitvijo sadja.

Slika 4: Primer preskrbovalne verige (vir: https://www.gs1si.org/GS1)

Z deklaracijami lahko označujemo maloprodajne enote, transportne enote (škatle, zabojčki, vreče) ali logistične enote (palete). Vse enote pa imajo lahko fiksno ali spremenljivo vsebino (razsuto stanje).

Na embalaži sadja ali v spremnem dokumentu, če se sadje prodaja v razsutem stanju, mora biti jasno navedeno ime in država porekla sadja ter, če je ustrezno, kakovostni razred sadja in sorta. Označeno mora biti tudi, če je sadje bilo tretirano s kakršnimkoli kemičnim ali fizikalnim postopkom preprečevanja kvarjenja in podaljševanja trajnosti.

Na prodajnem mestu mora biti sadje označeno v skladu s pravilnikom. Le-ta pravi, da mora sveže sadje, ki ni predpakirano, imeti označeno poreklo, to pomeni, v kateri državi sveta oz. EU je bilo pridelano. Označba mora biti v bližini prodajne police z izdelkom, označeno mora biti jasno, tako da ni možna zamenjava z drugim izdelkom.

Pri pregledu trenutnega stanja na slovenskem trgu je bilo ugotovljeno, da se za označevanje transportnih enot uporablja samo identifikacijska številka izdelka oziroma pakiranja GTIN-13. Ostali podatki, kot so LOT, država porekla in neto masa, pri transportnih enotah s spremenljivo neto vsebino niso vsebovani v kodah in jih zato ni mogoče zajemati s skeniranjem.

Izjemoma se ponekod uporablja še kodna simbologija GS1-128, ki sicer lahko vsebuje dodatne podatke, vendar ima omejeno zmogljivost na 48 znakov. Večina logističnih enot (palet) pa sploh ni označena z logistično etiketo, kar upočasnjuje postopke prevzema sadja.

Priporočila GS1 Slovenija za označevanje in sledljivost sadja so, da se na etiketah transportnih in logističnih enot podatki zapisujejo s kodnimi simboli oziroma črtnimi kodami in dopolnilnimi 2D kodami simbologije GS1 DataMatrix, ki omogočajo zapis večjega števila podatkov – vse do 2335 znakov. Poleg tega se dimenzije 2D-kod, za razliko od 1D-črtnih kod, ne glede na količino podatkov ne spreminjajo. Kodno simbologijo GS1 DataMatrix. To je mogoče odčitati tudi, če je poškodovana, raztrgana ali slabo natisnjena.

Slika 5: Primera transportnih etiket, ki poleg linearne 1D-črtne kode vsebujeta še 2D-kodo GS1 DataMatrix (vir: https://www.gs1si.org/GS1)

Slika 6: Primer logistične nalepke z 1D kodami in 2D kodo (vir: https://www.gs1si.org/GS1)

Na logistični enoti (paleti) prinaša uporaba dopolnilne 2D-kode hitrejši zajem podatkov. Osnovna simbologija GS1-128 na logistični nalepki, ki je nalepljena na paletizirano enoto, ima namreč omejeno zmogljivost na 48 znakov, ki so zapisani v dve ali tri črtne kode (najnižja je SSCC koda). Posledično je za zajem vseh podatkov treba odčitati vsako kodo posebej, pri 2D-kodi pa so zajeti vsi podatki iz črtnih kod skupaj, zraven pa še država porekla. Zato je potrebno samo eno odčitavanje.

8. ZAKLJUČEK

Sadje na trgovskih policah mora biti že na pogled vabljivo, brez poškodb povrhnjice, raznih peg in otiskov. Ker pa pride iz oddaljenih območij, je zaradi transporta pogosto slabše kakovosti. Težave, s katerimi se srečujemo pri ohranjanju ustrezne kakovosti hladnih živil, so še vedno nezadostno zavedanje vseh členov v pomenu hladne verige. Dosledno je potrebno poskrbeti za hlajenje in ustrezno tretiranje sadja tekom celotne globalne oskrbovalne verige. Z usklajenimi navodili, kontrolo in doslednim nadzorom bi pripomogli k učinkovitejši celotni hladni transportni verigi.
Poleg tega pa je potrebno vedeti tudi, da je za ohranitev kakovosti sadja najpomembnejši čim krajši čas, ki mine od obiranja do uporabe, zato je vredno premisliti tudi o večji uporabi sezonskega sadja, ki prihaja iz bližnjega okolja ali morda kar iz domačega vrta.

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EKONOMSKA ŠOLA MURSKA SOBOTA
SREDNJA ŠOLA IN GIMNAZIJA
NORŠINSKA ULICA 13, 9000 MURSKA SOBOTA

20. COLD LOGISTICS OF SOUTH AND TROPICAL FRUIT

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ABSTRACT

Globalization enables almost unlimited transport of tropical or exotic fruits from all parts of the world. Since transport is time consuming, it is necessary to maintain the cooling chain through the entire supply chain, all the way to the buyer, ie during transportation, storage and manipulation of fruit, in order to preserve the freshness and quality of the fruit. Fruit cooling slows fruit ripening and prevents malfunction. The area of cold fruit logistics is governed by the IFS logistics standard, which is also part of the HACCAP standard. Particular attention must be paid to transport, which is mostly time-consuming. Fruit is transported in refrigerated vehicles, which can have various systems for maintaining constant temperature. It is also necessary to have control of the vehicle temperature all the time. Fruits are stored in conditioned warehouses, where we maintain low temperatures, in addition, an atmosphere with low oxygen content and an increased amount of carbon dioxide, and high air humidity. This slows down the process of ripening fruit. In modern cold stores, they also have systems for ripening fruit - ripening chambers in which fruit is harvested when it runs out on the shelves. Fruit producers often intervene in various chemical and physical processes to prevent fruit failure, especially citrus. Fruit marking and ensuring the traceability of the fruit is also of great importance, thus ensuring adequate safety and quality for the consumer.

Key words: fruit, cold chain, transport, storage, traceability, fruit labeling

1. INTRODUCTION

How can fruit that is not seasonal always be "fresh" on the shelves?
Worldwide globalization allows almost unlimited transport of goods around the world. So there are also southern, tropical and exotic fruits, more and more on our shelves. They are brought from different parts of the world, they are stored in the middle of it, so that it does not break down, and it just comes to our shelves. Unlike locally produced fruits, which usually sprout on plants, most of the exotic fruits come to us even more immature, ripening it in ripening mills and warehouses. Ensuring the proper quality of the goods throughout the logistics chain is of utmost importance, especially when it comes to perishable foods, such as fruit, where the defect can affect human health. Care for the proper quality begins with the manufacturer and goes all the way to the final destination, that is to the consumer. Refrigerated and frozen foods and other products in transport require special attention. The challenge is above all to ensure the proper temperature throughout the chain - from the manufacturer to the transferee. Consequently, constant temperature checks are required at the essential control points and during transport. The goal is to come up with perishable goods like fruit as soon as possible and in the best condition to the consumer.

2. COLD CHAIN FOR PROTECTION OF FOOD SAFETY

In today's modern society, freezing and refrigerating foods are often used to conserve fast foods. The production of frozen and chilled foods is one of the fastest growing industries in the food industry, including, inter alia, the time constraints of an individual in their everyday lives. In the era of globalization, some foods travel across the planet before reaching the consumer's table.
Cold Logistics is a special branch of logistics, in which all the time, from the production, the takeover of goods, transport, storage, ordering, distribution, market sales and delivery to the end user, take care of the required temperature.
A cold chain means maintaining a prescribed, sufficiently low temperature of the food, in order to maintain the safety and the best quality of the food throughout the food chain. These products allow for a long time to maintain freshness and shelf life. Goods are usually cooled or frozen in the cold chain as a rule by the producer or producer, and then the temperature is maintained throughout the path to which the consumer is included as the last. She should have kept this too.
In the context of cold chain logistics, transport, takeover or delivery of goods and storage are important. The required temperature conditions indicated on the label by the food manufacturer must be provided at all stages of the food chain. Maintaining low enough temperature is a key preventive measure that prevents the growth and survival of micro-organisms in the food, and which in addition to safety also ensures the quality of the food. Departure from the required temperature regime can lead to infections and food poisoning and triggers the process of spoilage of foods.
Foods that are transported under the required temperature conditions retain their characteristic characteristics considerably longer than those transported in temperature uncontrolled conditions. A process of premature ripening or internal rotting can begin, which is not visually visible when handing over, only the buyer sees that after the purchase of goods in the store it is no longer quality or even inedible. For example, fruit is damaged (figs, carambola), lean (passionate), mold (citrus), dried (pineapple), overlooked (softened kiwi, spotted bananas), etc.

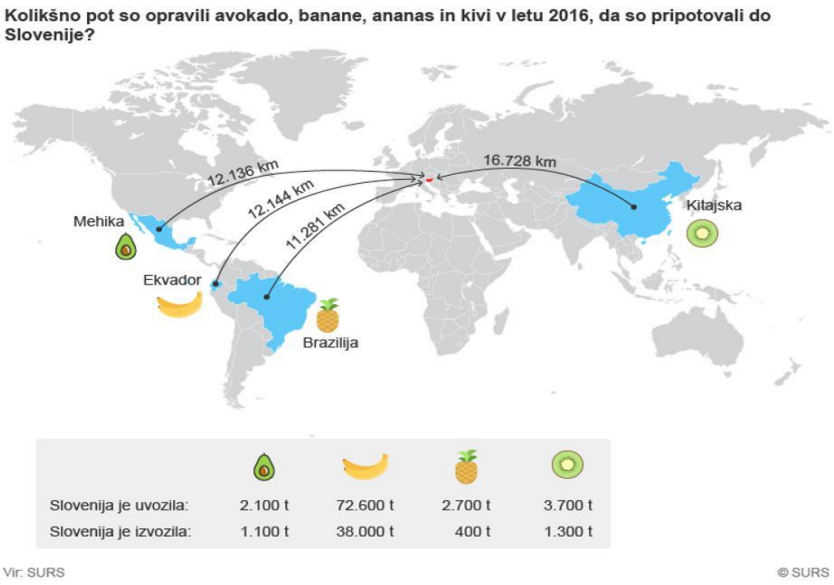
This means that the cooling chain has been interrupted. The most common cause of the supply of warm goods to trade is the failure to comply with the instructions in maintaining an appropriate temperature regime or the lack of knowledge and experience of drivers. The contracting authority should draw the rules and request a temperature leaf, and on this basis the goods could be rejected.
The consumer is also responsible for providing a cold chain of foods when buying, transporting home and storing at home. Feeding food at home even one of the most critical members of the cold chain. These areas are not regulated by laws and regulations, and consumer behavior depends primarily on its awareness.

3. STANDARD IFS AND HACCP SYSTEM

In the field of cold logistics, strict criteria are strictly controlled by the inspection services. Best of all, this is governed by the IFS (International Food Standard) logistics standard. This is a standard for evaluating food suppliers, which ensures the supplier's ability to meet food quality and safety criteria. It encompasses the common goal of trade, industry to create transparency and also the trust of all involved in the logistics chain.
An integral part of the IFS standard is HACCAP (Hazard Analysis and Critical Control Point).
HACCP is an internationally recognized, legally prescribed system for everyone working in the food chain, that is, for growers, producers, traders, caterers, and for the transport and storage of foods. It relates to the implementation of hygiene programs and to the control and management of critical control points in the process and ensures the highest level of food safety in the cold supply chain. It allows identification or identification, assessment, action and control of potentially present risk factors in foodstuffs that may endanger a person. The goal of the HACCP system in place is to provide safe food for the consumer.

4. TRANSPORT OF FRUIT

Exotic or tropical fruits come from different parts of the world, mostly by sea with ocean-going container ships or airplanes. Bananas come from Ecuador, an avocado from Mexico, pineapples from Brazil and kiwi from China, totaling over 50,000 kilometers of paths to bring tropical fruit to our shelves.
The path of tropical fruits to our store shelves begins when it is harvested in strictly protected and inspected plantations by the unharmed. Bananas, for example, from the plantations, travel to packages of two to three hours. They then take them immediately to the port where they are loaded onto containers or ships. Bananas must be cooled to fourteen times during the journey within three days. Such a cooled fruit can last up to one month, as soon as the temperature rises, the maturation process starts. Packaging is also important in order to avoid damaging fruits that will speed up the maturation process.



Picture 19: Transporting exotic fruits to us (source: SURS)

When transporting, the food should be maintained at the appropriate temperature and recorded on thermographs or electronic thermometers, which store the measurements in a memory module for later analysis. At take-over or surrender, the take-off temperature shall be measured, which must correspond to the one specified for such transport. If at the time of takeover or surrender it is established that the temperature during transport deviation from the prescribed, the customer has the right to refuse the goods, despite the appropriate take-off temperature.

Prior to each loading of the fruit into the refrigerating chamber of the vehicle, it is first necessary to ensure cleanliness in the loading compartment or in the cooling chamber. Before loading, the cooling chamber must first cool down or be prepared at the required temperature. Goods must be loaded so as to allow proper air circulation in the cooling chamber. Thus, the temperature is the same in all parts of the cooling chamber. The temperature in the cooling chamber must be during the entire period of transport in the area prescribed by the transferee. At the place of explanation, care must also be taken to ensure that the goods are exposed to the external environment as little as possible. In transport jargon, this service is referred to as "NON-STOP", which means that the cooling unit continuously blows the prescribed temperature without a degree of deviation.

4.1.Container transport of tropical fruits

Most tropical frulit come to uš by sea, with container ships. Navigation is often tramp. In contrast to regular shipping lines whose competitive advantage is speed, tramp boats are competitive because of the low price that owners can afford, as they ship ships from port to port without a well-known route to fill the transport capacity. Fruits are transported in mechanically cooled containers or reefers, which have cooling aggregates for maintaining constant temperature over long distances. The mechanically cooled containers have grate on the floor, which allows a uniform flow of cooled air. The cooling device blows cooled air into the lower part of the container, which is spread across the grids on the floor and rises up through the holes in the fruit boxes. The air then returns through the free space under the roof back to the refrigeration unit. When the ship arrives at the Port of Koper, refrigerated containers are connected to electrical connections in the port, where they wait a short time for further transportation by road or rail to customers.

The refrigerated containers are checked at the ports of Luka Koper twice a day and, on the basis of parameters, they identify possible faults in the cooling systems. For longer storage or ripening of fruit, the Koper also has modern equipped, computer controlled conditioned warehouses with the possibility of regulating temperature and humidity and air circulation. In addition to storage, additional services such as sorting and reading, maturing and palletizing bananas, weighing, packaging and labeling are carried out in the port warehouse.

Picture 20: Mechanically refrigerated containers in Luka Koper (source: own)

4.2.Refrigerated trucks

Often, due to poor vehicle equipment, inadequate cooling equipment that is poorly or improperly serviced, non-observance of legislation and regulations, or insufficient knowledge of carriers about them, the appropriate temperature of the goods is not guaranteed.
Because the fruit is a perishable food, it needs to be transported according to the ATP standards. It is an agreement on the international transport of perishable foods and special vehicles for their transportation. In accordance with the provisions of the ATP Agreement, trucks, semi-trailers, wagons, containers or other vehicles having an ATP certificate may be used as special vehicles for the carriage of perishable vehicles.

In the supply chain with fruit it is necessary to maintain a constant cooling chain at a temperature of mostly 1 ° C to 5 ° C. So we have to transport it with special vehicles, such as:

- **isothermal vehicle: it** is a thermally insulated vehicle that has a bodywork with insulating walls that prevents the exchange of internal and external heat;

- **refrigerant:** it is an isothermic vehicle that, with a specific source of cooling, allows the interior of the body to cool off and maintain such a temperature for at least 12 hours. The vehicle has tanks or storage containers for the cooling agent, thus preventing a loss of coldness and prevents the risk of direct contact of products with a refrigerant. CO2 is used mainly as a refrigerant, which, by decreasing pressure, changes in dry ice that is injected into the storage tank;

- **vehicle refrigerator:** is an isothermal vehicle with an individual device, which allows the temperature inside the body to be lowered and then constantly maintained. The cooling unit is located above the driver's cab. Modern cooling devices drive the diesel engine while driving, but when the vehicle is standing, the system switches to electricity.

All vehicles must have temperature control devices in the vehicle cab, whereby the driver can adjust the temperature. At the same time, the system warns of possible errors by means of temperature sensors. The doors of the vehicles must be sealed and the chambers of the floor must be ribbed to allow constant circulation of the air.
Legislation in the field of transport stipulates that carriage of refrigerated goods can be carried out only by carriers that meet the following conditions: insulation of a certified vehicle, a refrigerating device with a certificate of quality and data validity, a recorder with a certificate and a permanent record, where the record remains for five years maintenance of the vehicle and cooling device, driver training in relation to proper handling of the refrigerating device, proper service.

4.3.Critical points of transport

The most critical points in the cold logistics chain are the transport itself, as well as loading and unloading. Sometimes a large temperature fluctuation occurs in the cooling chamber, which may be due to a fault in the cooling system, incorrect temperature setting or longer door opening. The driver of the vehicle plays a key role in this. The driver should be instructed how to handle the refrigerating unit that regulates the temperature in the cooling chamber and the thermometer it uses to check the height of the temperature of the goods being taken.
Even if the failure of the cooling system does not occur, in some cases this may happen. If these are really exceptions, the cooling systems must be regularly maintained and controlled.

4.4.Monitoring of transportation and tracking

Throughout the cold chain, comprehensive monitoring is required to maintain the proper temperature, especially at the most critical points in the chain. Tracking of road lorries is already well established in the entire logistics industry, and is especially important in the transport of temperature-sensitive products such as fruit.
In cold chain transport, many customers want to have control over the entire route of goods. They want to know where their goods are and whether the temperature in the refrigerator is desired. In cold chain transport, a system of continuous monitoring is gaining ground, where the customer knows at all times where his shipment is and what the current temperature in the cold room is. The temperature in the cooling chamber must not deviate from the prescribed values.
We do not know what is happening with the goods from the warehouse to the location of unloading without a quality monitoring system. The tracking of the carrier or the responsibility of the carrier takes place from the moment when the goods pass over the edge of the truck until the delivery of the goods to the consignee. When transporting fruit, the temperature can be controlled with a digital thermostat thermometer, which turns the device on and off at the desired temperature. The temperature is monitored only visually. Another way is to monitor the temperature with a recorder, where you can print the temperature data on delivery and attach a slip to the delivery note. The temperature record on the entire transport route is also a requirement of the international IFS standard.
Transport vehicles - fruit refrigerators are equipped with a remote control system. establish written communication between the vehicle and the office and vice versa. Real-time online monitoring of the temperature of the goods and alarming according to the selected criteria is extremely important for the integrity of the fruit. This way, they can see at any time where a particular vehicle is located, what the current temperature of the cooling chamber is, if the chamber door is open, and the like. In the event of temperature deviations or someone opening the door, the device in the vehicle allows the transmission of a warning or alarm to computers in the office, to mobile phones and, more importantly, directly to the driver.
Refrigerator vehicles have built-in temperature recorders. When the driver has unloaded the goods, a slip of paper is recorded from the temperature recorder with information on the movement of the temperature in the cold room during transport. The receipt is received as evidence by the recipient or the client of the goods, and a copy is stored at the company's headquarters together with other documents for the transport of goods.

5. STORAGE OF SOUTH AND TROPICAL FRUIT

Upon completion, the foods are transported to the warehouse, and from there, as a rule, they enter the store. Once a food is taken over by a subscriber, the cold chain must be provided by him. Also, the temperature should be ensured during storage. Some fruits can be stored for a longer period if we take care of the appropriate conditions. Fruits for longer storage should be harvested a few days before they fully ripen. This way, the fruit will slowly mature and remain edible longer.

The operation of industrial cold stores is based solely on physical processes - the regulation of the temperature and composition of the air in the store, which slows down the biological processes in the fruit, especially breathing. Any slowing down of breathing results in an extension of the life span and the maintenance of quality and maturity, such as after harvesting. This is achieved by lowering the temperature as close as possible to the freezing point (ie at a temperature of 0-5 ° C), with a low amount of oxygen (while in the normal air it is just over 20 percent, it is also less than half a percent in modern warehouses) an increased amount of carbon dioxide, which makes the plant tissue very difficult to breath and air humidity of 95 percent. This creates a very difficult situation for vegetable tissue in which biochemical processes and, consequently, the intensive aging cycle slow down. After the harvest, the fruit continues to breathe, consuming oxygen and eliminating carbon dioxide, which consumes energy. The intensity of the respiration depends on the temperature - it is suitable as low as possible. Any decrease in temperature by 10 ºC results in a 10-fold decrease in the intensity of biochemical processes. Fruits are thus kept for a few weeks or even a few months. Appropriate temperature and humidity vary greatly between different types of fruit and different varieties. All the time in the refrigerator they also monitor how the fruit responds to changes and what kind of metabolites are produced. This allows individual parameters in t. i. controlled atmosphere adapts to the physiological state of the fetus. In modern cold stores, in some places, they also use procedures that directly affect the vegetation hormone of aging of ethylene, which is perceived in the air as the smell of matured fruit. In this case, gas is a methylcyclopropene, a natural substance that binds to ethylene receptors, a natural gas, which overcomes it and further slows down ripening. This is smart - a process that has no harmful effects.

5.1.Ripening of south fruit

Since a lot of unripe fruit comes to us, it is necessary to artificially create the conditions for their ripening before they go on store shelves. They also constantly monitor how the fruit responds to changes and what metabolites it produces in the refrigerator. This allows individual parameters in t. i. they adjust the controlled atmosphere to the physiological state of the fetus.

In some modern refrigerators, they also use procedures that directly affect the plant aging hormone ethylene, which is perceived in the air as the smell of fruit ripening. Methylcyclopropene gas is used, a natural substance that binds to ethylene receptors, a natural maturing gas, thus overtaking it and further slowing down maturation. It is "smart fresh" technology - a process that has no harmful effects.

Ripening is mainly used for bananas and takes place in ripening plants with the help of ethene or ethylene gas (C_2H_4). Ethylene in nature has the function of a plant hormone, which causes metabolic processes in plants and thus maturation.

It is blown into the ripening plants in a controlled manner, thus creating the conditions for bananas to ripen. Maturing gas cylinders usually contain 4 or 5% ethylene. The supply of ethylene is done through the maturation register. A maturing gas cylinder is connected to it, as well as valves that connect the maturing gas cylinder and the maturing chamber via tubes. Fans create sufficient air circulation through the pallets with bananas.

Picture 3: Banana rippering (vir: https://www.google.si/search?q=zorilnica+banan)

The maturation process requires, in addition to the presence of ethylene, appropriate temperature conditions to begin maturation. The temperature of the fruit is measured with prick sensors and must be around 16 ° C to start ripening. For this purpose, electric heaters are installed on the outlet side of the fans, which heat the air in the maturing room if necessary. When the temperature condition is met, ethylene is fed to the maturing plant. During this time, the ripening room is closed and has a blocked ventilation system that would otherwise blow ethylene out of the ripening room. During this time, ethylene performs its maturation function. Then the ventilation system is switched on and the stored bananas are properly cooled according to the program before the final transport to the store shelves.

6. PROCEDURES FOR THE PREVENTION OF FRUIT PROCESSING

During the long shipping route of fruit that comes to us from other parts of the world, there is a great chance that it will collapse and run. Therefore, in the country of fruit production, immediately after harvesting or before transport, fruit, especially citrus fruits, is often processed with plant protection products and waxes to prevent malfunction.

Chemical processing of fruit used to prevent physiological diseases of the tissue was abolished in the EU by regulations. Surface treatment in Europe is allowed only for citrus fruits, such as lemons, oranges, grapefruits and tangerines.

The funds allowed for this purpose in Europe fall into two groups:

- **waxing of citrus fruit** is a process where vegetable waxes (such as beeswax, carnauba, shellac, etc.) are applied to the surface, which prevents water loss and the access of micro-organisms to food. these waxes are additives marked with the letter e and are safe for use in foodstuffs;

- **plant protection products** or domestic pesticides that are hazardous to health, therefore they are citrus peel that is treated with them toxic and inedible. A certain amount of these agents can penetrate the fetus itself, but it does not present a health risk in the limit values. Therefore, citrus fruits are included in the program for the control of pesticide residues, which is provided in Slovenia by the Food Safety, Veterinary and Plant Protection Administration in Slovenia, both on the market and on imports.

Radiation is also one of the methods of prolonging fruit durability, as it causes a breakdown of DNA in the tissue cell, making it resistant to diseases, infections, injuries. Ionizing radiation is performed with low doses of gamma rays or X rays, which in our country is forbidden for use on fruit.

7. TRACEABILITY AND LABELING OF FRUIT

In addition to ensuring the proper temperature of exotic fruits, care must also be taken to trace and properly label the fruit, as this ensures adequate safety and quality for the consumer.
The United Nations General Assembly has declared 2021 the International Year of Fruit and Vegetables. This was joined by GS1 Slovenia, which last year carried out activities to increase the security and transparency of the fruit and vegetable supply chain.
From the moment the fruit ripens, the race begins on the way to the sales shelves. Too ripe fruit can lose flavor and nutrients or even become dangerous to health. Therefore, traders often reject overripe fruit, which often travels from country to country. In doing so, it is necessary to ensure that fruit data (declarations) travel together with the fruit, which is the basis for traceability.
The use of GS1 standards with bar and 2D codes and application identifiers brings key benefits to data exchange. Standardized processes enable supply chain partners greater capture speed and reliability, easier management of automatically recorded traceability data, better cost control and inventory management, and faster fruit withdrawal and recall procedures for greater security. Traceability starts with the correct labeling of the fruit.

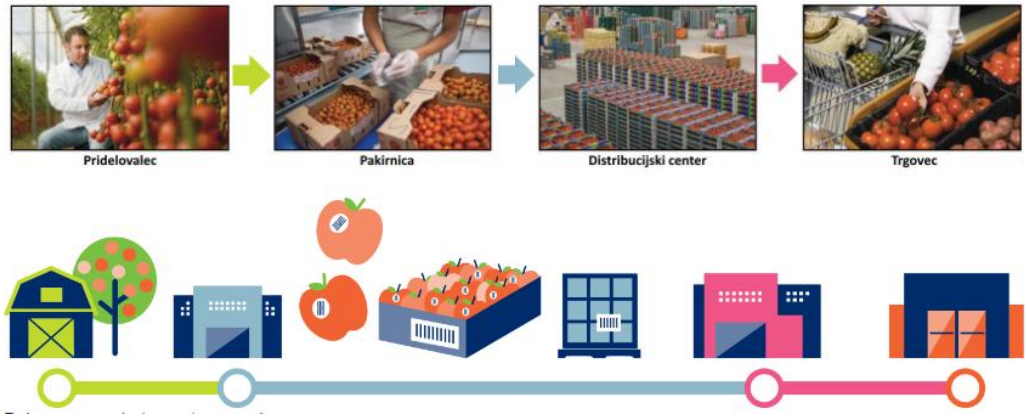


Figure 4: Example of supply chain (source: https://www.gs1si.org/GS1)

Declarations can be used to indicate retail units, transport units (boxes, crates, bags) or logistics units (pallets). However, all units can have fixed or variable content (bulk).
The packaging of the fruit or the accompanying document, if the fruit is sold in bulk, must clearly indicate the name and country of origin of the fruit and, if applicable, the quality class of the fruit and the variety. It must also be indicated if the fruit has been treated with any chemical or physical process to prevent spoilage and prolong shelf life.
The fruit must be marked at the point of sale in accordance with the regulations. It says that fresh fruit that is not pre-packaged must have a marked origin, this means in which country of the world or EU has been harvested. The label must be close to the sales shelf with the product, the label must be clear so that it cannot be confused with another product.
When reviewing the current situation on the Slovenian market, it was found that only the identification number of the product or package GTIN-13 is used to mark transport units. Other data, such as LOT, country of origin and net weight, are not contained in codes for variable net content transport units and therefore cannot be captured by scanning.

Exceptionally, the GS1-128 code symbology is used in some places, which may contain additional data, but has a limited capacity of 48 characters. Most logistics units (pallets) are not marked with a logistics label at all, which slows down the fruit picking process.

GS1 Slovenia's recommendations for fruit labeling and traceability are that data on the labels of transport and logistics units be written with code symbols or bar codes and supplementary 2D codes of GS1 DataMatrix symbology, which enable the recording of a larger amount of data - up to 2335 characters. In addition, the dimensions of 2D codes, unlike 1D bar codes, do not change regardless of the amount of data. GS1 DataMatrix code symbology. This can also be read if it is damaged, torn or poorly printed.

Figure 5: Examples of transport labels which, in addition to the linear 1D bar code, also contain the 2D code GS1 DataMatrix (source: https://www.gs1si.org/GS1)

Figure 6: Example of a logistics sticker with 1D codes and 2D code (source: https://www.gs1si.org/GS1)

On the logistics unit (pallet), the use of a complementary 2D code brings faster data acquisition. The basic symbology of the GS1-128 on a logistics label affixed to a palletized unit has a limited capacity of 48 characters written in two or three bar codes (the lowest is the SSCC code). As a result, each code must be read separately to capture all data, while the 2D code includes all bar code data together, as well as the country of origin. Therefore, only one reading is required.

8. CONCLUSION

Fruit on the shelves must be attractive, without damage to the epidermis, various spots and poisons. However, since it comes from remote areas, transport is often of poorer quality. The problems that we face in preserving the proper quality of cold foods are still insufficient awareness of all the articles in the sense of the cold chain. Consistent care should be taken on the cooling and proper treatment of fruit throughout the global supply chain. With harmonized instructions, control and consistent control, they would contribute to a more efficient whole of the cold transport chain.

In addition, it should also be noted that in order to preserve the quality of fruit, the most important is the shortest time that goes from harvesting to usage, so it is worth considering the increased use of seasonal fruit coming from the nearby environment, or perhaps even from the home garden.

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IV POGLAVLJE

Saobraćajno planiranje i organizacija prevoza

REPUBLIČKI SOVET ZA BEZBEDNOST NA SOOBRAKAJOT NA PATIŠTATA

m-r GORDANA KOŽUVAROVSKA, pretsedatel na RSBSP

21. SOOBRAKAJNO PLANIRANJE – POTREBA ZA POVEKE VELO PATEKI

Apstrakt
Vo tekstot se zboruva za značenjeto i upotrebata na velosipedot, navedeni se pričini za poddrška na velosipedizmot, kako i načini za aplikacija na velozipedizmot vo urbani sredini. Daden e primer za idejno rešenie za primarna velosipedska infrastruktura vo gradot Bitola, RSM.

Klučni zborovi: velosiped, velo pateki, soobrakajno planiranje

VELOSIPEDSKI SOOBRAKAJ

Velosipedskiot soobrakaj **denes se promovira bidejki** e ekološki najodržliva forma na soobrakaj, troši malku energija, ne bara mnogu prostor za dviženje i za parkiranje, e najevtin način na urbana mobilnost i pridonesuva za unapreduvanje na zdravjeto.

Načini na upotreba na velosipedot
Vo nekoi gradovi i zemji postoi razviena infrastruktura i značaen broj patuvanja se pravat so velosiped, dodeka vo drugi velosipedot skoro i da ne postoi.

Sredstvo za davanje transportna usluga

- Rikši, tricikli – velosipedski taksi
- Raznos na mali pratki
- Dostava na prehrambeni produkti (pica, brza hrana)
- Dostava na itni poraki
- Policija na velosipedi


PRIČINI ZA PODDRŠKA NA VELOSIPEDOT

Direkten pristap

- Osven pešačenjeto, velosipedot e sredstvo za transport so koe može direktno da se pristapi do celta na patuvanjeto (door-to-door)
- Velosipedot e kako mehaničko prodolžuvanje na čovečkoto telo
- Vo mnogu slučai se vnesuva i vnatre vo objektite

Mala potrošuvačka na energija

- Ne upotrebuva fosilni goriva
- Ubedlivo najmala potrebna energija
  - Avtomobil so 1 patnik troši okolu 1860 kalorii za da se prejde 1,6 km (1160 kalorii na 1 km)
  - Pešak troši okolu 100 kaloriiza da prejde 1,6 km (62 kalorii po km)
  - Velosipedist troši okolu 35 kalorii za da pomine 1,6 km(22 kalorii po km)

Ne zagaduva

- Nema izduvni gasovi
- Nema bučava

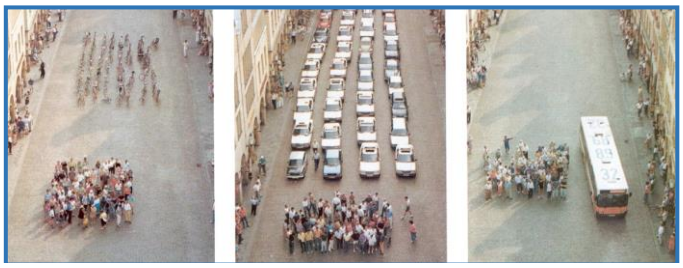
- Nema istekuvanja na masla, benzini i drugi tečnosti
- Polesno se reciklira

Održuvanje na zdravjeto

- Sovremeniot čovek strada od nedovolno dviženje i fizički aktivnosti (srcevi zaboluvanja, visok pritisok, prekumerna težina itn.)
- Dviženjeto so velosiped može da bide povekekratno korisno i zaradi dnevnata fizička aktivnost

Zašteda na prostor

- Velosipedot bara relativno malku prostor za dviženje i miruvanje
- Toj zafaka 2 m^2koga e parkirani okolu5 m^2vo dviženje
- Za sporedba avtomobilot bara 25 m^2za parkiranjei 55 m^2za dviženje
- Samo 5% od avtomobilite samo so vozačako preminat na upotreba na avtomobil, problemot so zakočuvanje na soobrakajotbi bil rešen



Mali javni vložuvanja

- Velosipedot bara malikapitalni vložuvanja
  - Cesto možat da se koristat vekeoformeni javni prostori (parkovi, pokraj reki, slobodni prostori itn.)
  - Možat da se koristat postojni ulici i bulevari
  - Trošoci za vertikalna i horizontalna signalizacija
  - Trošoci za kolovozna površina i odvod
  - Trošoci za parking mesta i oprema za parkiranje

NAČINI NA APLIKACIJA

Značajna primena niz celata urbana sredina

Vo gradovi kade: rastojanijata ne se pogolemi od 8 km, kade ima dominantno ramen teren, blaga klimam silna tradicija za upotreba na velosiped, razviena velosipedska infrastruktura ili potencijal za razvivanje na istata, grad so dosta zeleni površini, slobodni prostori i široki bulevari velosipedskiot soobrakaj može da ima značaen udel.

PRIČINI ZA VNIMATELNOST

Kompaktibilnost so ostanatiot soobrakaj

- Velosipedite se dosta različni od motornite vozila spored golemina, brzina i tehnički karakteristiki
- Formalno po zakon, velosipedot e ramnopravno prevozno sredstvo, no velosipedistite se zagrozeni
- Velosipedot ne e kompaktibilen i so pešačkiot soobrakaj – brzoto dviženje e opasno za pešacite
- Spored toa najdobro e da se izgradat posebni pateki – prašanje na politika, svest na zaednicata i ekonomska isplatlivost

Postojna urbana struktura i oprema

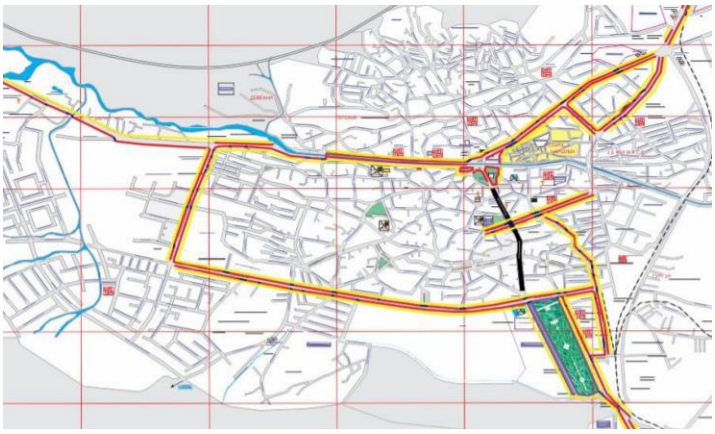
- Dolgo vreme velosipedot bil zanemaren pri planiranjeto na urbanata transportna infrastruktura
- Problematicni gradski avtopati i magistralni ulici
- Nasledeni istoriski delovi so tesni ulici
- Problemi na mostovi i tuneli kade što nema predvideno pateka za velosipedi
- Vo postojna sostojba – treba da se odzeme prostor od motoren soobrakaj ili prostor za pešaci

VELO PATEKI VO BITOLA

Spored Nacionalnata transportna strategija 2018–2030 ke se izgradat golem broj na velosipedski pateki. „Makedonskiot nacionalen transporten sistem ke se sostoi od integriran paten, železnički, vozdušen i ezerski/pristaništen i urban transport,efikasno reguliran so održliva transportna politika... Spored megunarodnite standardi i najdobrite praktiki i vo soglasnost so nacionalnite pravila i propisi celosno usoglaseni so upatstvata i direktivite na EU“.

- ✓ **Vizijata** na planot za velosipedski soobrakaj vo Bitola e transformacija na Bitola vo prijatelski i bezbeden grad za vozenje na velosiped i grad koj ke bide prijaten za živeenje.
- ✓ **Misijata** na ovoj plan e pottiknuvanje na vozenjeto velosiped kako način za prevoz i rekreacija vo koe graganite ke uživaat.
- ✓ **Strateška cel:** Izgradba na **VELO MREŽA** i zgolemuvanje na velosipedskiot soobrakaj za 5% do 2030-ta godina.

Idejno rešenie za primarnata velosipedska infrastruktura vo Bitola:



ŠTO IM E VAŽNO NA VELOSIPEDISTITE?

1. Bezbednost

Zagrozenost od motoren soobrakaj. Poželno izdvojuvanje na posebni trasi. Kade toa ne e možno reduciranje na brzinata na motorniot soobrakaj na 30 km/čas. Posebno rešavanje na raskrsnicite.

2. Direktnost na trasata

Važno za sekojdnevni patuvanja vo gradot zaradi sporedlivost so vreminja na patuvanja so drugi vidovi na prevoz.

3. Kontinuiranost

Podrazbira potreba za kontinuirana mreža na velosipedska infrastruktura, odnosnoda nema prepreki, barieri ili rizični delnici.

4. Atraktivnost

Prijatna okolina so poveke zelenilo i urbana oprema vlijae mnogu na upotrebata na velosipedot.

5. Udobnost

Podrazbira dobra podloga na kolovozot i što pomalku zapiranja po dolžina na trasata.

Literatura:

1. Nacrt plan za velosipedski soobrakaj, izveštaj od rabotna grupa, Opština Bitola, avgust 2020.
2. Буневска-Талевска, Ј.: Стратегија за развој на сообраќајот и мобилноста во градовите – прирачник, 2019.

REPUBLIC COUNCIL ON ROAD TRAFFIC SAFETY

m-r GORDANA KOŽUVAROVSKA, President of RSBSP

21. TRAFFIC PLANNING – NEED FOR MORE BIKE LINES

Abstract:
The text discusses the meaning and use of cycling, the reasons for supporting cycling, as well as ways to apply cycling in urban environments. There is an example for a conceptual solution for the primary cycling infrastructure in the city of Bitola, RSM.

Key words: bicycle, bicycle paths, traffic planning

BIKE TRAFIIC

Bike traffic **today is being promoted because** it is the most environmentally sustainable form of traffic, uses little energy, does not require a lot of space for movement and parking, it is the cheapest way of urban mobility and it contributes to the improvement of health.

Ways of using the bicycle
In some cities and countries there is a developed infrastructure and a significant number of trips are made by bicycle, while in others the bicycle is almost non-existent.

Means of providing a transport service

- rickshaws, tricycles – bicycle taxis
- amount of small shipments
- delivery of food products (pizza, fast food)
- delivery of urgent messages
- police on bicycles


REASONS TO SUPPORT THE BICYCLE

Direct access

- Apart from walking, the bicycle is a means of transport that can be used to directly access the destination of the trip (door-to-door)
- A bicycle is like a mechanical extension of the human body
- In many cases, it is also brought inside the buildings

Low consumption of energy

- It does not use fossil fuels
- The lowest required energy
- A car with one passenger uses about 1860 calories to travel 1.6 km (1160 calories per 1 km)
- A pedestrian spends about 100 calories to walk 1.6 km (62 calories per km)
- A cyclist spends about 35 calories to travel 1.6 km (22 calories per km)

It does not pollute

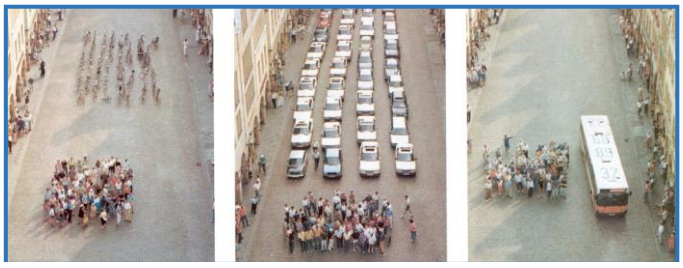
- No exhaust fumes
- There is no noise
- There are no leaks of oil, gasoline or other liquids
- Easier to recycle

Maintaining health

- Modern man suffers from insufficient movement and physical activities (heart disease, high blood pressure, overweight, etc.)
- Movement by bicycle can be many times beneficial for daily physical activity

Space saving

- The bicycle requires relatively little space for movement and rest
- It occupies 2 m2 when parked and about 5 m2 in motion
- For comparison, the car requires 25 m2 for parking and 55 m2 for movement
- If only 5% of driver-only cars switched to using a bicycle, the problem of traffic congestion would be solved



Small public investments

- The bike requires little capital investment

  - Already established public spaces (parks, along rivers, free spaces, etc.) can often be used.
  - Existing streets and boulevards can be used
  - Costs for vertical and horizontal signage
  - Costs for road surface and drainage
  - Costs for parking spaces and parking equipment

METHODS OF APPLICATION

Significant application throughout the urban environment

In cities where the distances are not greater than 8 km, with predominantly flat terrain, mild climate, where there is a strong tradition of bicycle use, developed cycling infrastructure or the potential to develop it, and a cities with lots of green areas, free spaces and wide boulevards.

REASONS FOR CAUTION

Compatibility with other traffic:

- Bicycles are quite different from motor vehicles in terms of size, speed and technical characteristics
- Formally by law, the bicycle is an equal means of transportation, but cyclists are at risk
- The bicycle is also not compatible with pedestrian traffic - fast movement is dangerous for pedestrians
- It is therefore best to build separate tracks – a matter of policy, community awareness and economic viability

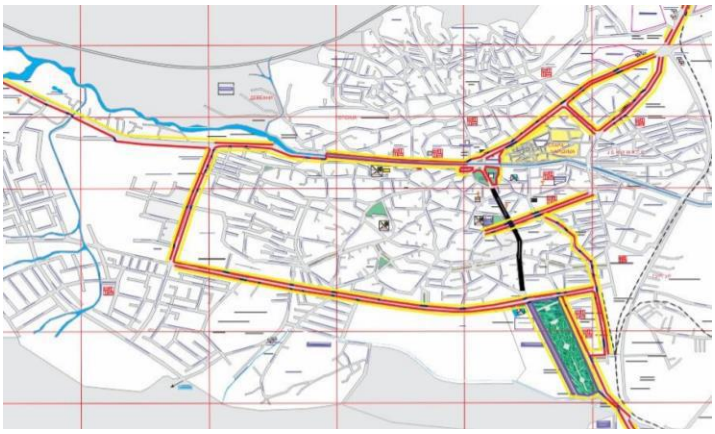
Permanent urban structure and equipment

- For a long time, the bicycle was neglected in urban transport infrastructure planning
- Problematic city highways and main streets
- Inherited historical parts with narrow streets
- Problems on bridges and tunnels where there is no bicycle path
- In the existing state – space should be taken away from motor traffic or space for pedestrians

VELO PATHS IN BITOLA

According to the National Transport Strategy 2018–2030, a large number of bicycle paths will be built. "The Macedonian national transport system will consist of integrated road, rail, air and lake/port and urban transport, effectively regulated by a sustainable transport policy... according to international standards and best practices and in accordance with national rules and regulations fully compliant with the guidelines and EU directives".

- ✓ The vision of the plan for bicycle traffic in Bitola is the transformation of Bitola into a friendly and safe city for cycling and a city that will be pleasant to live in.
- ✓ The mission of this plan is to encourage cycling as a means of transportation and recreation that citizens will enjoy.
- ✓ Strategic goal: Construction of the VELO NETWORK and increase of bicycle traffic by 5% by 2030.



WHAT MATTERS TO CYCLISTS?

1. Security

Danger from motor traffic. Desirable separation of special routes, where it is not possible to reduce the speed of motor traffic to 30 km/h. Finding solutions of intersections.

2. Directness of the route

Important for daily city trips for comparability with travel times by other modes of transport.

3. Continuity

It implies the need for a continuous network of bicycle infrastructure, that is, to have no obstacles, barriers or risky sections

4. Attractiveness

A pleasant environment with more greenery and urban equipment greatly affects the use of the bicycle.

5. Convenience

It implies a good road surface and as few stops as possible along the rout

Literature:

1. Draft plan for bicycle traffic, report from the working group, Municipality of Bitola, August 2020.

2. Bunevska-Talevska, J.: Strategy for the development of traffic and mobility in cities – manual, 2019.

АВТОСООБРАКАЕН УЧИЛИШЕН ЦЕНТАР

“Боро Петрушевски” - Скопје

22. -ИНТЕЛИГЕНТНИ ТРАНСПОРТНИ СИСТЕМИ-

- труд -

Изработил :

Зоки Стојмиров дипл.сооб.инж.

1. ВОВЕД

Континуиран и стабилен економски раст е императив на модерното доба од кој не се одрекуваат дури и најразвиените земји, а за земјите во развој тој е од највисок интерес. Ако се има предвид дека енергетиката е една од фундаментални компоненти на економијата, јасно е дека таа претставува неопходен ресурс за економски и технички развој. Енергетиката е во толкава мерка вклучена во сите гранки на стопанството и во секојдневното живеење, така што некои индекси кои се однесуваат на неа се земаат како мерка за достигнатото ниво на животен стандард на населението на една земја. Од друга страна, зголемување на потрошувачката на енергија сé повеќе ја загадуваат и дестабилизираат човековата околина исцрпувајќи ги необновливите природни ресурси на Земјата. Од тие причини, еден од најголемите предизвици на денешницата е пронаоѓање на начин како да се задоволат сé поголемите потреби за енергија, а при тоа, загадувањето на животната средина да биде сведено на минимум. Најефикасен начин да се задоволат овие две спротивставени цели е **рационализација** на нејзиното користење што е една од клучните претпоставки на одржлив економски развој. Секторот за транспорт е значаен потрошувач на енергија. Развојот на автомобилската индустрија доведе до огромно зголемување на бројот на превозни средства во светот. Современиот начин на живот бара постојан пораст на мобилноста и зголемување на употребата на возила во лична сопственост што резултира со зголемување на сообраќајот и оптоварување на транспортната инфраструктура. Новите решенија бараат сосема нов пристап и нов концепт. Еден од начините за подобрување на енергетската и еколошката ефикасност во сообраќајот е користење на ресурсите на информациско-комуникациските технологии како надградба на класичното **сообраќајно инжењерство**. Тоа ново подрачје познато **како интелигентни транспортни системи** (ИТС). нуди современи технички решенија и уреди кои овозможуваат различни услуги во различни функционални области во сообраќајот (информирање на патниците, управување со сообраќајот, превоз на товар, електронско плаќање, јавен транспорт и др.). Централизиран и непрекинат (online) надзор врз возилата и сообраќајните текови е клучен елемент за реализација на таа цел. Во водечките земји во светот интелигентните транспортни системи придонесуваат за значително подобрување на перформансите на транспортниот систем, подобро искористување на постоечката инфраструктура, унапредување на безбедноста во сообраќајот, поквалитетна услуга во јавниот превоз, помали трошоци во транспортот, смалување на негативното влијание врз животната околина и сл. Системот за глобално позиционирање (GPS – Global Positioning System) денес стана основа за многу кориснички системи. Еден од нив е системот за лоцирање и пратење на возила. Тие системи во основа се состојат од GPS уред интегриран со безжичен предавател (GSM) со чија помош се реализира комуникација со системот за лоцирање и пратење. GPS уредот во возилото и неговото поврзување со дигиталниот тахограф и другите контролни уреди овозможува добивање на информации од најразличен карактер: лоцирање на возилата во реално време, брзина на движење и изминат пат, нивото на гориво во резервоарот и количина на потрошено гориво за било кој период, број на вртежи на моторот, позиција на педалата за гас и др.

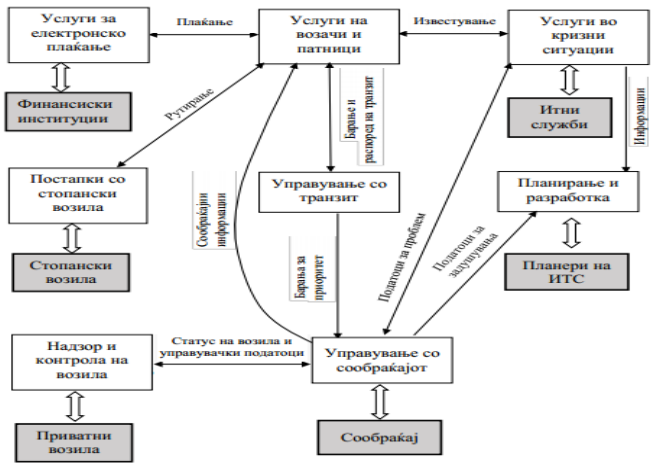
2. ИНТЕЛИГЕНТНИ ТРАНСПОРТНИ СИСТЕМИ

Сообраќајот е движечка сила на економскиот развој, но станува и еден од темелните проблеми на современиот свет кој зголемените потреби за мобилност и транспорт на стоки не успева повеќе да ги реши само со физичка градба или реконструкција на сообраќајниците. Во таа смисла, во последните дваесет години направени се значајни научно-истражувачки напори во земјите на Европската унија, САД, Јапонија и другите развиени земји, со цел да се согледаат начините за решавање на проблемите во сообраќајот со користење на ресурсите на информациско - комуникациските технологии. Тоа ново подрачје на надградба на класичното сообраќајно инженерство во научниот и техничкиот речник на сообраќајните и транспортните инженери е наречено интелигентни транспортни системи (ИТС). Постојат повеќе дефиниции за ИТС кои генерално можат да се поделат на две групи:

- Хардверски ориентирани каде „ИТС претставува примена на компјутерски, информациски и комуникациски технологии во сообраќајните мрежи и транспортни единици кои вршат превоз на патници и стока“.

- Софтверски ориентирани каде „ИТС претставува прилагодива, интелигентна интеграција на возила, возачи и транспортни системи заради ефикасно и безбедно одвивање на сообраќајот“.

Развојот на елементите на ИТС се стават во рамките на заедничката транспортна политика којашто вклучува и развој на техничката стандардизација, со цел да се обезбеди техничко-технолошка компактност на единствениот пазар на ИТС услуги.



Сл. 1 Дијаграм на текови на податоци до ИТС

Кај ИТС можат да се дефинираат четири системи врз основа на сличност на нивните функции или заедничка локација:

• Централен уред • Систем „Возач и патник“ • Систем „Возило“ • Систем „Пат“

Секој од наведените системи може понатаму да се подели на подсистеми.

На пр. централниот уред вклучува подсистем за управување со сообраќајот, управување со кризни ситуации, информирање на возачи и патници (Сл. 2.2).

Сл.2.2 Структура на интелигентен транспортен систем

Секоја од наведените подсистеми вклучуваат повеќе функции кои најчесто меѓу себе се зависни. Реализацијата на широкиот спектар на ИТС услуги подразбира примена на современ компјутерски, сензорски и комуникациски системи. Од особено значење е телекомуникацискатa инфраструктура кој има задача по пат на „пајакова мрежа“ да испреплете стационарна компјутерска, комуникациска, сигнализациска и сензорска опрема во објекти, надзорни и информациски пунктови и мобилна опрема во возило. Кај ИТС може да се препознаат следните комуникациски технологии:

• фиксни или жичани комуникации, кои ги поврзуваат фиксните терминали,

• подвижни (мобилни) или безжични широкопојасни комуникации, кои ги поврзуваат фиксните и мобилните терминали наменско, тесноподрачни безжични (мобилни) комуникации кои се поврзуваат со фиксна (на пр. наплатни и надзорни места) и мобилни терминали во возило,

• безжични (мобилни) комуникации кои ги поврзуваат возилата меѓусебно.

Структурата на ИТС системот треба да ги земе во предвид опишаните логички и физички модели инкорпорирани во организацискиот модел кој е прилагоден на реалниот свет. Соодветно на тоа, структурата на ИТС може да се дефинира како целина од следните делови:

- Централен уред на ИТС
- Комуникациски систем
- Надворешен свет

Централниот уред подразбира логичко и физичко средиште на информации (податоци) и луѓе. Централниот уред добива и праќа информации, како во однос на сигнализациска и сензорска опрема по патишта, контролни пунктови, паркинг простори, така и во однос на сите други (надворешни) системи кои се релевантни за работењето на ИТС. Во однос на сите задачи кои таквото средиште мора да ги исполни, може да се дефинираат следниве подсистеми на централниот уред (Сл. 2.3).

Сл.2. 3. Структура на ИТС

- Информациски подсистем
- Подсистем за контрола и управување на сообраќајот и транспортот
- Подсистем на локација и навигација
- Служба за информации

3. ИНТЕЛИГЕНТНИ ТРАНСПОРТНИ СИСТЕМИ ВО ТОВАРНИОТ ТРАНСПОРТ

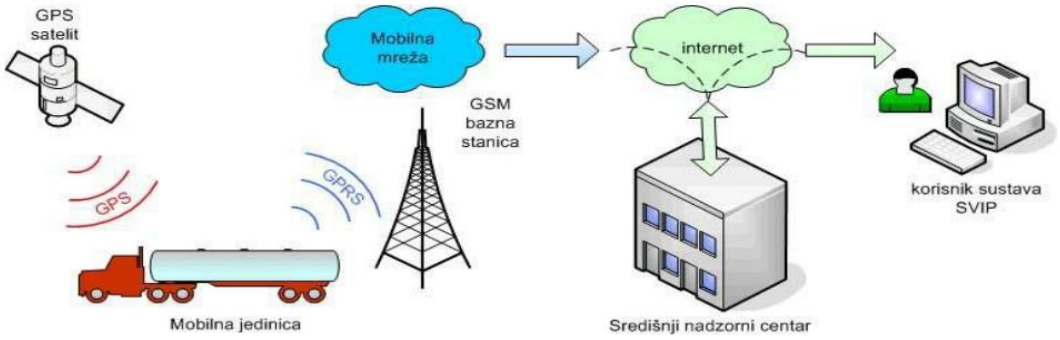
Во текот на последните децении индустријата на транспорт на стоки се соочува со нови предизвици предизвикани од глобализацијата, либерализација на пазарите, .дерегулација во транспортниот сектор како и зголемена посветеност кон филозофија на навремена испорака. Денес ширум светот се превезуваат стоки повеќе отколку кога било досега. Процентот на патниот транспорт во вкупниот транспорт порасна од околу една половина во 1970 година на околу три четвртини во 2000 година. Според направена студија од страна на Европската комисија, товарниот транспорт во рамките на Европската унија (вклучувајќи ги и десетте земји-членки кои пристапиле во 2004 г.) ќе се зголеми за речиси 90% до 2030 година во споредба со вредностите од 2000 г. Во некои области протокот на сообраќајот денес е веќе на критично ниво и секој ден 7500 km на европските автопатишта се блокирани од појава на сообраќајен метеж. Индустријата на товарен транспорт во 2000 г. зафаќала помалку од една четвртина од вкупната побарувачка на енергија во течни горива година и се смета дека ќе биде повеќе од една третина од вкупните потреби од енергија во течни горива во 2030 г. Транспортната инфраструктура секако дека ќе има проблеми да се справи со таков пораст. Информациско комуникациската технологија (ИКТ) претставува средство за обезбедување на сигурни и ефикасни операции во товарниот транспорт. Различни ИКТ технологии се користат за подобрување на перформансите на транспортните мрежи. Поимите како „интелигентно возило“, „интелигентен автопат“, „интелигентен транспорт“ се воведени од страна на индустријата и академската заедница за да се опишат напредните ИКТ технологии кој се користат или ќе се користат во иднина при менаџирање и логистиката на транспортните операции. Постоечката ИКТ овозможува прибирање на огромен број на податоци кои се однесуваат на транспортни операции и пренос на тие информации во различни форми кои можат да ги користат различни учесници во транспортните мрежи.

Главни функции на ИКТ во транспортот се:
• Управување со транспортните ресурси: • Управување со терминални операции: • Следење на возила: • Ефикасност и ефективност. • Безбедност и сигурност..• Еколошки перформанси. • Сообраќајни и инфраструктурни информации.• Информации за локацијата на возилата и товарот. • Информации за состојба на товарот. • Информации за инвентарот во магацините. • Информации за товар. • Податоци за возилата. • Системи за управување и набљудување на сообраќајот. • Системи за мерење на тежината на возилата во движење. • Системи за резервација на простор за испорака: за одреден временски период и го максимизира користењето на паркинг просторот.• Системи за следење на возилата: • Системи за планирање на маршрутите. • Системи за набљудување на однесувањето на возачите. • Систем за превенција од незгоди. • Системи за следење на локацијата на товарот. • Системи за набљудување на товарот

3.1.Телематски системи во товарен сообраќај

Главна задача од секоја транспортна компанија е обезбедување на квалитетни транспортни услуги. Транспортните услуги треба да се извршат со што пониски трошоци за транспорт, кои може да се постигнат само кога е обезбедена максимална продуктивност на транспортните средства. Нивото на продуктивноста на овие средства во голема мера зависи од организацијата на транспортниот процес, стапката на вработеност во возниот парк, како и нивото на техничката исправност на возилата, односно способноста на возниот парк за работа. Интелигентни транспортни системи, чиј основен потсистем е **телематика** (ТЕЛЕ - комуникација + инфор - MATIKA), се базира врз примена на современи технологии со цел унапредување на транспортните системи и претставуваат составен дел на информациските системи во транспортните компании. Со нив се обезбедуваат потребните алатки и механизми за постигнување на подобро управување во сообраќајната мрежа, се постигнува поголема безбедност на возилото, им помага на возачите пред и за време на транспортот и го прави патувањето поудобно. Првично овие системи, познати како системи за автоматска локација на возилата (Automatic Vehicle Location - AVL), се користеле за следење на транспортот на високо обезбеден товар. Континуираниот развој доведе до намалување на цените на опремата и трошоците за комуникација, што овозможи оваа технологија сé повеќе да се користи за управување со возните паркови на голем број на транспортните компании како сто се ДЕНИ ИНТЕРНАЦИОНАЛ, БОМИ 10 Логистик, БОКИ ТРАНС, НАЛЕ ТРАНС, БАЛ КОМЕРЦ, ЕВРОШШПЕД Кавадарци од поголемите и дел од помалите кои имаат број на товарни возила помал од 15. Во последно време овој систем особено се развива во нашата држава со цел и понатаму да се зголемува безбедноста и енергетската ефикасност. Применета на системот за глобално позиционирање (Global Possitioning систем - GPS) технологијата овозможува прецизно локализирање на возилото. На овој начин можно е 24-часовно тродимензионално следење на локацијата на возилото со одредување на прецизна географска ширина и должина, како и надморска височина во функција на времето. Обезбедените податоци безжично се пренесуваат до соодветниот приемник во возилото со помош на систем за радио сервис (General Pack Radio Service - GPRS) терминали за безжичен пренос на податоци преку глобален систем за мобилна комуникација (Global System for Mobile Communications - GSM) мрежа за мобилни комуникации за

понатамошна обработка. Горенаведените телематски системи во возилата може да се искористат во различни апликации.



Сл.2.4 Компоненти на телематски систем

3.2. Компоненти на телематските системи во товарен сообраќај

Постојат различни телематски системи, но во основа секој од нив претставува различна комбинација на три основни компоненти:
• Компоненти за прибирање на податоци; • Компоненти за пренос на податоци;• Управувачки софтвер;

3.3. Управување со возниот парк

Управувањето со возниот парк е систем за сателитско следење на возилата кои ја користат GPRS технологијата во реално време и обезбедува постојана и целосна контрола на возниот парк. Овој систем овозможува:
• Во секое време да се следат возилата; • Зголемување на искористеноста на возниот парк;
• Намалување на комуникациските трошоци; • Оптимизација на погонските трошоци; • Контрола на несовесни возачи;
• Своите партнери да ги опслужат на повисоко ниво; • Општо намалување на трошоците;
Една од најголемите предности на управување на возен парк е тоа што благодарение на сопствениот развој на хардверот и софтверот, флексибилно може да се прилагоди на барањата на корисниците. Затоа, без проблеми може да се прилагоди системот не само во претпријатијата кои се занимаваат со транспорт, туку и во логистичките системи на претпријатија кои се занимаваат со транспорт, производство и FMCG - претпријатија. За погонските трошоци исклучително се важни дополнителни информации кој доаѓаат од транспортните возила во реално време како што се:
1. Место и количина на гориво во резервоарот; **2.** Мерење на температурата на товарниот простор поради осигурување на квалитетот на транспортната роба; **3.** Евиденција на работата на возачот со помош на картичката на возачот (кога повеќе возачи возат едно возило); **4.** Регистрирање на отворање на врата на товарниот простор со цел избегнување на ситни и поголеми кражби; **5.** Следење на перформансите на моторот на компјутер, како и многу други информации обезбедени од страна на патниот компјутер во возилото.
За разлика од системот за собирање податоци за возилото кои користат сензори за „on-board“ дијагностика каде секој од измерените вредности бара посебен сензор, за системот за следење на возила е потребна само една информација за моменталната локација која се добива од GPS приемникот. Други информации дополнително, софтверски, се

пресметуваат во диспечерскиот центар. GPS приемникот, кој од возилото користи само енергетско напојување, се сместува директно на изложениот дел на возилото и обично претставува пасивен уред чија функција може да се поистовети со радио приемник. Тој ја пресметува позицијата врз основа на сигналите добиени од сателит. Така се утврдува позицијата на возило било каде на Земјата, во подрачје од 10 до 20 метри или 1-5 метри доколку се користат диференцијален GPS. Функцијата за следење на возилата во живо овозможува добивање на точна локација на возилото, брзината на движење на возилото и доколку има и вграден сензор за гориво може да се види и моменталната состојба на горивото во возилото. Компаративните предности кои може да се очекуваат од двата системи за маршрутирање и распоредување на возила се дадени во Табела 3.1.

СИСТЕМ ЗА ПЛАНИРАЊЕ НА ПАТУВАЊАТА	СИСТЕМ ЗА РАСПОРЕДУВАЊЕ НА ВОЗИЛАТА
- Намалување на вкупниот број на изминати километри	- Намалување на вкупниот број на изминати километри
- Намалување на потрошувачката на гориво	- Намалување на потрошувачката на гориво - Помал број на возила - Помал број на возачи - Намалување на трошоците - Намалување на режиското (административно) време - Намалување на рачното внесување на податоци - Економични маршрути
- Мало намалување на времето на планирање	- Значајно намалување на времето на планирање
- Подобрување на услугите на корисниците	- Подобрување на услугите на корисниците
- Овозможува постигнување на патеки која дава најкратко растојание, најмало времетраење на возење и најмали трошоци, но без земање предвид на временски и други барања на корисниците	- Овозможува постигнување на план кој овозможува обавување на сите планирани барања, земајќи ги предвид достапните ресурси и организирајќи најефикасни правци
- Препорачани време на испорака и превземања и најпогодни секвенци на поединечни патеки	- Предвидливо и поконзистентно време за преземање и достава на роба за поголем број на патувања
- Мало време на прекувремена работа	- Мало време на прекувремена работа - Мала потреба за изнајмување на простор - Поедноставен администартивен процес од барање за испорака се до самата испорака
- Одредени унапредувања во ефикасност на работа	- Одредени унапредувања во ефикасност на работа - Можност за разгледување на планот за испорака со цел прифаќање на барањата за транспорт во последен момент - Ревизија на маршрутата во било кое момент

Табела 3.1 Компаративните предности од користење на систем за планирање на патувањата (маршрутирање) и распоредување на возилата авторутери.

Итинерер претставува прецизно објаснување за движење на возилото на претходно избраниот пат. Формиран е врз база на реална патна мрежа и локација на сообраќајна сигнализација на неа. Системот исто така дава можност да се дефинира дневното време на возење за поедини типови на возила. Тоа практично значи дека системот дозволува да се подеси времето на возење (од-до), кој системот го усвојува при креирање на траекторијата на движење. Оваа опција е значајна при дефинирање на евентуално ноќно време на возење.

3.4.Системи за распоредување на возила

Главната цел на системот на распоредување на возила е да им помогне на луѓето кои се занимаваат со креирање на транспортен план да направат брза и прецизна пресметка на патување на возилата за голем број на транспортни барања, земајќи ги предвид надворешните фактори, како што се ограничување во врска со дозволена носивост, волуменот на товарниот простор на возилото и временските барања на клиентите. При одредувањето на маршрутата и транспортниот план се земаат предвид голем број на параметри кои се дефинирани од страна на корисникот, како и од страна на системот, а со цел подобро искористување на транспортни средства. Овие системи вршат распоредување на возилата на предложените компјутерски генерирани маршрути.

Овие системи уште може да се користат за да се потврди и/или оптимизација на постоечки рачно испланирани маршрути.

• Стратешки начин на користење
• Комерцијален начин на користење

4. ЗАКЛУЧОК

Од до сега изнесеното може да се каже дека ИТС во Сообраќајот кој е движечка сила на економскиот развој, но станува и еден од темелните проблеми на современиот свет кој зголемените потреби за мобилност и транспорт на стоки не успева повеќе да ги реши само со физичка градба или реконструкција на сообраќајниците туку треба да се превземаат низа активности базирани на современиот начин на живеење. Со научно технолошката револуција и се забрзаниот развој на техниката принудени сме да изнаогаме секојдневни иновации и решенија. Целта е една и единствена да ни се олесни работата во транспортот да ги намалиме трошоците и да дојдеме до брзи и прецизни информации како од стационарен така и од динамичен карактер.

БИДЕТЕ И ВИЕ ДЕЛ ОД ЕВРОПСКИОТ СИСТЕМ НА ОБРАЗОВАНИЕ НА ЕВРОПСКОТО СЕМЕЈСТВО НА ВОЗАЧИ.

КОРИСТЕНА ЛИТЕРАТУРА

1. Користени материјали од конференција на интелигентни транспортни системи
2. Материјали од логистика и транспорт
3. Користени податоци од транспортни претпријатија во РСМакедонија
4. Користени податоци од ЕУ

TRAFFIC SCHOOL CENTRE
"Boro Petrushevski" - Skopje

22. INTELLIGENT TRANSPORT SYSTEMS

Author :
Zoki Stojmirov, graduate traffic engineer

1. INTRODUCTION

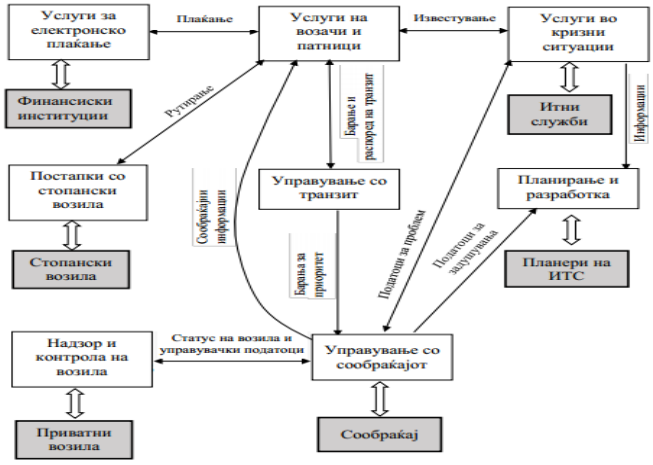
Continuous and stable economic growth is an imperative of the modern age that even the most developed countries do not renounce, and for developing countries it is of the highest interest. Considering that energy is one of the fundamental components of the economy, it is clear that it represents a necessary resource for economic and technical development. Energy is to such an extent included in all branches of the economy and in everyday life, that some indices referring to it are taken as a measure of the reached level of living standard of the population of a country. On the other hand, increasing energy consumption increasingly pollutes and destabilizes the human environment, depleting the Earth's non-renewable natural resources. For those reasons, one of the biggest challenges of today is finding a way to meet the ever-increasing energy needs, while minimizing environmental pollution. The most efficient way to meet these two conflicting goals is the rationalization of its use, which is one of the key assumptions of sustainable economic development. The transport sector is a significant consumer of energy. The development of the automobile industry has led to a huge increase in the number of vehicles in the world. The modern way of life requires a constant increase in mobility and an increase in the use of personally owned vehicles, which results in an increase in traffic and strain on the transport infrastructure. New solutions require a completely new approach and a new concept. One of the ways to improve energy and environmental efficiency in traffic is using the resources of information and communication technologies as an upgrade of classic traffic engineering. That new area known as Intelligent Transport Systems (ITS). offers modern technical solutions and devices that enable different services in different functional areas in traffic (passenger information, traffic management, cargo transportation, electronic payment, public transport, etc.). Centralized and uninterrupted (online) surveillance of vehicles and traffic flows is a key element for the realization of that goal. In the leading countries in the world, intelligent transport systems contribute to a significant improvement in the performance of the transport system, better use of the existing infrastructure, improvement of traffic safety, better service in public transport, lower transport costs, reduction of the negative impact on the environment, etc. . The Global Positioning System (GPS) has become the basis for many user systems today. One of them is the vehicle tracking and tracking system. Those systems basically consist of a GPS device integrated with a wireless transmitter (GSM) with the help of which communication with the tracking and tracing system is realized. The GPS device in the vehicle and its connection to the digital tachograph and other control devices allows obtaining information of a very different nature: real-time location of vehicles, speed and distance traveled, fuel level in the tank and amount of fuel consumed for any period , number of revolutions of the engine, position of the gas pedal, etc.

2. INTELLIGENT TRANSPORT SYSTEMS

Traffic is the driving force of economic development, but it is also becoming one of the fundamental problems of the modern world, which cannot solve the increased needs for mobility and transportation of goods by physical construction or reconstruction of the thoroughfares. In that sense, in the last twenty years, significant scientific research efforts have been made in the countries of the European Union, the United States, Japan and other developed countries, in order to perceive ways to solve traffic problems by using the resources of information and communication technologies. That new area of upgrading classical traffic engineering in the

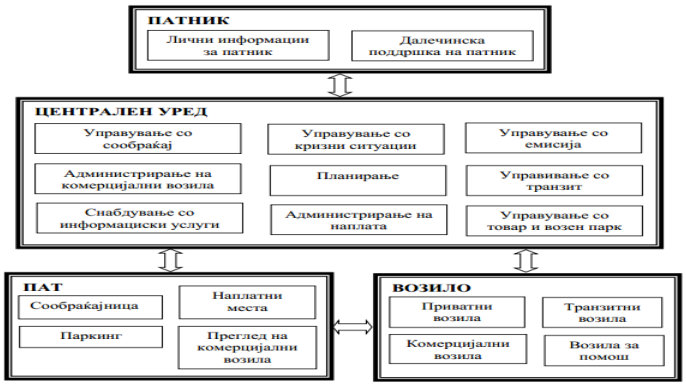
scientific and technical vocabulary of traffic and transport engineers is called intelligent transport systems (ITS). There are several definitions of ITS that can generally be divided into two groups:
• Hardware-oriented, where "ITS represents the application of computer, information and communication technologies in traffic networks and transport units that transport passengers and goods".

Software-oriented where "ITS is an adaptable, intelligent integration of vehicles, drivers and transport systems for efficient and safe traffic flow".
The development of ITS elements is placed within the framework of the common transport policy, which also includes the development of technical standardization, in order to ensure technical-technological compactness of the single market of ITS services.



Picture 1. Data flow diagram to ITS

In ITS, four systems can be defined based on the similarity of their functions or common location:
• Central unit • Driver and passenger system • Vehicle system • Road system
Each of the listed systems can be further divided into subsystems.
For example the central device includes a subsystem for traffic management, crisis management, informing drivers and passengers (Picture 2.2).



Picture.2.2 Structure of an intelligent transport system

Each of the listed subsystems includes several functions that are usually interdependent. The realization of the wide range of ITS services implies the application of modern computer, sensor and communication systems. Of particular importance is the telecommunication infrastructure,

which has the task of interweaving stationary computer, communication, signaling and sensor equipment in buildings, surveillance and information points and mobile equipment in a vehicle by means of a "spider network". The following communication technologies can be recognized at ITS:

• fixed or wired communications, which connect the fixed terminals,

• mobile (mobile) or wireless broadband communications, which connect fixed and mobile terminals on purpose, narrow-band wireless (mobile) communications connecting fixed (e.g. toll and surveillance points) and mobile terminals in a vehicle,

• wireless (mobile) communications that connect vehicles to each other.

The structure of the ITS system should take into account the described logical and physical models incorporated into the organizational model that is adapted to the real world. Accordingly, the structure of ITS can be defined as a whole of the following parts:

- ITS central device
- Communication system
- Outside world

The central device implies a logical and physical center of information (data) and people. The central device receives and sends information, both in relation to signaling and sensor equipment on roads, checkpoints, parking spaces, and in relation to all other (external) systems that are relevant to the operation of ITS. Regarding all the tasks that such a center must fulfill, the following subsystems of the central device can be defined (Picture 2.3).

Picture 2. 3. Structure of ITS

- Information subsystem
- Subsystem for control and management of traffic and transport
- Location and navigation subsystem
- Information service

3. INTELLIGENT TRANSPORT SYSTEMS IN THE LOAD TRANSPORT

Over the last decades, the freight industry has been facing new challenges caused by globalization, liberalization of markets, deregulation in the transport sector as well as an increased commitment to a philosophy of on-time delivery. Today, more goods are transported around the world than ever before. The percentage of road transport in total transport grew from about one-half in 1970 to about three-quarters in 2000. According to a study by the European

Commission, freight transport within the European Union (including the ten member states that joined in 2004) will increase by almost 90% by 2030 compared to 2000 values. In some areas the flow of traffic today is already at a critical level and every day 7500 km of European highways are blocked by traffic jams.

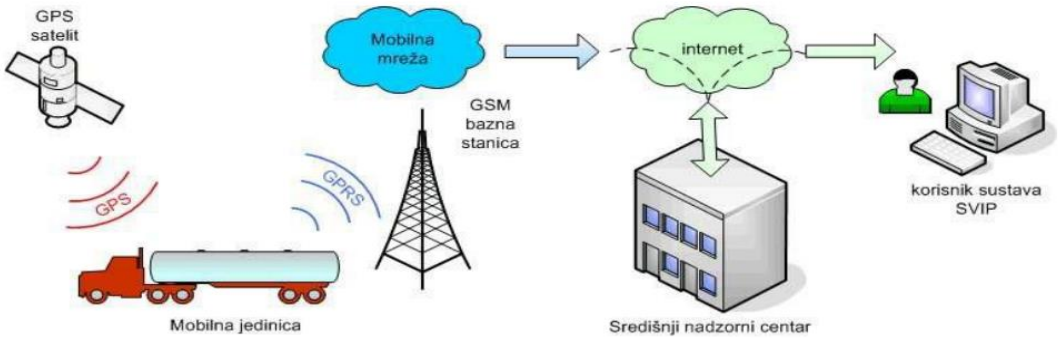
The trucking industry in 2000 accounted for less than a quarter of total energy demand in liquid fuels last year and is expected to be more than a third of total energy demand in liquid fuels in 2030. The transport infrastructure will certainly have problems to cope with such an increase. Information and communication technology (ICT) is a means of ensuring reliable and efficient operations in freight transport. Various ICT technologies are used to improve the performance of transport networks. Terms such as "intelligent vehicle", "intelligent highway", "intelligent transport" have been introduced by industry and the academic community to describe advanced ICT technologies that are used or will be used in the future in the management and logistics of transport operations. The existing ICT enables the collection of a huge amount of data related to transport operations and the transfer of that information in different forms that can be used by different participants in the transport networks.

The main functions of ICT in transport are:
• Transport resource management: • Terminal operations management: • Vehicle tracking: • Efficiency and effectiveness. • Safety and security.. • Environmental performance. • Traffic and infrastructure information. • Information about the location of vehicles and cargo. • Information about the condition of the cargo. • Information about inventory in warehouses. • Cargo information. • Vehicle data. • Traffic management and monitoring systems. • Systems for measuring the weight of vehicles in motion. • Delivery space reservation systems: for a certain period of time and maximizes the use of parking space. • Vehicle tracking systems: • Route planning systems. • Systems for monitoring the behavior of drivers. • Accident prevention system. • Cargo location tracking systems. • Load monitoring systems

3.1. Telematics systems in freight traffic

The main task of every transport company is the provision of quality transport services. Transport services should be performed with the lowest possible transport costs, which can only be achieved when the maximum productivity of the means of transport is ensured. The level of productivity of these assets largely depends on the organization of the transport process, the employment rate in the vehicle fleet, as well as the level of technical correctness of the vehicles, that is, the ability of the vehicle fleet to work. Intelligent transport systems, whose basic subsystem is telematics (TELE - communication + info - MATIKA), is based on the application of modern technologies in order to improve transport systems and are an integral part of information systems in transport companies. They provide the necessary tools and mechanisms to achieve better management in the traffic network, achieve greater vehicle safety, help drivers before and during transport and make travel more comfortable. Initially these systems, known as Automatic Vehicle Location (AVL) systems, were used to track the transport of highly secured cargo. Continuous development has led to a reduction in equipment prices and communication costs, which has allowed this technology to be increasingly used to manage the fleets of a number of transport companies such as DENI INTERNATIONAL, BOMI 10 LOGISTICS, BOKI TRANS, NALE TRANS, BAL KOMERC, EVROSHPED Kavadarci of the larger ones and some of the smaller ones that have a number of trucks less than 15. Recently, this system has

been especially developed in our country in order to further increase safety and energy efficiency. Applied to the global positioning system (Global Positioning system - GPS) technology enables precise localization of the vehicle. In this way, 24-hour three-dimensional tracking of the vehicle's location is possible by determining precise latitude and longitude, as well as altitude as a function of time. The provided data is wirelessly transmitted to the appropriate receiver in the vehicle using a radio service system (General Pack Radio Service - GPRS) terminals for wireless data transmission through a global system for mobile communications (Global System for Mobile Communications - GSM) mobile communications network for further processing. The above telematics systems in vehicles can be used in various applications.



Picture.2.4 Components of a telematics system

3.2. Components of telematics systems in freight traffic

There are different telematics systems, but basically each of them represents a different combination of three basic components:
• Data collection components; • Data transfer components; • Management software;

3.3. Fleet management

Fleet management is a system for satellite tracking of vehicles that uses GPRS technology in real time and provides constant and complete control of the fleet. This system allows:
• To follow the vehicles at any time; • Increasing the utilization of the vehicle fleet; • Reduction of communication costs; • Optimization of operating costs; • Control of reckless drivers;
• To serve their partners at a higher level; • General cost reduction;
One of the biggest advantages of fleet management is that thanks to its own development of hardware and software, it can be flexibly adapted to the demands of users. Therefore, the system can be adapted without problems not only in enterprises dealing with transport, but also in the logistics systems of enterprises dealing with transport, production and FMCG - enterprises. Additional information coming from transport vehicles in real time is extremely important for driving costs, such as:
1. Place and amount of fuel in the tank; 2. Measurement of the temperature of the cargo space due to the quality assurance of the transported goods; 3. Records of the driver's work using the driver's card (when several drivers drive one vehicle); 4. Registering the opening of the cargo area door in order to avoid minor and major thefts; 5. Monitoring the performance of the engine on the computer, as well as many other information provided by the on-board computer in the vehicle.

Unlike the vehicle data collection system that uses sensors for "on-board" diagnostics where each of the measured values requires a separate sensor, the vehicle tracking system only needs one information about the current location which is obtained from the GPS receiver. Other information is additionally calculated by software in the dispatch center. The GPS receiver, which uses only energy from the vehicle, is placed directly on the exposed part of the vehicle and is usually a passive device whose function can be identified with a radio receiver. It calculates the position based on the signals received from the satellite. This is how the position of a vehicle is determined anywhere on Earth, in an area of 10 to 20 meters or 1-5 meters if differential GPS is used. The live vehicle tracking function allows you to get the exact location of the vehicle, the speed of the vehicle and if there is a built-in fuel sensor, you can also see the current state of the fuel in the vehicle. The comparative advantages that can be expected from the two vehicle routing and scheduling systems are given in Table 3.1.

TRAVEL PLANNING SYSTEM	VEHICLE SCHEDULING SYSTEM
Reducing the total number of kilometers traveled	Reducing the total number of kilometers traveled
reducing fuel consumption	reducing fuel consumption smaller number of vehicles smaller number of drivers cost reduction, administrative time reduction reducing manual data entry economical routes
slight reduction in planning time	significant reduction in planning time
improving user services	improving user services
enables the achievement of routes that provide the shortest distance, the shortest driving time, the lowest costs, without taking into account the time and other requirements of the users	enables the achievement of a plan that enables the execution of all planned requirements, taking into account the available resources and organizing the most efficient routes
recommended delivery times and pick-up of the most convenient sequences on individual tracks	predictable time for pickup and delivery of goods for a larger number of trips
little overtime	little overtime little need to rent space
certain improvements in work efficiency	certain improvements in work efficiency ability to review the shipping plan in order to accommodate last-minute transportation requests revision of the route at any time

Table 3.1 The comparative advantages of using a system for planning trips (routing) and scheduling vehicles with autorouters.

Itinerary represents a precise explanation of the movement of the vehicle on the pre-selected road. It is formed on the basis of a real road network and the location of traffic signals on it. The system also provides the possibility to define the daily driving time for individual types of vehicles. This practically means that the system allows to set the driving time (from-to), which the system adopts when creating the movement trajectory. This option is significant when defining a possible night driving time.

3.4. Vehicle deployment systems

The main purpose of a vehicle scheduling system is to help people involved in the creation of a transportation plan to make a quick and accurate calculation of vehicle travel for a large number of transportation requests, taking into account external factors, such as constraints in relation to the permissible payload, the volume of the vehicle's cargo space and the customer's time requirements. When determining the route and the transport plan, a large number of parameters are taken into account, which are defined by the user, as well as by the system, with the aim of better utilization of means of transport. These systems perform the deployment of vehicles on proposed computer-generated routes.

These systems can still be used to verify and/or optimize existing manually planned routes.

- Strategic way of using
- Commercial mode of use

4. CONCLUSION

From what has been stated so far, it can be said that ITS in Traffic, which is the driving force of economic development, but is also becoming one of the fundamental problems of the modern world, which cannot solve the increased needs for mobility and transport of goods anymore only with physical construction or reconstruction of the roads, but a series of activities based on the modern way of living should be undertaken. With the scientific-technological revolution and the ever-accelerating development of technology, we are forced to find daily innovations and solutions. The goal is one and only to facilitate our work in transport, to reduce costs and to get quick and precise information, both stationary and dynamic.

BE A PART OF THE EUROPEAN EDUCATION SYSTEM OF THE EUROPEAN FAMILY OF DRIVERS.

USED LITERATURE

1. Used materials from a conference on intelligent transport systems
2. Materials from logistics and transport
3. Used data from transport companies in RS.Macedonia
4. EU data used

ŠOLSKI CENTER CELJE

Srednja šola za kemijo, elektrotehniko in računalništvo

Eva Boh, profesorica angleščine

23. STROKOVNA TERMINOLOGIJA V ANGLEŠČINI

POVZETEK:

Nemogoče je natančno predvideti, kdaj, zakaj in za kakšen namen bodo bodoči dijaki in študentje potrebovali angleščino, ko bodo končali formalno izobraževanje in začeli delati, a vsaj poskušati jih moramo čim bolje pripraviti na situacije, ki se morda zdijo verjetne, da bodo v njih uporabljali angleščino. Zato bi morala biti analiza potreb delovnih mest in ustrezna priprava učnega načrta prednostna naloga vsakega učitelja tujih jezikov.

Ta članek bo predstavil postopek prepoznavanja takšnih potreb, jih analiziral in poudaril nekatere dejavnike, ki jih je treba upoštevati pri poučevanju angleščine za specifične potrebe (ESP). Ta proces bom ponazorila na primeru izobraževalnih potreb dijakov in študentov na poklicnih, srednjih tehniških in višjih strokovnih šolah, pri čemer se bom osredotočila na kvalifikacije za delo, potrebne za njihov poklic, analizirala raven znanja, potrebnega za tovrstno delo, obravnavala problematiko jezikovne funkcije in jezikovne teme ter njihovo razmerje v izobraževalnem programu, pa tudi stik z drugimi jeziki, s katerimi angleščina sovpada na posameznem delovnem področju.

Ključne besede: analiza potreb, kurikul, jezik v stroki, angleščina za specifične potrebe, strokovna terminologija

ANALIZA POTREB

V vseh vrstah izobraževanja je temeljito analiziranje potreb udeležencev izobraževanja ključnega pomena, če želimo doseči dobre rezultate. Tudi poučevanje angleščine pri tem ni izjema. Še več, proučitev potreb je še posebej pomembna, ko gre za poučevanje angleščine za specifične potrebe (angl. English for Specific Purposes - ESP).

Jezikovne potrebe v zvezi s prihodnjim poklicem

Ni treba posebej poudarjati, da je z razvojem globalizacije narasla tudi potreba po učinkovitem jezikovnem sporazumevanju in da je angleščina kot globalna lingua-franca nujna za vse, ne glede na področje dela.

Zato moramo učitelji pripraviti naše slušatelje, da bodo sposobni spretno komunicirati v angleščini, in obstaja več dejavnikov, s katerimi se moramo soočiti, ko poskušamo to doseči.

Pouk ESP mora pripraviti na komunikacijo iz oči v oči. Da bi to dosegli, je pri poučevanju govornih veščin priporočljivo uporabiti komunikacijski pristop. Naloge za učenje jezikov bi morale biti smiselne in povezane naj bodo tudi s strokovnim področjem, da se študenti z njimi lažje poistovetijo, razumejo vsebino s pomočjo svojega strokovnega znanja, ki jim lahko pomaga, ko se pojavijo jezikovne ovire. Podobno naj naloge temeljijo na igranju vlog, kar prav tako prispeva k smiselnosti vaj.

Ti dejavniki bodo spodbujali tudi motivacijo študentov, saj bodo videli smisel v takšnih nalogah in jih bodo razumeli kot koristne za svojo kariero.

V pouk ESP je potrebno vključiti tudi sposobnost ustne predstavitve. Znati spregovoriti, organizirati svoje misli, podati pravilna in jasna navodila, vse to so lastnosti formalnega diskurza in javnega nastopanja, zato je potrebno veliko časa v okviru ESP posvetiti prav temu.

Obe zgoraj opisani vrsti jezikovnih vaj sta povezani z govornimi veščinami, ki najverjetneje prevladujejo pri pouku ESP, vendar nikakor ne smemo zanemariti tudi branja, poslušanja in pisanja. Treba je skrbno razmisliti o porazdelitvi jezikovnih veščin.

Pomembno je, da pri pouku izhajamo iz stvarnega delovnega okolja, zato moramo uporabljati avtentična angleška besedila, z namenom vzpodbuditi študente, da bi čim več posegali po tuji literaturi ter znali tuje vire uspešno uporabljati pri svojem delu. Vaje morajo temeljiti na vsakdanjih in življenjskih situacijah v poslovnem svetu (npr. izpolnjevanje obrazcev, pisanje korespondence, sprejem novega sodelavca, ...) ter poskušati združiti vse štiri jezikovne spretnosti: poslušanje, govor, branje in pisanje.

Kurikul in moduli izobraževalnega programa v poklicnem in srednjem tehniškem izobraževanju

Pri nas že v poklicnem in srednjem tehniškem izobraževanju poudarjamo prilagajanje stroki in specifičnim potrebam lokalnega gospodarstva in okolja. Temeljne prvine oblikovanja kurikula so:

- **Izhodišča za pripravo učnega načrta**

Vsebina izobraževalnih programov temelji na poklicnih kompetencah, ki določajo zahtevnost, opredeljujejo potrebna znanja, spretnosti ter splošne in poklicne sposobnosti, ki jih mora posameznik pridobiti v času šolanja.

- **Fleksibilnost kurikuluma**

Strokovni svet RS za srednje tehniško in poklicno izobraževanje je določil 80 % vsebine in s tem tudi ciljev programov na nacionalni ravni. Ostalih 20 % vsebin določijo šole same v sodelovanju z lokalnim gospodarstvom in socialnimi partnerji lokalne skupnosti. To omogoča prostor za uresničevanje specifičnih izobraževalnih potreb, ki jih določata regionalno gospodarstvo in lokalno okolje.

- **Modularizacija programov**

Elementi splošnoizobraževalnega znanja, povezani s tehnično teorijo in prakso, so združeni v tehniških modulih. Modularizacija predstavlja premik od predmetno usmerjenih programov k problemsko usmerjenim. Modul torej predstavlja enoto izobraževalnih programov v srednjem tehniškem in poklicnem srednjem izobraževanju, v kateri so tehnično-teoretična znanja, praktične spretnosti, splošnoizobraževalna znanja in kompetence povezane v celovito ciljno in vsebinsko celoto. Večina modulov je obveznih, nekateri pa so izbirni.

Oblikovanje višješolskih študijskih programov

Višješolski študijski programi se pripravijo na podlagi enega ali več poklicnih standardov, na osnovi česar so opredeljeni cilji študija ter generične in poklicno-specifične kompetence.

Študijski program sestavljajo obvezni in izbirni moduli, ki omogočajo študentom izbirnost, šolam pa prilagajanje lokalnim potrebam glede na razvoj posamezne panoge oziroma študijskega področja.

Vsi višješolski študijski programi imajo temeljne strokovne module, ki poleg temeljnih strokovnih znanj vključujejo tudi generične kompetence. Eden od teh predmetov je namenjen tudi poslovnemu sporazumevanju v tujem jeziku.

Cilji pouka angleščine v višjem strokovnem šolstvu

Cilj pouka angleščine v okviru predmeta v višjem strokovnem izobraževanju je, da bo študent sposoben na svojem delovnem mestu:

- komunicirati s strokovnjaki s svojega strokovnega področja v tujem jeziku,
- uporabljati literaturo v tujem jeziku pri reševanju problemov s svojega strokovnega področja
- spremljati razvoj stroke s poznavanjem in spremljanjem strokovne literature v tujem jeziku.

Pomembno je, da zna študent uporabljati angleščino slovnično in pravopisno pravilno, da zna pripraviti kvalitetno predstavitev postopka, metode, naprave ipd. iz svojega strokovnega področja, da zna opisati svoje delovno okolje, da zna razložiti osnove svoje stroke v tujem jeziku in da pozna strokovne termine.

Prav tako je pomembno, da zna študent uporabljati slovarje in to tako v knjižni obliki kot elektronsko podprte slovarje.

STROKOVNA TERMINOLOGIJA PRI POUKU ANGLEŠČINE KOT TUJEM JEZIKU

Potem ko opravimo podrobno analizo potreb in na osnovi ugotovitev zasnujemo kurikul, učne cilje in pedagoško metodologijo poučevanja, je potrebno razdelati učno snov še iz vsebinskega vidika. Ta pri predmetu strokovne angleščine zajema natančno predviden nabor tematik in besedišča, ki ga morajo dijaki osvojiti, da bodo dosegli v kurikulu zastavljene učne cilje.

Proces opredelitve vsebine je za učitelje tujega jezika izjemno zahtevna naloga. Zato obstaja več razlogov. Med njimi so nepoznavanje terminologije v maternem jeziku, problemi strokovnega prevajanja in malo ponudbe gradiv na založniškem trgu.

Učiteljem tujih jezikov je navadno strokovna terminologija nepoznana v maternem jeziku. Težko pričakujemo, da se jezikoslovec spozna na stroko, še posebno če je ta zelo specifična, tehnična in zajema specializirano področje tehnike.

Še zahtevnejši problem predstavlja učiteljem tujega jezika za strokovno izrazoslovje najti ustrezne prevode. Slovarjev za strokovne izraze je za slovenščino na trgu zelo malo. Učitelji se tako poslužujejo prevajanja s priljubljenimi spletnimi prevajalniki, kot so Google Translate in Pons. Med manj poznanimi, a kvalitetnimi prevajalniki pa je tudi Glosbe, ki ponuja prevode za veliko strokovnih področij. Poleg slovarjev si učitelji lahko pomagamo tudi z tezavri. Nekaj jih je nastalo pri prevajanju ob vstopu Slovenije v Evropsko unijo. Čeprav gre večinoma za pravne dokumente, pa mnogi vsebujejo strokovne izraze, ki so uporabljeni v zapisih pravilnikov, navedeni pri reguliranju standardov kakovosti ali podeljevanju certifikatov.

Tretja ovira, na katero naletijo učitelji tujih jezikov pri strokovni terminologiji, je pomanjkanje gradiva za poučevanje, saj je slovenskih gradiv zelo malo, zato se učitelji zatekajo k uporabi gradiv priznanih mednarodnih založb.

PRIMER POUČEVANJA ANGLEŠČINE ZA POTREBE LOGISTIKE

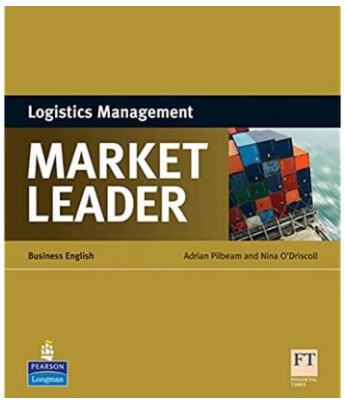
Logistika je v zadnjih desetletjih med najhitreje razvijajočimi se znanstvenimi področji, saj je zaradi vplivov globalizacije prišlo do potrebe po razvoju znanosti o logistiki in njenih rešitvah do neverjetnih razsežnosti. Logistika je izredno kompleksna, saj jo glede na dejavnost ločimo na transportno in to naprej na cestno, železniško, zračno, morsko, rečno… , na skladiščno, špedicijsko, distribucijsko, nabavno… imamo pa še celo vrsto smeri glede na področje uporabe. Zaradi globalne konkurence so podjetja prisiljena k vedno bolj učinkovitemu sodelovanju, za kar pa je temelj dobro upravljanje oskrbnih verig. Veliko sprememb in novosti prinaša tudi uvajanje informacijske podpore logističnih procesov. Vse te kompleksne prvine logistike narekujejo potrebe bodočih logistov in morajo biti upoštevane pri načrtovanju kurikula v logističnih izobraževalnih programih.

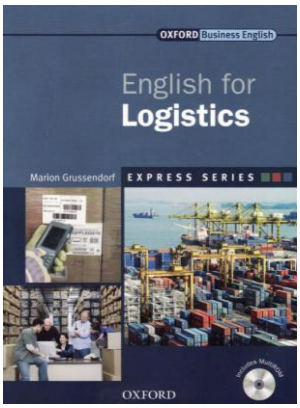
Težave, na katere naletijo učitelji angleščine pri poučevanju bodočih logistov, so predvsem:

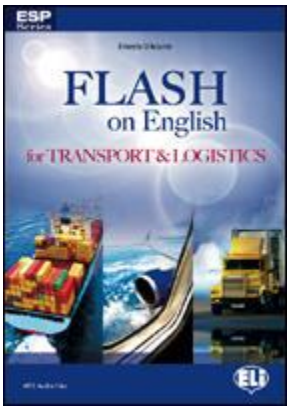
- Problem predstavlja učiteljem tujega jezika za strokovno izrazoslovje najti ustrezne prevode, saj ni na voljo aktualnih slovarjev, zato si morajo pomagati s spletnimi prevajalniki in tezavri.
- Ker gre pri logistiki za hitro rastočo in spreminjajočo se znanstveno področje, je težko slediti vsem novostim v stroki in jo dovolj dobro poznati za vključevanje v pouk.

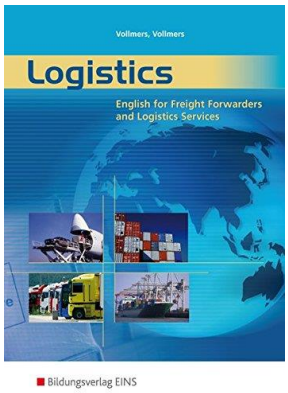
- Velik problem je spremljanje terminoloških novosti. Terminologija za novosti se pogosto v slovenščini ne uvaja dovolj hitro in ne sledi novostim v svetu, kar predstavlja težavo pri strokovnem prevajanju.
- Problem je tudi, da v slovenskem jeziku ni na voljo aktualnih specializiranih učbenikov za poučevanje angleščine. Ob prenovi izobraževalnih programov je pred leti nastalo nekaj kvalitetnih gradiv za poučevanje angleščine v okviru evropskega projekta Impletum, vendar bi bili zaradi hitro spreminjajoče se znanstvene discipline že potrebni dopolnitev. Učitelji se tako zatekajo k uporabi gradiv priznanih mednarodnih založb. Na področju logistike je kar nekaj gradiv, ki so specializirana za poučevanje tujih jezikov. Med širše rabljenimi so:

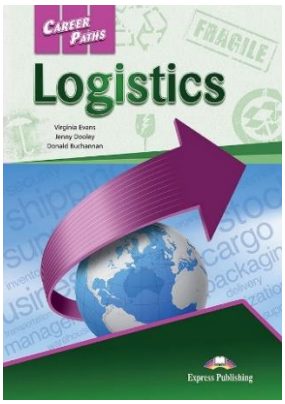
- Market Leader ESP Book - Logistics Management (Pilbeam in O'Driscoll, 2010)
- Express Series: English for Logistics (Grussendorf, 2009)
- Flash on English For Transport and Logistics (Ernesto D´Acunto, 2012)
- Logistics - English for Freight Forwarders and Logistics Services (Vollmers C., Vollmers S., 2004)
- Career Paths: Logistics (Evans, Dooley, Buchannan, 2016)











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ELEKTRONSKI VIRI:

- https://cpi.si/poklicno-izobrazevanje/izobrazevalni-programi/programi/vsi/
- http://www.impletum.zavod-irc.si/sl/gradiva/

ŠOLSKI CENTER CELJE

Srednja šola za kemijo, elektrotehniko in računalništvo

Eva Boh, teacher of the English language and English literature

23. PROFESSIONAL TERMINOLOGY IN ENGLISH

SUMMARY:

It is impossible to predict exactly when, why and for which purpose pupils and students will need English when they finish formal education and start working, however we should at least try to prepare them as best as possible for the situations that we predict they may find themselves in as users of English. Therefore, job needs analysis and appropriate curriculum preparation should be a priority for every foreign language teacher.

This article will introduce the process of identifying such needs, analyze them and highlight some factors to consider when teaching English for Specific Purposes (ESP). I will illustrate this process on the example of the educational needs of pupils and students at vocational, secondary technical and higher professional schools, focusing on the job qualifications required for their profession, analyzing the level of knowledge required for this type of work, addressing the issue of language functions and language topics and their relationship in the educational program, as well as contact with other languages with which English coincides in the individual work area.

Key words: needs analysis, curriculum, language in the profession, English for specific purposes, professional terminology

NEEDS ANALYSIS

In all types of education, a thorough analysis of the needs of the participants is crucial if we want to achieve good results. Teaching English is no exception to this. Moreover, needs assessment is particularly important when it comes to teaching English for Special Purposes (ESP).

Language needs related to the future profession

It goes without saying that with the development of globalization, the need for effective language communication has also grown and that English as a global lingua franca is necessary for everyone, regardless of the field of work.

Therefore, as teachers, we need to prepare our listeners to be able to communicate proficiently in English, and there are several factors that we have to deal with when trying to achieve this.

ESP lessons must prepare for face-to-face communication. To achieve this, it is recommended to use a communicative approach when teaching speaking skills. Language learning tasks should be meaningful and related to the professional field, so that students can more easily identify with them, understand the content with the help of their professional knowledge, which can help them when language barriers appear. Similarly, the tasks should be based on role-playing, which also contributes to the meaningfulness of the exercises.

These factors will also encourage students' motivation, as they will see the point in such assignments and see them as useful for their careers.

It is necessary to include the ability of oral presentation in ESP lessons. Knowing how to speak, organize one's thoughts, give correct and clear instructions, all of these are qualities of formal discourse and public speaking, so it is necessary to devote a lot of time within ESP to this.

Both types of language exercises described above are related to speaking skills, which are most likely to dominate ESP lessons, but reading, listening and writing should also not be neglected. Careful consideration should be given to the distribution of language skills.

It is important that the lessons are based on a real working environment, so we must use authentic English texts, with the aim of encouraging students to use foreign literature as much as possible and to be able to use foreign sources successfully in their work. The exercises must be based on every day and life situations in the business world (for example, filling in forms, writing correspondence, accepting a new colleague, ...) and try to combine all four language skills: listening, speaking, reading and writing.

ENGLISH IN VOCATIONAL, SECONDARY TECHNICAL AND HIGHER VOCATIONAL EDUCATION IN SLOVENIA

Curriculum and modules of the educational program in vocational and secondary technical education

Already in vocational and secondary technical education, we emphasize adaptation to the profession and the specific needs of the local economy and environment. The fundamental elements of curriculum design are:

- **Starting points for the preparation of the curriculum**

The content of educational programs is based on professional competences, which determine the level of difficulty, define the necessary knowledge, skills and general and professional abilities that an individual must acquire during schooling.

- **Curriculum flexibility**

The Expert Council of the Republic of Slovenia for Secondary Technical and Vocational Education determined 80% of the content and thus also the goals of the programs at the national level. The other 20% of the content is determined by the schools themselves in cooperation with the local economy and social partners of the local community. This provides space for the realization of specific educational needs determined by the regional economy and local environment.

- **Modularization of programs**

Elements of general education knowledge related to technical theory and practice are combined in technical modules. Modularization represents a shift from object-oriented programs to problem-oriented ones. The module therefore represents a unit of educational programs in secondary technical and vocational secondary education, in which technical-theoretical knowledge, practical skills, general education knowledge and competences are linked into a comprehensive target and content whole. Most modules are compulsory, but some are optional.

Designing post-secondary study programs

Higher education study programs are prepared on the basis of one or more professional standards, on the basis of which study goals and generic and professional-specific competences are defined.

The study program consists of compulsory and optional modules, which enable students to be selective, and schools to adapt to local needs according to the development of each industry or field of study.

All post-secondary study programs have core professional modules that, in addition to core professional skills, also include generic competencies. One of these subjects is also intended for business communication in a foreign language.

Objectives of English lessons in higher professional education

The aim of English lessons within the subject in higher professional education is for the student to be able to:

- communicate with experts in your field of expertise in a foreign language,
- to use literature in a foreign language when solving problems in one's field of expertise
- monitor the development of the profession by knowing and monitoring professional literature in a foreign language.

It is important that the student knows how to use English grammatically and spelling correctly, that he knows how to prepare a quality presentation of the process, method, device, etc. from his professional field, to be able to describe his work environment, to be able to explain the basics of his profession in a foreign language and to know professional terms.

It is also important that the student knows how to use dictionaries, both in book form and electronically supported dictionaries.

PROFESSIONAL TERMINOLOGY IN TEACHING ENGLISH AS A FOREIGN LANGUAGE

After carrying out a detailed analysis of the needs and designing the curriculum, learning objectives and pedagogical teaching methodology based on the findings, it is necessary to elaborate the learning material from the content point of view. In the course of professional English, this includes a precisely planned set of topics and vocabulary that students must master in order to achieve the learning goals set in the curriculum.

The process of defining content is an extremely challenging task for foreign language teachers. There are several reasons for this. Among them are lack of knowledge of terminology in the mother tongue, problems of professional translation and a small supply of materials on the publishing market.

Foreign language teachers are usually unfamiliar with professional terminology in their mother tongue. It is difficult to expect a linguist to know his profession, especially if it is very specific, technical and covers a specialized field of technology.

An even more challenging problem for foreign language teachers is to find appropriate translations for professional terminology. There are very few dictionaries for professional terms for Slovenian on the market. Teachers thus use popular online translators such as Google Translate and Pons. Glosbe is one of the less well-known but high-quality translators, which offers translations for many professional fields. In addition to dictionaries, teachers can also help themselves with thesauruses. Some of them were translated when Slovenia joined the European Union. Although they are mostly legal documents, many contain technical terms that are used in policy records, listed when regulating quality standards or awarding certificates.

The third obstacle that foreign language teachers encounter when it comes to professional terminology is the lack of teaching materials, as there are very few Slovenian materials, so teachers resort to using materials from recognized international publishers.

AN EXAMPLE OF TEACHING ENGLISH FOR THE NEEDS OF LOGISTICS

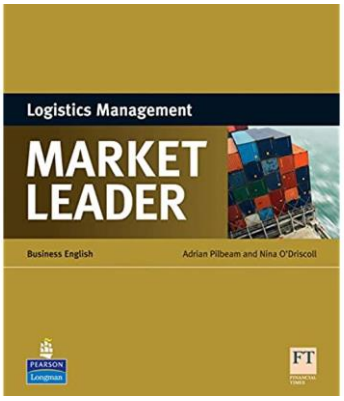
In recent decades, logistics has been one of the fastest developing scientific fields, as the impact of globalization has led to the need to develop the science of logistics and its solutions to incredible proportions. Logistics is extremely complex, as depending on the activity, it can be divided into transport, and further into road, rail, air, sea, river..., storage, forwarding, distribution, procurement... and we have a whole range of directions depending on the field of application. Due to global competition, companies are forced to cooperate more and more efficiently, which is based on good management of supply chains. The introduction of information support for logistics processes also brings many changes and innovations. All of these complex elements of logistics dictate the needs of future logisticians and must be considered in curriculum planning in logistics education programs.

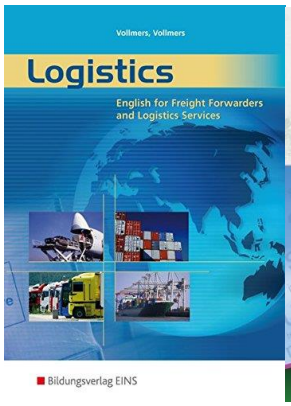
The problems encountered by English teachers in teaching future logisticians are mainly:

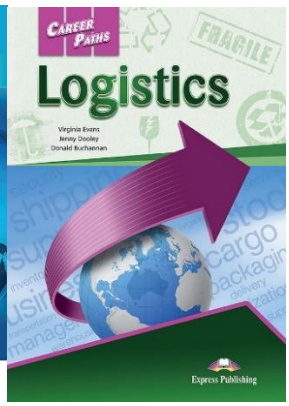
- It is a problem for foreign language teachers to find appropriate translations for professional vocabulary, as there are no current dictionaries available, so they have to use online translators and thesauruses for help.
- Since logistics is a rapidly growing and changing scientific field, it is difficult to keep up with all the innovations in the field and to know it well enough to include it in classes.
- A big problem is keeping up with terminological innovations. Terminology for innovations is often not introduced quickly enough in Slovenian and does not follow the innovations in the world, which presents a problem in professional translation.
- Another problem is that there are no current specialized textbooks for teaching English available in the Slovenian language. During the renovation of the educational programs,

some quality materials for teaching English were created years ago within the framework of the European project Impletum, but due to the rapidly changing scientific discipline, additions would be necessary. Teachers thus resort to using materials from recognized international publishers. In the field of logistics, there are quite a few materials that specialize in teaching foreign languages. Among the more widely used are:

- Market Leader ESP Book - Logistics Management (Pilbeam and O'Driscoll, 2010)
- Express Series: English for Logistics (Grussendorf, 2009)
- Flash on English For Transport and Logistics (Ernesto D'Acunto, 2012)
- Logistics - English for Freight Forwarders and Logistics Services (Vollmers C., Vollmers S., 2004)
- Career Paths: Logistics (Evans, Dooley, Buchannan, 2016)







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- http://www.impletum.zavod-irc.si/sl/gradiva/

S. O. U. Riste Risteski Ričko – Prilep

dipl. soobr. ing. Sekuloska Violeta

Tema:

24. Lokalniot soobrakaj vo globalniot svet

Apstrakt:

Na luǧeto odsekogaš im bilo svojstveno da živeat zaedno so drugite luǧe vo zaednica. No načinot na živeenje vo zaednica porano i denes e mnogu različen. Imeno porano luǧeto živeele zaedno no vo bukvalna smisla na zborot. Dodeka denes, sekoj čovek saka da bide povrzan so drugite luǧe i toa ne samo od negovoto opkružuvanje tuku i poširoko, no od druga strana ima potreba da živee posamostojno i pokomotno. Ottuka i povrzanosta vo zaednicata e samo formalna i virtuelna kade glavnata uloga ja imaat soobraḱajot i internet povrzanosta. So toa i problemite koi proizleguvaat od poimite za lokalno vo odnos na globalno vo opšta smisla na živeenjeto na luǧeto se drastično promeneti.

Od druga strana pak i ragraničuvanjata na globalno nasproti lokalno, se dosta različni i bez nekoja jasna granica.

Vo zavisnost koja e perspektivata na gledanje, poimite lokalno I globalno možat da bidat različni. Nivnata veličina e relativna ne samo po golemina tuku i po obemot na dejstvuvanje vrz životot na luǧeto. Vo sekoj slučaj globalniot svet e sostaven od mnogu lokalni edinki koi za običniot čovek se svetovi vo koi čovekot go živee sekojdnevieto ne samo kako edinka tuku i vo sklop na svoeto semejstvo.

So samiot fakt deka lokalniot svet e prepleten so drugi lokalni svetovi vo globalniot svet, no e i negova osnovna kletka, se postavuva prašanjeto: Dali so deluvanje vrz lokalniot svet možeme da go izmenime i globalniot? Odgovorot na ova prašanje proizleguva vo zavisnost od aktivnostite koi ḱe se prevzemaat i istiot može da bide pozitiven ili negativen.

Soobraḱajot kako neizostaven del od sekojdnevniot život na luǧto isto taka možeme da go tretirame vo različni lokalni ramki koi možat mnogu da vlijaat na globalniot soobraḱaj, a so toa i na celokupniot globalen svet.

Klučni zborovi:

Soobraḱaj;

Svet;

Lokalno;

Globalno;

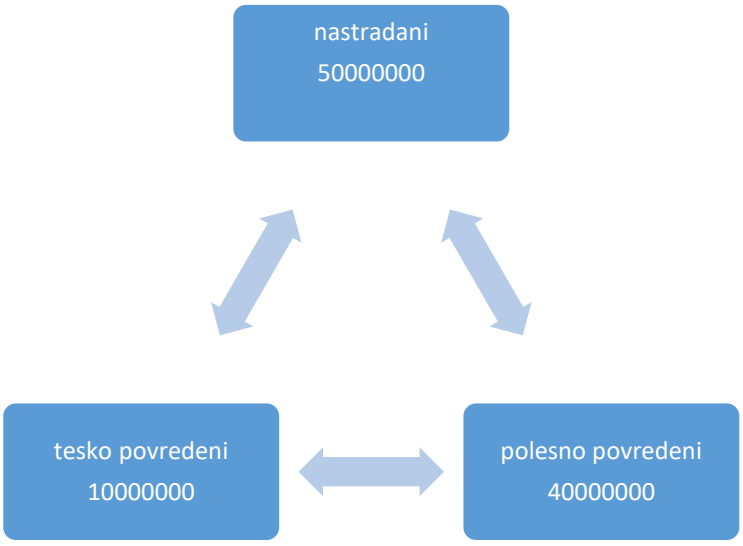
Luǧe.

Glaven del:

Soobraќajnite nezgodi se naše sekojdnevie bez razlika dali nie sakame da priznaeme ili ne. Sekojdnevno slušame po mediumite ili na socijalnite mreži za barem edna soobraќajna nezgoda. Fakt e deka patištata veќe odpoodamna ličat na sceni od nekoj horror film. Od druga strana toa ne se samo brojki za zaginati ili povredeni luѓe, toa se životni sudbini, semejni tragedii toa se čovečki životi koi zgasnuvaat prinudno. Pričinite za tolkaviot broj na nezgodi se najrazlični, a kako najčesti se slednite:

- Brzo vozenje;
- Vozenje pod dejstvo na alkohol;
- Nepočituvanje soobraќajna signalizacija;
- Nedavanje prvenstvo na minuvanje;
- Nedrženje rastojanie;
- Tehnička neispravnost na voziloto;
- Vozačko neiskustvo;
- Soobraќajna nekultura;
- Nesogleduvanje na uslovite na patot i sl.

Golem broj na soobraќajni institucii se zanimavale so problemot koj gi zema vo predvid pričinite za soobraќajni nezgodi se so cel da se napravi analiza za niv i soodvetno da se deluva. Edna od pričinata koja može da predizvika soobraќajna nezgoda a za koja mnogu malku dosega e analizirano, ako ne i voopšto, e adaptacijata na učesnicite vo soobraќajot pri promenata na Zakonot za Bezbednost na soobraќajot. Sekoj zakon, vklučitelno i Zakonot za Bezbednost vo soobraќajot, podleži na povremeni izmeni I dopolnenija. Periodot za adaptacija na učesnicite vo soobraќajot za sekoja izmena ili dopolnenie e različen i e dosta rizičen. Ova ušte poveќe doaѓa do izraz pri obavuvanje na meѓunaroden soobraќaj. Spored statistikata, na svetsko nivo, 1,2 milioni lica godišno go gubat životot vo soobraќajni nezgodi i okolu 50 milioni se zdobivaat so telesni pov



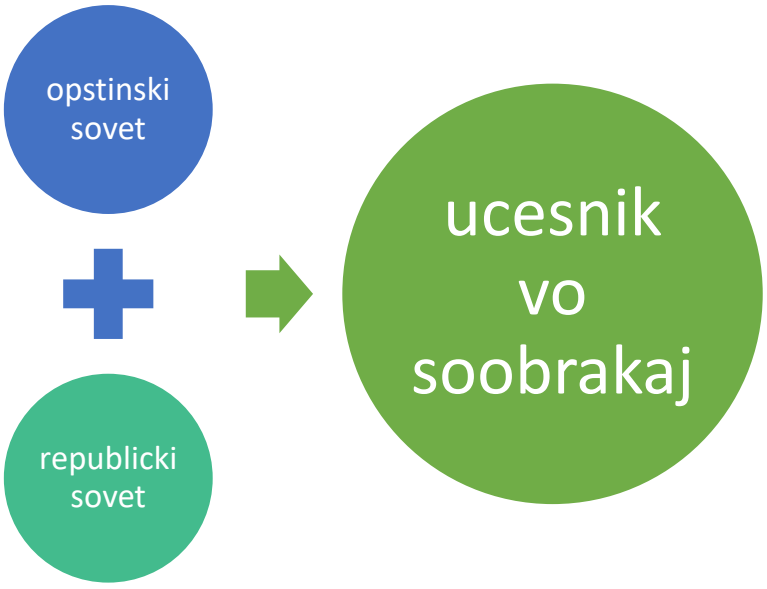
Dijagram br. 1 Nastradani vo soobraќajni nezgodi

Bez razlika za kakva povreda stanuva zbor brojkata e sekako golema a štetata napravena i na semejstvoto a na opštestvoto ušte pogolema.

Dobar del od nastradanite lica vo soobraќajnite nezgodi e i zaradi nesoodvetnata adaptacija na izmenite na Zakonot za Bezbednost od strana na učesnicite vo soobraќajot.

Celta na ovoj trud e da se sogleda taa posledica, no poseben osvrt sakam da dadam na eliminacija na istata ili vo najloš slučaj namaluvanje na posledicite koi istata bi gi napravila. Isto taka sakam da potenciram na periodot koj e potreben za adaptiranje na novonastanatata situacija vo Zakonot za Bezbednost na soobraќajot. Ovoj period e različen vo različni grupi na učesnici vo soobraќajot, različen e i kaj učesnicite koi pripaѓaat na edna ista grupa na učesnici vo soobraќajot. Periodot na adaptacija najpoveќe zavisi od samata ličnost, od nejzinite psihofizički karakteristiki, vozrasta, socijalnata kategorija na učesnikot, kako od samata izmena na zakonot t.e. od zakonskata regulativa koja se predviduva da bide vmetnata kako nov člen vo zakonot ili dopolnenie na veќe postoečki.

Mediumskata pokrienost vo ovoj slučaj igra golema uloga no ne i klučna. Tuka ima dosta i drugi okolnosti koi možat da go namalat periodot na adaptacija pa i da gi ublažat reakciite koi pri toa se pojavuvaat. Klučnata uloga vo ovoj slučaj ќe ja imaat opštinskite i republičkite soveti za bezbednost na soobraќajot na patištata što vsušnost e i nivna primarna obvrska. Ottuka povtorno se gleda potrebata od soodvetna povrzanost pomeѓu ovie dve strukturi pa i ušte ponatamu t.e. povrzuvanje na sekoj republički sovet za bezbednost so site svetski i meѓunarodni asocijacii, konvencii i združenija, a koi se od oblasta na soobraќajot. Odlukite koi bi bile doneseni, a se odnesuvaat na izmenata na zakonot, ponatamu bi se prosledile soodvetno na povisokite strukturi, no i sugestiite koi pri toa bi se dobile bi se vratile nazad do opštinskite soveti, a so toa i do lokalnite učesnici vo soobraќajot.



Dijagram br. 2 Povrzuvanje vo soobraќajot

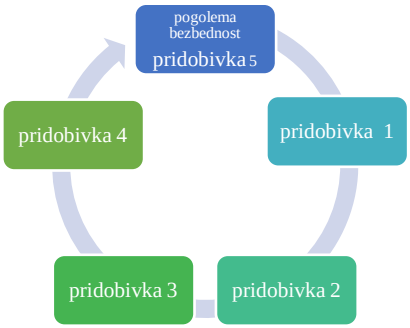
Меѓународниот учесник во сообраќајот нема да ги добива информациите од учесници кои се сретнале со некаков сообраќаен заклучок, затоа што тој често пати не е веродостоен, туку ќе ги добива од релевантен орган. Во секој случај, секој меѓународен учесник во сообраќајот има потреба од доверлив извор на информации како не би дошол до погрешни заклучоци, а кои би се однесувале на земјите каде истиот има потреба да патува. Ова посебно доаѓа до израз кај товарниот транспорт каде возачите од меѓународната шпедиција директно го имаат искусено во текот на своето возачко искуство. Покрај возачите и сите други жители можат да ги осетат негативните влијанија, кои се однесуваат од недоволната информација, со тоа што меѓународниот проток на стоки би бил побавен, поефикасен со повлекување на цената на чинење на транските стоки.

Сл. бр. 1 Колона на камиони

Со помош на мрежната поврзаност на соодветните здруженија кои се од областа на сообраќајот можеби нема да се решат сите проблеми, но би се ублажиле голем број на штетни последици и би се искористиле некои придобивки.

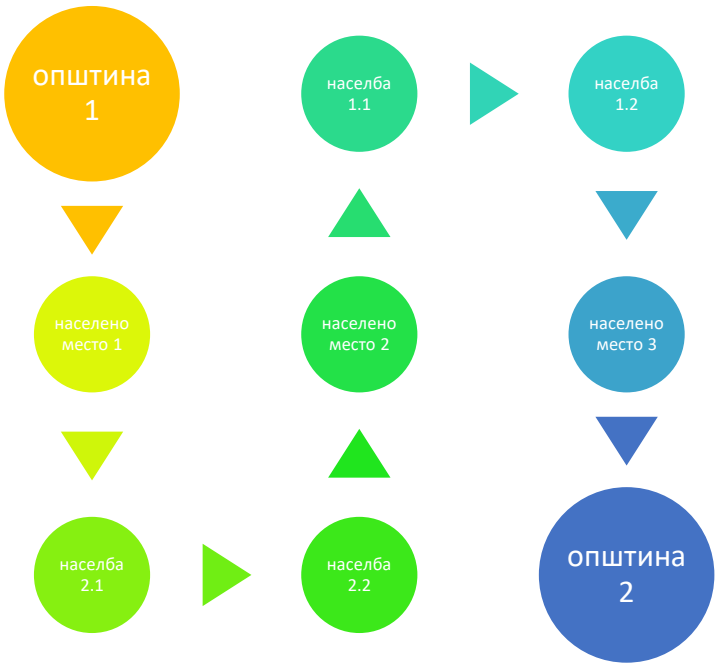
Придобивките во овој случај би биле следни:

1. Секоја измена, или дополнение на законот, ќе биде презентиран пред стручна фела;
2. Можноста за грешки при измените драстично се намалува;
3. Измените благовремено би се проследиле не само локално туку и пошироко;
4. Периодот на адаптација би се намалил;
5. Последиците би се ублажиле.



Дијаграм бр. 3 Придобивки од вмрежување во сообраќајот

Druga rabota e dali izmenite na zakonot se neophodni sekogaš i sekade i koga istite stanuvaat neizbežni. Skoro sekoja promena od urbanistički aspect bara i promena vo zakonot za soobraќaj. Vpročem celokupniot život na luǧeto e povrzan direkno ili indireknto so soobraќajot. Taka da sekoja drastična promena vo načinot na život na luǧeto, doveduva do izmena ili dopolnuvanje na Zakonot za soobraќaj. Toa e taka zaradi toa što luǧeto za normalno da funkcioniraat mora da napravat različni dviženja i razmena na informacii. Na toj način luǧeto se povrzuvaat meǧusebno i gi obavuvaat sekojdnevnite aktivnosti. Site tie dviženja i razmena nainformacii ne samo što sekojdnevno stanuvaat pomnogubrojni tuku istite poveќe i poveќe se pokompleksni. Ovdeka stanuva zbor za taka narečen lokalen soobraќaj koj često pati ima potreba od meǧusebno povrzuvanje so drugite lokalni vidovi na soobraќaj vo edna Celina koja od svoja strana e Celina na svetsko nivo. Taa povrzanost pomeǧu naselenite mesta, dokolku gledame od svetsko nivo isto taka pretstavuva lokalen soobraќaj vo sklop na celokupniot soobraќaj.



Dijagram br. 4 Povrzuvanje na opštini i naseleni mesta

Od druga strana mrežnoto povrzuvanje na luǧeto vo sklop na edna država može da bide globalno dokolku go analizirame edinstveno od aspect na naseleno mesto ili od aspekt na opština. Suštinata e vo toa što sekoja opština e potrebno da go rešava lokalniot soobraќaj no ne samo samostojno kako opština tuku i vo soglasnost i konsultacija so sosednite opštini pa i na nivo na država.

Povrzanosta pak meǧu državite može da se analizira od aspect na opština ili na svetsko nivo. Spored taa percepcija i mrežnoto povrzuvanje e različno, koe može da bide lokalno ili globalno. Vo sekoj slučaj, sekoja država treba da gi rešava soobraќajnite problemi na nivo na država no i vo konsultacija i korespodencija so sosednite državi.

Na ovoj način loklaniot učesnik vo soobraќajot ќe može mnogu lesno da se adaptira vo globalniot soobraќaj bez nikakvi predhodni obuki i bez nesakani posledici.

Sl. br. 2 Povrzuvanje vo soobraќajot

Poteško bi se odgovorilo na prašanjeto kako povrzanosta na lokalniot so globalniot soobraќaj pravilno da se sprovede vo delo.

Za da istoto da se sprovede vo delo potrebna e ne samo soodvetna organizacija tuku i soodvetna korespodencija koja bi započnala od najniskite soobraќajni organizacii i site strukturi implementirani vo soobraќajot, pa se do najvisokite strukturi pri toa što istite zadolžitelno bi bile rangirani hierarhiski. Imeno, sekoja opština, bez isključok mora da ima na svojata teritorija funkcionalen opštinski sovet za bezbednost na soobraќaj na patištata, kade što pogolemiot broj na členovi bi bile soobraќajni inženeri. Ovaj opštinski sovet za da go opravda svoeto postoenje i da gi ispolni obvrskite kon građanite, treba da funkcionita kako svoetodavno telo na sekoja lokalna vlast. Seto ova bi bilo ovozmoženo samo so zakonsko počituvanje na zaklučocite, ideite i zabeleškite doneseni od strana na členovite na sovetot. Pokraj toa što bi ja imal ulogata na sovetodavno telo istiot najpoveќe bi trebalo da se nasoči kon prevencijata vo soobraќajot i toa na site kategorii na učesnici soodvetno.

Ponatamu sekoj opštinski sovet za bezbednost na soobraќajot na patištata da bide neizostaven sostaven del od Republičkiot Sovet za Bezbednost na Soobraќajot na Patištata, so neposredno pravo na donesuvanje i iznesuvanje zaklučoci, zabeleški i idei povrzani so soobraќajni problem pa i so samiot soobraќaj vo celina bez razlika dali stanuva zbor za zakonski izmeni, dopolnenija na zakonite ili promena na načinot na organizacija na soobraќajot.

Počituvajќi ja hierarhiskata skala sekoj Republički sovet za bezbednost na soobraќajot na patištata treba da bide neizostaven sosotaven del od regionalnite soveti za bezbednost pa i od kontinentalnite i meģukontinentalnite soveti za bezbdnost na soobraќajot na patištata. Regionalni, kontinentalni i meģukontinentalnite soveti za bezbednost na soobraќajot na patištata da bidat organizirani i registrirani bez isključok koj vo soodvetno teritorijalno područje.

Vo sostav na site ovie soveti za bezbednost na soobraќajot na patištata od lokalno pa se do globalno nivo, svoe mesto da najdat i predstavnici od soodvetni soobraќajni združenija no i členovi na meģunarodnite simpoziumi za soobraќaj. Na toj način učesnicite direkno ќe bidat i zapoznaeni i involvirani vo problematikata so soobraќajot no i so site izmeni i nadopolnenija koi skoro sekojdnevno se sreќavaat i vo lokalniot i vo globalniot soobraќaj.

So ovoj pristap na povrzuvanje na loklaniot I globalniot soobraќaj sekoj učesnik ќe ima možnost da dava svoj pridonest vo rešavanje na problem od oblasta na soobraќajot bez razlika dali istiot problem e lokalen ili globalen. So samoto toa što samo kompetentni ličnosti ќe bidat

staveni na soodvetno mesto problemot može i soodvetno da bide rešen. Ušte koga kon toa se dodade i međunarodnoto povrzuvanje i implementacija na međunarodni iskustva, problemot bi se rešil na opšto zadovolstvo i na lokalniot žitel no i na patnikot koj doağa do taa destinacija ili samo tranzitira.

So rešavanje na lokalnite soobraќajni problemi nema da doağame do situacija da zaobikoluvame odredeni destinacii koi bi bile pokratki maršuti, a bi gi zaobikoluvale zaradi nesoodvetno rešavanje na lokalen soobraќaen problem. Vo toj slučaj gubi i patnikot zaradi podolgite maršuti no gubi i mestoto koe e zaobikoleno zaradi uskratuvanje na ekonomskite efekti. So toa sakam da ukažam deka našiot lokalen soobraќaen problem može da bide i vaš zaradi toa što vpročem site zaedno živeeme vo toj globalen svet.

Izmenite i dopolnuvanjata na Zakonot za bezbednost vo soobraќajot mnogu često lokalniot učesnik vo soobraќajot ne gi dobiva navremeno pa i samata adaptacija kon izmenite i dopolnuvanjata na zakonot učesnikot vo soobraќajot ja pravi vo odredeno soodvetno vreme vo koe vreme pak se pravat i najgolemiot broj na soobraќajni prekršoci a so samoto toa i soobraќajni nezgodi.

Koga stanuva zbor pak za međunarodnite patuvanja ili međunarodniot transport na stoka, situacijata koja e povrzana so odredeni izmeni i dipolnenija na zakonot za bezbednost vo soobraќajot e ušte pokompleksna.

Međunarodnite dviženja bezrazlika dali stanuva zbor za patničkiot ili tovarniot soobraќaj se kompleksni pred se zaradi slednite pričini:

- Relevantni tolkuvanja;
- Nesoodvetna implementacija;
- Različnost vo primenata.

Međunarodnito učesnik vo soobraќajot često pati odredeni izmeni vo zakonot za soobraќaj bi gi implementiral onaka kako što ќe gi protolkuva, koe što tolkuvanje može da bide različno od slučaj do slučaj. Kaj sekoj učesnik vo soobraќajot se pojavuva doza na odbivnost pri odedeni izmeni vo zakonot, vklučitelno i vo zakonot za soobraќaj. Odbivnosta stanuva se pogolema so nesoodvetniot način na implementacija na izmenite i so neblagovremenoto ukažuvanje na prestojnite izmeni. Skepticizmot isto taka kaj sekoj učesnik vo soobraќajot e prisuten povtorno zaradi istite pričini.

Psihološki gledano učesnicite vo soobraќajot ќe se revanširaat na ova izmena so nepočituvanje na istiot ili so delimično počituvanje barem vo prvite denovi koga veќe e stapen vo sila noviot zakonik. Psihološkiot moment e ušte edna bitna komponenta so koja drastično se namaluva bezbednosta vo soobraќajot i toa kaj site grupi na učesnici bez razlika za koja grupa na učesnici e donesenata izmena ili dopolnenie na zakonot.

Zaključok:

Životot e reka koja teče i minuva. Nekogaš e mirna i blaga za da vo sledniot mig stani brza i burna.Site nie sme del od toj proces. Kako ќe se odviva zavisi od nas samite. Sekoj period od našite životi, miren ili brz, so sebe nosi i ubavi momenti no i rizici. Rizicite povrzani so soobraќajot isto taka se del od našite životi. Ovie rizici poveќe od bilo koi drugi vo sekoe vreme se prisutni vo našite životi, bez razlika dali denot e miren i tivok ili brz i buren.

Se što sme storile do sega za da na nekakov način gi ublažime rizicite povrzani so soobraќajot, očigledno e malku ili nedovolni. Našata opredelba kako luǵe koi sme ja odbrale profesijata povrzana so soobraќajot, odsekogaš i prvenstveno treba da bide povrzana so bezbednosta vo soobraќajot.

I site naši ponatamošni založbi povtorno moraat da se dvižat vo taa nasoka. Dali seto ova ќe vrodi so plod…morame da počekame i da analizirame posle izvesen period. Dokolku brojkite koi ќe gi analizirame odat nadolu…togaš da prodolžime po toj pat…no dokolku brojkite odat nagore nie morame da go smenime kursot na deluvanje i da barame drug, posoodveten pat kojќe ne dovedi do uspeh. Najbitno od se e da ne se otkažuvame nikogaš. Samo taka imame možnost da ja postignime celta.

Edna od tie založbi e i spodeluvanjeto i razmenata na iskustva na ovie naučni sostanoci. Kon toa e nasočena i mojata idea za povrzuvanje na lokalniot soobraќaj so globalniot svet. Toa e samo eden čekor od maratonot koj treba da go izodime. Najvažno od se e da čekorime napred pa makar toa da e i samo eden čekor. Samo taka čekorejki napred se približuvame do celta, koja za site nas bez razlika na koja vera, nacija ili pol pripaǵame, se vika BEZBEDEN SOOBRAĆAJ.

S. O. U. Riste Risteski Ričko – Prilep

dipl. trafficeng. Sekuloska Violeta

Subject:

24. Local traffic into the global world

Abstract:

The people had always been living together with other people into community. But the way of living together in the past is very different than today. In the past the people have been living together literarily. Today every person wants to be connected with other people not only from its surrounding, but also wider, and it still needs to have more privacy and commodity. Therefore the connections into community are only formal and virtual, so the traffic and internet connections are in the leading role. This leads to a drastic change of the problems coming out from local compared to global in general life of the population.

On the other side determinations between global and local are very different without clear borders.

Depending on the perspective of view, terms local and global can be very different. Their importance is different not only by size, but also volume of affecting people's lives. In every situation global world is composed of many local units that, for ordinary person are worlds where he lives his everyday life as individual and as a part of his family.

The fact that the local world is connected to other local worlds into the global world, but it also is its basic component, is introducing the question: Can influencing the local world change the global one too? The answer of this question depends of the activities that will be taken and it can be positive as much as negative influence.

The traffic as a key part of everyday life can be treated in various local scale that can have significant influence on global traffic and with that on the global world.

Key words:

Traffic;

World;

Local;

Global;

People.

Main part:

Traffic accidents are part of our everyday life no matter if we admit that or not. We constantly hear from media and social networks about traffic accidents at least one in a day. It is a fact that roads for a long time look like scenes from the horror movies. On the other side these are not only numbers of killed or injured people, these are life destinies, family tragedies, these are human lives forcibly shortened. Causes for the high number of accidents are different, but most common are:

- Driving fast;
- Driving and drinking;
- Disobeying traffic signals;
- Disobeying passing sequence;
- Disobeying determined distance;
- Technical malfunction of the vehicle;
- Inexperienced driver;
- Traffic rudeness;
- Maladjustment of the road conditions and other.

Large number of traffic engaged institutions are considering the problem of the causes for traffic accidents in order to analyze them and act appropriately. One cause for traffic accident that is very little analyzed, if at all, is the adaptation of the traffic participants when the change of the Law for Safety in Traffic is made. Every law, including the Law for Safety in Traffic, is a subject of occasional changes and amendments. Period for adaptation of the traffic participants on every change or amendment is different and very risky. This is even more obvious with international traffic. According to statistics, on global level, 1,2 million people annually lost their lives in traffic accidents, and about 50 million are injured.

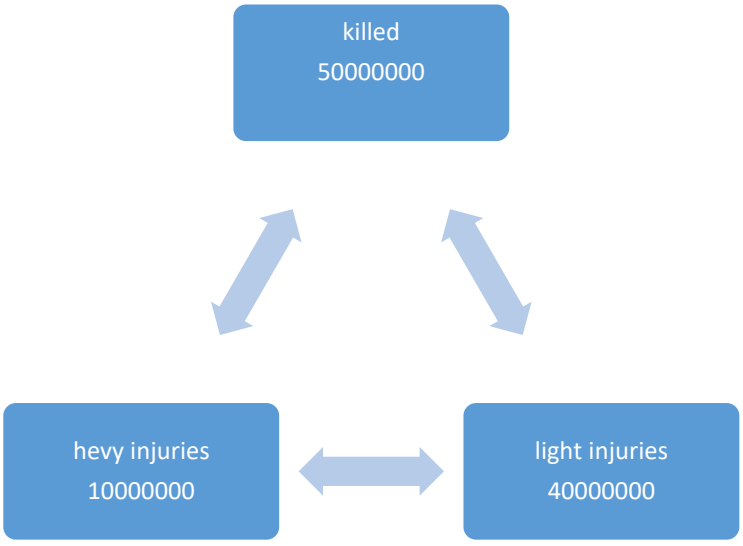


Diagram no. 1 Suffered in traffic accidents

No matter which injury took place the number is still too high and the damage made to the family and the society is larger.

Big part of the people affected with the traffic accidents is because of the inappropriate adaptation of the traffic participants to the changes of the Law for Safety in Traffic.

The goal of this work is to analyze the consequences of that, with specific review how to eliminate it, or, at least, decreasing the consequences that come with this. I would also point to the period needed to adapt to the new situation with the Law for Safety in Traffic. This period is different for different groups of traffic participants; it is different for every single participant in traffic. The period of adaptation depends on the person itself, on its psychophysical characteristics, age, social category, but also on the change itself, on the legislation that tends to be implemented as a new regulation or as an amendment of the existing one.

Media coverage in this case is crucial, but not a key factor. There are many different circumstances that can shorten the period of adaptation and to reduce reactions that occur during the implementation. Key role in this situation will be to the local and state chancellors for safety in traffic on roads; this actually is their primary obligation. Here, again, it is obvious that these structures need to be properly connected, and even further – connecting every state council for safety with every world and international association, convention and groups involved into traffic. Decisions that will be made, changes of the existing Law will be introduced further to higher structures, but and suggestions will take place and brought back to the local authorities, furthermore to the local traffic participants.

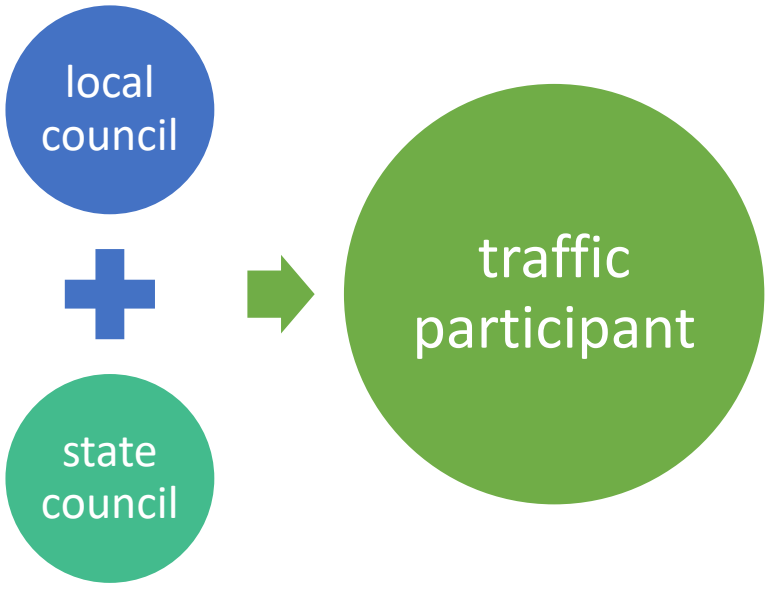


Diagram no. 2 connection in traffic

International traffic participant is not going to gather information from other participants from their point of view, this is not trustworthy source, and information will be delivered from relevant source. Anyhow, every international traffic participant needs relevant source of information to prevent wrong conclusions about countries he needs to travel to or thru. This is most obvious for truck transport where drivers of the international transport had a lot of firsthand

experience. Not only the drivers, every other resident can feel the negative influence of the inadequate information because international transport of goods will be slower, less efficient and with that and higher price of the foreign, imported goods.

Pic. no.1convoy of trucks

With help of the network of appropriate associations involved in traffic we cannot solve all the problems, but we will decrease the number of the negative consequences and we will gain some benefits.

Benefits in this situation will be:

1. Every change or amendment of the existing legislative will be presented directly to those involved;
2. Possibility of mistake with the changes is drastically lowered;
3. The changes will be introduced on time locally and wider;
4. Period for adaptation will be shortened;
5. The consequences will be smaller.

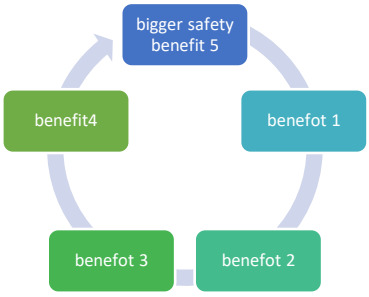


Diagram no. 2 Benefits of Traffic Networking

Another thing is if the changes of the Law are necessary every time and everywhere, and when they cannot be avoided. Almost every change in the urban area requests change into the Law for traffic. To be precise every aspect of the human life is somehow connected, directly or indirectly, with traffic. Every drastic change in the way of life of the people is brings the necessity for change or addition of the Law for traffic. It is like that because people in order to function normally must move constantly and exchange information. That is how people connect

with each other and fulfill everyday activities. All this movement and exchange of information are becoming more and more every day, and more complex. We are talking about so-called local traffic that often needs to be connected with other local kinds of traffic into one unit, and eventually creating unit of the world scale. This connection among populated areas, compared to the world traffic, is also a local traffic as part of a world traffic.

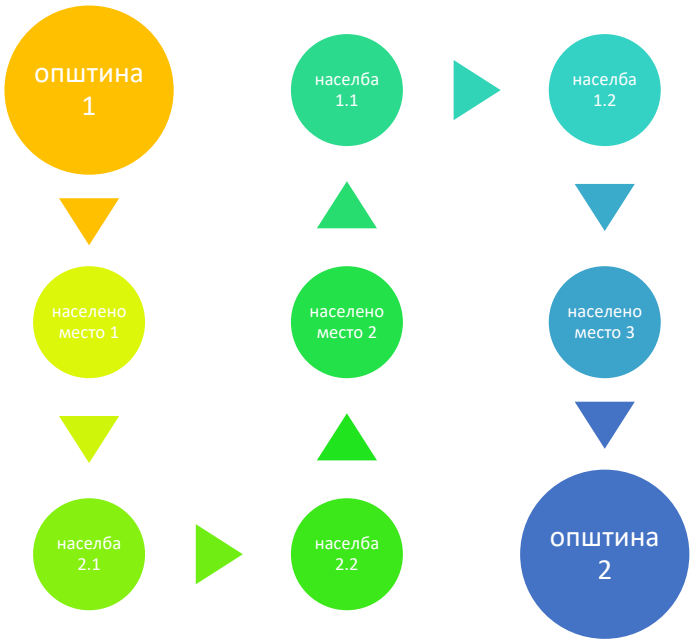


Diagram no. 3 connecting municipalities and settlements

On the other side the net of roads for people's connection into one state can be global if we analyze it apart for one populated area, or for the whole municipality. The point is into necessity every municipality to solve the local traffic but not individually for that municipality but to consult and agree with neighboring municipalities as well as with the whole country.

Connection between the countries can be analyzed as between municipalities and on global scale. According to this connecting is different and can be local and global. Anyhow, every country should solve the traffic problems for itself but still should consult and correspond to neighboring countries.

This way the local traffic participant can easily be adopted into global traffic without any further training and unwanted consequences.

Pic. no. 2 connection in traffic

It is harder to answer the question how to implement the connection between local and global traffic correctly.

To implement this it is necessary to be well organized and have intense exchange of information that is starting from the smallest traffic organizations and every other structure involved into traffic, including the highest structures that must be structured by the hierarchy. Every municipality with no exceptions must include on its territory functional council for safe traffic on roads, where most of the members will be Traffic engineers. This local council, to justify its existence and to fulfill its obligations toward the citizens, needs to function as an advisor to every local government. This can only be implemented only with if the conclusions, ideas and notifications of this council are respected and regulated. Not only as an advisor, this council should mostly be directed to prevention for every category of participants.

Furthermore, every local council for traffic safety on roads to be “must have” part of the Republic Council for Safety in Traffic on Roads, with direct right of bringing conclusions, ideas and notifications about traffic problems and the traffic as a unit, no matter if it is about changes of the legislative, amendments to the law or changes into organization of the traffic.

Respecting the hierarchy every republic council for safety in traffic on roads needs to be part of the regional councils for safety as well as continental and intercontinental councils for safety in traffic on roads. Regional, continental and intercontinental councils for safety in traffic on roads to be organized and registered with no exceptions into their territory.

These councils for safety in traffic on roads from local to global level must include representatives of appropriate traffic organizations and members of the international traffic symposia. This is how participants will be directly introduced and involved into the area of traffic as well as involved into changes and amendments that almost every day are made into local and global traffic.

With approach like this to the connection among local and global traffic every participant will be able to contribute to the solution of the problems about traffic no matter if the problem is local or global. Competent professionals will be on the right places so the problems can be solved fast and adequate. If we add to that international cooperation and worldwide experiences the problem will be solved for local residents as well as for the traveler who is going to or thru.

Solving the local traffic problems will lead to a situation not to bypass certain destinations that would have shorter distance just because unsolved traffic problems. It will be a loss for traveler because of the longer path, but also and the area because of the economical benefits. I want to say that our local problem can also be yours because we all live in this global world.

Changes and amendments into Law for safety in traffic are often late for the local participants into traffic. This leads to late adaptation of the participants according to the changes and amendments, the time is passing and most of the violations and accidents are due to this delay.

When we talk about international traveling or international transport of goods, situation connected to certain changes and amendments of the Law for safety in traffic is more complex.

International movement, no matter if it is traveling or transport are complex mainly because:

- Relevant interpretations;
- Inappropriate implementation;
- Difference into application.

International traffic participant is often implementing the rules the way he thinks is right, and it can be different from the base idea. Every traffic participant is experiencing a dose of disagreement with certain changes of the law, including the law of traffic. Disagreement is larger if the way if implementing is inappropriate or not on time. Skepticism is present because of the same reason.

Psychologically observed participants into traffic will answer with disobedience of the laws or partial respect at least the first days of the new legislative. Psychological moment is one more crucial component that drastically decreases safety in traffic for every group of participants no matter what group the legislative is affecting.

Conclusion:

The life is a river that flows and passes. Sometimes it is calm and peaceful, but the next moment it can become fast and furious. We are all part of that process. How it flows depends mostly on us. Every period of our lives, calm or fast, brings nice moments and risks. The risks connected to traffic are also part of our lives. These risks are present in our lives any time more than any other no matter if the day is calm and peaceful or fast and furious.

Anything we have done so far to somehow reduce the risks connected to the traffic is obviously little or not enough. Our goal as human that have chosen this profession connected to traffic always and mainly need to be safe traffic.

Our every further engagement must move in that direction. Is this going to have positive effects… we have to wait and analyze later. If the analyzed numbers are decreasing… then we should continue that road, but if numbers are increasing we have to change the course and look

for another, more appropriate way to lead us to success. The most important thing is never to give up. Only then we can achieve our goals.

One of this “must be done” things is sharing and exchange of experiences on these scientific meetings. My idea for connecting the local traffic and global world is leading in that direction. It is only one step of the marathon. Most important is to keep making those steps forward, one by one. Step by step forward we are approaching to the goal that is same for every religion, nation or gender, and it is SAFE TRAFFIC.

V POGLAVLJE

Zaštita životne sredne i savremene tehnologije u saobraćaju i logistici

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25. "Влијанието на сообраќајот и транспортот врз загадувањето на животната средина"

Абстракт: Преку овој труд би сакале да ги прикажеме главните аспекти на влијанието на транспортот и сообраќајот врз еколошките промени преку неколку примери кои се забележани и нотирани во некои од нашите градови како и во светските метрополи. Имено ќе се осврнеме на тоа како преку одредени мерења е утврдено во колкав процент одредени загадувачки супстанции и материи како(прашина, сулфур диоксид, азот оксиди, јаглен моноксид и јагленоводородот) , кои се и најчести загадувачи а се и предмет на повеќегодишни испитувања и студии во повеќе трудови, како истите и во колкава мера ја загадуваат животната околина. Интензивната употреба и користењето на автомобилите во јавниот транспорт не само во агломерациите туку и во помалите градови се повеќе се причинители за загадување на животната средина , нарушување на еколоґкиот баланс и доведување до дисбаланс и висококо загадени градови. Целта е да утврдиме како настанува до загадување на животната средина преку масовното користење на автомобилите и превозните средства кои за гориво користат бензин, нафта или плин и како можеме да дејствуваме во насока на за концептуален модел за планирано, превентивно смалување на влијанието на сообраќајот и транспортот врз загадувањето на животната средина. Модерниот начин на живот и зголемувањето на животниот стандард доведе до зголемување на бројот на превозни средства во сообраќајот кои го користат горенаведеното гориво, тие не само што ги оптеретуваат постоечките патишта туку се и главни зна мапата на загадувачи на живоитната средина. Воедно би сакале да се осврнеме и на тоа да се промени свеста на населението кон прибегнување и користење на друг нчин на транспорт кои се еколошки подобни и корисни, кои можеби одземаат подолго време на транспорт но се покорисни за зачувување на еколошкота средина и се помали причинители за нејзино загадување.

Клучни зборови: Сообраќај, транспорт, животна средина, емисија на гасови.

1. В О В Е Д

Живееме во 21 век кога начелно се цени дека човекот го достигнува врвот на научно-техничко-технолошкиот развој, усовременил многу нешта, го поедноставнил начинот на живот од една страна но по цена на експанзивниот развој едновремено си наштетил имајќи во предвид дека во голема мера преку корситење, употреба , начин на затоплување на домовите, изградба на фабрики, начинот на организирање и користење на транспортот во сообраќајот придонел за големо загадување на животната средина која се повеќе преку дисбалансот во неа ни враќа двојно преку различни природни катастрофи но и лични штети по нашето здравје.

Доволно е да се знае дека во средината на XX век , кога всушност и отпочнува екпанзијата на автомоблската индустрија и користењето на автомобилите на земјата живееле некаде 2,6 милјарди луѓе кои во своја сопственост имале некаде околу 50.000.000. автомобили.На почетокот на новиот милениум бројот на население се зголемува на 5,7 милјарди и истите поседувале повеќе од 500.000.000 автомобили (Доколку ги вброиме теретните возила и мотоциклите достигнува бројка од дури некаде 800. 000.000).

Во овој период е удвостручен како бројот на населението , така и користењето и поседувањето на автомобили за транспорт и сообраќај.

Се претпоставува дека трендот на покачување на користењето на моторните возила ќе се зголемува и дека истиот ќе предизвика уште поголемо загадување и промена на климата но и причини за други несакани ефекти , како бучава, кисели дождови, загадување на водата за пиење и узурпација на земјиштето. Проценето е дека во земјите членки на OECD во делот на транспортот 30% ќе отпаѓа на користењето на моторните возила.

Од овие несакани влијанија не е поштедена ниту нашата држава каде што во огромен процент начинот на организација на транспорт е копнен и тоа преку користење на моторни возила во сообраќајоот со што се вбројуваме во една од најзагадените држави во ЕУ.

Оттука произлегува и потребата да се поразмислиме и час поскоро да превземме одредени мерки пред се во доменот на преконструкција на сообраќајната инфраструктура како и трендот и начинот на употреба на моторните возила за пренос на луѓе и стоки.

Едно од можните решенија е прибегнување кон Комбиниранв копнен транспорт кој уште се нарекува “пријателски” вид на транспорт а го опфаќа различниот вид на патен и железнички сообраќај. Овој тип на сообраќај во голема мера придонесува кон заштитата на животната средина со оглед на тоа што емисијата на штетни гасови се намалува, како и потрошувачката на гориво, предизвикување на бука и редукција на моторните возила по патиштата а со тоа и одбегнување на сообраќајниот метеж и зголемување на сообраќајната безбедност.

2. Сообраќајот и животната средина

Животната средина во која живееме е симбиоза од човечки, животински, ботанички свет кој неретко е изложен на различни штетни влијанија пред се предизвикани од индустриските постројки, хемиските производители, производителите на топлинска енергија, начинот на затоплување на домовите, немилосрдното уништување на зелените површини но како еден од главните фактори за загадување на животната средина се издвојува токму сообраќајаот и се она што тој го вклучува како превозно средство (можеби некои помалку, но некои превозни средства во голема, значителна мера). Начиот на кој тој предизвикува загадување и нарушување на животната средина е многукратно и на повеќе начини, пред се преку издувните гасови (горивото кое го користи) ја загадува животнта околина , земјиштето, тлото, водата а едновремено предизвикуваат и бука,

завземаат површина (изградба на современи патишта), пренос на опасни материи но и нервоза во секојденвниот живот преку прекумерната употреба на автомобили и други превозни средства кои предизвикуваат метеж по патиштата.

Воздухот главно и начелно се загадува преку испуштањето на штетни издувни гасови- јаглен моноксид, оксид азот, сулфурдиоксид, олово, честички на прав и прашина. Сите горенаведени штетни издувни гасови силно вллијаат врз човековото здравје , пред се имаат канцерогено дејство. Кислородот , како еден од најважните елементи за живот е се позагаден и го има во се помали количини. Поради преоптовареноста на патиштата со превозни средства а користат течно гориво за нивен погон, истите трошат огромна количина на кислород , појава која е најзабележителна во густо населените места. Загадувањето на водата и на почвата исто така ер предизвикано од сообраќајот, поради ослободување на хемиски супстанции и издувни гасови од превозните средства.

Покрај тоа што се јавуваат во улога на главни загадувачи на воздухот превозните средства се вбројуваат и во групата на предизвикувачи на бучава која во денешницата станува голем проблем, предизвикува многу негативни појави и последици како хормонални и органски пореметувања кај луѓето.

Патниот сообраќај во споредба со железничкиот транспорт е поголем предизвикувач на бучава , дури во некои истражувања се споменува дека патниот сообраќај за двапати повеќе создава бучавост отколку железничкиот сообраќај.

Се понагласената потреба и користење на автомобилите и други превозни средства кои користат течно гориво воедно е причина и за згуснување на сообраќајот кој од друга страна имплицира негативни последици, создава нервози во сообраќајниот метеж, дополнително се загадува воздухот, се попречува слободното движење на пешаците, предизвикуваат застој во сообраќајот а со тоа каснење до одредиштата, успорување и каснење на достава на роба и материјали по продавници и фабрики и сл. Автомобилот и понатаму е најчестото превозно средство кое се користи кај нас и насекаде низ светот, а според истражувањата на Американската агенција за животна средина, дури 29 % од штетните емисии на гасови во светот доаѓаат од автомобилите, правејќи го најштетниот сегмент од превозните средства.

Во некои од западноевропските земји дури дошле на идеја да израшунаат колкави се штетите и загубите при незгоди па така дошле до заклучок дека на автомобилите до 400 пати а на автобусите до 40 пати штетите се поголеми поднос на оние во железничкиот сообраќај.

Ова како истражување можеби е добар индикатор и показател за нашата земја како една од понеразвиените во делот на патната инфраструктура да се насочи во иднина кон прибегнување на изградба на повеќе железнички пруги, насоки, со цел да се растрети патниот сообраќај и транспорт а со тоа и се поголемото згадување на животната средина.

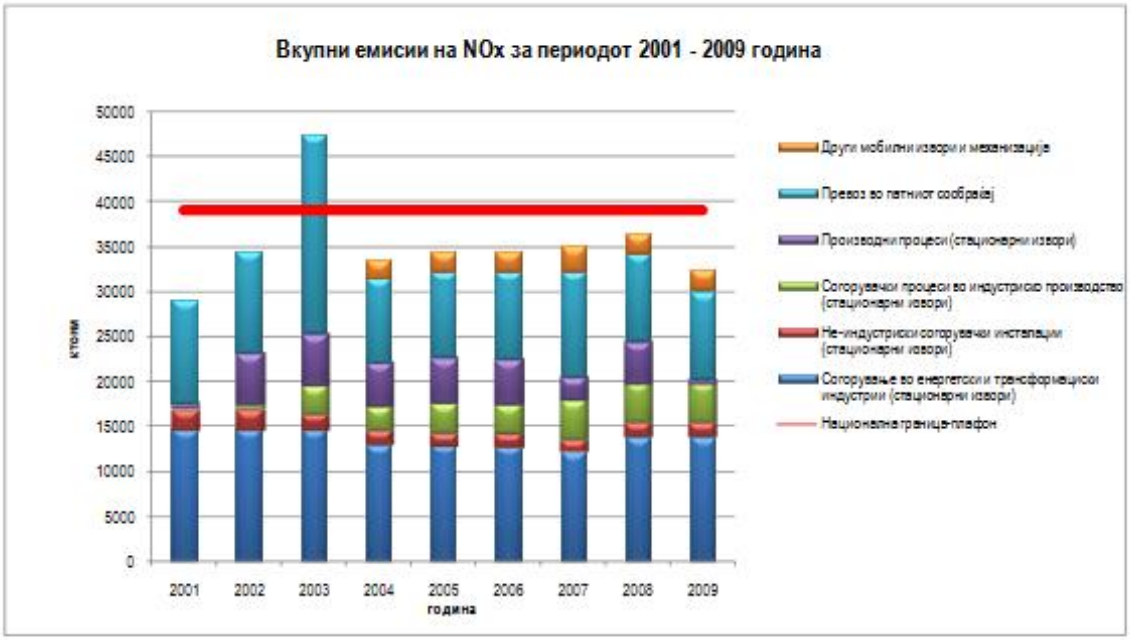
3. Комбиниран копнен транспорт

Начелно во сообраќајот се разликуваат два видови на транспорти и тоа директен или непрекинат и претоварен или прекинат сообраќај кој е понепрактичен, одзема подолго време на транспорт поради временската рамка која е подолга од причини што стоката, патниците или добрата морат да се претовараат од едно во друго транспортно средство. Со цел да се надминат овие недоследности и попреченост се прибегнва кон еден нов облик на транспорт- Комбиниран или (поврзан) транспорт. Овој вид на транспорт е систематичен и се карактеризира со посебна техничка база, стандардизирани и унифицирани дополнителни средства , посебна техологија и истиот е следен преку информациски- управувачки систем. Технологијата на комбинираниот транспортподразбира превоз на комплетни, стандардизирани транспортни единици , од испраќачот до примачот , со помош на најмалку два вида на сообраќај без притоа да се замени транспортниот сад.

Основната цел на комбинираниот транспорт е рационализација и поедноставување во транспортниот циклус по сиот превозен пат , од испраќачот до примачот. Единицата на комбинираниот транспорт ги означува транспортните садови кои овозможуваат користење на различни видови сообраќај:**железнички и патен** , железнички+поморски, железнички+речен, патен + воздушен итн.

4. Влијанието на комбинираниот транспорт врз животната средина

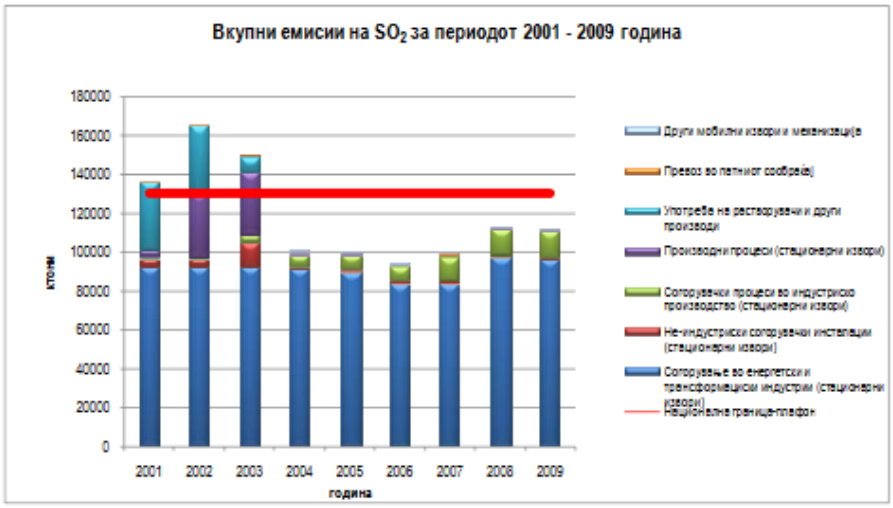
Кога веќе станува збор за комбинираниот транспорт, веднаш на почетокот да напоменеме дека желзничкиот транспорт во споредба со копнениот многу помалку придонесува кон загадување на животната средина. Ваквиот тренд се забележува насекаде, сите истражувања во некои земји членки од ЕУ укажуваат на тоа па несомнено истото важи и за останатите држави во кои железничката мрежа т.е сообраќај е поразгранет, позастапен и посикористен.За жал во земјите од поранашна СФРЈ вклучувајќи и ја и нашата држава неможеме да се пофалиме со разгранета железничка сообраќајна инфраструктура па отука и загаденоста на животната средина од година во година бележи тренд на зголемување а кое пред се се должи на користењето на копнените превозни средства. А кога веќе зборуваме за загадување пред се мислиме на штетните гасови кои ги испуштаат превозните средства , пред се јаглен – моноксид (65%), јагленоводород (45%) и оксид - азот(49%).



Графикон 2. Тренд на NO_x емисии за период 2001-2009 година

Според некои истражувања се дошло до заклучок дека учеството на емисија на штетни супстанции во % по сообраќајни гранки е:

- 66% do 99% - отпаѓа на копнениот сообраќај
- 3-26% на железничкиот и
- 1-8% на водниот сообраќај.



Графикон 1. Количини на емисии за SO_2 од 2001-2009 година

Вкупната емисија на олово во воздухот потекнува од сообрќајаот, а водомен на тоа скоро 94% е резултат на користењето на патниот сообраќај. Многу повеќе загадувањето го прават автомобилите и тоа за 30 пати повеќе загадуваат во споредба со користењето на железничкиот сообраќај. Меѓутоа оваа компарација е валидна само тогаш кога станува збор за користење на електрични возови во железничкиот сообраќај а имајќи во предвид дека во нашата држава во мала мера е застапен овој тип на железнички транспорт сепак доаѓаме до заклучок дека ижелезничкиот сообраќај е голем причинител за загадувањето на живитната околина. Доколку во иднина се насочиме кон подобрување, осовременување на овој тип на транспорт ќе придонесеме во голема мера кон заштита на животната средина, но засега фактите упатуваат на тоа дека и железничкиот транспорт можеби не во мера колку автомобилскиот но и тој е причинител за загадување на животната околина. Воедно една од предностите а железничкиот транспорт е во неговиот капацитет и можности за носење на голем товар, големи количини на материјални добра како и животизагрозувачки супстанци и тоа од утовар до истовар според однапред пропишани процедури и стандарди. Фокусот во иднина мора да се стави на овој тип на сообраќај, да се земе како најадекватен, со што ќе се намалат и транспортните трошоци но ќе придонесе и за помала загаденост на животната околина.

Доколку се разгледаат некои параметри ќе се дојде до заклучок дека врз основа на потрошувачката кај другите видови сообраќај во споредба со железничкиот е следната:

- за скоро 5% е поголема кај автобускиот превоз
- скоро 13% кај патничките автомобили и
- некаде околу 30% кај воздушниот патнички сообраќај

Зборувајќи за железничкиот сообраќај мора да се напомене и фактот дека тој има уште една предност во споредба со другите типови на сообраќај а тоа е што создава помала бука која исто така спаѓа во доменот на влијанието и нарушувањето врз животната средина. Пред се поамалата бука која ја прават возовите се должи на тоа што во сегашноста се цели кон електрификација на истите како и при изградбата на железничките пруги истите да се конструираат под нивото на градовите.

Главните предности и јаки страни на железничкиот сообраќај се однесуваат на следното:

- помал број на сообраќајни несреќи
- застој во сообраќајот
- загадување и
- создавање помала бучавост во однос на патниот сообраќај.

Табела 8. Вкупни емисии од секторот патнички сообраќај

Сектор патнички сообраќај	Загадувачки супстанции (во t/год.)					
	CO	NH_3	NMVOC	NO_x	PM (од издувни и неиздувни процеси)	SO_2
Патнички возила	3166	37	309	572	43	197
Лесни товарни возила	270	2	27	105	12	21
Тешки товарни возила	805	0	83	294	13	30
Автобуси	137	0	34	577	25	16
Мотоцикли	50	0	11	2	0	2
Вкупно емисии	4428	39	464	1549	93	265

5.Влијанието на штетните материи и бучавоста по здравјето на човекот

Несомнено дека со загадувањето на животната средина најмногу трпи човекот, меѓутоа можеби и тој е главниот причинител за тоа загадување затоа што сеуште ги негува старите навики да користи автомобил во сообраќајот или друго патничко превозно возило кои и во најголема мера го загдуваат воздухот а преку тоа и животната средина. Имено најмногу човекот трпи од издувните гасови кои се ослободуваат а при тоа штетно влијаат при неговото здравје на најразлични начини.

На пример се цени дека јаглен моноксидот предизвикува нарушување т. е забавување на перцепцијата и размислувањето кај луѓето што може да предизвка и смрт,во содејство со други штетни материи ја зголемува причината за смртност посебно кај луѓето кои имаат проблеми со дишењето.

Азотните оксиди се причина за акцелерација на вирусните инфекции особено кај астматичарите. Исто така и тие во содејство си други штетни материи можат полесно да доведат и до смртност.

Јагленоводородот како и останатите лесно испарливи соединенија ги надразнуваат очите и слузокожата, некои се дури и канцерогени, подеднакво се штетни и за луѓето но и за вегетацијата.

Озонот ги иритира дишните патишта и оже да е причинител за појава на хронични заболувања.

Оловото влијае врз нервниот систем особено кај децата, ги генерира бубрежните заболувања, тој е уште познат како опасен отров.

Сулфур диоксидотво голема мера ги иритира дишните патишта посебно кај хронично болните, астматичари и оние кои боледуваат од бронхитис,штетно влијаат и врз вегетацијата.

Честичките, најчесто се канцерогени, доколку ги има во голема концентрација посебни во малите населени места се причина и за смрт.

Отровните супстанции предизвикуваат проблеми кај репродуктивните органи, ја надразнуваат кожата , дишните патишта и истите најчесто се канцерогени.

Од непомало значење во нарушувањето на човековото здравје спаѓа и бучавоста која се создава најчесто во населените места а од прекумерната употреба на автомобили и други превозни средства во сообраќајаот. Доколку човекот е подолго изложен на бучавост може да воочи дека истата му ја нарушува неговата способност и ја намалува неговата концентрација. Истата може да е причина за појава на одредени стресни состојби но и нарушување во комуникацијата. Во некои случаи се забележало повреда на средното уво, пореметување на сонот дури кај некои луѓе и појава на агресивност и социјални конфликти. Во поглед на бучавоста која ја создаваат се смета дека кај патничките возила кои се на 25 метри оддалеченост а се движат со 120 Km/h бучавоста е од 70 до 75 Db.

Бучавоста на автопат на оддалеченост од 25метри на сообраќјница која оптеретена со преку 1600 возила и преку 400 теретни возила се оценува дека е 75 Db, тетретните возила кои возат со 80 Km/h а се на оддалеченост од 25 метри создаваат бучавост од 75 до 80 Db.

6. Заклучни согледувања

Загадувањето на животната средина од година во година има зголемувачки тренд што се должи пред се на зголемениот број на користење на автомобили во сообраќајот.

Се смета дека изградбата на железничка инфраструктурна мрежа, поврзување и користењето на железничкиот сообраќај пред се на електричните возови во голема мера ќе го намали загадувањето на животната средина. Воедно и добрата координираност и соработка помеѓу железничкиот и патен сообраќај е добар знак за растеретеност во сообраќајаот и кориостење на различни капацитети и можности за транспорт.

И покрај заложбите во нашата држава за унапредување на комбинираниот транспорт сеуште сме на ниско ниво на користење на неговите капацитети и можности, тој не е доволно развиен и допрва треба да се гради стратегија чиј главен носител ќе е Министерството за транспорт и врски за истото да го унапреди и обезбеди.

Во периодот кој следува нашите влсти треба да постават цел пред себе и да изградат цврста стратегија со цел изградба и развој на рационален, техничко-технолошки современ сообрајќаен систем , преку максимално користење на сите капацитети во насока на заштита на животната средина. Комбинираниот копнен транспорт е тој врз кој треба да с естави акцентот, да завземе значајно место во сообраќајната политика.

Од непомало значење е и улогата на човечкиот фактор во сето ова, имено промена на одредени негови навики во однесувањето во сообраќајот. Кога го споменуваме човекот најповеќе мослиме на неговото однесување во сообраќајот во населените места каде што час поскоро треба да отпочне на масовно користење на велосипед кој не ја загадува средината , едновремено го чува неговото здравје како и користење на електрични мопеди. На таков начин во голема мера ќе се придонсе кон зачувување на животната средина, ќе нема толкава емисија на штетни гасови како и секојдневната бучавост на која сме изложени во секојдневието.

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25. "The impact of traffic and transport on environmental pollution"

Abstract: Through this work we would like to show the main aspects of the impact of transport and traffic on environmental changes through several examples that have been observed and noted in some of our cities as well as in the world capitals. Namely, we will refer to how certain polluting substances and substances such as (dust, sulfur dioxide, nitrogen oxides, carbon monoxide and hydrocarbons), which are the most common pollutants and are the subject of multi-year tests and studies, how and how much they pollute the living environment. The intensive use and use of cars in public transport not only in agglomerations but also in smaller cities are increasingly causing environmental pollution, disrupting the ecological balance and leading to imbalance and highly polluted cities. The goal is to determine how environmental pollution occurs through the mass use of cars and means of transport that use gasoline, oil or gas as fuel and how we can act in the direction of a conceptual model for a planned, preventive reduction of the impact of traffic and transport on environmental pollution. The modern way of life and the increase in the standard of living has led to an increase in the number of vehicles in traffic that use the above-mentioned fuel, they not only burden the existing roads but are also the main polluters of the environment. We would also like to refer to the fact that the population's awareness should be changed towards resorting to and using other means of transport that are environmentally acceptable and useful, which may take longer to transport but are more useful for preserving the ecological environment and are less harmful for its pollution.

Keywords: Traffic, transport, environment, gas emission.

1. Intro

We live in the 21st century when it is generally appreciated that man reaches the pinnacle of scientific-technical-technological development, has modernized many things, simplified the way of life on the one hand, but at the cost of expansive development, he has simultaneously harmed himself, bearing in mind that largely through consumption, use, way of heating homes, construction of factories, the way of organizing and using transport in the traffic contributed to a great pollution of the environment, which more and more through the imbalance in it returns to us twice through various natural disasters but also personal damages after our health.

It is enough to know that in the middle of the 20th century, when the expansion of the automotive industry and the use of cars actually began, there were around 2.6 billion people living in the country who owned around 50,000,000 cars. At the beginning of the new millennium, the number of people increased to 5.7 billion and they owned more than 500,000,000 cars (If we include trucks and motorcycles, the figure reaches even somewhere around 800,000,000).

During this period, both the number of the population and the use and ownership of cars for transport and traffic doubled.

It is assumed that the trend of increasing the use of motor vehicles will increase and that it will cause even greater pollution and climate change, but also cause other side effects, such as noise, acid rain, drinking polluted water and usurpation of land. It is estimated that in the OECD member countries, 30% of the transport will be accounted for by the use of motor vehicles.

Our country has not been spared from these unwanted influences either, where a huge percentage of the way of organization of transport is by land, through the use of motor vehicles in traffic, which makes us one of the most polluted countries in the EU.

Hence the need to rethink and take certain measures as soon as possible, primarily in the field of reconstruction of the traffic infrastructure, as well as the trend and the way of using motor vehicles for transporting food and goods.

One of the possible solutions is resorting to Combined land transport, which is also called a "friendly" type of transport and includes different types of road and rail traffic. This type of traffic greatly contributes to the protection of the environment, considering that the emission of harmful gases is reduced, as well as fuel consumption, causing noise and reduction of motor vehicles on the roads, thus avoiding traffic jams and increasing traffic safety.

2. Traffic and the environment

The environment in which we live is a symbiosis of the human, animal, and botanical world, which is often exposed to various harmful influences primarily caused by industrial plants, chemical producers, heat energy producers, the way homes are heated, the relentless destruction of green areas, but as one of the main factors for environmental pollution stands out precisely the traffic and what it includes as a means of transport (maybe some less, but some means of transport to a large, significant extent). The way in which it causes pollution and disruption of the environment is manifold and in several ways, first of all through the exhaust gases (the fuel it uses) it pollutes the living environment, the land, the soil, the water and at the same time they also cause noise, occupy the surface (construction of modern roads), transfer of dangerous substances but also annoyance in everyday life through the excessive use of cars and other means of transport that cause congestion on the roads.

The air is mainly and fundamentally polluted through the release of harmful exhaust gases - carbon monoxide, nitrogen oxide, sulfur dioxide, lead, particles of dust and dust. All the above-mentioned harmful exhaust gases have a strong impact on human health, primarily they have a cancerous effect. Oxygen, as one of the most important elements for life, is getting more and more polluted and is available in smaller quantities. Due to the overloading of the roads with

vehicles that use liquid fuel for their propulsion, they consume a huge amount of oxygen, a phenomenon that is most noticeable in densely populated areas. Water and soil pollution is also caused by traffic, due to the release of chemical substances and exhaust gases from vehicles.

In addition to appearing as the main air polluters, vehicles are also included in the group of noise triggers, which is becoming a big problem today, causing many negative phenomena and consequences such as hormonal and organic disorders in people.

Road traffic compared to rail transport is a greater cause of noise, even in some studies it is mentioned that road traffic creates twice as much noise as rail traffic.

The ever-increasing need and use of cars and other means of transportation that use liquid fuel is also the cause of traffic congestion, which on the other hand implies negative consequences, creates anxiety in traffic jams, additionally pollutes the air, hinders the free movement of pedestrians, causes stoppage in traffic and thus delays to destinations, slowing down and delays in the delivery of goods and materials to stores and factories, etc. The car is still the most common means of transportation used in our country and all over the world, and according to research by the American Environmental Agency, as much as 29% of harmful gas emissions in the world come from cars, making it the most harmful segment of means of transportation.

In some of the Western European countries, they even came up with the idea of calculating the amount of damages and losses in accidents, so they came to the conclusion that the damages on cars are up to 400 times and on buses are up to 40 times greater than those in railway traffic.

This as research may be a good indicator and indicator for our country as one of the more underdeveloped in terms of road infrastructure to be directed in the future towards resorting to the construction of more railways, directions, in order to relieve road traffic and transport and thus the increasing pollution of the environment.

3. Combined land transport

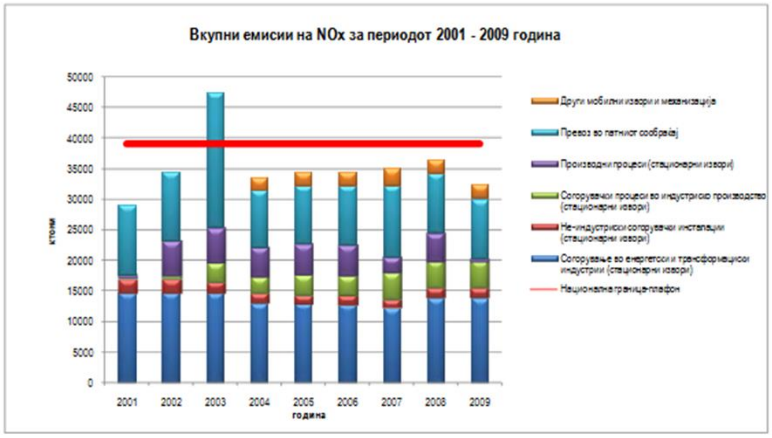
In principle, two types of transport are distinguished in traffic, namely direct or continuous and reloaded or interrupted traffic, which is more impractical, takes longer to transport due to the time frame that is longer, due to the fact that goods, passengers or goods have to be transshipped from one to another means of transport. In order to overcome these inconsistencies and disabilities, a new form of transport is resorted to - Combined or (connected) transport. This type of transport is systematic and characterized by a special technical base, standardized and unified additional means, special technology and it is monitored through an information-management system. The technology of combined transport means the transport of complete, standardized transport units, from the sender to the recipient, using at least two types of traffic without replacing the transport vessel.

The main goal of combined transport is rationalization and simplification in the transport cycle along the entire transport route, from the sender to the recipient. The unit of combined transport indicates the transport vessels that allow the use of different types of traffic: rail and road, rail + sea, rail + river, road + air, etc.

4. The impact of combined transport on the environment

When it comes to combined transport, let's mention right at the beginning that rail transport contributes much less to environmental pollution compared to land transport. Such a trend is observed everywhere, all researches in some EU member states point to it, so undoubtedly the same applies to the rest of the countries in which the railway network, i.e. traffic is more branched, more represented and more used. Unfortunately, in countries from the former SFRY, including and our country cannot boast of a branched railway traffic infrastructure, so the pollution of the environment from year to year shows an increasing trend, which is primarily due

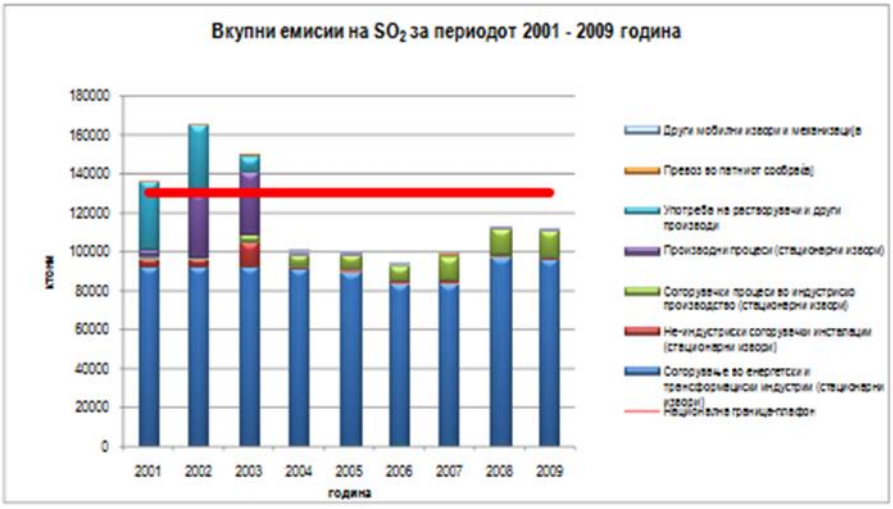
to the use of land transport means. And when we talk about pollution, we first think of the harmful gases emitted by vehicles, primarily carbon monoxide (65%), carbon dioxide (45%) and nitrogen oxide (49%).



Графикон 2. Тренд на NO_x емисии за период 2001-2009 година

According to some research, it was concluded that the share of emissions of harmful substances in % by traffic branches is:

- 66% to 99% - belongs to land traffic
- 3-26% of the railway and
- 1-8% of water traffic.



Графикон 1. Количини на емисии за SO_2 од 2001-2009 година

The total emission of lead in the air originates from traffic, and almost 94% of it is the result of the use of road traffic. Much more pollution is caused by cars and it is 30 times more polluting compared to the use of railway traffic. However, this comparison is valid only when it comes to the use of electric trains in railway traffic, and bearing in mind that in our country this type of railway transport is represented to a small extent, we still come to the conclusion that railway traffic is a major cause of environmental pollution. If in the future we focus on improving and modernizing this type of transport, we will greatly contribute to the protection of the environment, but for now the facts point to that rail transport, perhaps not as much as car transport, is also a cause of environmental pollution. At the same time, one of the advantages of railway transport is in its capacity and possibilities for carrying large loads, large quantities of material goods as well as life-threatening substances, from loading to unloading according to pre-defined procedures and standards. In the future, the focus must be placed on this type of

traffic, to be considered as the most adequate, which will reduce the transport costs, but will also contribute to less pollution of the living environment.

If some parameters are considered, the conclusion will be reached that based on the consumption of other types of traffic compared to the railway, it is as follows:

- it is almost 5% higher for bus transport
- almost 13% in passenger cars and
- somewhere around 30% in air passenger traffic

Speaking about railway traffic, it must be noted that it has another advantage compared to other types of traffic, which is that it creates less noise, which also falls into the realm of environmental impact and disruption. First of all, the less noise made by the trains is due to the fact that in the present, the aim is to electrify them, as well as during the construction of the railways, they should be constructed below the level of the cities.

The main advantages and strengths of rail traffic refer to the following:

- lower number of traffic accidents
- traffic jam
- pollution and
- creating less noise in relation to road traffic.

Табела 8. Вкупни емисии од секторот патнички сообраќај

	Загадувачки супстанции (во t/год.)					
Сектор патнички сообраќај	CO	NH_3	NMVOC	NO_x	PM (од издувни и неиздувни процеси)	SO_2
Патнички возила	3166	37	309	572	43	197
Лесни товарни возила	270	2	27	105	12	21
Тешки товарни возила	805	0	83	294	13	30
Автобуси	137	0	34	577	25	16
Мотоцикли	50	0	11	2	0	2
Вкупно емисии	4428	39	464	1549	93	265

5. The impact of harmful substances and noise on human health

There is no doubt that man suffers the most from environmental pollution, but he may also be the main cause of that pollution because he still cultivates the old habits of using a car in traffic or another passenger transport vehicle that pollutes the air to the greatest extent and through that enviroment. Namely, the man suffers the most from the exhaust gases that are released, which have a harmful effect on his health in a variety of ways.

For example, it is estimated that carbon monoxide causes a disorder, or in other words, slowing down of perception and thinking in people that can cause death, in combination with other harmful substances it increases the cause of death, especially in people who have breathing problems.

Nitrogen oxides are the cause of acceleration of viral infections, especially among asthmatics. Also, they, together with other harmful substances, can more easily lead to death.

Hydrocarbons, like other easily volatile compounds, irritate the eyes and mucous membranes, some are even cancerous, they are equally harmful to humans and vegetation.

Ozone irritates the respiratory tract and can cause chronic diseases.

Lead affects the nervous system especially in children, it generates kidney diseases, it is also known as a dangerous poison.

Sulfur dioxide greatly irritates the airways, especially in chronically ill people, asthmatics and those suffering from bronchitis, and has a harmful effect on vegetation.

The particles of dust are mostly cancerous, if they are present in large concentrations, especially in small settlements, they are the cause of death.

Toxic substances cause problems in the reproductive organs, irritate the skin, respiratory tract and are often carcinogenic.

Of considerable importance in the disruption of human health is also the noise that is created mostly in populated areas and from the excessive use of cars and other means of transportation in traffic. If a person is exposed to noise for a longer time, he can perceive that it impairs his ability and reduces his concentration. It can be the cause of the occurrence of certain stressful situations, but also a disturbance in communication. In some cases, an injury to the middle ear, sleep disturbance even in some cases, and the emergence of aggressiveness and social conflicts were observed. In terms of the noise they create, it is considered that in the case of passenger vehicles that are 25 meters away and moving at 120 Km/h, the noise is from 70 to 75 Db. The noise on a highway at a distance of 25 meters on a road that is loaded with over 1600 vehicles and over 400 trucks is estimated to be 75 Db, trucks that drive at 80 Km/h and are at a distance of 25 meters create noise from 75 to 80 Db .

6. Concluding observations

The pollution of the environment from year to year has an increasing trend, which is primarily due to the increased number of cars used in traffic.

It is considered that the construction of a railway infrastructure network, connection and the use of railway traffic, especially electric trains, will greatly reduce environmental pollution. At the same time, good coordination and cooperation between rail and road traffic is a good sign of relief in traffic and the use of different capacities and opportunities for transport.

Despite the efforts in our country to promote combined transport, we are still at a low level of using its capacities and opportunities, it is not sufficiently developed and a strategy has yet to be built, the main bearer of which will be the Ministry of Transport and Communications, in order to advance and secure.

In the following period, our authorities should set a goal in front of themselves and build a solid strategy with the aim of building and developing a rational, technical-technological modern traffic system, through maximum use of all facilities in the direction of environmental protection. The combined land transport is the one on which the emphasis should be placed, to occupy a significant place in the traffic policy.

The role of the human factor in all of this is also of considerable importance, namely the change of certain habits in traffic behavior. When we mention the man, we mostly refer to his behavior in the traffic in the populated areas, where he should soon begin to use a bicycle on a mass basis, which does not pollute the environment, and at the same time protects his health, as well as the use of electric mopeds. In such a way, it will greatly contribute to the preservation of the environment, there will not be as much emission of harmful gases as the daily noise to which we are exposed in everyday life.

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26. Glasni izpuhi rešujejo življenja – mit ali resnica?

Povzetek

Glasni izpuhi rešujejo življenja – ta trditev je med zagovorniki glasnih izpuhov zelo popularna. Ali je resnična? Meritve so pokazale, da ne. Glasni izpuhi so nelegalni, nadležni, nemalokrat zmedejo sodobne elektronske sisteme vbrizga in s tem povzročijo neoptimalno delovanje pogonskega agregata, obenem pa v prometu ne prinesejo dodatne varnosti. Ta trditev je lahko dober izgovor za nakup neoriginalnega izpušnega sistema – kar pa samo po sebi še nič slabega, saj so takšni in drugačni dodatki na motociklu kot osebni nakit. Gre brez njih, vendar je prav fino, če jih imamo.

Ključne besede:

-izpuh

-hrup

-varnost prometa

-motocikel

Glasni izpuhi rešujejo življenja – mit ali resnica?

Izpušni sistem

Izpušni sistem ima načeloma tri glavne funkcije: odvod izpušnih plinov, čiščenje le teh oz. skrb za kontrolo emisij, in pa dušenje hrupa. Odvod plinov je speljan iz glave motorja za vozilo, tako da se zagotovi čisto delovno okolje voznika in potnikov, hkrati pa le ti niso izpostavljeni povišanim temperaturam izpušnih plinov. Prav tako so pred visokimi temperaturami zaščiteni deli vozila.

Kontrola izpušnih plinov se vrši preko različnih mehanizmov. Od same konstrukcije izpušnega sistema je odvisen statičen in dinamičen povratni tlak izpušnih plinov, ki neposredno vpliva na pretok plinov skozi motor, in s tem vpliva na zgorevanje. Morebitna loputa v izpuhu skrbi za kontrolo povratnega tlaka in za kontrolo hrupnosti motocikla v različnih režimih delovanja. Izpušni sistem praviloma vsebuje tudi katalitični pretvornik, ki škodljive pline spreminja v manj škodljive, hkrati pa duši hrup. Del izpuha je tudi kisikova sonda, ki skrbi za povratno informacijo o kvaliteti zgorevanja goriva.

Izpušni sistem pa sestoji tudi iz vsaj enega dušilnega lonca oz. glušnika, katerega primarna naloga je, kot pove njegovo ime – dušenje hrupa. Poznamo absorpcijski tip, refleksivni tip in resonančno komoro. Vsak tip ima svoje prednosti in lastnosti ter svoje frekvenčno območje najučinkovitejšega delovanja.

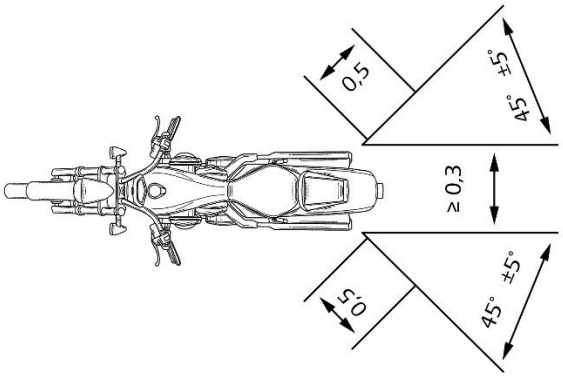
Zvok

Zvok je eden izmed dejavnikov, katerega uspešna in natančna zaznava ima v prometu s stališča varnosti zelo pomembno vlogo.

Barva in jakost zvoka sta specifična za vsako vozilo posebej. Zvok motocikla v vožnji je sestavljen iz več izvorov: kotaljenje koles, vetrni piš, piskanje naluknjanih zavornih kolutov, zvok verige, ventilatorjev, mehanski zvoki motorja, zvok izpuha. Veliko večino zvoka predstavljata mehanski zvok delovanja motorja in zvok izpuha.

Hrupnost vozil se meri po standardiziranem postopku. Mikrofon instrumenta s katerim opravljamo meritev, se namesti v višini izpušne cevi (vendar ne bliže kot 20 cm od tal, saj tla predstavljajo odbojno površino), pol metra od zaključka izpušne cevi, in 45 +/-5 stopinj od vzdolžne osi, da na mikrofon ne delujejo direktni udarni valovi z izpušne cevi. Motor ob meritvi deluje s polovico maksimalne vrtilne hitrosti.

Predpisani maksimalen nivo hrupnosti je odvisen od konstrukcije motocikla oz. od tega, kateremu ekološkemu razredu ustreza. Z menjavo izpušnega sistema se uporabnik poleg zajetne vsote denarja praviloma znebi tudi kakšnega odvečnega kilograma motocikla, obenem pa pridobi zadovoljstvo ob personalizaciji motocikla, kateremu se neredko spremenijo zmogljivosti, spremeni pa se tudi zvok motocikla – le ta postane bolj robat, globok, in seveda – močnejši. Menjava izpuha je popularna predelava tudi v svetu avtomobilizma, vendar se v tem primeru govori izključno o zmogljivostih pogonskega motorja, medtem ko se v svetu motociklizma pogosto debatira tudi o sami aktivni varnosti – glasen izpuh rešuje življenja. Ali to drži?



Slika 21: položaj fonometra med izvajanjem meritve hrupnosti

Loud pipes save lives

Trditev »glasni izpuhi rešujejo življenja« izvira iz predpostavke, da je glasnejši motocikel lažje, razločneje in hitreje opažen kot tišji. Sama trditev tradicionalno jemlje primer, kjer je motorist neopažen s strani voznika avtomobila – raziskave potrjujejo, da je avtomobilist, ki je sicer tudi motorist, v vožnji bistveno bolj pozoren na motoriste kot avtomobilist, ki sicer motocikla ne vozi. Eden izmed najpogostejših tipov nesreče, kjer sta udeležena motorist in avtomobilist, je namreč odvzem prednosti motoristu s strani avtomobilista. Za potrditev trditve, ki je predmet članka, moramo najprej preveriti nekaj pogojev:

- avtomobilist mora motocikel pravočasno slišati,
- zaznava zvoka motocikla mora pritegniti avtomobilistovo pozornost,
- avtomobilist mora zaznati od kod prihaja zvok motocikla,
- skladno z zaznano situacijo mora avtomobilist odreagirati.

Na dosego teh ciljev vpliva več dejavnikov:

- jakost hrupa s prednje strani motocikla,
- nivo protihrupne izolacije avtomobila,
- jakost hrupa v kabini avtomobila,
- razdalja med avtomobilom in motociklom,
- frekvenčni spekter zvoka motocikla,
- reakcijski čas.

Jakost hrupa s prednje strani motocikla

Hrupnost motocikla se z razlogom meri z zadnje strani. Praviloma je izpuh motocikla usmerjen nazaj ali na stran. Le v redkih primerih, kadar ima motocikel ekstremno tih izpuh, je hrupnost pred motociklom večja od tiste zadaj. Romunska organizacija MotoDNA je izvedla zanimivo študijo na to temo, v kateri je za meritve uporabila 5 motociklov in en skuter. Izkazalo se je, da je nivo hrupa pri tišjih motociklih spredaj zelo podoben tistemu zadaj, medtem ko je pri glasnejših motociklih ta razlika bistveno večja – v povprečju med 5 in 7,5 dB(A). Ugotovljeno sem potrdil z meritvami na svojih motociklih. Za meritve sem uporabljal laboratorijski merilnik nivoja hrupa MONACOR SM-4. Aprilia RST 1000 Futura z nameščenim originalnim izpušnim

sistemom je z zadnje strani okrog 1 dB(A) glasnejša kot spredaj, medtem ko je dirkalna izvedenka motocikla Aprilia SL 1000 Falco (z nameščenim dirkalnim izpuhom) zadaj glasnejši za kar 6 dB(A). Motocikla imata v osnovi enaka agregata, edina bistvena razlika, ki vpliva na nivo hrupa, je ravno v izpušnih sistemih. To pa hkrati pomeni, da glasnejši izpuh močno vpliva na nivo hrupa za motociklom, precej manj pa na nivo hrupa na prednji strani motocikla.

Slika 22: Aprilia RST 1000 Futura (levo) in Aprilia SL 1000 Falco (desno)

Iz izkušenj lahko trdim, da na dirkalni stezi, kjer praktično vsi motocikli uporabljajo precej glasne izpuhe, dirkač zelo slabo sliši motocikel za seboj, medtem ko zelo razločno sliši motocikel, ki vozi pred njim.

Nivo protihrupne izolacije avtomobila

Sodoben avtomobil nudi potnikom precejšnjo mero udobja. Sem spada tudi učinkovita protihrupna zaščita, katera duši ne samo neželene zvoke, ki jih povzroča sam avtomobil (kotaljenje koles, hrup s podlage, delovanje motorja, menjalnika, prenosov, itd), ampak tudi hrup okolice – hrup vetra in preostalih avtomobilov in motociklov.

Jakost hrupa v kabini avtomobila

Sodobni avtomobili imajo vgrajeno takšno ali drugačno infotainment opremo, ki lahko s svojim delovanjem moti voznikovo zaznavanje zvokov iz okolice. Bodisi gre za govor ali glasbo, navodila z navigacije, signali iz parkirnih ali drugih pripomočkov, ali pa le pogovor med sopotniki – vsak hrup lahko preglasi zvok iz okolice, ali pa zamoti voznika, da zvoka iz okolice ne zazna pravočasno, dovolj jasno, ali pa ga sploh ne zazna. Psihofizičnega stanja voznika se ob teh distrakcijah nismo niti dotaknili.

Razdalja med avtomobilom in motociklom

Študije na temo zvočnega zaznavanja motoristov v avtomobilu ugotavljajo, da je hrup motocikla, ki vozi 15 m za sodobnim avtomobilom pri 60 km/h, popolnoma nezaznaven. Na tej razdalji mejo zaznavnega predstavlja motocikel, ki sicer oddaja hrup jakosti 111 dB(A) (najglasnejši legalen motocikel je omejen na 96 dB(A)), kar je bistveno več od situacije, ki jo lahko srečamo v normalnem prometu. Ta meja bi bila dosežena le, če bi bil radio v avtomobilu ugasnjen, potniki pa bi bili tiho.

Na razdalji 10 m do avtomobila bi tak motocikel (ki ni legalen za uporabo v cestnem prometu) dosegel stopnjo hrupa 3 dB(A) nad hrupnostjo okolice – v primeru, da radio in potniki ne oddajajo zvokov. V primeru tihe glasbe, je stopnja hrupa motocikla v kabini avtomobila okrog 0 dB(A) nad hrupom okolice, kar pomeni, da je motocikel vozniku in potnikom avtomobila praktično neslišen.

Kadar je ta isti motocikel ob avtomobilu ali pred avtomobilom, zvok motocikla v notranjosti avtomobila celo ob normalni glasnosti glasbe zlahka preseže 5 dB(A) nad nivojem hrupa okolice, kar je dovolj, da pritegne pozornost voznika.

Frekvenčni spekter zvoka motocikla

Jakost zvoka, ki ga oddajajo različni motocikli, je v povprečju najvišja med 200 in 450 Hz. To je relativno nizko območje, kar človeku predstavlja težavo pri lociranju izvora zvoka.

Reakcijski čas

Pri 60 km/h v eni sekundi prevozimo 16,7 m, pri tej hitrosti pravilna razdalja znaša vsaj 30 m. Z razdaljo 15 m lahko varno vozimo za avtomobilom pri hitrosti do 30 km/h. Torej meritve na razdalji 10 in 15 m dajejo uporabne rezultate? Da in ne. Če bi bil rezultat meritev – odgovor na vprašanje pravilnosti trditve pozitiven, bi bili rezultati meritev v praksi neuporabni. Ker pa meritve na vprašanje odgovorijo negativno, s tem dobimo dvojno potrditev. Trditev je napačna – če pa ne bi bila, bi bile te meritve v praksi (pri tako majhnih razdaljah) neuporabne.

Zaključek

Torej – je res, da glasni izpuh rešuje življenja? Da poenostavim vprašanje – je res, da glasen izpuh motocikla prej in bolj pritegne pozornost avtomobilista, s čimer je motorist varnejši? Na kratko – ne. Vzrokov za to je več:

- Če želimo biti slišani ko vozimo 15 m za avtomobilom, ki vozi s 60 km/h, bi morali oddajati zvok glasnosti 135 dB(A), kar je za človeško uho boleče, in povzroča trajne zdravstvene posledice;
- pri 60 km/h 15 m prevozimo v 1,1 sekunde, torej nam ta razdalja ne predstavlja niti varnostne razdalje v vožnji za avtomobilom;
- če motocikel vozi ob ali pred avtomobilom, je njegov zvok jasno slišen tudi v avtomobil, vendar na tej razdalji tako rekoč noben manever ali reakcija avtomobilista ne more povečati varnosti motorista;
- neoriginalni izpuh poveča jakost hrupa za motociklom, medtem ko se hrupnost pred motociklom spremeni minimalno;
- frekvenčni spekter motocikla ne dopušča jasnega lociranja izvora hrupa, zato lahko zvok motocikla voznika avtomobila zmede;

Na kratko – »glasni izpuhi rešujejo življenja« je neresnična trditev. Zvok motocikla je v avtomobil slišen prepozno, da bi lahko (pozitivno) vplival na avtomobilistovo reakcijo.

Kaj torej preostane, da bi si dejansko reševali življenja? Certificirana zaščitna oprema vidnih, kontrastnih barv, airbag, dnevne luči, izpraven motocikel v dobri tehnični formi, uporaba asistenčnih sistemov kot so ABS in TCS, predvsem pa defenzivna, premišljena vožnja. Za izpuh pa je najbolje, da je glasen toliko, kot dovoljuje zakon.

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26. Loud pipes save lives – a myth or the truth?

Abstract

Loud pipes save lives – this statement is very popular among motorists that prefer them over factory exhaust system. However noise measurements have proved it to be false. Loud exhaust are illegal, annoying, more often than not can confuse modern electronic injection systems which results into less than optimal operation of the engine. And they do not bring any safety benefit in traffic at all. This statement can be a great excuse for buying an aftermarket exhaust system – which in itself is nothing bad. These add-ons are like jewlery on a motorcycle – one can live without them, but would rather not.

Key words:

-exhaust

-noise

-traffic safety

-motorcycle

Loud pipes save lives – a myth or the truth?

Exhaust system

An exhaust system has three basic functions: venting exhaust fumes away from the rider, cleaning i.e. converting them to less harmful form - taking care of emission control, and supressing noise. Gases are lead from the engine through piping under the vehicle and let into the atmosphere behind the vehicle, so the rider and passenger(s) are exposed to clean air and at the same time are not exposed to hot environment caused by hot exhaust fumes.

Emission control is executed through different mechanisms. The exhaust construction itself provides needed static and dynamic backpressure that directly affect gas flow through the engine and therefore combustion quality. An exhaust flap (that is not always present) controls the backpressure and noise emission in certain operating regimes. Exhaust system also incorporates a catalytic converter that converts harmful gases to less harmful form and lowers sound pressure level at the same time. An important part of an exhaust system is also an oxygen sensor that provides the injection computer with an information about combustion quality.

An exhaust system also includes at least one muffler which takes care of noise supression. There are multiple different types, the most common being absorption type, reflective type and resonance chamber. Each type has its own advantages and disadvantages and its most efficient frequency spectre.

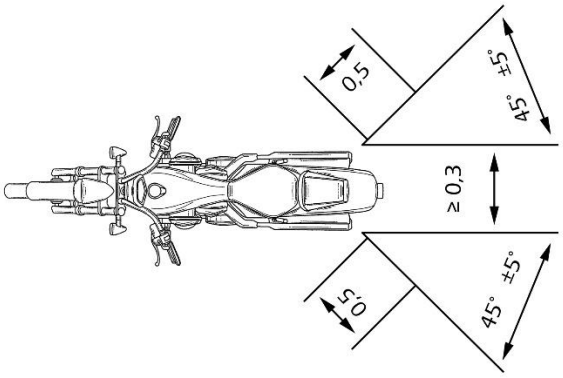
NOISE

The noise is one of the factors that have great influence on the traffic safety.

The sound tone and sound pressure level (SPL) are specific for each individual vehicle type. A motorcycle's sound consists of many different sounds: wheel rolling, wind turbulence, squeeking of drilled brake rotors, a sound of a chain, cooling fans, combustion sound and mechanical sounds of an engine and transmission, and the sound of an exhaust system. The two that are by far the loudest are mechanical sounds of a engine, and the sound o fan exhaust.

Vehicle noise measurement is done by a standard procedure. The phonometer (instrument that measures SPL) is placed at the height of an exhaust outlet (but not lower than 20 cm as the floor is also a sound reflective surface), 50 cm away from exhaust exit, 45 +/-5 degrees horizontally off the driving line. The engine should run with half of its maximum rpm.

Legally allowed SPL depends on the motorcycle itself – it depends on the working displacement and to which emission norm it complies. No motorcycle should exceed 96 dB(A). Replacing the exhaust system for an aftermarket piece (that is in most cases louder than a factory option) costs a lot of money, but it weights less, and adds to motorcycle personalisation. It may also cause a change in performance (not always for the better). Replacing the exhaust system is a common car modification, but there is no such thing in car world as a statement »loud pipes save lives«. So is it true or false?



Picture 1: Measuring motorcycle's SPL is a standard procedure

Loud pipes save lives

A statement »loud pipes save lives« assumes that a louder motorcycle is easier to spot than a quieter one. The statement traditionally takes an example where a motorist is not spotted by a car driver. Researches show that a car driver who is also a motorist takes greater care of spotting motorists than a car driver that never rode a motorcycle. One of the most common type of an accident between a car and a motorcycle is a failure to yield right-of-way because a motorist is unnoticed by a car driver. To confirm a statement »loud pipes save lives«, we must first check some conditions:

- A car driver must hear a motorcycle soon enough,
- the sound of a motorcycle must attract driver's attention,
- a driver must sense where the sound is coming from,
- a driver must react according to situation.

There are many important factors that affect these points:

- SPL at the front of a motorcycle,
- effectiveness of sound insulation of a car,
- SPL in a car's passenger compartment,
- distance between a car and a motorcycle,
- frequency spectre of a motorcycle's sound,
- reaction time.

SPL at the front of a motorcycle

SPL measurements are done from behind for a good reason. An exhaust system is directed at the back or at the side of a motorcycle. Only if a motorcycle has an extremely quiet exhaust system is the SPL at the front higher than the one at the back. Romanian organisation MotoDNA has made an interesting research about noise. They used 5 motorcycles and one scooter. The SPL of very quiet motorcycles is the same at the front and at the back while louder motorcycles had a greater difference ranging from 5 to 7.5 dB(A) – all of them were louder at the back. I confirmed that by measuring two of my motorcycles. I used a laboratory phonometer MONACOR SM-4. Aprilia RST 1000 Futura with factory exhaust system is 1 dB(A) louder at the back than at the

front while a racetrack version of an Aprilia SL 1000 Falco (with factory race exhaust) is 6 dB(A) louder at the rear than at the front. These bikes have virtually the same engines, the only significant difference that affects noise level is the difference in exhaust system. Which means that a louder exhaust affects SPL at the rear much more than SPL at the front of a motorcycle.

Picture 2: Aprilia RST 1000 Futura (left) and Aprilia SL 1000 Falco (right)

I can say from my own experience that on the racetrack where most motorcycles use very loud exhausts, a rider can barely (if at all) hear a motorcycle behind, while can very clearly hear the motorcycle at the front.

Effectiveness of sound insulation of a car

A modern car offers a decent amout of comfort. This also includes an effective noise insulation that supresses not only noises that the vehicle itself produces, but also environmental noises, including noises of other vehicles.

SPL in a passenger compartment

Modern cars have integrated infotainment equipment that can disturb driver's environmental noise reception. Music, speech, vocal navigation commands, sound of a parking asisstant, passengers talking – all that can override environment noise or distract the driver so that one can not detect the sound of an incoming motorcycle in time or at all.

The distance between a car and a motorcycle

Researches conclude that a motorcycle that is 15 meters behind a modern car that is driving at 60 km/h, is completely impossible to hear from the inside of a passenger compartment. A treshold of detection in this circumstances would be reached by a motorcycle that would produce a SPL of 111 dB(A) which is a lot louder than can be met in regular traffic – the noisiest legal motorcycle is limited to 96 dB(A). Yet this 111 dB(A) motorcycle would be on its bare limit, detectable from 15 m only if the radio would be turned off and passengers in the car would not talk or produce any other noise.

At the distance of 10 m behind a car that same 111 dB(A) motorcycle (that is illegal to use in public traffic) would reach SPL of 3 dB(A) above environmental noise – again if the radio and passengers would not emit any additional noise.

If the radio would play quiet music, the sound of a motorcycle in the passenger compartment would be around 0 dB(A) above environmental noise which would render the motorcycle inaudible.

If that same motorcycle would be by the side of a car or in front of it, the sound of it would easily reach 5 dB(A) above environmental noise in the passenger compartment, which is more than enough to catch attention of a driver.

Frequency spectre of a motorcycle's sound

SPL of a motorcycle sound is generally the highest in a frequency spectre between 200 and 450 Hz. That makes it relatively low frequency band, and it is not very easy for humans to accurately locate the source of noise in that spectre.

Reaction time

A vehicle driving at 60 km/h moves 16,7 meters in every second. At that speed a proper safety distance would be 30 m. A safety distance of 15 m is legal only at speeds up to 30 km/h. So do measurements at distances of 10 and 15 m give useful results? Yes and no. If the answer to the main question would be positive, these data would be useles because there would be no proper safety distance at these speeds. But because the answer to this question is negative, we basically get a double confirmation – loud pipes do not bring more attention, and even if they would, they would still not bring more attention in time - not in these conditions.

Conclusion

So – is it true, that loud pipes save lives? To put it simpler – is it true, that a louder exhaust system of a motorcycle makes a motorist safer by attracting attention of a car driver? In short – no. There are a few reasons for it:

- for the motorcycle to be heard at 15 m behind a car driving at 60 km//h, one would have to reach SPL of 135 dB(A) which is painful for human ear and causes permanent hearing loss,
- at 60 km/h the vehicle moves 15 m in 0,9 second which is far less than a proper safety distance when driving behind a vehicle,
- when a motorcycle is by the side or in front of a car, its noise is clearly heard in the car's passenger's compartment, but at point that no driver's reaction could improve a motorist's safety,
- aftermarket exhaust increases SPL behind a motorcycle while SPL in front of it changes by far lesser amount,
- a motorcycle's noise frequency spectre does not enable easy locating of a sound source, so a sound of a motorcycle can confuse drivers.

To put it short – »loud pipes save lives« is a completely false statement. The noise of a motorcycle is heard way too late into the car's passenger's compartment for it to (positively) affect driver's reactions.

What is left to motorists to actually save lives? Wearing certified safety equipment in bright colours, wearing an airbag, having daylight running lights installed on a motorcycle, having a properly maintained motorcycle in top condition, riding a bike with electronic assistants as ABS and traction control etc. And most of all – to ride sesnibly and predict other people's mistakes. The best exhaust choice is still the one that is fully compliant with the law.

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STROJARSKA I PROMETNA ŠKOLA VARAŽDIN, Varaždin, 26.05.2022.
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Marijana Balić Lovrec, mag. ing. traff.

27. ELEKTROMOBILNOST U STROJARSKOJ I PROMETNOJ ŠKOLI U VARAŽDINU

Sažetak

Upotreba fosilnih goriva u prometu uvelike utječe na globalno zatopljenje i klimatske promjene u svijetu. Prelazak na alternativne oblike energije u prometu može globalno pomoći u smanjenju temperature, a to je uloga električnih vozila u njihovoj budućnosti.

Nova prekretnica u prometu je proizvodnja i upotreba nove generacije vozila, vozila s 0% emisije štetnih plinova koja su tiša i ekonomičnija. Trenutno se još preispituju mnoge nedoumice oko prednosti i nedostataka električnih vozila ali svakako se upotrebom električnih vozila utječe na ekološko osviještenje pojedinca i ukupan utjecaj na smanjenje zagađenja okoliša.

U Varaždinskoj županiji, prema dostupnim podacima 2020. godine bilježi se 106 električnih vozila, 313 hibridnih vozila i 34 hibridnih vozila sa vanjskim punjenjem. U 2021. i 2022. godini taj broj električnih i hibridnih vozila se naglo povećava zbog državnih poticaja na kupnju ekoloških vozila.

Cilj ovog rada je prikazati isplativost primjene električnog vozila u Strojarskoj i prometnoj školi, istražiti mišljenje šire javnosti o upotrebi i nabavci električnih vozila te podići svijest o prednostima korištenja vozila na električni pogon.

Istraživanje će se provesti na temelju statističkih podataka i provedbom ankete gdje će se generirati podaci i mišljenja o električnim vozilima, te mogućnostima nabave ekološki prihvatljivog vozila.

Ključne riječi: *električni automobil, ekološka osviještenost, primjena električnih vozila, elektromobilnost*

1. UVOD

Elektromobilnost je novi ekološki način mobilnosti u urbanim sredinama, gdje se električna energija dobiva iz obnovljivih izvora za pokretanje električnih vozila. Pod pojmom električna vozila podrazumijevamo vozila koja koriste za pogon elektromotore s pogonom na električnu energiju. Cilj elektromobilnosti je naći održivi balans između ljudi, automobila i okoliša. Elektromobilnost pruža pozitivan učinak za smanjenje emisija štetnih plinova. Studije pokazuju da je ukupni izračun emisija stakleničkih plinova za električna vozila puno niži od emisije vozila s motorom s unutarnjim izgaranjem. Smanjenje CO_2 iznosi od 11 do 100% ukoliko je električna energija s kojom punimo električni automobil iz obnovljivih izvora energije. Onečišćenje zraka je problem svake zemlje, jer onečišćenje zraka jedne zemlje atmosferom može doprijeti do druge zemlje i utjecati na lošu kvalitetu zraka. Smatra se da je 90 % europskih gradova izloženo onečišćenju tvarima koje se smatraju štetnima za ljudsko zdravlje u koncentracijama višim od dozvoljenih da bi se mogla osigurati dovoljna kvaliteta zraka. Promet je odgovoran otprilike za 25% od ukupne emisije stakleničkih plinova u europskim zemljama, pa mnoge europske zemlje ulažu velike napore u poboljšanje kvalitete zraka u gradovima, te smanjenje emisije CO_2 u prometu.

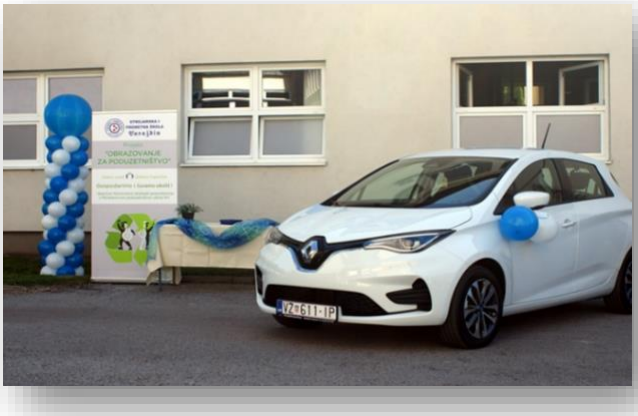
Jedna od osnovnih djelatnosti Strojarske i prometne škole je osposobljavanje vozača motornih vozila i vozača automobila stoga se škola zbog ekološke osviještenosti odlučila na kupnju električnog automobila.

2. ELEKTROMOBILNOST U STROJARSKOJ I PROMETNOJ ŠKOLI

U Strojarskoj i prometnoj školi obrazuju se dva sektora : sektor strojarstva te sektor prometa i logistike. Vozni park škole sastoji se od nekoliko osobnih vozila koja se koriste za obuku vozača u autoškoli i službena putovanja te kamion s prikolicom za osposobljavanje C+E kategorije.

U Republici Hrvatskoj 2019. godine Fond za zaštitu okoliša i energetsku učinkovitost objavio je javni poziv za sufinanciranje kupnje električnih automobila građanima. Subvencije su se dijelile principom "najbržeg" prsta, gdje je samo određen broj građana mogao dobiti subvenciju. Građani su mogli dobiti najviše do 40% bespovratnih sredstava za kupnju novog električnog vozila. Prijavom na Javni poziv za kupnju električnog automobila Strojarska i prometna škola dobila je subvencioniranje iz državnog fonda te je uslijedila kupnja električnog automobila Renault ZOE.

Električni automobil služi za edukaciju učenika, službena putovanja za potrebe škole te kao dobar primjer škole o ekološkoj osviještenosti i praćenju novih tehnologija i trendova.



Slika 1. Električni automobil Renault Zoe Strojarske i prometne škole Varaždin

2.1. Primjena elektromobilnosti u školi

Renault Zoe je prvi električni automobil u vlasništvu Strojarske i prometne škole Varaždin. Koristi se za razne aktivnosti škole, a neke od njih su poticanje učenika na kupnju električnog automobila nakon 18-te godine, očuvanje okoliša, edukacijske svrhe za pojedina strojarska i prometna zanimanja. Novi elektromotor R135 snage 52 kWh s poboljšanim performansama postiže maksimalnu brzinu od 165 Wh/kh, a jedno punjenje baterije dovoljno je za 315 km dometa.

Mreža od 200 punionica za električne automobile ima mogućnost ubrzanog punjenja do 22kW, što znači da se u roku od 30 minuta domet može povećati za 60 km. Punjenje kod kuće može biti brzo ukoliko posjedujemo električnu kućnu punionicu od 7,4 kW*. Kada je priključen kabel za punjenje koji dolazi s vozilom, vozilo možete napuniti od 0 do 100 % za 9 sati i 25 minuta.

Škola je za automobil izdvojila 222.631,50 kuna uz državne poticaje za kupnju električnog vozila od 70.000 kn.

Važan faktor kod odluke za nabavku električnog vozila je potrošnja. U narednoj tablici prikazana je usporedba potrošnje vozila na električni te diesel i benzinski pogon prema trenutnim cijenama energenata koje će prema najavama u budućnosti još porasti.

TROŠAK POGONA	VRSTE POGONA				
	PUNJENJE ELEKTRIČNOG VOZILA			FOSILNA GORIVA	
	SOLARNO/BESPLATNO	NOĆNA TARIFA	DNEVNA TARIFA	DIESEL	BENZIN
20 000 km	/	1 950 kn	3 540 kn	13 080 kn	12 960 kn
100 000 km	/	9 750 kn	17 700 kn	65 400 kn	64 800 kn
200 000 km	/	19 500 kn	35 400 kn	130 800 kn	129 600 kn

Tablica 1. *Potrošnja energenata za određene vrste pogona*

Tablica prikazuje potrošnju energenata od 20 000 - 200 000 km, bez servisa i održavanja. Prema izračunu izdvajanja za energente vidljivo je da najveći trošak čine vozila sa pogonom na diesel, zatim slijede vozila sa pogonom na benzin dok kod električnih vozila postoji mogućnost besplatnog punjenja ili punjenje kod kuće na solarnu energiju gdje se ti troškovi mogu svesti na minimum. Na 20 000 prijeđenih kilometara za konvencionalna vozila trebamo izdvojiti samo za gorivo od 12 960 kuna za benzinska vozila i 13 080 kuna za dizelska vozila, a za istu prijeđenu kilometražu kod električnih vozila treba izdvojiti kod besplatnog punjenja 0 kn, kod punjenja po dnevnoj tarifi 3 540 kuna, a po noćnoj 1 950 kuna. Razlika na 20 000 prijeđenih kilometara samo u energentima je 9 460 kn kod punjenja po dnevnoj tarifi, a kod punjenja vozila po noćnoj tarifi ušteda je 11 050 kn. Kod kod posjedovanja solarnih panela ušteda je 100%. Povećanjem kilometraže uštede na energentima su sve veće što je vrlo važno pogotovo u današnje vrijeme kada su cijene goriva izuzetno visoke. Električna vozila ne zahtijevaju nikakve dodatne servise i isplativost im je samim time veća.

3. PROVEDBA I REZULTATI ANKETIRANJA

Za potrebe ovog rada provedena je anketa o elektromobilnosti za dobivanje podataka o stavovima ispitanika o električnim automobilima, te njihovoj nabavci. Anketa je bila usmjerena na ispitanike koji su različitih interesa, dobnih skupina, razmišljanja i stavova o električnim automobilima. Iz dobivenih rezultata ankete dobiveni su odgovori o ekološkoj osviještenosti naših građana te o primjeni električnih vozila.

Prema godinama 5% ispitanika je mlađe od 18 godina, 45% ispitanika je od 18-30 godina, 43% ispitanika je od 31-50 godina i 7% ispitanika ima više od 50 godina.

Od ukupnog broja ispitanika njih 87% posjeduje vozačku dozvolu, dok 13% ispitanika ne posjeduje vozačku dozvolu.

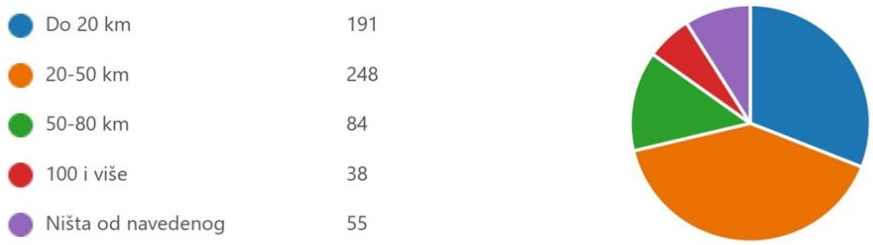
45% ispitanika posjeduje 2 osobna automobila za vlastite potrebe, a 18% ispitanika posjeduje tri osobna automobila u kućanstvu.

Grafikon 1. *Broj osobnih automobila u kućanstvu*

63% ispitanika koristi svoje vozilo više puta dnevno, dok njih 13% koristi svoje vozilo jednom dnevno ili dva do tri puta tjedno.

Najviše ispitanika njih 40%, odgovorilo je da svojim vozilom u jednom danu prelaze od 20-50 km, 31% ispitanika do 20 kilometara, 14% ispitanika 50-80 kilometara, a njih 6% 100 i više kilometara.

Iz ankete je vidljivo da velik broj ispitanika koristi svoje vozilo više puta dnevno i da prelazi do 50 km dnevno što prikazuje da ispitanici često koriste svoje vozilo da bi zadovoljili potrebe za prijevozom.

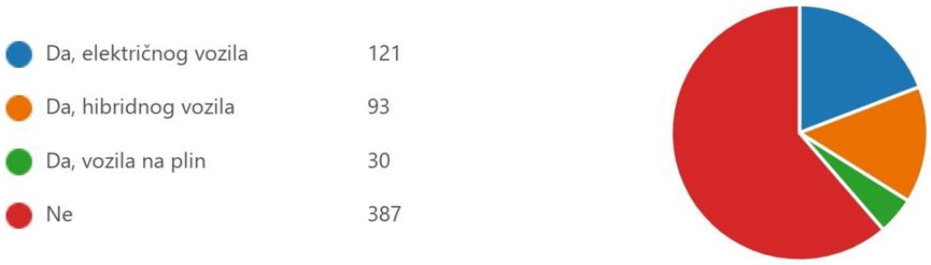


Grafikon 2. *Broj prevaljenih kilometara dnevno*

35% ispitanika posjeduje vozilo na benzinski pogon, dok 62% posjeduje vozilo na diesel pogon. Vozilo na plin, hibridno vozilo i električno vozilo posjeduje samo 1% ispitanika, što pokazuje da jako mali broj ispitanika vozi ekološki isplativa vozila i da njihova primjena još nije zaživjela.

U provedenoj anketi 55% ispitanika daje do znanja da im je čisti zrak i okoliš jako važan, a njih 13% ne razmišlja o važnosti čistog zraka i okoliša te nisu nimalo ekološki osviješteni.

U provedenoj anketi najviše ispitanika njih 61% ne razmišlja o kupnji niti jedne vrste ekološkog vozila, 19% ispitanika razmišlja o kupnji električnog vozila, a 15% ispitanika razmišlja o kupnji hibridnog vozila.



Grafikon 3. *Kupnja ekološkog vozila*

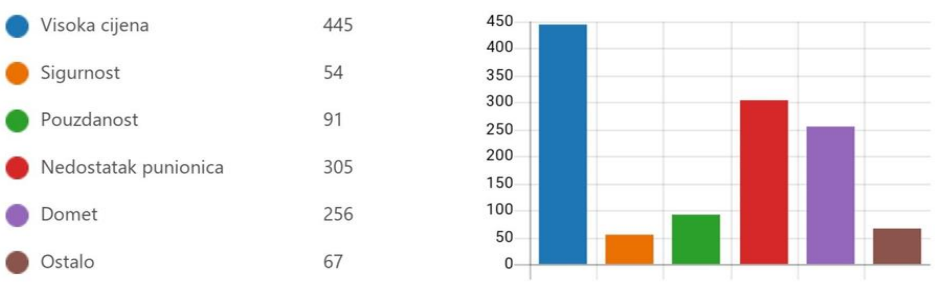
Od ukupnog broja ispitanika manji broj ispitanika njih 11% ima iskustva sa električnim automobilom, dok ostatak ispitanika 89% nema iskustva sa električnim automobilom. Pojavljivanje električnih automobila na našem tržištu je relativno novo i zato ljudi imaju razne predrasude o električnim vozilima.

Veliki problem su i auto kuće koje nemaju testna električna vozila koja bi se mogla odmah isprobati. Stanovništvo je premalo educirano o električnim automobilima i njihovim prednostima. Većinu električnih automobila se može isprobati tek netom prije sklapanja ugovora o kupnji vozila.

Provedbom ankete utvrđeno je da samo mali broj ispitanika upravljao potpuno električnim automobilom, njih svega 10%, a 90% ispitanika nikada nisu upravljali električnim automobilom. U anketi postavljena su i pitanja subjektivnog dojma o prednostima i nedostacima električnih automobila gdje je bilo moguće izabrati više odgovora.

Najveći problem i razlog zašto ispitanici ne posjeduju ili ne razmišljaju o kupnji električnog automobila je prvenstveno visoka cijena i upitna sigurnost. Samo 8% ispitanika smatra da je problem električnih automobila pouzdanost, dok 25% ispitanika najvećim problemom smatra nedostatak punionica.

21% ispitanika najvećim problemom električnih automobila ističe domet koji jako brzo pada upotrebom klima uređaja, utjecajem pada temperature te vrijeme punjenja i starost baterije.



Grafikon 4. *Nedostaci električnih vozila*

Većina ispitanika njih 91% ne posjeduje solarnu elektranu u svom domu, te bi za punjenje svog automobila trebali izgraditi brzu punionicu ili puniti na dnevnoj i noćnoj tarifi s kućnim priključkom za što im je potreban poseban kabel i duže vrijeme punjenja. Samo 9% ispitanika posjeduje solarnu elektranu u svom domu kojima bi se u potpunosti isplatilo električno vozilo i punjenje obnovljivim izvorima energije koje proizvodi njihovo kućanstvo.

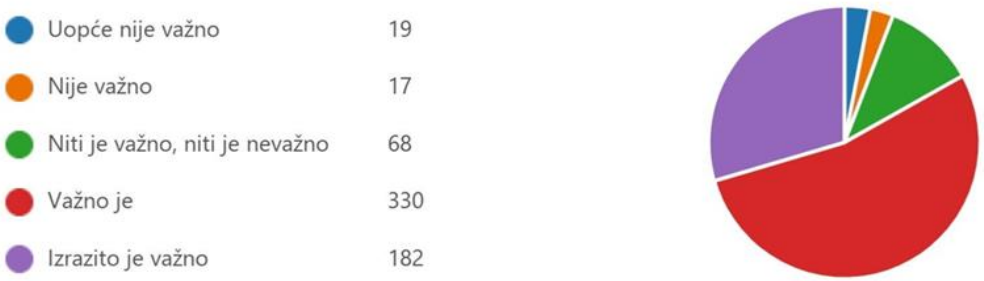
Na pitanje zašto bi se ispitanici i dalje odlučili na konvencionalno vozilo dobiveni su sljedeći odgovori: 58% ispitanika smatra da je prevelika cijena električnih vozila, 30% ispitanika je mišljenja da je bolja kvaliteta i izdržljivost konvencionalnih vozila nego li električnih vozila. Naravno postoje i drugi razlozi zašto se ispitanici još uvijek radije odlučuju za kupnju konvencionalnih vozila, a to je prvenstveno skupo i loše riješeno odlaganje potrošnih dijelova prvenstveno baterija.

Električna vozila u većini zemalja Europske unije još uvijek su vrlo skupa, zbog visokih stopa poreza i nisu dostupna većini građana ni uz državne poticaje. Republika Hrvatska ne odriče se svojih nameta na ekološki isplativa vozila i građani trebaju izdvojiti 25% više financijskih sredstava samo za PDV.

Grafikon 5. *Bi li država trebala smanjiti PDV na potpuno električno vozilo?*

Od 616 ispitanika njih 95% smatra da su vozila i dalje preskupa i da država ne daje dovoljno poticaja, a samo njih 5% smatra da država daje dovoljno poticaja za kupnju električnog vozila. Nedostupnost vozila našim građanima pokazuje podatak da je Republika Hrvatska na dnu ljestvice što se tiče broja električnih vozila i izgrađenih punionica.

Jedna od glavnih karakteristika električnih vozila je udobnost, miran i nečujan rad motora i zbog tih karakteristika električnih vozila proizvođači imaju mogućnost uključivanja zvuka motora da se upozore ranjivi sudionici u prometu na njihovu prisutnost.



Grafikon 6. *Udobnost vozila*

Glavni kriterij pri odabiru automobila većine ispitanika je razina udobnosti, što je logično s obzirom na učestalost korištenja.

Što se tiče mišljenja ispitanika o važnosti smanjenja ispušnih plinova upotrebom električnih i ekoloških prihvatljivih vozila većini je to izrazito ili vrlo važno

Grafikon 7. *Važnost smanjenja ispušnih plinova*

Nove tehnologije i napredni moderni sustavi karakteriziraju električna vozila. Njihov vrhunski dizajn i udobnost čine ih primamljiva kupcima. Većini vlasnika automobila vrlo je važan dizajn vozila koje voze, a električna vozila po tome nimalo ne zaostaju za ostalim konvencionalnim vozilima.

Slika 2*. Električno vozilo marke Audi*

Slika 3. *Električno vozilo marke Kia*

4. ZAKLJUČAK

Električna vozila danas su sve više prisutna oko nas ali nemaju iste mogućnosti kao konvencionalna vozila, jer su ograničena vremenom punjenja i dosegom, a k tome su i relativno skupa, a samim time i nedostupna građanima. Za sada električna vozila čine neznatan dio voznog parka. Infrastruktura za punjenje električnih vozila u gradovima i na izvangradskim prometnicama ne može zadovoljiti veliku količinu električnih vozila koja bi se mogla pojaviti u budućnosti. Najveći problem koji bi se mogao javiti u budućnosti je zbrinjavanje dotrajalih baterija koje je vrlo skupo. Vožnja električnih vozila omogućuje svojevrsni užitak i veliku udobnost tokom vožnje. Kako bi se postigao trend rasta elektromobilnosti važno je poticati i uvoditi elektromobilnost u sve grane gospodarstva, djelatnosti i grane prometa kako bi korištenje postalo što jednostavnije, a ne preskupo i teško dostupno (nisu svi gradovi jednako razvijeni, kao ni infrastruktura za implementaciju). Osim poticaja, od velikog je značaja i edukacija stanovništva koji su u svakodnevnoj potrebi korištenja vozila, ali i stručnjaka koji imaju odgovornost u smislu održavanja i uvođenja inovacija. Kako bi se ostvario interes posebno je važno naglašavati, prezentirati i promovirati takav način očuvanja okoliša, održivosti i stvaranja novih prilika. Kupnjom električnog vozila za potrebe škole željeli smo potaknuti buduće mlade vozače učenike naše škole kao i polaznike autoškole o ekološkoj osviještenosti te pokazati da smo škola koja vodi brigu o utjecaju prometa na okoliš. Za potrebe ovog rada provedena je

anketa koja nam pokazuje i daje informacije o razmišljaju ispitanika o kupnji ekoloških isplativih vozila, o njihovim stavovima i mišljenju o električnim automobilima. Rezultat ankete pokazuje da naši građani nisu baš osviješteni o ekološkim automobilima, a to je posljedica što su cijene električnih automobila previsoke i država ne daje dovoljno poticaja za kupnju električnih automobila pa građani nisu zainteresirani za takve automobile. Država bi trebala smanjiti ili ukinuti PDV na ekološke automobile i možda bi tim postupkom povećala interese i osviještenost građana o ekološkim automobilima.

5. LITERATURA

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27. ELECTROMOBILITY IN ENGINEERING AND TRAFFIC SCHOOL IN VARAŽDIN

Summary

The use of fossil fuels in transport greatly affects global warming and climate change in the world. Switching to alternative forms of energy in traffic can help lower temperatures globally, and that is the role of electric vehicles in their future.

A new milestone in traffic is the production and use of a new generation of vehicles, that is vehicles with 0% emissions, which are quieter and more economical. Currently, many perplexities about the advantages and disadvantages of electric vehicles are still being questioned, but the use of electric vehicles certainly affects the environmental awareness of the individual and affects also reducing environmental pollution in general.

In Varaždin County, according to available data, in 2020 there were 106 electric vehicles, 313 hybrid vehicles and 34 hybrid vehicles with external charging. In 2021 and 2022, the number of electric and hybrid vehicles increased sharply due to government incentives to purchase eco-friendly vehicles.

The aim of this paper is to show the cost-effectiveness of the use of electric vehicles in the Engineering and Traffic School in Varaždin, to explore the opinion of the public on the use and procurement of electric vehicles and to raise awareness of the benefits of using electric vehicles.

The research will be conducted based on statistical data, as well as by conducting a survey where data and opinions on electric vehicles will be generated. The possibilities of purchasing an environmentally friendly vehicle will also be explored.

Keywords: *electric vehicle, environmental awareness, application of electric vehicles, electromobility*

1. INTRODUCTION

Electromobility is a new ecological way of mobility in urban areas, where the electricity needed to power electric vehicles is obtained from renewable sources. The term electric vehicles imply the vehicles that use electric motors with electric drive. The goal of electromobility is to find a sustainable balance between people, cars and the environment. Electromobility provides a positive effect for reducing harmful gas emissions. Studies show that the overall calculation of greenhouse gas emissions for electric vehicles is much lower than the emissions of vehicles with internal combustion engines. The CO_2 reduction is between 11 to 100% assuming that the electricity we charge the electric car comes from renewable energy sources. Air pollution is a problem that affects every country because the air pollution of one country can reach another country by the atmosphere and affect poor air quality. It is estimated that 90% of European cities are exposed to pollutants that are considered harmful to human health in concentrations higher than allowed to ensure sufficient air quality. Traffic is responsible for approximately 25% of total greenhouse gas emissions in European countries, which is why many European countries are making great efforts to improve air quality in cities and reduce CO_2 emissions in transport. One of the main activities of the Engineering and Traffic School in Varaždin is the education of motor vehicle drivers and car drivers, so the school decided to buy an electric car due to environmental awareness.

2. ELECTROMOBILITY IN ENGINEERING AND TRAFFIC SCHOOL

Engineering and Traffic School educates students in two sectors: the mechanical engineering sector and the transport and logistics sector. The school's fleet consists of several personal vehicles used for driver training at the driving school and business trips, as well as a truck with a trailer for C + E category training.

In the Republic of Croatia, the The Environmental Protection and Energy Efficiency Fund published in 2019 a public call for co-financing the purchase of electric cars for Croatian citizens. Subsidies were distributed according to the principle of the "fastest" finger, and only a certain number of citizens could receive a subsidy. Citizens could receive up to 40% of non-refundable funds for the purchase of a new electric vehicle. By applying to the public call for the purchase of an electric car, the Engineering and Traffic School in Varaždin received a subsidy from the state fund, and the purchase of an electric car Renault ZOE followed.

This electric car is used for student education, business trips for the needs of the school, and serves as a good example of the school's environmental awareness and monitoring of new technologies and trends.

Picture 1. *Renault Zoe electric car owned by the Engineering and Traffic School in Varaždin*

2.1. Application of electromobility in school

Renault Zoe is the first electric car owned by the Engineering and Traffic School in Varaždin. The vehicle is used for various school activities, some of which are encouraging students to buy an electric car after turning 18 years old, environmental protection, educational purposes for certain engineering and transport professions. The new electric motor R135 with a power of 52 kWh with improved performance reaches a maximum speed of 165 Wh/kh, and one charge of the battery is enough for a range of 315 km.

The network of 200 charging stations for electric cars has the possibility of accelerated charging up to 22kW, which means that the range can be increased by 60 km within 30 minutes. Charging at home can be fast if you have a 7.4 kW electric home charger*. When the charging cable supplied with the vehicle is connected, you can charge the vehicle from 0 to 100% in 9 hours and 25 minutes.

The school spent HRK 222,631.50 for the car, along with state incentives in the amount of HRK 70,000.

An important factor in the decision to purchase an electric vehicle is consumption. The following table shows a comparison of the consumption of electric, diesel and gasoline powered vehicles according to the current energy prices, which according to announcements will increase even more in the future.

DRIVE COST	DRIVE TIPE				
	CHARGING OF THE ELECTRIC VEHICLE			FOSSIL FUELS	
	SOLAR/FREE	NIGHT TARIFF	DAILY TARIFF	DIESEL	GASOLINE
20 000 km	/	HRK 1 950	HRK 3 540	HRK 13 080	HRK 12 960
100 000 km	/	HRK 9 750	HRK 17 700	HRK 65 400	HRK 64 800
200 000 km	/	HRK 19 500	HRK 35 400	HRK 130 800	HRK 129 600

Table 1. *Energy consumption for different types of vehicle drives*

The table shows energy consumption at 20,000 - 200,000 km, excluding vehicle service and maintenance. According to the calculation of energy costs, it is evident that diesel-powered vehicles have the highest cost, followed by gasoline-powered vehicles, while electric vehicles have the option of free charging or charging at home with solar energy, where these costs can be reduced to a minimum. For 20,000 kilometres travelled with conventional vehicles, it is necessary to spend HRK 12,960 for gasoline vehicles and HRK 13,080 for diesel vehicles for fuel alone, and for the same mileage with electric vehicles, HRK 0 should be spent for free charging, for daily charging tariff HRK 3,540, and per night tariff HRK 1,950. The difference for 20,000 kilometres driven is HRK 9,460 when charging at the daily rate, and when charging the

vehicle at the night rate, the saving is HRK 11,050 only in energy. When having solar panels, the saving is 100%.

By increasing mileage, energy savings are also increasing, which is very important, especially nowadays when fuel prices are extremely high. Electric vehicles do not require any additional maintenance and are therefore more cost-effective.

3. CONDUCT AND RESULTS OF THE SURVEY

For the purposes of this paper, a survey on electromobility was conducted with the aim of obtaining data on respondents' attitudes regarding electric cars and their purchase.

The survey targeted respondents of different interests, age groups, thoughts and attitudes regarding electric cars. From the results of the survey, answers about the environmental awareness of our citizens and the use of electric vehicles were obtained.

According to age goup, 5% of respondents were under 18 years old, 45% of respondents were 18-30 years old, 43% of respondents were 31-50 years old and 7% of respondents were over 50 years old.

87% of survey respondents owns a driver's license, while 13% of respondents does not own a driver's license.

45% of respondents own 2 cars for personal use, and 18% of respondents own three cars in their household.

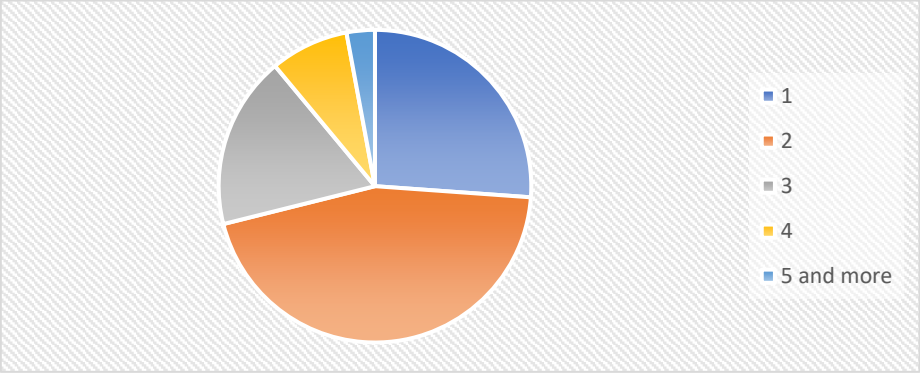

Chart 1. Number of cars in the household

63% of respondents use their vehicle several times a day, while 13% of them use their vehicle once a day or two to three times a week.

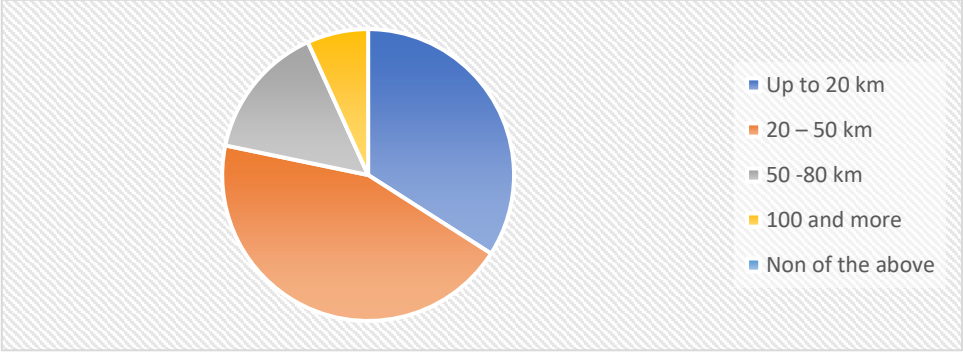

Chart 2. Number of kilometers traveled per day

Most of the respondents, 40%, answered that they drive 20-50 km in one day, 31% of respondents up to 20 kilometers, 14% of respondents 50-80 kilometers, and 6% of them 100 kilometers or more. It is evident from the survey that a large number of respondents use their vehicle several times a day and that they drive up to 50 km per day, which shows that the respondents use their vehicle very often to meet their transportation needs.

35% of respondents own a gasoline-powered vehicle, while 62% own a diesel-powered vehicle. Gas, hybrid, and electric vehicles are owned by merely 1% of respondents, which shows that a very small number of respondents drive ecologically profitable vehicles and that their application has not yet taken off.

In the conducted survey, 55% of respondents stated that clean air and the environment are very important to them, and 13% of them do not think about the importance of clean air and the environment and are not environmentally conscious at all.

Also, the results of the survey show that most respondents, 61%, are not thinking about buying any kind of ecological vehicle, 19% of respondents are thinking about buying an electric vehicle, and 15% of respondents are thinking about buying a hybrid vehicle.

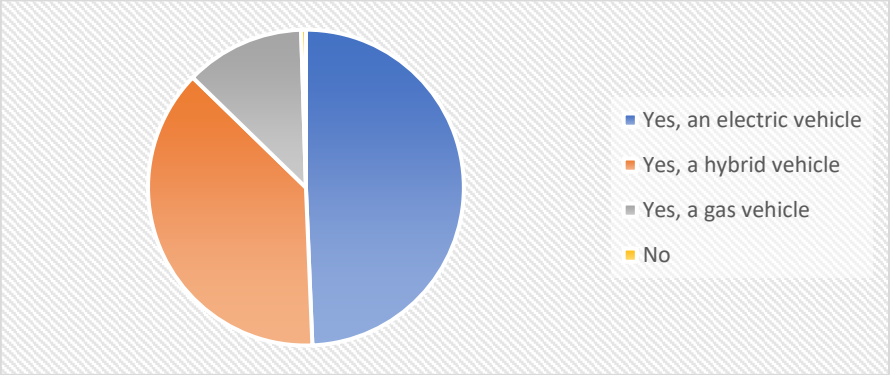

Chart 3. *Purchase of an eco-friendly vehicle*

Out of the total number of respondents, a smaller number of respondents, 11% of them, have experience with the use of electric cars, while the rest of the respondents, 89%, have no experience with their use. The presence of electric cars on our market is relatively new and that's why people have various prejudices about electric vehicles.

Car dealerships that do not have test electric vehicles that could be tested immediately are a big problem. Citizens are insufficiently educated about electric cars and their advantages. Most electric cars can only be tested just before signing the vehicle purchase contract.

The survey found that only a small number of respondents had driven a fully electric car, only 10% of them, and 90% of respondents had never driven an electric car. The survey also asked questions about the subjective impression of the advantages and disadvantages of electric cars, where it was possible to choose more than one answer.

The biggest problem and the reason why survey respondents do not own or think about buying an electric car are primarily high prices and questionable safety. Only 8% of respondents believe that the problem with electric cars is reliability, while 25% of respondents consider the lack of charging stations to be the biggest problem. 21% of the respondents point out that the biggest problem with electric cars is the driving range, which drops very quickly due to the use of air conditioning, the influence of the temperature drop, the charging time, and the battery age.

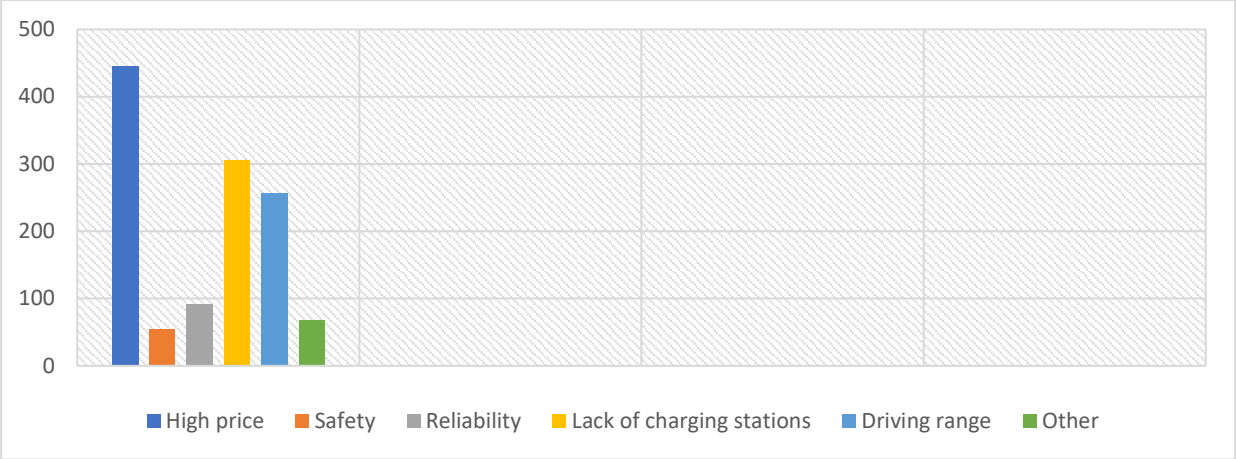

Chart 4: Disadvantages of electric vehicles

Most of the respondents, 91% of them, do not have a solar power plant in their home, and to charge their car it would be necessary to build a fast-charging station, or they would have to charge on a day and night tariff with their home connection, for which they would need a special cable and a longer charging time.

Only 9% of the respondents own in their home a solar power plant, which would make an electric vehicle and charging with renewable energy sources produced by their household fully cost-effective.

When asked why they would still choose a conventional vehicle, the respondents gave the following answers: 58% of the respondents believe that the price of electric vehicles too high is, 30% of the respondents think that the quality and durability of conventional vehicles is better than that of electric vehicles. Of course, there are other reasons why respondents still prefer to buy conventional vehicles - primarily the expensive and poorly handled disposal of consumable parts, especially batteries.

Electric vehicles are still very expensive in most countries of the European Union, due to high tax rates, and are not available to most citizens even with state incentives. The Republic of Croatia does not give up its levies on ecologically profitable vehicles and therefore citizens must pay an additional 25% more just for VAT.

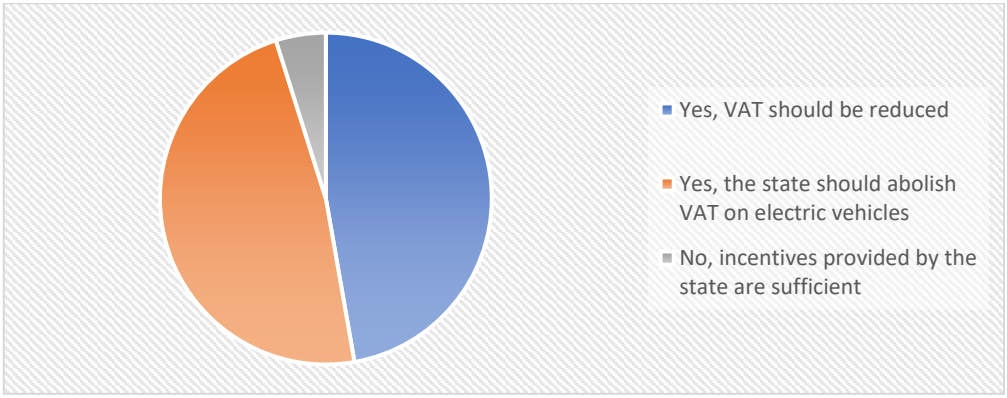

Chart 5: *Should the state reduce the VAT on a fully electric vehicle?*

Out of 616 respondents, 95% believe that vehicles are still too expensive and that the state does not provide enough incentives, and only 5% of them believe that the state provides enough incentives for buying an electric vehicle. The unavailability of vehicles for our citizens is shown

by the fact that the Republic of Croatia is at the bottom of the ranking in terms of the number of electric vehicles and built charging stations.

One of the main characteristics of electric vehicles is comfort, quiet and silent operation of the engine, and because of this, electric vehicle manufacturers have the option of turning on the sound of the engine to warn vulnerable road users of the presence of the vehicle.

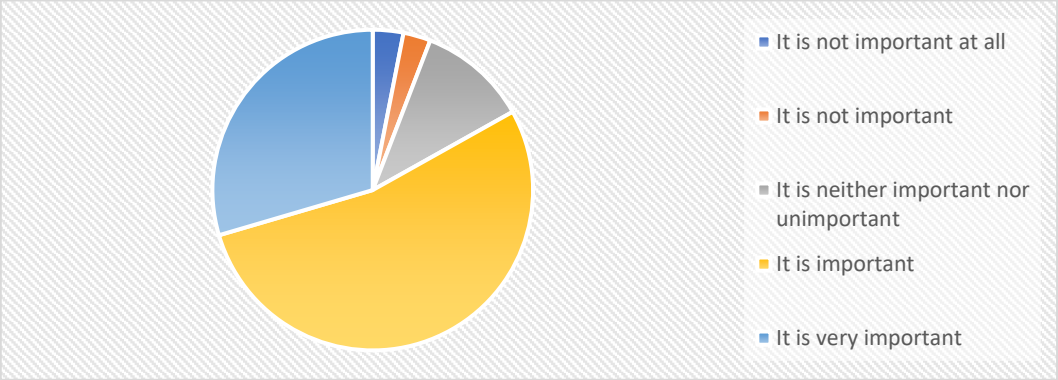

Chart 6: *Vehicle comfort*

The main criterion when choosing a car for most respondents is the level of comfort, which is logical considering the frequency of use.

Regarding the respondents' opinion on the importance of reducing exhaust gases by using electric and environmentally friendly vehicles, most of them find it extremely or very important.

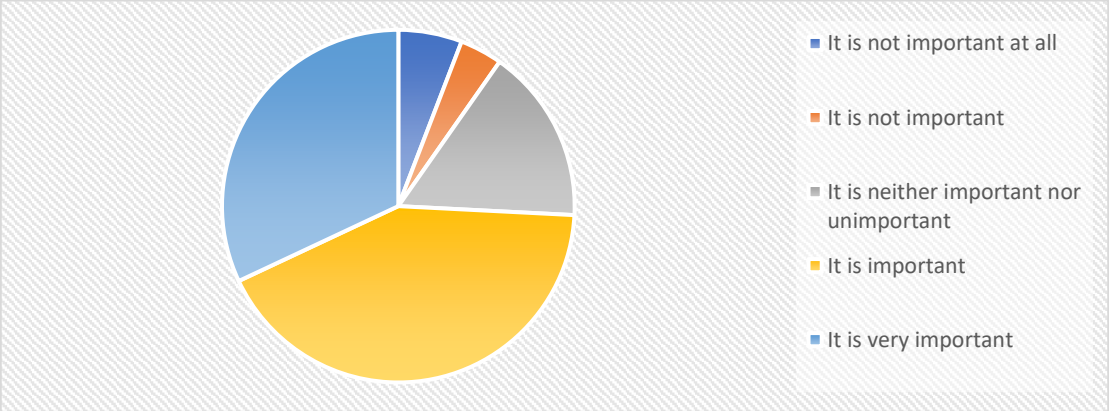

Chart 7: *The importance of reducing exhaust gases*

New technologies and advanced modern systems are the characteristics of electric vehicles. Their superior design and comfort make them attractive to customers. The design of the vehicle they drive is very important to most car owners, and electric vehicles are not far behind conventional vehicles in this regard.

Picture 2. *Audi electric vehicle*

Picture 3. *Kia electric vehicle*

4. CONCLUSION

Today, electric vehicles are more and more present in our environment, but they do not have the same possibilities as conventional vehicles, because they are limited with charging time and driving range, besides that they are relatively expensive, and therefore inaccessible to citizens. For now, electric vehicles represent an insignificant part of the car fleet. The infrastructure for charging electric vehicles in cities and on suburban roads cannot meet the needs of the large number of electric vehicles that could appear in the future. The biggest problem that could arise in the future is the disposal of used batteries, which is very expensive. Driving electric vehicles provides a kind of pleasure and great comfort during driving. In order to achieve the growth trend of electromobility, it is important to encourage and introduce electromobility in all branches of the economy, as well as in all activities and branches of transport, so that use becomes as simple as possible, and not too expensive and difficult to access (not all cities are equally developed, nor is the infrastructure for implementation). Besides of incentives, it is also important to educate the population which uses vehicles daily, as well as experts who are responsible for vehicle maintenance and the introduction of innovations. To generate interest, it is particularly important to emphasize, present and promote such a way of preserving the environment, sustainability and creating new opportunities.

By purchasing an electric vehicle for the school's needs, we wanted to encourage our students - future young drivers as well as driving school students to be environmentally aware and also wanted to show that we are a school that takes care of the impact of traffic on the environment. For the purposes of this paper, a survey was conducted. The survey shows and gives us information about the respondents' thinking regarding buying ecologically friendly vehicles, and regarding their attitudes and opinions about electric cars.

The result of the survey shows that our citizens are not aware of ecological cars, and this is a consequence of the fact that the prices of electric cars are too high, and the state does not give enough incentives to buy electric cars, so citizens are not interested in buying them. The state should reduce or abolish the VAT on ecological cars, and perhaps by doing so, it would increase the interests and awareness of citizens about them.

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28. -PREDUSLOVI ZA VOZENJE ELEKTRICNI TROTINETI-

Izrabotil:
Nikolče Spasovski *dipl. soob. inž.*

1. ŠTO SE ELEKTRIČNI TROTINETI

Nakratko: ova se trotineti, kako što mnogumina od nas gi koristevme kako deca, no so opcija da rabotat na struja, t.e. da se startuva so pomoš na vgradeniot motor na baterii (akumulator).

Slika 1: električni trotinet – model xiaomi m365

Glavnata planirana namena na električnite trotineti e transport vo urbani sredini, po asfaltirani patišta.

2. PREDNOSTI I NEDOSTATOCI NA ELEKTRIČNITE TROTINETI

Prednosti na električnite trotineti:

- mali dimenzii - lesno se pakuva i nosi, bilo do stanot, bilo do javniot prevoz, kancelarijata... za razlika od velosipedot.
- pobrz e od pešačenje, a popraktičen od javniot prevoz, osobeno za pokratki rastojanija (do 10 km), osven vo loši vremenski uslovi.
- izbegnuvanje soobraćaen metež - iako toa može da se postigne i so velosiped, verojatno podobro.
- lesno se odi na ugornica, bez da se potime, bidejќi ima električen motor.
- povolna cena vo odnos na drugite visokokvalitetni električni velosipedi.

Nedostatoci na električnite trotineti:

- Nema rekreacija, kako što se vozenje velosiped i planinarenje (iako ova može da bide prednost za onie koi se zanimavaat so teška fizička rabota). Samo stoenje - što e mnogu slično na sedenjeto vo odnos na oštetuvanje na 'rbetot i zdravjeto voopšto.
- Trkalata se mnogu mali, što e nezgodno, duri i opasno, vo slučaj da naidete na dupka ili neramnina na patot.
- Malite trkala go pravat vozenjeto mnogu neprijatno.
- Ako se koristat vozdušni (pnevmatski) gumi, a ne „cvrsti“ gumi, zamenuvanjeto/krpenjeto e isklučitelno makotrpna rabota, vo sporedba so krpenjeto dupnata guma na velosiped. Dodeka upotrebata na „cvrsti“ gumi go pravi vozenjeto mnogu neprijatno, duri i so amortizeri, vo golem del poradi mnogu malite trkala.
- Profilot na vozač koj stoi, so nozete edna zad druga, e prilično mal, duri i pomal od profilot na velosipedist. I od napred i odzadi, kako i od strana. Dodadete na ova pogolema brzina od brzinata na odenje, isklučuvajќi go sekoe dviženje (race, noze, kako pedali na velosiped).
- Za da se dvižite voopšto efikasno, osobeno po ugornina, potrebno e bateriite da se polnat - za drugo što treba da razmislite, za razlika od velosipedot, duri i električen, koj odi dosta dobro „samo“ na pedalite.

- Kontroliranjeto na trotinetot e mnogu poteško otkolku na primer da se kontrolira velosiped. Vrtenjeto, osobeno nagloto, kako i ponagloto sopiranje, baraat visok stepen na veština i koncentracija, pa duri i togaš se inferiorni vo odnos na (prosečniot) velosiped.

3. TEHNIČKI KARAKTERISTIKI NA ELEKTRIČNI TROTINETI

3.1. BATERII KAJ ELEKTRIČNI TROTINETI

Postojat različni tipovi na baterii, so različni karakteristiki (cena, kapacitet, vreme na polnenje...).

3.1.1. KARAKTERISTIKI NA BATERIJATA

Dobrite baterii treba da bidat kolku što e možno lesni, da se polnat što e možno pobrzo i da obezbedat što e možno poveќe električna energija (što znači kolku daleku i kolku brzo može da se patuva so edno polnenje na baterijata). važni karakteristiki povrzani so bateriite se kako što sleduva:

- soodnos težina i kapacitet.
- otpornost na niski i visoki temperaturi (temperaturen opseg na rabota).
- raboten vek i brojot na ciklusi na polnenje-praznenje što gi podnesuvaat (kapacitetot i performansite na site baterii se namaluvaat so tekot na vremeto i brojot na polnenja - nekoi pobrzo, nekoi pobavno).
- količinata na samo-praznenje pri „stoenje“ (nadvor od upotreba, kolku pomalku samo-praznenje, tolku podobro).
- brzina na polnenje – kapacitet do 50, 80 i 100%.
- cena po kapacitet

Električnite trotineti koristat tri „glavni“ tipa na baterii:

- litium-jon (li-ion).
- nikel-metal-hidrid (nimh).
- dobra stara olovna kiselina (sla - inž. zapečatena olovna kiselina), slična na onie što se koristat za palenje na poveќeto avtomobili.

Razlikite pomeģu ovie tipovi baterii se objasneti, so mnogu iskustvo od prva raka, vo napisot za baterii. ovde nakratko ќe gi navedam glavnite karakteristiki i razliki:

3.1.2. LITIUM-JONSKI BATERII

Ednostavno kažano: najdobroto i najskapiot. Pokraj „standardnite“ litium-jonski baterii (Li-ion), postojat dve podvarijanti:

- Litium-ferofosfat (LFP, ili LiFePo4) - so podolg vek na traenje od „običnite“ Li-ion baterii i pogolema stabilnost na ќeliite. Tie se ušte poskapi.
- Litium-polimer (LiPo) - tie se napraveni vo forma na „kutija“, pokraj klasičnata forma na cilindrični ќelii, taka što polesno se „spakuvaat“ na pomalku prostor, što e pogodno za pomali uredi, kako na pr. električni skuteri. Polnenjeto mora da se kontrolira, inaku može da stanat nestabilni i zapalivi.

3.1.3. NIKEL-METAL-HIDRID (NIMH) BATERII

Vo odnos na litium-jonskite baterii:

- Tie ne možat da eksplodiraat i da se zapalat vo slučaj na lošo polnenje
- Ne im preči da bidat celosno isprazneti (se dodeka polaritetot ne e obraten).
- Potrebno im e podolgo vreme za polnenje (pobavno se polnat).
- Tie poteško podnesuvaat ekstremni temperaturi (nivniot kapacitet paǵa).
- Pomal kapacitet za ista težina.
- Ni-MH bateriite se nešto poevtini od Li-ion, no i so malku pološi karakteristiki, koga ḱe se zemat predvid site prednosti i nedostatoci.

3.1.4. BATERII SO OLOVNA KISELINA (SLA)

Najevtino i najlošo. Tie se teški (nizok soodnos kapacitet-težina), nadvorešnata temperatura vlijae na nivniot životen vek i kapacitet.

Vo zavisnost od vidot i kapacitetot (i težinata) na bateriite, električnite skuteri imaat opseg od okolu 10 do okolu 100 kilometri (zavisi i od terenot, brzinata i težinata na vozačot) so edno polnenje na baterijata.

3.2. SOPIRAČKI

Postojat različni tipovi na sopirački:

- Disk sopirački (mehanički i hidraulični).
- Baraban sopirački.
- Sopirački „noga“, kade sopiranjeto se vrši so pritiskanje na branikot na zadnoto trkalo na gumata - kako kaj detskite skuteri.
- Električni sopirački - vo varijanta deka baterijata se polni (minimalno) so sopiranje, ili bez funkcijata za polnenje.

Ḱe napišam nekolku redovi za sekoj tip na sopirački. Dopolnitelno, koga naveduvam sporedbi, prednosti i nedostatoci, mislam deka se raboti za kvalitetna izvedba (model) na sopiračkata, bez razlika kakov tip e. Da počneme:

Disk sopiračkite, od site gorenavedeni, imaat najdobri performansi (moḱ na zapiranje i, ušte považno, modulacija). Nakratko, so električni trotineti: tie se počuvstvitelni na udari i oštetuvanje na diskot - pri transport ili paǵanje.

Barabanskite sopirački se robusni, nadvorešnite vlijanija (vremenskite uslovi) najmalku vlijaat na niv, no nivnata modulacija e mnogu loša. Toa e silata na sopiranje se zgolemuva sama po odreden moment, taka što lesno se zaklučuva trkaloto i se lizga.

Nožnite sopirački baraat ednata noga da se postavi na branikot na zadnoto trkalo, što go ograničuva načinot na koj možete da stoite na trotinetot. Tie se najbavni za aktiviranje od site vidovi sopirački (vo sporedba so drugite koi se kontroliraat račno) i poteški za moduliranje od poveḱeto. Pokraj toa, tie se mnogu pološi koga patot e vlažen. Tie, se razbira, postojat samo na zadnoto trkalo.

Električni sopirački - modulacija postoi vo odnos na prethodno izbranata moḱ na sopiranje (od 1 do 3 najčesto), no nema fina modulacija. Toa e glavno samo prekinuvač za vklučuvanje-

isključuvanje. Verojatno ne se site vakvi, no ova definitivno treba da go proverite. Onie što se koristat samo za zabavuvanje/kontrola na brzinata, no ne i za vistinsko sopiranje.

Od seto gorenavedeno, za električnite trotineti najdobri se sopirачkite so disk i baraban (po toj redosled).

VAŽNA ZABELEŠKA:
Zadnata sopirачka e pomalku efikasna poradi raspredelbata na težinata za vreme na sopiranjeto, dodeka prednata nosi rizik od trkalanje napred. Rezultat: trotinetite ne možat efikasno i silno da sopiraat. Imajte go ova na um.

3.3. ELEKTRIČEN MOTOR

Kaj električnite motori, najvažna karakteristika e mokнosta, izrazena vo vati (W). No, postoi finta. Brojot na označeni vati pokažuva kolku električna energija može da potroši motorot. Obično motorite so pogolema potrošuvačka možat da proizvedat pogolema mokнost (na volanot), no motorite so povisok kvalitet se poefikasni (taka što potrošuvačkata e poblisku do isporačanata mokнost), dodeka onie so ponizok kvalitet (obično poevtini) možat da bidat mnogu pomalku efikasni.

Ova ne e krajot na razgovorite. Postoi razlika pomeǵu vrvnata mokнost i održlivata mokнost. „Održliva mokнost“ e maksimalnata mokнost što može da ja obezbedi (i troši) motorot dodeka ne se potroši baterijata. Maksimalnata mokнost e najvisokata (mnogu) kratkoročna potrošuvačka što može da ja povleče motorot, obično 3 do 5 pati pogolema od održlivata mokнost - i često ovaa vrednost e napišana vo brošurite do „Mokнost:“. Da.

Druga razlika e vo tipot na motorot: modernite elektromotori, koi se poefikasni i podolgotrajni, se od tipot „DC bez četkički“, odnosno bez četki, koi se napojuvaat so direktna struja. Motorite bez četki se ušte se mnogu poskapi (osobeno kontrolnata edinica e posložena i poskapa vo sporedba so onaa za motori so četki).

Mokнosta na motorot vlijae na zabrzuvanjeto i maksimalnata brzina. Mnogumina imaat elektronski ograničena maksimalna brzina, dodeka mokнiot motor služi za da mu ovozmoži duri i na teškiot vozač da odi nagornina bez problemi. Dodeka drugi dostignuvaat i do 80 km/h. Poveḱeto, duri i modelite so poslabi motori, postignuvaat okolu 25 km/h na ramno.

3.4. KONTROLOR NA ELEKTRIČEN MOTOR

Iako često se zanemaruva stavka, kontrolorot e ključen za bezbedno i efektivno rabotenje na električniot trotinet. Položite možat da otkažat srede vozenje (po ugornicata), ili da vlijaat na toa motorot da ne ja isporačuva ramnomerno silata.

3.5. ŠASIJA – RAM

Bidejḱi poveḱeto električni trotineti se preklopuvaat/rasklopuvaat (za polesen transport), mnogu e važno mehanizmot za preklopuvanje da e so dobar kvalitet. Odnosno, lesno se preklopuva i rasklopuva, a trotinetot se drži silno i stabilno - osobeno koga e postaven za vozenje.

Se razbira, ramkata mora da bide sposobna da ja zadrži težinata na vozačot, duri i ako se vozi na (pomali) ispaknatini, bez premnogu izvrtuvanje ili pukanje.

Električnite trotineti obično imaat propišana maksimalna nosivost, obično do 100 kilogrami. Poteškite vozači isto taka mora da obrnat vnimanie na ovaa stavka pri kupuvanjeto.

Nekoi ramki imaat i suspenzija. Ova go pravi vozenjeto pomalku neprijatno do odreden stepen, no pnevmaticite i dijametarot na trkalata se ušte se isklučitelno važni, kako što e objasneto vo slednoto poglavje.

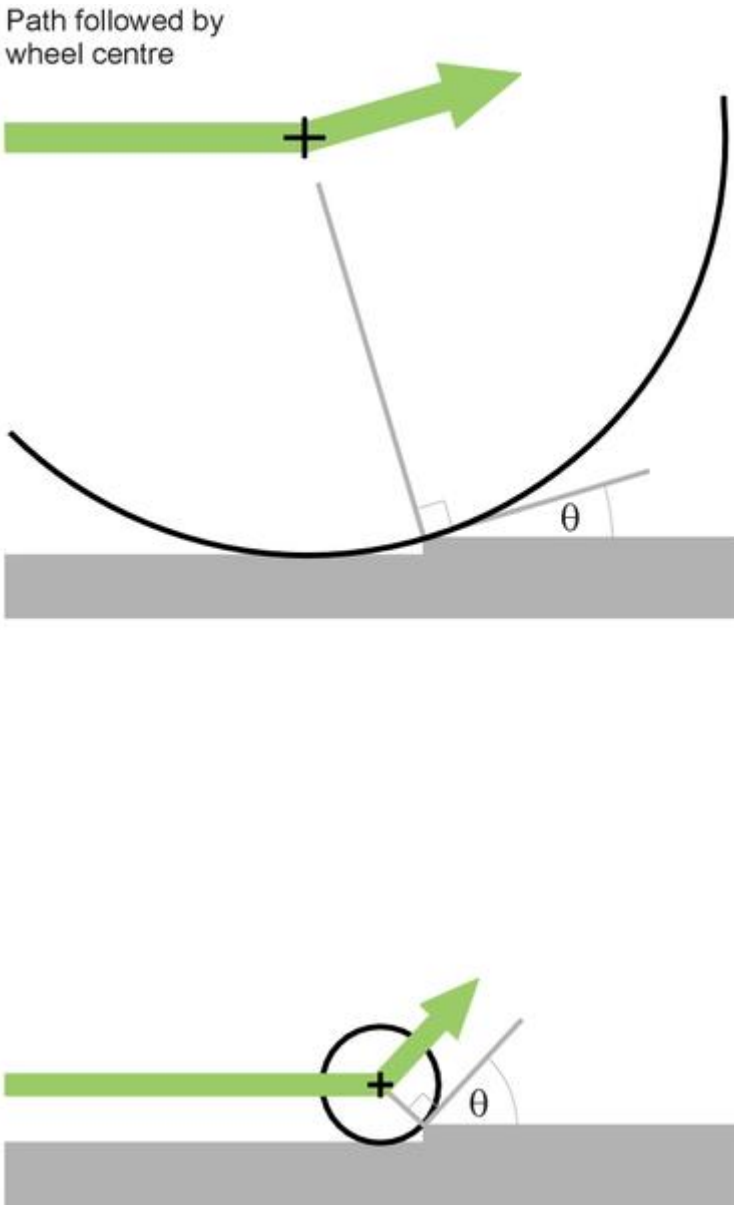
3.6. TRKALA

Trkalata za električni trotineti se napraveni vo dijametar od 5 do 12 inči. Vo zavisnost od modelot.

Ako vi e mnogu važno trotinetot da bide što pomal, možete da zemete nekoj od modelite so pomali trkala (vo ovoj slučaj, poželno e patištata po koi vozite da bidat što e možno poramni i trotinetot da ima amortizeri).

Meǵutoa, ako voopšto e možno, poglednete da izberete modeli so pogolemi trkala, najmalku 8 inči. Pogolemite trkala ovozmožuvaat postabilno i poudobno vozenje, bidejќi neramninite i dupkite potoa nemaat zgolemen efekt, kako što e prikažano na Slika 2 (preterano za da se naglasi poentata).

Slika 2: Slična situacija so dupkite - pogolemo trkalo e mnogu pomala verojatnost da navleze i da ja naruši patekata



Slika 3: Slika (so vektori) kažuva poveќe od iljada zborovi

3.7. GUMI

Za da se sprečat punkcii, nekoi modeli na električni trotineti doaǵaat so „cvrsti“ gumi (ne pnevmatski, t.e. ispolneti so vozduh).

Na pnevmatski gumi, postojat verzii so vnatrešna cevka, kako i bez cevka (bez vnatrešna cevka). Gumite so vozduh obezbeduvaat podobro drženje na površinata (važno pri svioci i sopiranje), pomal otpor pri trkalanje i pogolema udobnost (gi amortiziraat site najmali neramnini).

Teškoto nešto za pnevmatskite gumi e dupnuvanjeto - teško e da se zakrpi/zamenuva guma na električen skuter, kako što ubavo pokažuva ova video (na angliski): https://www.youtube.com/watch?v=z-5SvOievIU.

Mnogumina se obiduvaat da go sprečat ova so različni sredstva „za anti-dupčenje“. Jas ne sum ljubitel na ovie - tie se leplivi i valkani, mora da se menuvaat redovno (bidejќi se sušat so tekot na vremeto) i ne se 100% zagarantirani. Ventilot isto taka znae da izgori koga supstancijata ќe se isturi vo gumata.

4. EKOLOŠKI ASPEKT NA ELEKTRIČNITE TROTINETI

Poveќeto električni vozila (vklučuvajќi gi trotinetite) se promoviraat kako ekološki. Ne sum tolku siguren. Proizvodstvoto na baterii, kako i nivnoto otstranuvanje i recikliranje, e mnogu toksično i štetno za životnata sredina. Dodeka životniot vek na bateriite e relativno kratok: od 3 do maksimum 5 godini, po što treba da se smenat. Pešačenjeto, vozenjeto velosiped, duri i javniot prevoz se mnogu pomalku štetni za životnata sredina.

5. ZAKLUČOK

Bez razlika dali ste gi videle ili ne, električnite trotineti se tuka da ostanat. Tie se praktični, lesni za upotreba i relativno evtini.

Definitivno bi ve sovetuval da razmislite za drugi načini na transport, pred se velosiped. Dokolku seušte razmisluvate da kupite električen trotinet, izberete pokvalitetni, podobri modeli i vnimavajte. Gi objasniv problemite so upravuvanjeto i sopiranjeto. Imajte go toa na um. Pogrižete se da ste soodvetno osvetleni i da ne odite brzo tamu kade što ne e jasno i kade pešacite, velosipedistite ili avtomobilite možat da vi go presečat vašiot pat.

28. PREREQUISITES FOR DRIVING ELECTRIC SCOOTERS

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1. WHAT ARE ELECTRIC SCOOTERS

Shortly: These are scooters, which many of us were using as a children in the past, but with option for work on electricity t.e. to start with the help of built-in engine based on batteries (accumulator).

Picture 1: electris scooter – model xiaomi m365

Main planned purpose of the electric scooters is the transport in urban areas and paved roads.

2. ADVANTAGES AND DISADVANTAGES OF ELECTRIC SCOOTERS

Advantages of electric scooters:

- small dimensions - easy to pack and carry, to the flat, to the transport, office, as difference of bicycle.
- faster than walking, better than public transport, especially for shortly distance except of bad weather conditions.
- avoiding traffic – is the same as bicycle but is better.
- easy goes to uphill, without sweating,because of electric engine.
- favorable price compared to electric bicycles.

Disadvantages:

- No recreation, such as cycling, which is an advantage for those engaged in manual labor, as there is only standing, which is similar to sitting in terms of spinal damage.
- Wheels are too small, which is dangerous, when a hole or stone is encountered.
- Small wheels made driving unpleasant.
- If are used pneumatic tires, and not hard tires, replacement is difficult,in correlation with the damaged tire of the bicycle. Using the hard tires, made the driving too unpleasant, even with dampers, because of too small tires.
- The profile of the driver who stand with the legs one behind the other, is too small, and smaller than the person who drive a bicycle. Add to this bigger speed from the speed of walking, excluding any movement of legs, arms, pedals of bicycles, e.t.c.
- To move efficiently, especially uphill, batteries need to be charged, unlike a bicycle.

- Controlling the scooter is hardly than the bicycle. Sharp turns and sudden braking require a high degree of skill and concentration, and even then are inferior to a regular bicycle.

3.Technical characteristics of electric scooters

3.1. BATTERIES OF ELECTRIC SCOOTERS

There are a lot of types of batteries, with different characteristics (price, capacity, time of charging…)

3.1.1. CHARECTERISTICS OF BATTERIES

Good batteries have to be easy, to charge quickly and to provide more electricity (it means how far and as soon as possible to drive with one charging of the batterie).Important characteristics of the batteries are:

- weight to capacity ratio.
- resistance to high and low temperatures
- service life and number of charge and discharge cycles the batteries can handle
- amount of self-discharge when standing
- speed of charging - brzina na polnenje – capacity of 50, 80 i 100%.
- price based of capacity

Electric scooters use three main types of batteriesi:

- lithium ion batteries (li-ion).
- nickel metal hydride (nimh).
- lead acid batteries (sla - inž. sealed lead acid), similar to that used in the ignition of some cars

Differents between all the types of batteries.

3.1.2. LITHIUM-ION BATTERIES

Simply said, the best and most expensive. Beside of standard lithium-ion baterries (Li-ion), there are also two types of them:

- Lithium-ferofosfat (LFP, or LiFePo4) - with a longer lifespan and greater cell stability. They are more expensive.
- Lithium-polimer (LiPo) - they are made in the shape of a box, compared to the usual cylindrical ones, so they can be packed into a smaller space, as in electric scooters. Charging has to be contolled, because they have to be unstable and flammable.

3.1.3. NICKEL-METAL-HYDRIDE (NIMH) BATTERIES

In correlation with lihtium-ion batteries:

- they cannot explode and catch fire under bad charge conditions
- they don't mind being completely emptied
- they need longer time for charging
- their capacity fell down on extreme temperature
- smaller capacity for the same weight

- Ni-MH batteries are cheaper than the Li-ion, but with a with worse characteristics, when all advantages and disadvantages are taken into account.

3.1.4. LEAD ACID BATTERIES

Cheapest and worst. They are heavy, the outside temperature affects their service life and capacity.

Depending on the type and capacity of the batteries, electric scooters have a range of 10 to about 100 kilometers (depends on the terrain, speed and weight of the rider), with one charging of the batterie.

3.2. BRAKES

There are a lot of types of brakes:

- Disc brakes (mechanical and hydraulic).
- Drum brakes
- Brakes „leg“,where braking is done by touching the bumper, the rear wheel of the tire
- Electric brakes – with possibility that the batterie will charge minimally with braking, or without charging function .

I will write some words about all the types of brakes.

Disc brakes, from all the rest, have the best performances (stopping power, modulation). They are more sensitive to impacts and damage to the disc during transport and falling.

Drum brakes are robust, external influences affect them the least, but their modulation is very bad. It is the power of braking which which increases by itself up to a certain point , so that it is easy to lock the wheel and slide.

Legs brakes, need one leg to put on the rear wheel fender, which limits the way the scooter can stand. They are the slowest of all brake types, compared to all manually controlled ones and heaviest for modulation. Also they are worse when the road is wet. Of course they only exist on the rear wheel.

Electric brakes – modulation exist in relation to the pre-selected braking power (from 1 do 3 very often), but there are not good modulation. It's mostly just a switch on and switch off. Probably not all are like that, but you have to check this out. those used only for deceleration/speed control and not for actual braking

Of all the above, disc and drum electric scooters are the best.

An important note:

The rear brake is less effective due to the distribution of weight during braking, while the front carries the risk of rolling forward. The result is: scooters cannot brake efficiently and strongly. Keep this in mind.

3.3. ELECTRIC ENGINE

In electric motors, the most important quantity is the power expressed in watts (W). The number of watts show how much electricity the motor can consume. Usually the motors with higher consumption they can produce more power (on the steering wheel), but the motors with the higher quality are more efficient (so the consumption is closer to the delivered power), while those of lower quality (usually cheaper), could be less efficient.

There is a difference between peak power and sustainable power.„Peak power“is the maximum power that can be consumed by the engine, until the battery is exhausted. Maximum power is the highest short-term consumption that the engine can pull, usually 3 to 5 times the sustained power and often in brochures this value is written next to power – yes.

Another different is in the type of motor: modern electric motors that are more efficient and last longer are of the type, are of the type „DC without brushes “,which are powered by direct current.The motors without brushes are more expensive (especially the control unit is more complex and expensive compared to that of brush motors).

Engine power affects acceleration and top speed. A lot of them have electronically limited top speed, while the powerful engine serves to enable even the heaviest rider to go uphill without problems. While, the others reach up to 80 km/h. The most of them, even the models with weaker engines, reach about 25 km/h on the flat.

3.4. ELECTRIC MOTOR CONTROLLER

The controller is the most important for effective and safe operation of the electric scooter. Worst can fail in the middle of driving uphill or cause the engine to not deliver power.

3.5. CHASSIS

Because most of scooters are collapsible, for easier transport, it is very important that the disassembly mechanism is of better quality. That is, it is easy to fold and unfold, and the scooter is held strong and stable.

Of course, the chasses has to be able to keep the weight of the driver even if riding on minor bumps.

Electric scooters usually have prescribed maximum load capacity , of about 100 kg. Heaviest drivers, also must pay attention to this item when purchasing.

Some frames also have suspension. This makes the ride less uncomfortable, to some extent, but tires and wheel diameter are extremely important, as explained in the next chapter.

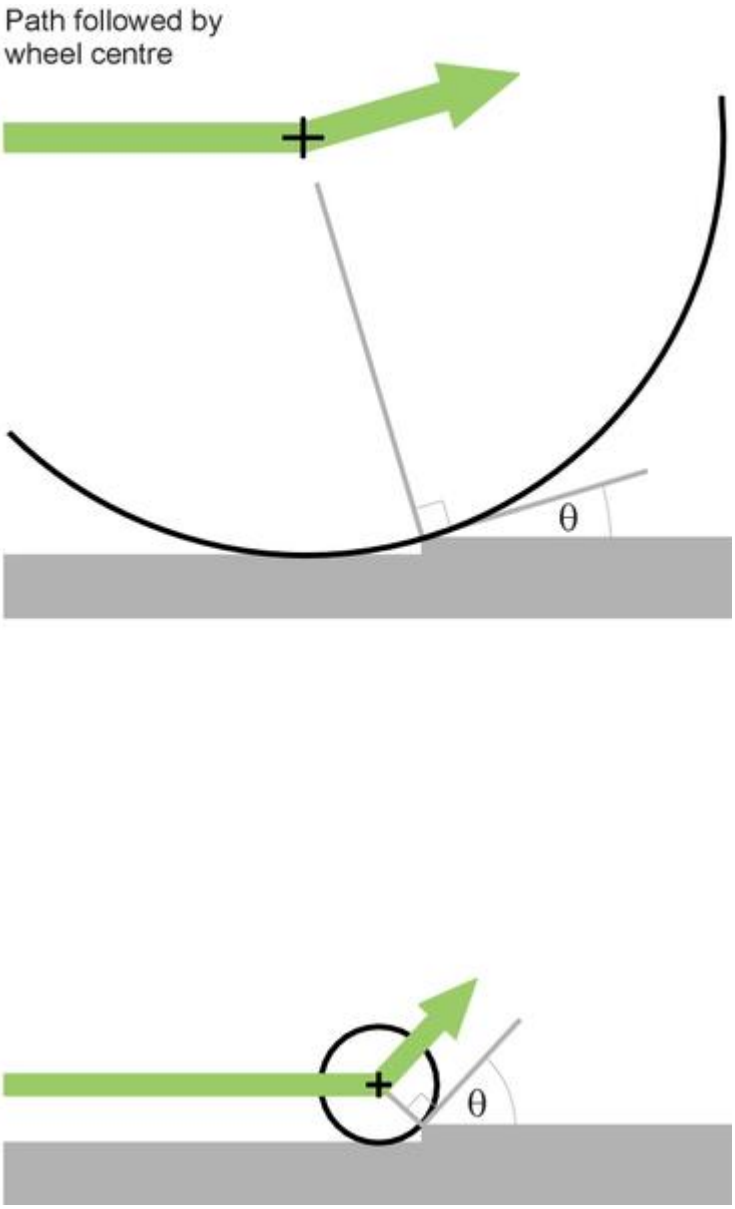
3.6. WHEELS

The wheels of electric scooters are made with diameter from 5 to 12 inches, depend of the model.

If is important for you, the scooter to be smaller, you can take some of the models with smaller wheels (on the good streets and the scooter has to have shock absorbers).

But, if is possible, you can choose models with bigger wheels, smallest of inches. Bigger wheels, enable more comfortable and stable driving, because bumps and holes have no increasing effect.

Picture 2: similar situation with potholes - a larger wheel is less likely to go into the pothole and disrupt the track



Picture 3: with vectors - says more than a thousand words

3.7. TIRES

To prevent punctures, some models of scooters have solid tires (not pneumatic ones filled with air).

On the pneumatic tires, there are versions with an inner tube, and also without tube. The tires with air, enable better grip on the surface, cornering and braking, less rolling resistance and better comfort, they cushion small bumps.

The difficult thing about pneumatic tires is the puncture - it is difficult to patch or replace a tire on an electric scooter, as is resented on this video: https://www.youtube.com/watch?v=z-5SvOievIU.

Many try to prevent this with various anti-piercing agents. I am not a fan of these, they are sticky and dirty, have to be changed regularly and are not 100% guaranteed. Also, the valve can burn if the substance is spilled into the tire.

4. ENVIRONMENTAL ASPECT OF ELECTRIC SCOOTERS

Most electric vehicles, including scooters, are promoted as environmentally friendly.I am not sure. The production of batteries, as well their disposal and recycling is very toxic and harmful to the environment. While battery life is very short: from 3 to maximum 5 years, and after that, they have to be changed. Walking, driving bicycle and also public transport, a less harmful to the environment.

5. CONCLUSION

Whether you've seen them or not, electric scooters are here to stay. They are practical, easy to use and relatively inexpensive.

I would definitely advise you to choose other modes of transportation, primarily a bicycle. If you are still thinking of buying an electric scooter, choose higher quality, better models and be careful. I explained the steering and braking problems. Keep that in mind. Make sure you are properly lit and do not go fast where it is not clear and where pedestrians, cyclists and cars can cross your path.

29. PRINCIPI ZELENE LOGISTIKE

Pujić Goran , Tehnička škola, Zaječar

Rezime: Moderno doba donosi velike izazove u pogledu transporta robe kako u izolovanim pojedinačnim sistemima tako i integralnim sistemima transporta. Sve veća zabrinutost u pogledu zagađenja životne sredine od strane globalnog transporta nameće pitanje koliko je moderna logistika zelena i kakve su mogućnosti da se ublaži njen efekat na životnu sredinu od strane logističkih procesa. Moderan način života i želja ljudi da poseduju robu koja dolazi sa drugog kraja sveta doveli su do poveća obima transporta robe na globalnom nivou. I dalje su fosilna goriva dominatna energija u svim oblicima transporta i njihov efekat na životnu sredinu postaje sve negativniji. Autor, ovim radom, će pokušati da ukaže na probleme moderne logistike sa aspekta zagađenja životne sredine i kako ista može da se učini zelenijom.

Ključne reči: logistički procesi, zagađenje životne sredine, železnica, drumski saobraćaja, racionalizacija transportnih sredstava.

1. UVOD

Logistika je jedan od ključnih faktora konkurentnosti, na tržištima razvijenih zemalja. Osnovni cilj logistike često se izražava kroz poznati koncept "7P": **p**rava roba na **p**ravom mestu u **p**ravo vreme u **p**ravoj količini u **p**ravom stanju u **p**ravom pakovanju po **p**ravim troškovima. Drugim rečima, logistika je usmerena ka zadovoljenju sve zahtevnijih korisnika kroz postizanje koristi od mesta, vremena i količine. Kompleksnost procesa neophodnih za postizanje navedenih logističkih ciljeva, se može, bar donekle, ilustrovati kroz faze realizacije robnih tokova odnosno kroz odgovarajuću funkcionalnu diferencijaciju logistike – **logistiku nabavke – logistiku proivodnje – logistike distribucije**, čemu treba dodati i brojnost i raznovrsnost zahteva koje postavljaju kako robni tokovi tako i korisnici.

Pri postizanju navedenih ciljeva, logistika nastoji da ostvari optimalni odnos između logističke usluge i logističkih troškova, što podrazumeva korišćenje postojećih i razvoj novih strategija i koncepcija. Naime, u logistici se uspešno primenjuju strategije kao što su just-intime (JIT), make-or-buy, outsourcing, insourcing, koncepcije city logistike, logistički kontroling, supply chain management itd. Ključna obeležja navedenih strategija su: integracija, koncentracija, kooperacija, koordinacija i specijalizacija.

Sa aspekta zaštite životne sredine a s obzirom na prirodu logističkih procesa važne su sve navedene faze realizacije robnih tokova, međutim posebno treba istaći reverzibilnu logistiku koja je nastala kao odgovor na pojačane ekološke zahteve. Reverzibilna logistika obuhvata čitav reprodukcioni proces i odnosi se na tokove reciklaže, otpada, povratne ambalaže, praznih logističkih jedinica (paleta i kontejnera) i oštećene robe.

Da se u okviru logistike, zaštiti okoline poklanja sve veća pažnja, ide u prilog i činjenica da se kao osnovne performanse logističkih sistema, sem logističkih troškova, servis stepena i tehnoeksploatacionih performansi, sve češće navodi i uticaj logističkih procesa na čoveka i okruženje. Treba imati u vidu da su prostorni i vremenski procesi transformacije, karakteristični za logistiku, veoma uslovljeni ograničenim prirodnim resursima energije, vazduha i vode. Propisi o pakovanju, transportu, problemi sa otpadom, stavljaju jasno do znanja da će otpad i zbrinjavanje otpada u budućnosti biti značajno područje angažovanja logistike. Sve ovo ukazuje da se u okviru logistike primećuju neke pozitivne promene sa aspekta zaštite okoline. Ovo stanovište se više može primetiti kod razvijenih zemalja, tj. kod zemalja gde je ekolološka svest jača nego kod zemalja na Balkanu. Uzimajući u obzir činjenicu da su drumska transportna sredstva dominantan u transportu i distribuciji proizvoda jasno je da negativni efekat ovakvog transporta na kvalitet života i životnu sredinu ostaje dosta veliki.

Sumirajući navedeno, u logistici su se, vezano za zaštitu životne sredine, izdiferencirala dva paralelna područja delovanja:

- racionalno korišćenje otpadnih materijala i
- racionalizacija logističkih procesa (transport, pretovar, skladištenje) sa aspekta uticaja na okruženje (korišćenje energetski efikasnijih vidova transporta, koncentracija robnog rada, lokacija skladišta).

PARADOKSI ZELENE LOGISTIKE

Reverzibilna logistika je, pre svega, usmerena na postizanje ekonomskih i ekoloških koristi koje proizilaze iz boljeg korišćenja otpadnih materijala. Naime, rastuće potrebe za odlaganjem otpada i reciklažom dovele su do otvaranja novih mogućnosti na tržištu. Problem prikupljanja otpada, kao početak procesa reciklaže ili odlaganja, je rešen na dva načina:

- Potrošači sami sortiraju materijale za reciklažu i odlaganje. Kako su deponije nepoželjne u blizini urbanih područja, i uglavnom su im kapaciteti popunjeni, otpad je potrebno prevoziti na sve veće udaljenosti.
- Proizvođači preuzimaju obavezu kako za dostavu novih proizvoda tako i za povraćaj ambalaže i ostataka. To je proces trajne reverzibilne distribucije.

Logistički procesi su sami po sebi genaratori velike količine otpada. Ovaj otpad se najčešće generiše na mestima gde počinje distribucija istih i gde se prizvodi odvajaju od transportne ambalaže, kao što su mesta skladištenja. Materijali koji se ovde generišu kao otpada jesu u većoj meri bazirani, na kartonu, papiru i drvetu. Ovi materijali lako se mogu reciklirati ili koristiti kao sirovina u drugim industrijama i iz tog razloga ne bi ih trebalo ni smatrati otpadom neko sirovinom, čijom prodajom bi se mogli smanjiti logistički troškovi i na taj način bi naravno došlo do smanje finalne cene proizvoda.

U ovim poslovima logistika nesumnjivo pomaže zaštiti životne sredine ali pri tome istovremeno vrši i neposredni uticaj na životnu sredinu. Logistika za obrnutu distribuciju ima komercijalne razloge ali postavlja se pitanje šta je sa zagađenjem, gužvama u saobraćaju, smanjenjem neobnovljivih resursa.

U mnogim svetskim istraživanjim pokazalo se da logistika i nije baš tako “zelena”, i da bi se došlo do zadovoljavajućeg nivoa zelenosti logistike neophodno je uraditi puno, ali ne samo kod karika transportnog procesa već i kod samog potrošača kao konačnog konzumeta tog proizvoda. Dva glavna pitanja koja su se u ovim istraživanjima izdvojila bila su odlaganje opasnog otpada i odlaganje čvrstog otpada. Dve trećine upitanih označilo je ova pitanja kao „veoma važna“ i „najvažnija“. Najmanje važna pitanja bila su problem gužvi u saobraćaju i iskorišćenje zemljišta - dva elementa koja se najčešće označavaju kao pitanja od centralnog značaja za zaštitu okoline. Kada su upitani da označe budući uticaj zaštite okoline na logističke funkcije, opet su, kao vodeći, izdvojeni odlaganje otpada i pakovanje dok je za servis korisnika, kontrolu zaliha, raspored proizvodnje - ključni logistički elementi – navedeno da imaju zanemarljiv uticaj na okolinu. Sve ovo je pokazalo da je reverzibilna logistika glavna ekološka preokupacija logistike i da je put do zelene logistike još dug.

Koncept zelene logistike u sebi sadrži nekoliko izrazitih kontradiktornosti. Ciljevi logističkih sistema često su upravo suprotni očuvanju životne sredine i ovo je u suštin glavini kamen spoticanja u ostvarivanju aspekata zelene logistike. Ove kontradiktornosti se ogledaju u sledećem.

Troškovi: Svrha logistike je da smanji troškove, ostvari uštede u vremenu, poveća pouzdanost i fleksibilnost. Strategije smanjenja troškova često se direktno sukobljavaju sa zaštitom životne sredine. U praksi to najčešće znači da korisnici lanca snabdevanja smanjuju troškove dok okolina preuzima na sebe velike probleme i troškove. Postoje državni programi u pojedinim zemljama kojima se korisnici primoravaju da plate pune troškove infrastrukture, međutim, fokus većine ekoloških programa je na privatnim automobilima. Kao što je malopre navedeno prodajom čvrstog otpada kao sirovinu bi uticalo na smanjenje troškova. Novija ekološka vozila u drumskom transport utiču na smanjenje emisije štetnih gasova, međutim njihova cena odvlači preduzetnike i preduzeća od njihove nabavke (ovde uvek postoji i opasnost od rizika pouzdanosti kod novih tehnologija). Država bi bila ta koja bi ovde trebala da stimuliše process nabavke ovakvih vozila kroz razne poreske olakšice i subvencije.

Vreme i fleksibilnost: Vreme je često najvažniji rezultat logističkih operacija. Smanjenjem vremena protoka povećava se produktivnost, ali to se, u najvećem broju slučajeva, ostvaruje korišćenjem drumskog ili vazdušnog transporta. Ova dva vida transporta imaju veoma malu energetsku efikasnost, tj. troše više energije po jedinici prevezenog tereta. Povećavanje fleksibilnosti logistike, kao i smanjenje vremena isporuke omogućavaju proizvodnim sistemima velike uštede i manja ulaganja. JIT koncept omogućava dopremu manjih količina robe prema potrebama proizvodnje. Smanjivanje pošiljaka odgovara proizvodnji ali zato se znatno povećavaju gužve u saobraćaju i zagađenje. Drumski saobraćaj značajno učestvuje u zagađenju vazduha. Od ovog vida saobraćaja potiče: 86% ugljenmonoksida (CO), 33% ugljovodonika (CH), 42% azotnih oksida (NOx). Osim toga, dizel motori emituju izuzetno velike količine čađi i dima (dominatno gorivo u logističkim procesima). Sem toga, različiti vidovi transporta imaju različitu potrošnju energije, za obavljanje istog transportnog rada. Najveći potrošač je drumski transport na koji otpada 82% ukupne potrošnje energije u saobraćaju, zatim sledi vazdušni sa 13%, železnički sa 3% i rečni sa 2%. Specifična potrošnja energije po jedinici transportnog rada (Wh/tkm) se značajno razlikuje za različite vidove i tehnologije transporta.

Imajući sve ovo u vidu, kao jedan od odgovora, nameću se kombinovani transportni lanci, gde će drumski transport, kroz obavljanje odvozno-dovoznog rada na kraćim relacijama, lakše odgovoriti na sve strožije zahteve zaštite životne sredine, dok bi u kontinetalnom delu Evrope glavni deo transportnog procesa pao na elektrificiranu železnicu.

Zahtev potrošača koji se odnose na što kraću dostavu trebalo bi po autoru da se ograniči i da se proces dostave produži čime bi se omogućilo organizatorima transportnog procesa da pređu na ekološki efikasnije sisteme transporta, pa bi sam efekat na zagađenje životne sredine bio smanjen.

Prostorni raspored (mreža): Razvoj logistike u velikoj meri prati razvoj infrastrukturne mreže. Povećani zahtevi koji se postavljaju distributivnom sistemu prouzrokovali su izgradnju distributivnih centara i terminala u blizini ili unutar urbanih sredina. Kada se tome doda i činjenica da saobraćajna infrastruktura (putevi, pruge, aerodromi, železničke stanice) zauzima najviše zemljišta u urbanim sredinama, dobija se ne baš zelena slika logistike. Sem toga, velika koncentracija logističkih aktivnosti u naseljenim područjima, vrši veliko zagađenje vazduha i prouzrokuje buku. Na osnovu navedenog, može se zaključiti da je teško pomiriti interes distributivne logistike da se približi što bliže urbanim sredinama i opšti interes očuvanja resursa životne sredine. U cilju smanjenja emisije štetnih gasova u distributivnim procesima u urbanim sredima važnu ulogu bi mogla da ima železnica (o čemu će više reči biti kasnije), kao i racionalizacija upotrebe transportnih sredstava (o čemu će tako đe biti više reči kasnije)

Pouzdanost: Jedan od prioriteta logistike je i pouzdanost dostave robe. Cilj je robu isporučiti na vreme uz što manje loma i rastura, gde najbolje rezultate daju drumski i vazdušni transport. Ova dva vida transporta su već apostrofirana kao veliki zagađivači životne sredine. Skladištenje: Razvoj logistike je značajno doprineo brzini, pouzdanosti i fleksibilnosti isporuke. Samim tim, nestala je potreba proizvodnih sistema za skladištenjem velikih količina robe. Razvojem JIT koncepta, mnogi proizvodni sistemi su gotovo izgubili funkciju skladištenja, koja je generisala pored velikih investicionih i značajne troškove održavanja, ali, zalihe su delom prenete u transportni sistem. Dobar deo zaliha je zapravo u tranzitu što donosi veće gužve i zagađenje a životna sredina i društvo snose troškove. Ovo je potvrđeno empirijskim istraživanjem u Velikoj Britaniji gde je na uzorku od 87 preduzeća utvrđeno smanjenje broja i kapaciteta skladišta za 39% dok je 1/3 preduzeća zabeležila povećan obim kamionskog transporta.

2. DOBRA/LOŠA ŽELEZNICA

Železnica, po autoru ovog rada, je izuzetno zapostavljena u kontekstu logistike kako obične tako i zelene. Železnica, takođe po autoru, po svojim sadašnjim karakteristikama, vuče korene još komunističkog perioda, sa velikim brojem radnika, zastarelom mehanizacijom i vozilima, lošom organizacionom strukturom, o marketing i da ne govorimo (većina preduzeća koja bi možda i koristila usluge železnice nije upoznata sa vrstama usluga koja ona pruža kao i sa cenama). Železnica ima velike mogućnosti da postane izutno primenljiva kao instrument unapređenja logistike pogotovu segmentu smanjenja emisije štetnih gasova i smanjenja opterećenja drumskih saobraćajnica kao vangradskih tako i urbanih.

Na prostoru Srbije puno je bilo velikih industrijskih giganata koji su raspologali sa velikim skladištnim sistemima i imali u okviru svog komplesa mogućnost utovara i istovara robe iz železničkih vagona. Većina ovih giganata je propala i skladištni sistemi su otkupljeni od strane drugih preduzeća i konvertovani u robno distributivne centre. Dosta ovih bivših giganata je bilo pozicionirano u okviru urbanih sredina, čime im je lokacija idealna sa aspekta distribucije proizvoda (odličan element city logistike) čime se smanjuje daljina te distribucije. Druga dobra stvar je upravo prolazak železničke pruge kroz prostor ovih giganata a sada robno distributivnih centara, što ostavlja mogućnost direktne dostave robe železničkim transportnim sredstvima. Međutim u praksi se ova mogućnost izuzetno malo koristi.

Važno je ovde napomenuti i karateristike pojedinih vidova prevoza koja se provlače u obrazovnim udžbenicima u srednjem i visokom obrazovanja a koja se kose praksom. Naime, u svim literaturama se navodi da se drumski transport tereta koristi do distanca od oko 500 km, a preko ove distance da se koristi železnički transport. Kada bi ovo u praksi bilo realizovano efekti logističkih procesa na životnu sredinu bi zasigurno bili manji nego što jesu. Međutim u praksi smo vinovnici drugačije situacije tj. da se transport drumskim transportni sredsvima bukvalno odvija bez ikakvih ograničenja, tj. na distancama koja premašuju i više hiljada kilometara, dok se za železnički transport stiče utisak totalnog ignorisanja, kao i utisak da sama železnice i ne želi da promeni takvo stanje stvari.

Ovde se sada nameće pitanje kako rešiti problem upotrebe ovih transportnih sredstava, tj. kako ravnomernije raspodeliti upotrebu sredstava između drumskog i železničkog saobraćaja. Struktura i organizacija železnice vuče korene iz stare SFRJ, što znači da je menadžment politički postavljen, marketing i ne postoji, problem viška radnika niko ne želi da reši, zastarele oprema kao i kadar itd. Železnica bi morala da se aktivnije uključi u ovu ekonomsku trku ako želi da opstane, a njen opstanak, po autoru je ključana za razvoj zelene logistike. Država sa druge strane morala donositi zakone koji će ograničaviti drumski saobraćaj i favorizovati železnički, kao i davati razne stimulacije privrednim subjektima koji koriste logističke usluge bazirane na železnilkom transportu.

3. RACIONALIZACIJA DRUMSKIH TRANSPORTNIH SISTEMA

Ako logistički procesi i uspeju da se oslone na železnička transpotna sredstva radi dopreme robe do robno distributivnih centara onda samo ostaje problem distribucije robe do maloprodajnih objekata ili krajnih korisnika. Ovde na scenu stupaju drumska transportna sredstva. Dobra strana drumskih transportnih sredstava, pored dostave od „vrata do vrata“, jeste i široka lepeza vozila različitih nosivosti, čime određena količina tereta može da se rasporedi na adekvatana način.

Racionalizacija može da se ogleda na više načina:

- Upotreba adekvatnog transportnog sredstva prema količini tereta koje treba prevesti;
- Ekonomija deljenja;
- Upotreba dvotočkaša;

Sva od ova tri načina daju pozitivne rezultate na polju zelene logistike.

Ako se transportno sredstvo maksimalno iskoristi, sa aspekta kapaciteta, tokom distribucije proizvoda do maloprodajnog objekta onda na taj način dobijamo najmanji negativni efekat po životnu sredinu, tj. količina emitovanog ugljen dioksida i drugih gasova po jedinici transportovanog proizvoda je najmanji. Međutim u praksi je situacija malo drugačija. Distribucija proizvoda se najčešće vrši na taj način da se jedno transportno sredstvo koristi za transport do više objekata ili korisnika (brze pošte na primer), čime dolazi do povećane emisije štetnih gasova kao i optrećenje saobraćaja.

Problem naveden u prethodnom pasusu može se rešiti kroz primenu tzv. ekonomije deljenja. Ova princip je prvo zaživeo kod prevoza putnika (gde su Uber i Lift najbolji primeri). Uber je aplikacija koja povezuje korisnika prevoza sa osobom koja vrši prevoz sopstvenim automobilom. Na ovaj način osoba vlasnik vozila smanjuje svoje troškove upotrebe vozila i ostvaruje zaradu. Radno vreme je fleksibilno. Ovaj princip se vrlo brzo preselio i na prevoz robe manjeg kapaciteta u većim urbanim sredinama (najbolji primeri, Glovo i Walt). Po autoru ovaj princip rada bi mogao da se proširine i na druge oblasti distribucije a ne samo kod prevoza hrane i osnovnih životnih potrebština. Mesto gde ima mogućnosti da se ovaj princip primeni su zasigurno brze pošte. Prednost ovakvog načina jeste smanjenje voznog parka distributivnog centra, bolje iskorišćenje transportnih sredstava angažovanih od strane angažovanih vozila, smanjenje troškova održavanja, i sveukupno manji negativni efekti na životnu sredinu.

Za distributivne potrebe u urbanim sredinama kod transporta manjih količina tereta dobre rezultate sa aspekta zelene logistike mogu dati i dvotočkaši (motocikli i bicikli). Bicikli i neimituju izduvne gasove, dok svi dvotočkaši generalno malo zauzimaju prostora tokom saobraćaja i prosečna brzina im je i veća nego putničkih automobila i teretnih vozila (motorizovani dvotočkaši).

4. ZELENA LOGISTIKA U OBRAZOVNIM SISTEMIMA

Logistika i integralni transport u obrazovno sistemu vezano za srednjoškolsko obrazovanje u republici Srbiji se izučava kroz nekoliko obrazovnih profila (vozač motornih vozila, tehničar drumskog saobraćaja, tehničar logistike…). Međutim u svim tim literaturama malo se pažnje posvećuje značaju zelene logistike. Ista se izuzetno malo ako ne i ni malo ne spominje. Kada se god govori o prednostima i nedostacima nekih od logističkih sistema gotovo nikad se ne govori o uticaju logističkih procesa na životnu sredinu (kako u pozitvom, tako i u negativnom smismislu).

Ovo se može pripisati i zastarelim udžbenicima koji su pisani u vreme kada ova tematika nije bila toliko izražena. Spominjanje zelene logistike kao i njen značaj i potrebe u obrazovnim sistemima svode se na inicijativu predmetnog nastavnika koji želi da se data priča sprovede u delo i kako bi se budućim naraštajim otvorili vidici u datoj oblasti gde učenici logistiku i integralne sisteme transporta ne bi trebalo da posmatraju kao sredstvo za smanjenje ukupnih troškova i skraćenje vremena putovanja robe već i kao sredsvo koje trebe da obezbedi i kvalitetniji način života posmatrano kroz prizmu zaštite životne sredine.

Po autoru nedvosmisleno treba u srednjoškolske sisteme obrazovanja uvrstiti nastavne jedinice koje bi se bavile ovom tematikom sve sa ciljem stvaranja budućih kadrova koji bi kroz svoj rad priču o zelenoj logistkici sproveli u delo.

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29. PRINCIPLES OF GREEN LOGISTICS

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Summary: The modern age brings great challenges in terms of the transportation of goods both in isolated individual transportation systems and integral transportation systems. The growing concern about environmental pollution from global transport raises the question of how green modern logistics really is and what are the possibilities to mitigate its effect on the environment by logistics processes. Modern lifestyles and people's desire to own goods that come from the other side of the world have led to an increase in the volume of goods transportation on a global level. Fossil fuels are still the dominant energy in all forms of transport and their effect on the environment is becoming more and more negative. The author, with this work, will try to point out the problems of modern logistics from the aspect of environmental pollution and how it can be made greener.

Keywords: logistic processes, environmental pollution, railways, road traffic, rationalization of means of transport.

INTRODUCTION

Logistics is one of the key factors of competitiveness in the markets of developed countries. The basic goal of logistics is often expressed through the well-known concept "7R": the right goods at the right place at the right time in the right quantity in the right condition in the right packaging at the right costs. In other words, logistics is aimed at satisfying increasingly demanding users by achieving benefits from place, time and quantity. The complexity of the processes necessary to achieve the aforementioned logistical goals can, at least to some extent, be illustrated through the phases of realization of commodity flows, i.e. through the corresponding functional differentiation of logistics - logistics of procurement - logistics of production - logistics of distribution, to which should be added the number and variety of requirements set by commodity flows and the users.

When achieving the stated goals, logistics strives to achieve an optimal relationship between logistics service and logistics costs, which implies the use of existing and the development of new strategies and concepts. Namely, strategies such as just-in-time (JIT), make-or-buy, outsourcing, insourcing, concepts of city logistics, logistics controlling, supply chain management etc. are successfully applied in logistics. The key features of the mentioned strategies are: integration, concentration, cooperation, coordination and specialization.

From the point of view of environmental protection, and considering the nature of logistics processes, all the mentioned stages of the realization of goods flows are important, however, reversible logistics, which was created in response to increased environmental requirements, should be highlighted in particular. Reversible logistics includes the entire reproduction process and refers to the flows of recycling, waste, returnable packaging, empty logistics units (pallets and containers) and damaged goods.

The fact that the impact of logistics processes on people and the environment is increasingly mentioned as the basic performance of logistics systems, apart from logistics costs, service level and techno-exploitation performance, is also supported by the fact that within logistics, the protection of the environment is being paid more and more attention. It should be borne in mind that spatial and temporal processes of transformation, characteristic of logistics, are highly conditioned by limited natural resources of energy, air and water. Regulations on packaging, transport, waste problems, make it clear that waste and waste disposal will be a significant area of logistics engagement in the future. All this indicates that some positive changes are being observed in logistics from the aspect of environmental protection. This point of view can be observed more in developed countries, i.e. in countries where the ecological conscience is stronger than in countries in the Balkans. Taking into account the fact that road means of transport are dominant in the transport and distribution of products, it is clear that the negative effect of such transport on the quality of life and the environment remains quite large.

Summarizing the above, two parallel areas of action have been differentiated in logistics, related to environmental protection:

- rational use of waste materials and
- rationalization of logistics processes (transport, transshipment, storage) from the aspect of impact on the environment (use of more energy-efficient modes of transport, concentration of commodity work, warehouse location).

PARADOXES OF GREEN LOGISTICS

Reversible logistics is, above all, aimed at achieving economic and environmental benefits resulting from better use of waste materials. Namely, growing needs for waste disposal and recycling have led to the opening of new opportunities on the market. The problem of waste collection, as the beginning of the recycling or disposal process, is solved in two ways:

- Consumers themselves sort materials for recycling and disposal. As landfills are undesirable near urban areas, and their capacities are mostly full, waste must be transported over ever greater distances.
- Manufacturers undertake the obligation both for the delivery of new products and for the return of packaging and leftovers. It is a process of permanent reversible distribution.

Logistics processes, themselves, are generators of a large amount of waste. This waste is most often generated in the places where the distribution of the logistics processe begins and where the products are separated from the transport packaging, such as storage places. The materials, that are generated here as waste, are mostly based on cardboard, paper and wood. These materials can easily be recycled or used as raw materials in other industries and for this reason they should not even be considered as waste but as raw materials, which sale could reduce logistics costs and thus naturally reduce the final price of the product.

Doing these jobs, logistics undoubtedly helps to protect the environment, but at the same time it has a direct impact on the environment. Logistics for reverse distribution has commercial reasons, but the question that arises is what about pollution, traffic jams, reduction of non-renewable resources.

In many world studies, it has been shown that logistics is not really that "green", and in order to reach a satisfactory level of greenness of logistics, it is necessary to do a lot, but not only with the links of the transport process, but also with the consumer himself as the final consumer of that product. The two main issues that stood out in these studies were the disposal of hazardous waste and the disposal of solid waste. Two thirds of those asked marked these issues as "very important" and "most important". The least important issues were the problem of traffic congestion and land use - two elements that are most often marked as issues of central importance for environmental protection. When they were asked to indicate the future impact of environmental protection on logistics functions, waste disposal and packaging were again singled out as leaders, while customer service, inventory control, production scheduling - key logistics elements - were stated to have a negligible impact on the environment. All this has shown that reversible logistics is the main environmental concern of logistics and that the road to green logistics is still long.

The concept of green logistics contains several distinct contradictions. The goals of logistics systems are often the exact opposite of environmental protection, and this is essentially a stumbling block in the realization of aspects of green logistics. These contradictions are reflected in the following.

Costs: The purpose of logistics is to reduce costs, save time, increase reliability and flexibility. Cost-cutting strategies are often in direct conflict with environmental protection. In practice, this usually means that users of the supply chain reduce costs while the environment takes on major problems and costs. There are government programs in some countries that force users to pay the full cost of the infrastructure, however, the focus of most environmental programs is on private cars. As mentioned earlier, selling solid waste as raw material would reduce costs. Newer ecological vehicles in road transport affect the reduction of harmful gas emissions, however, their price distracts entrepreneurs and companies from purchasing them (there is always a reliability risk with new technologies). It would be the state that should stimulate the process of purchasing such vehicles through various tax incentives and subsidies.

Time and flexibility: Time is often the most important result of logistics operations. Reducing the time flow increases productivity, but in most cases this is achieved by using road or air transport. These two types of transport have very low energy efficiency, ie. they consume more energy per unit of transported cargo. Increasing the flexibility of logistics, as well as reducing the delivery time, enable production systems to achieve great savings and lower investments. The JIT concept enables the delivery of smaller quantities of goods according to production needs. Reducing shipments corresponds to production, but traffic jams and pollution therefore increase significantly. Road traffic significantly contributes to air pollution. From this type of traffic comes: 86% carbon monoxide (CO), 33% hydrocarbons (CH), 42% nitrogen oxides (NOx). In addition, diesel engines emit extremely large amounts of soot and smoke (the dominant fuel in logistics processes). In addition, different types of transport have different energy consumption, for performing the same transport work. The biggest consumer is road transport, which accounts for 82% of the total energy consumption in traffic, followed by air transport with 13%, rail transport with 3% and river transport with 2%. The specific energy consumption per unit of transport work (Wh/tkm) differs significantly for different types and technologies of transport.

Bearing all this in mind, as one of the answers, combined transport chains are imposed, where road transport, through the performance of delivery on shorter distances, will more easily respond to the increasingly strict requirements of environmental protection, while in the continental part of Europe, the main part of the logistics chains would fell on the electrified railway.

According to the author, the demand of consumers related to the shortest possible delivery should be limited and the delivery process extended, which would allow the organizers of the transport process to switch to more environmentally efficient transport systems, so the effect on environmental pollution would be reduced.

Spatial layout (network): The development of logistics largely follows the development of the infrastructure network. The increased demands placed on the distribution system have caused the construction of distribution centers and terminals near or within urban areas. When you add to that the fact that the transport infrastructure (roads, railways, airports, railway stations) takes up the most land in urban areas, you get a not very green picture of logistics. In addition, the large concentration of logistics activities in populated areas causes a lot of air pollution and noise. Based on the above, it can be concluded that it is difficult to reconcile the interest of distribution logistics to move as close as possible to urban areas and the general interest of preserving environmental resources. In order to reduce the emission of harmful gases in distribution processes in urban areas, an important role could be played by the railway (which will be discussed more later), as well as the rationalization of the use of means of transport (which will also be discussed more later).

Reliability: One of the priorities of logistics is the reliability of goods delivery. The goal is to deliver the goods on time with as little breakage and breakage as possible, where road and air transport provide the best results. These two types of transport have already been apostrophized as major environmental polluters. Warehousing: The development of logistics has significantly contributed to the speed, reliability and flexibility of delivery. Therefore, the need for production systems to store large quantities of goods has disappeared. With the development of the JIT concept, many production systems almost lost the storage function, which generated, in addition to large investment and significant maintenance costs, but the stocks were partly transferred to the transport system. A good part of the stock is actually in transit, which brings more congestion and pollution, and the environment and society bear the costs. This was confirmed by empirical research in Great Britain, where a 39% decrease in the number and capacity of warehouses was found on a sample of 87 companies, while 1/3 of the companies recorded an increased volume of truck transport.

GOOD/BAD RAILWAY

The railway, according to the author of this paper, is extremely neglected in the context of both conventional and green logistics. The railway, also according to the author, according to its current characteristics, traces its roots back to the communist period, with a large number of workers, outdated machinery and vehicles, a poor organizational structure, not to mention marketing (most companies that might use railway services are not familiar with types of services it provides as well as prices). The railway has great possibilities to become extremely applicable as an instrument for the improvement of logistics, especially in the segment of reducing the emission of harmful gases and reducing the load on road traffic, both non-urban and urban.

On the territory of Serbia, there were many large industrial giants who had large storage systems and had within their complex the possibility of loading and unloading goods from railway wagons. Most of these giants failed and the warehouse systems were bought by other companies and converted into commodity distribution centers. Many of these former giants were positioned within urban areas, which makes their location ideal from the point of view of product distribution (an excellent element of city logistics), which reduces the distance of that distribution. Another good thing is precisely the passage of the railway through the area of these giants, now the goods distribution centers, which leaves the possibility of direct delivery of goods by means of railway transport. However, in practice, this possibility is rarely used.

It is important to mention here the characteristics of certain modes of transportation that are covered in educational textbooks in secondary and higher education and that are contradicted by practice. Namely, in all the literature it is stated that road freight transport is used up to a distance of about 500 km, and that railway transport is used beyond this distance. If this were realized in practice, the effects of logistics processes on the environment would certainly be smaller than they are. However, in practice we are see a different situation, ie. that transport by road means of transport literally takes place without any restrictions, i.e. on distances that exceed thousands of kilometers, while for railway transport, one gets the impression of total ignoring, as well as the impression that the railway itself does not want to change such a state of affairs.

Here comes the question of how to solve the problem of using these means of transport, i.e. how to more evenly distribute the use of funds between road and rail traffic. The structure and organization of the railway has its roots in the old SFRY, which means that management is politically appointed, marketing does not exist, no one wants to solve the problem of surplus workers, outdated equipment and staff, etc. The railway would have to become more actively involved in this economic race if it wants to survive, and its survival, according to the author, is crucial for the development of green logistics. The state, on the other hand, has to pass laws that would limit road traffic and favor rail traffic, as well as provide various incentives to economic entities that use logistics services based on rail transport.

RATIONALIZATION OF ROAD TRANSPORT SYSTEMS

If the logistics processes succeed in relying on railway means of transport for the delivery of goods to the goods distribution centers, then only the problem of distributing the goods to retail establishments or end users remains. This is where road vehicles come into play. The good side of road transport means, in addition to door-to-door delivery, is a wide variety of vehicles with different capacities, so that a certain amount of cargo can be distributed in an adequate way.

Rationalization can be reflected in several ways:

- Use of an adequate means of transport according to the amount of cargo to be transported;
- Sharing economy;
- Use of two-wheelers;

All of these three ways give positive results in the field of green logistics.

If the means of transport is used to the maximum, from the aspect of capacity, during the distribution of the product to the retail facility, then in this way we get the least negative effect on the environment, i.e. the amount of emitted carbon dioxide and other gases per unit of transported product is the smallest. However, in practice the situation is a little bit different. The distribution of products is usually done in such a way that one mean of transport is used for transport to several facilities or users (fast mail, for example), which leads to increased emission of harmful gases and traffic burden.

The problem mentioned in the previous paragraph can be solved through the application of the so-called sharing economy. This principle first came to life in passenger transportation (where Uber and Lyft are the best examples). Uber is an application that connects a transport user with a person who carries out transport in their own car. In this way, the person who owns the vehicle reduces his costs of using the vehicle and makes a profit. Working hours are flexible. This principle quickly moved to the transportation of goods of smaller capacity in larger urban areas (the best examples, Glovo and Walt). According to the author, this work principle could be extended to other areas of distribution, not only in the transportation of food and basic necessities. The place where there is an opportunity to apply this principle is certainly fast mail. The advantage of this method is the reduction of the distribution center's fleet, better utilization of the means of transport employed by the hired vehicles, reduction of maintenance costs, and overall lower negative effects on the environment.

Two-wheelers (motorcycles and bicycles) can also provide good results from the aspect of green logistics for distribution needs in urban areas when transporting smaller amounts of cargo. Bicycles do not emit exhaust gases, while all two-wheelers generally take up little space during traffic and their average speed is higher than that of passenger cars and trucks (motorized two-wheelers).

GREEN LOGISTICS IN EDUCATION SYSTEMS

Logistics and integral transport in the educational system related to high school education in the Republic of Serbia is studied through several educational profiles (motor vehicle driver, road traffic technician, logistics technician...). However, in all those literatures, little attention is paid to the importance of green logistics. It is mentioned very little, if not at all. Whenever we talk about the advantages and disadvantages of some logistics systems, we almost never talk about the impact of logistics processes on the environment (both positively and negatively).

This can also be attributed to outdated textbooks that were written at a time when this topic was not so prominent. The mention of green logistics, as well as its importance and needs in educational systems, is due to the initiative of the subject teacher who wants the given story to be put into practice and to open up horizons for future generations in the given area where students should not observe logistics and integral transport systems as a means of reducing total costs and shortening the travel time of goods, but also as a means that should ensure a better quality of life viewed through the prism of environmental protection.

According to the author, it is unequivocally necessary to include teaching units dealing with this topic in high school education systems, all with the aim of creating future personnel who would put the story of green logistics into practice through their work.

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