

The Use of Cell Phones While Driving - A Case Study in Serbia

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Abstract: Recording the data about the use of cell phones as one of the possible factors that contribute to accidents is not often conducted in practice. All the world's research indicate that the use of cell phone affects negatively the attention of the driver and his ability to safely operate the vehicle. In the literature, the most frequently mentioned is the increasing risk of a traffic accident, four times when using the phone and also that when reading or texting messages the driver takes his eyes off the road for almost 5 seconds. This means that at a speed of 50 km/h, during these 5 seconds while looking at his phone, the driver exceeds 70 m, and does not look what is happening in front of him, or around the vehicle. This paper describes the world experience in terms of analysing accidents and the use of cell phones in accidents. Also, an analysis was conducted of the legislation about the use of cell phones while participating in traffic in Republic of Serbia, as well as the domestic experience about the use of cell phone. Based on the above analysis, a research about attitudes of citizens of Serbia has been made, in order to give at least an approximate picture of the problem.

Keywords: cell phone, traffic accidents, traffic safety.

TELEMATICS GPS DATA

Nowadays we can't imagine our life without using a cell phone. All generations use a cell phone, in all kinds of situations. The discovery of cell phone has brought numerous benefits to humanity. It has provided that a person can be reached in any place, anytime. All the world's research indicate that the use of cell phone negatively affects the driver's attention and his ability to safely operate the vehicle. In the literature, the most frequently mentioned is the increasing risk of a traffic accident, four times when using the phone [10] and also that when reading or texting messages the driver takes his eyes off the road for almost 5 seconds. This means that at a speed of 50 km / h, during these 5 seconds while looking at his phone, the driver exceeds 70 m, and does not look what is happening in front of him, or around the vehicle. Even a distraction for just one second, while driving at same speed, makes the driver exceed 14 m and not look at the road.

LEGISLATION IN SERBIA

Law on Road Traffic Safety of the Republic of Serbia provides regulations which prescribe penalties referring to use of cell phones while driving. Law on Road Traffic Safety, provides punishment for using cell phones while driving. The driver commits an offense if he uses some

of the communication devices while driving, even when the vehicle is in a traffic queue or at the crossroad. The only allowed form of communication is to have some kind of special equipment that allows the phone to be used without holding it in your hand. Therefore, with the help of hands free devices.

Law on Road Traffic Safety of Republic of Serbia prescribes restrictions related to the official use of phone [9], excepting the members of those professions where for the execution of duties is necessary to use radio or telephone, and those are firefighters, members of the ambulance, police and other services. States provide different penalties relating to the use of cell phones while driving. From a complete prohibition on the use of cell phones while driving (for example in Switzerland); through a partial prohibition, allowed with the use of hands free devices, as the case in many countries, including the United States and Serbia; to the unregulated status, or permitted use of cell phones while driving.

ACCIDENTS AND CELL PHONES – WORLDWIDE EXPERIENCE

Recording of data about the use of cell phones, as one of the possible factors that contribute to the traffic accident, is not often in practice. In cases where the data is recorded, the collection of data is usually not systematic, which

makes the evaluation of danger of cell phone usage in the vehicle even more difficult.

In most countries the presence or use of a cell phone in the vehicle is not even recorded [13]. One of the main ways of collecting data related to the use of cell phones while driving, as the reports after the accident and in a variety of researchs that are conducted, is the testifying of drivers themselves. This is also one of the most unreliable ways, because you can't be sure that drivers are telling the truth. Anyway, due to the lack of systematic collection of data on the use of cell phones while driving, for now we can analyze the situation of cell phone use in several countries.

The USA

In the USA, a special system for the analysis of traffic accidents (Fatality Analysis Reporting System (FARS) which is used by the National Administration for Safety in Traffic (National Highway Traffic Safety Administration NHTSA) began to record the use of cell phones by drivers in 1991. In 1995 a second system, National Automotive Sampling System (NASS), began to record the use of cell phones as a possible influential factor to traffic accidents. At the time, Oklahoma and Minnesota were the only two states whose police reports on traffic accidents contained specific questionnaires aimed to gather this kind of data. Oklahoma had standardized parts of the report in form of questions, with the possibility to reply with a yes or no ("check-box") made for the police to identify the presence and / or the use of a cell phone.

Anyway, only the cell phones that were noticed by the investigators were recorded, which means that in situations where phones were used but not noticed, weren't recorded. Analysis of data obtained by FARS system for year 1994 shows the most common factors that contributed to road accidents, as a result of cell phone use while driving: inattention, speeding, yaw movement. In most cases, cell phone users are the drivers of the vehicle that crashed into another vehicle or object, and this crash usually happens during the call and not at the stage of dialing a number. This is in contrast to the results obtained from studies in Japan.

JAPAN

In June 1996, Japanese National Police Agency performed a study to evaluate [3,7] how big and what kind of impact the use of cell phones has on a motor vehicle accident. From 129 analyzed accidents, 76% was the collision with the rear of the vehicle, 2.3% were traffic accidents with only one vehicle, 2.3% was knocking down pedestrians, and 19% were categorized as "other". In contrast to the results obtained in the United States, the highest number of accidents was related to the phase [4,1,6] of 'phone usage "(32% to dial a number, 42% answering a call, 5.4% ending calls) compared to only 16% of drivers that were talking when the crash happened. At

42% of drivers who were answering a call at the time of the accident, the behavior was described as "looking to the side, trying to reach the phone," and "careless driving at the time when the phone rings."

FINLAND

Out of the 2200 traffic accidents that occurred on the roads of Finland from 1991 to 1998, the use of a cell phone was the risk factor in 26 accidents (0.9%). The majority of drivers [2,5], (14 of 26) were talking at the time of the accident and a cell phone was handheld type in 23 (out of 26) of cases.

ACCIDENTS AND CELL PHONES - EXPERIENCES OF THE REPUBLIC OF SERBIA

When it comes to the use of cell phones in Serbia, the situation is similar to everywhere in the world [13]. According to surveys conducted by the Republic Institute of Statistics a few years ago, the number of households owning a cell phone is increasing, as shown in diagram 8.1. In 2006, in Serbia without Kosovo and Metohija we had a little more than 70% of households with a cell phone, but that number is now over 82%.

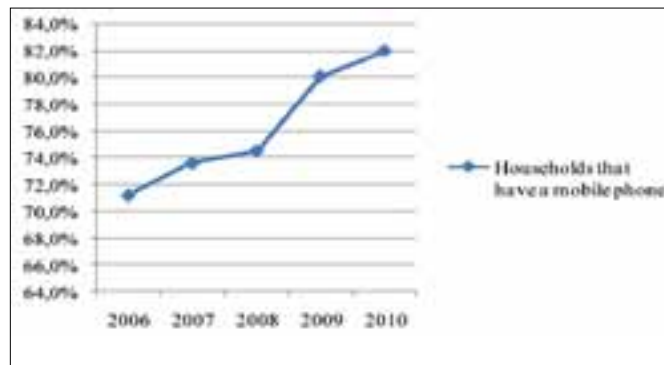


Figure 1. Representation of a cell phone in households in Serbia in the period from 2006 to 2010

Today, according to the information given by cell phone operators in Serbia, there are over 10 million cell phone [12] users. Also, it should be noted that these 10 million users compared to the 6 million inhabitants of Serbia, indicates that a number of residents actually own more than one cell phone or number, which further confirms the increasing expansion of cell phone usage in Serbia. Data on the use of cell phones in Serbia are consistent with those from abroad, the trend of growth is evident, there are more young users than the old ones, and there is little difference between men and women.

SURVEY OF ATTITUDES OF CITIZENS OF THE REPUBLIC OF SERBIA ABOUT THE USE OF CELL PHONES WHILE DRIVING

Survey

Considering that there are no official studies [8] about using a cell phone while driving in Serbia, neither research on the attitudes of drivers about it, this paper contains a survey of Serbian citizens, in order to give at least an approximate picture of the problem. Below is the more detailed description of the survey and then the analysis of the obtained data. The survey contains only a certain group of the population of Serbia. These are the drivers who own a cell phone. A total of 350 drivers were surveyed, of which 344 surveys were filled out correctly and used for further analysis. The survey was conducted in October and November of 2016, by written filling of surveys, with the note that the survey could only be filled by drivers who own a cell phone.

Questions

The survey consists of 20 closed type questions (for each question one of the offered answers is elected). The questions are divided into four groups. The first group consist of general questions (gender, age and driving experience). The second group refers to the frequency of phone use while driving and driver's attitudes about the dangers of using the phone while driving.

ANALYSIS OF THE RESEARCH RESULTS

Frequency of Cell Phone Usage While Driving

The survey covered 242 men (70,3%) and 102 women (29,7). Table 1. provides an overview of respondents by gender and age.

Table 1. Structure of surveyed drivers by gender and age

Gender/Age	17-30	31-45	46-60	61-more	Total
male	86	73	68	15	242
female	56	33	11	2	102
total	142	106	79	17	344

Table 2. Cell phone usage by the gender of respondents

Do you use a cell phone while driving?	Gender		Total
	Male	Female	
Yes	194 (80.2%)	57 (55.9%)	251 (73%)
No	48 (19.8%)	45 (44.1%)	93 (27%)
Total	242 (100%)	102 (100%)	344

It can be concluded that males, significantly more, use cell phones while driving than females and these results are consistent with global statistics, which also shows that more men than women use the phone (Table 2 and Figure 2).

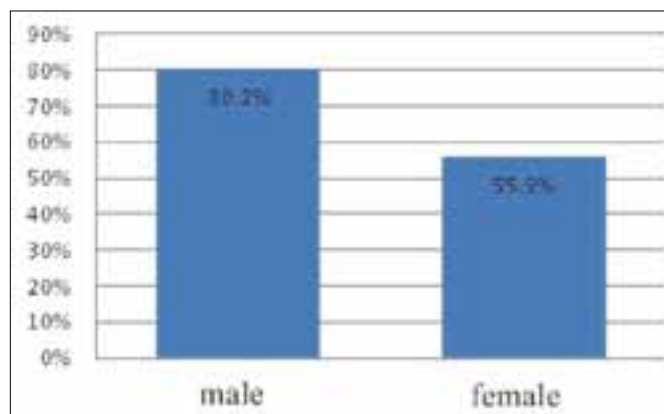


Figure 2. Percentage ratio of cell phone use by gender of respondents

More than half of respondents use the phone while driving (73%).

Table 3. Using a cell phone while driving by age of respondents

Do you use a cell phone while driving?	Age				Total
	17-30	31-45	46-60	61-more	
yes	118 (83%)	82 (77%)	47 (59%)	4 (23%)	251 (73%)
no	24 (17%)	24 (23%)	32 (41%)	13 (77%)	93 (27%)
Total (100%)	142	106	79	17	344

It can be concluded that the majority of those who use the phone while driving are among drivers between 17 to 30 years old (Table 3). Around 40% of drivers, of the total number who use a cell phone while driving are under 31 years, while the situation is completely different when it comes to people older than 61 years, 17 of those surveyed, 4 uses a cell phone while driving. However, this result may be due to a small sample of respondents older than 61 years (Image 3).

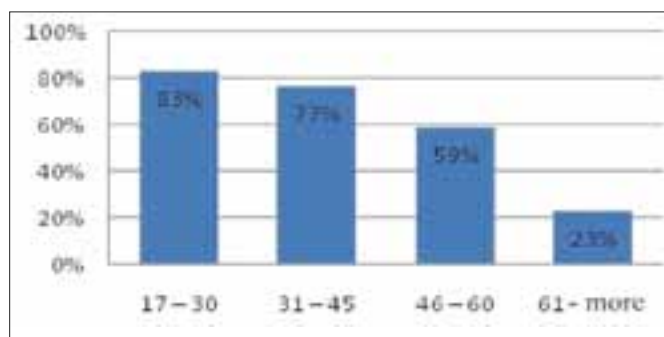


Figure 3. Percentage ratio of respondents regarding the use of cell phones while driving by age structure

Table 4. shows the answers to the question "How often do you talk on the phone while driving?", in total and by gender, as graphically shown (image 4 and 5). Every second a respondent uses a phone while driving, occasionally or often, while one in eight said that they never do that. Men make phone calls while driving more often than women - men 25.2% more often compared to

13.7% of women, and occasionally to 34.7% compared to 21.5%, respectively. 22.5% of women declared never to use the phone while driving compared to 8% of men.

Table 4. Frequency of phone conversations while driving by gender and total

How often do you talk on the phone while driving?	Gender		
	male	female	Total
often	61 (25,2%)	14 (13,7%)	75 (22%)
occasionally	84 (34,7%)	22 (21,5%)	106 (31%)
rarely	78 (32,1%)	43 (42,3%)	121 (35%)
never	19 (8%)	23 (22,5%)	42 (12%)
Total (100%)	242	102	344

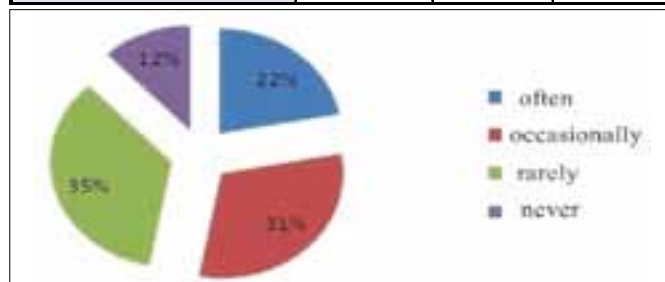


Figure 4. Frequency of using the phone to talk while driving, expressed in percentages

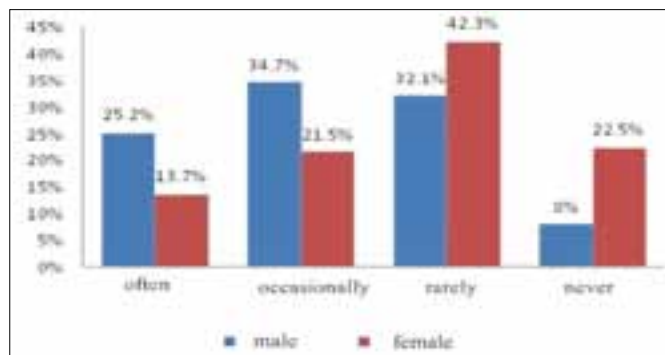


Figure 5. Frequency of phone conversation while driving by gender, percentage

When it comes to sending and reading messages while driving, there is no significant difference between genders. 49% of all respondents use the phone for messaging while driving (Table 5).

Table 5. Frequency of sending and /or reading messages while driving by gender and total

How often do you send and/or read messages while driving?	Gender		
	male	female	Total
often	15 (6,2%)	9 (8,8%)	24 (6,9%)
occasionally	37 (15,3%)	19 (18,6%)	56 (16,1%)
rarely	58 (24,5%)	31 (30,4%)	89 (26%)
never	132 (54%)	43 (42,2%)	175 (51%)
Total (100%)	242	102	344

In the population under 45, the youngest use the phone for calls and messaging equally, while older are

more likely to use the phone for calls and less for messages. Older than 45 rarely use the phone for calls, and even rarer for messages. Also from the table 6. and 7. we notice that as the age of the respondents increases, the percentage of respondents who talk or send/read messages while driving decreases.

Table 6. Frequency of using the phone to talk while driving, according to age structure

How often do you talk on the phone while driving?	Age			
	17-30	31-45	46-60	61-more
often	20 (14%)	28 (26%)	27 (34,2%)	0 (0%)
occasionally	49 (34,5%)	30 (28%)	25 (31,6%)	2 (11,8%)
rarely	63 (44,4%)	37 (35%)	13 (16,4%)	8 (47%)
never	10 (7,1%)	11 (11%)	14 (17,8%)	7 (41,2%)
Total (100%)	142	106	79	17

So usually middle aged men make calls during driving, while messages are typically sent by younger people, regardless of gender.

Table 7. Frequency of sending and / or reading messages while driving by age structure

How often do you send and/or read messages while driving?	Age			
	17-30	31-45	46-60	61-more
often	10 (7%)	9 (8,5%)	5 (6,3%)	0 (0%)
occasionally	23 (16%)	19 (18%)	14 (17,7%)	0 (0%)
rarely	36 (25%)	37 (35%)	14 (17,7%)	2 (12%)
never	73 (52%)	41 (38,5%)	46 (58,3%)	15 (88%)
Total (100%)	142	106	79	17

Attitudes on Dangerous Impact of Cell Phone While Driving

The survey shows that most drivers think that using a cell phone while driving is dangerous. Although the majority of surveyed drivers think it's dangerous to use the phone while driving, they still do it, regardless of the danger. From Table 8 it can be seen that 87% of those who use a cell phone think it is dangerous 54.4% of those who think it's dangerous to use the phone, talk on the phone while driving frequently to occasionally (Table no. 9), while the 23.3% often to periodically sends messages (Table 10). Therefore, it is necessary to influence the drivers to change their behavior in accordance with their attitudes, so that their true views are against the use of cell phones while driving, because it is possible that the attitudes that they listed in the survey are actually responses which respondents thought it was right to give.

Table 8. Using a cell phone while driving and attitudes about the dangers

Do you think that using a phone while driving is dangerous?	Do you use a cell phone while driving?	
	yes	no
yes	220 (87%)	76 (81,7%)
no	9 (3,6%)	5 (5,4%)
in some situations	19 (7,6%)	11 (11,8%)
I don't know	3 (1,8%)	1 (1,1%)
Total (100%)	251	93

Table 9. Frequency of use of cell phones for conversations while driving and attitudes about the dangers

How often do you talk on the phone while driving?	Do you think that phone use while driving is dangerous?			
	yes	no	in some situations	I don't know
often	65 (24,2%)	1 (7,1%)	7 (23,3%)	2 (50%)
occasionally	90 (30,4%)	7 (50%)	8 (26,6%)	1 (25%)
rarely	104 (35%)	4 (28,6%)	12 (40%)	1 (25%)
never	37 (10,4%)	2 (14,3%)	3 (10,1%)	0 (0%)
Total (100%)	296	14	30	4

Table 10. Frequency of use of cell phones for messages while driving and attitudes about the dangers

How often do you send and/or read messages during driving?	Do you think that phone use while driving is dangerous?			
	yes	no	in some situations	I don't know
often	21 (7,1%)	2 (14,3%)	1 (3,3%)	0 (0%)
occasionally	48 (16,2%)	3 (21,4%)	5 (16,7%)	0 (0%)
rarely	72 (24%)	7 (50%)	8 (26,7%)	2 (50%)
never	155 (52,7%)	2 (14,3%)	16 (53,3%)	2 (50%)
Total (100%)	296	14	30	4

Interestingly, among drivers from 1730 years old almost 83% (Table 11) are those who think that using a phone while driving is dangerous, and yet also in this age group are most people who often and/or occasionally talk on the phone while driving. This points to the paradox that although they think that it is dangerous they still use cell phone while driving, which makes them an especially risky group which should be influenced. On the other hand, the drivers of this age are young people/ drivers with whom we need to work in terms of education. On the other hand, as far as the respondents from 31-45 years old are concerned, almost 82% of them think that using a phone while driving is dangerous, and even 61.5%, still use the phone for messages while driving.

Table 11. Attitudes about using the phone while driving according to the driver's age structure

Do you think that using cell phone while driving is dangerous?	Age				
	17-30	31-45	46-60	61-more	Total
yes	124 (87%)	87 (82%)	68 (86%)	17 (100%)	296 (83%)
no	3 (2%)	6 (5,7%)	5 (6%)	0 (0%)	14 (4%)
in some situations	13 (10%)	11 (10,4%)	6 (8%)	0 (0%)	30 (8,7%)
I don't know	2 (1%)	2 (1,9%)	0 (2,1%)	0 (0%)	4 (4,3%)

Also, three of four drivers think that making a call with a "hands free" device is safer than without it. All

the world's research indicates that this device does not contribute significantly in reducing the negative influence of the phone, and therefore we should work on raising awareness of drivers about the negative impact of the phone, regardless of whether they used any of the auxiliary devices or not. Such cogitation of respondents can be correlated with the permitted use of "hands free" devices in Serbia.

Table 12. The frequency of accidents and incidents in the use of cell phones while driving

How many times have you participated in a traffic accident?	Have you ever been in a situation to suffer a traffic accident while using your cell phone?			
	No, never	Yes, once or twice	Yes, several times	Total
Never	136 (41,8%)	0 (0%)	0 (0%)	136
Once/Twice	172 (53%)	10 (58,8%)	0 (0%)	182
Three times or more	17 (5,2%)	7 (41,2%)	2 (100%)	26
Total (100%)	325	17	2	344

Every thirtieth driver was in a situation (once or twice) that his traffic accident occurred while using cell phone (Table 12), and almost 94.4% of respondents were not in such situation. However, this information can be questioned, given the possibility that drivers simply did not want to admit they have ever been in a situation like this. On the other hand, if this information is correct, it may indicate that drivers often use cell phone while driving, just because they have not yet experienced the incidental situation while doing it. From table 12 we can see that most of the drivers who have participated in the same number of traffic accidents with the number of incidents when using a cell phone. This can be attributed to personality characteristics, and preferences of individual drivers to aggressive driving, including the use of phones while driving.

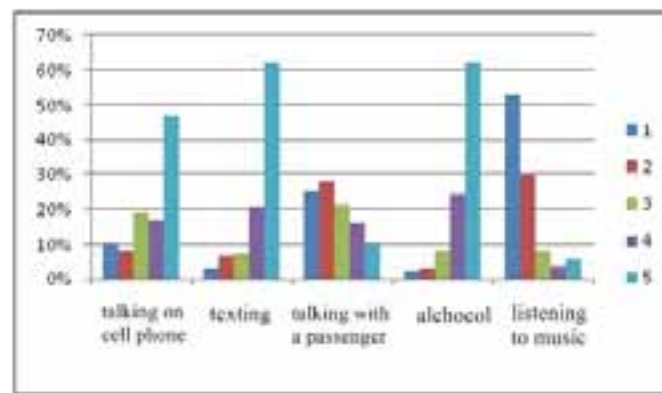


Figure 6. Estimated influence of valuated actions on driving

When the drivers evaluated the influence of individual actions on driving, they evaluated on a scale of 1 to 5, where 1 indicates that the given action has no effect,

while 5 means that it has a very strong influence (Image 6). Actions that were listed in the survey were talking on cell phone, sending/reading messages, talking with the passenger, drunk driving (0.3 mg / ml of alcohol in the blood - the legally permitted maximum) and listening to music. Reading and sending messages was rated as equally influential as alcohol, over 62% of respondents rated these actions as very influential to driving (the average score for these two actions, in the sequence provided was 4.31, and 4.4). Talking on the phone was estimated in average with 3.81, a conversation with a passenger 2.58, while listening to music occupies the last place with 1.8. Therefore, the drivers considered talking on a phone slightly less influential than the messages and alcohol, while listening to music and chatting with a passenger received the highest score 1 (no influence) compared to all the others. The graph 6 gives a picturesque view of these data. From these studies, matches with the results of global research are revealed, according to which most of the drivers considered cell phone usage while driving dangerous, on the other hand they still admit they use it. Also, drivers are under the misconception that the use of cell phone with a "hands free" device is significantly safer. Drivers evaluated using cell phone as equally dangerous as drunk driving, in our country and in the world.

CONCLUSION

Cell phone has become one of the most commonly present device in vehicles today, with more than two-thirds of the drivers who use it at least sometimes while driving. In parallel with the increase in number and more intensive use of cell phones in traffic, the concern about their potential negative effect on traffic safety is also growing with a significant number of research focused on the consequences of the use of cell phones while driving. Overall, the conclusion of all the behavior research is that the use of cell phones while driving has a negative impact on various aspects of the driver's driving performance. Reaction time at traffic signals is slower, braking reaction is also slower with shorter braking distances, drivers miss more traffic signs, have a tendency to risky behavior, which could be proven by their acceptance of shorter distances between vehicles at detours or turns, or make minor speed changes while adapting to road conditions. These negative effects on driving performances are a result of physical, visual, sound and mental distraction that arise from the use of a cell phone. Although physical distraction may be reduced or limited with a variety of technical accessories such as hands-free equipment, speed dial, voice activation, etc., mental distraction remains a major problem in the use of cell phones. This is why hands-free phones do not have significant advantages in terms of security over handheld cell phones. The intensity of negative effects of using cell phones while driving depends on the complexity of the conversation

and the complexity of the current traffic situation. The more complex the conversation, the more expressed are the negative effects on driving performance. The survey showed the following: most phone calls while driving are made by men from 17-30 years old, while the younger send messages regardless of gender; most drivers think it's dangerous to use the phone while driving, but still admit that they use it; sending and reading messages while driving are equally dangerous as driving drunk; most drivers support a ban on using the phone without auxiliary devices, with the fact that the more they use the phone while driving, drivers are less likely to support a ban. The special risk group are young drivers, who have a combination of inexperience, overestimation of their abilities and frequent use of cell phones; which makes their risk of traffic accidents when using a cell phone while driving higher than the risk for other drivers.

REFERENCES

- [1] Dragutinovic, N., Twisk, D.: Use of cell phones while driving – effects on road safety, Leidschendam, 2005.
- [2] Haigney D.E., Westerman S.J., Taylor R.G.: Concurrent mobile (cellular) phone use and driving performance: task demand characteristics and compensatory processes, Birmingham (UK), September 2000.
- [3] Paul J. Treffer, Rod Barrett: Hands-free cell phone speech while driving degrades coordination and control, Australia, 2004.
- [4] Stutts J.C., Huang H.F., Hunter W.W., The University of North Carolina, Highway Safety Research Center: Cell Phone Use While Driving in North Carolina: 2002.
- [5] Tornros J., Bolling A.: Cell phone use – effects of conversation on mental workload and driving speed in rural and urban environments, Linköping (Sweden), 2006.
- [6] Waard D., Edlinger K., Brookhuis K.: Effects of listening to music, and of using a handheld and handsfree telephone on cycling behavior, Groningen (Netherlands), 2011.
- [7] Zhou, R., Changxu, W., Patrick, R., Wei, Z.: Young driving learners' intention to use a handheld or hands-free cell phone when driving, Tsinghua Universtiy, Beijing (PR China), 2009.
- [8] Vučetić, Z.: The possibilities of implementation of cell phones in education, konferencija: tehnika i informatika u obrazovanju, 2008.
- [9] Zakon o bezbednosti saobraćaja na putevima Republike Srbije, član 182. Stav 4.
- [10] Kićanović, J.: Uticaj upotrebe mobilnih telefona u vožnji na bezbednost saobraćaja, završni rad, Beograd, 2011.
- [11] Milošević S., Percepcija, pažnja i motorna aktivnost, zavod za udžbenike i nastavna sredstva, Beograd, 2002, str.211
- [12] Miljević, M.: Metodologije naučnog rada, naučni rad, Univerzitet u Sarajevu, 2007.
- [13] Hristić, T.: Analiza uticaja upotrebe mobilnog telefona tokom vožnje na bezbednost saobraćaja sa predlogom normativnog regulisanja, diplomski rad, Beograd, 2007.
- [14] http://en.wikipedia.org/wiki/List_of_countries_by_number_of_mobile_phones_in_use, poslednji put posećen 22.11.2016. Godine.
- [15] <http://www.evocentar.net/post/5388143794/mts-brojke-2010?Ccb9de38>, poslednji put posećen 22.11.2016. godine.