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THE USE OF MOBILE PHONE IN THE CAR AS A RISING ROAD SAFETY PROBLEM

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Abstract: *Obstruction of traffic is another risk and is becoming an increasing problem in the world. Previous studies in the field of traffic safety indicate that about 25% of all traffic accidents related to driver distraction or distraction while driving. In fact, mobile phones are now extensively used in a motor vehicle, and taking into account mobile operators increasingly offer new products or services to drivers that are useful for them (using the Internet, send and receive e-mail messages, watching movies, etc. .), the total time and the risk of using mobile phones while driving is increasing. Taking into account that the use of mobile phones while driving just as much dangerous as driving under the influence of alcohol, over the past few years, the impact of mobile technology on traffic safety has become the subject of numerous studies that aim.*

Keywords: *mobile phone, traffic accident, traffic safety*

1. INTRODUCTION

A number of factors have been identified that influence road accident occurrence in road traffic, and limiting the exposure of these risk factors is crucial to reduce road traffic injuries. For example, there is now a large number of scientific studies that show that the increased risk of traffic deaths and injuries is due to speed overruns, driving alcohol, non-use of the seat belt, child seat or motorcycle helmet. Over the past several decades, program developments around the world have helped provide solid evidence-based grounds, based on which policy makers can make solutions to improve road safety in their countries.

Basically, most of these surveys focus on the risk that arises as a result of using a mobile phone while driving. What is significant is that these studies reveal that the use of a mobile phone while driving results in an unsafe driving pattern. Taking into account the foregoing, it can be concluded that the activity "mobile phone use" during driving is recognized as a factor contributing to the occurrence of a traffic accident, in which case most countries prohibited the use of mobile phones while driving. Bosnia and Herzegovina is also one of the countries that banned the use of mobile phones in traffic.

2. RESEARCH METHODOLOGY

2.1. RESEARCH SUBJECT

Driver distraction is an important factor in increasing the risk of injuries in road traffic.There are various types of driver disturbances, usually divided into those in which vehicle interference sources, such as radio, mobile phones and alike, and those out of the vehicle, watching billboards or watching people by the side, etc., This paper focuses on the use of mobile phones while driving, in response to concerns among lawmakers that this potential road safety risk is accelerating rapidly as a result of the exponential growth of use mobile phones in general.

2.2. RESEARCH GOALS

• Determine whether more often male or female drivers use mobile phones when participating in
traffic;
• Determine whether the age of the driver affects the awareness of the use of the mobile phone while driving;
• Determine how many drivers consider it dangerous to use a mobile phone while driving a vehicle;
• Determine the consequences of using a mobile phone while driving;
• Determine how often drivers of passenger cars use mobile phones or handsfree devices;
• Determine the scope of use of mobile phones in urban and rural areas of the municipality;
• Determine whether existing preventive measures for regulating the use of mobile phones when participating in traffic should be more rigorous.

This paper aims to raise awareness of driving risks associated with the use of mobile phones, as well as to present countermeasures that are being used worldwide to combat this growing problem.

2.3. RESEARCH SPACE

The survey was conducted in the municipality of Šamac. The municipality of Šamac is a northeastern municipality of Republika Srpska and a central municipality in Posavina. The municipality of Šamac is located in the following municipalities: Vukosavlje, Pelagićevo, Donji Žabar, Modriča, Domaljevac-Šamac, Gradačac, and on its north are the river Sava and the Republic of Croatia. Through the

municipality, the Sava and Bosna rivers flow, and in the area
The municipality is the mouth of Bosnia in the Sava. It is about 10 km to the main road from the Belgrade-Zagreb highway. A favorable geographical position provides the possibility of developing transit tourism. On the Sava River, a freight and transport center "Luka" was built with a port, with the hubs of land and river transport modes: road-railroad-river, road-river, railroad-river.

2.4. RESEARCH TIME

The time period of the research covered a period of 5 years, that is, it encompassed time period from 2009 to 2013.

2.5. RESEARCH METHODS

The method is a procedure that defines the set goal. There are different types of methods used in traffic safety. Each of these methods has its advantages and disadvantages. For the purposes of this paper, the method of the survey and the comparison method was used.

3. DEFINING THE DRIVER OBSTRUCTION

A driver's obstruction is generally considered to be different from the driver's negligence or poor attention. Driving occurs when some kind of attention is distracted by the driver and the driver shifts attention from the driving task (for example, a cell phone is ringing). Thus, attention is paid because the driver performs an additional task and temporarily focuses on an object, event or person that does not relate to the primary task of driving. Invalid driving involves all occurrences or events that cause the driver to pay less attention to the driving task. Some studies show that the impact on driver's driving performance that speaks to a mobile phone is similar to that influenced by conversation with passengers. However, other recent observations indicate that there is a significant difference between these two situations, with greater risk of disturbance and driving impact when using a mobile phone than those who talk to a passenger. Research has shown that the reaction time is slower among drivers talking to a mobile phone, but among those in conversation with a passenger. This seems to be the case, since passengers are aware of driving situations, unlike those with whom we talk to the phone, and can adjust the conversation during challenging driving situations, occurrences that do not appear in telephone conversations. However, this does not mean that talking with a passenger does not have the potential to interfere with the driver. Various studies have shown that the risk of colliding young drivers is significantly higher in the presence of people of the same age as in-car occupants. The driver's disturbance can be one of four types:[8]

• Visually (it arises when visible irritations in / out of the vehicle distract us from basic task - safe driving);
• cognitive (occurs when mental (cognitive) tasks are executed simultaneously, and execution of both tasks is often much more difficult than if they are separated);
• Physical (occurs when drivers have to move their hand from the steering wheel to hold the mobile phone while controlling the vehicle);
• Audible (occurs when drivers respond to a cellphone ringtone, or if the device is rings so loudly to mask other sounds, such as car horns).

[8]http://www.fvv.um.si/dv2013/zbornik/policijska_dejavnost/Obradovic_Magusic.pdf

4. THE USE OF MOBILE PHONES IN A VEHICLE AS A GROWING PROBLEM IN TRAFFIC SAFETY

Numerous research attempted to determine how many drivers use mobile phones while driving. For example, in many high-income countries (for example, in the United States, New Zealand, Australia and some European countries), 60-70% of drivers report the use of a mobile phone at least sometimes during driving. Some surveys also try to estimate and the length of mobile phone usage time while driving, because not only driving use but the length of use also affects the risk, the longer the use is the greater the risk. Most of the data is obtained from self-reported drivers, on-the-spot monitoring or police records. The following results were obtained:

Research in the world:

• In the United States, in Washington, 11% of surveyed vehicles had drivers using a mobile phone.
• Surveys by surveys in Canada revealed that 28% of Ottawa drivers use mobile phones while driving in rural areas, but this figure was significantly higher (59%) in urban areas.
• Police reports of traffic accidents in one US state show that the use of mobile phones while driving has more than doubled between 2001 and 2005, from 2.7% to 5.8%.[9]

Research in the municipality of Samac:

• The survey found the use of mobile phones of 26% in rural areas, while in the urban environment this figure was 22% higher (due to lower speeds) and amounted to 48%.

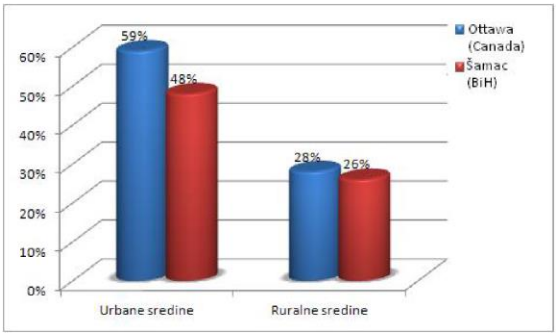

Diagram 1. The relationship between the use of mobile metaphones in urban rural areas of Samac and Ottawa

Although it is clear that there is increasing evidence of the use of mobile phones while driving, there is very little available data on the prevalence of the use of handsfree devices. Two studies providing these types of data are presented below:
Research in the world:

• In research in the Netherlands, it was found that 2% of drivers stated that they often used mobile phones, compared with 14% who reported using handsfree devices while driving.
• Observing research in the UK, London, showed that 2.8% of drivers use mobile phones, while this figure was much higher (4.8%) for handsfree devices.
The use of a handsfree device has grown more than using the latest handsets years.
• However, data from the UK show that the rate of use of mobile phones and handsfree devices outside the city is lower than in London: in 2009, 1.1% of car drivers, 2.2% of truck drivers and 1% of truck drivers are classified as users mobile phones while driving, while the corresponding figures for handsfree devices are 0.5%, 0.8% and 0.5%, which is significantly less than in London.[10]
This can be a reflection of lower speeds in the capital resulting from relative

[9] World Health Organization, Geneva 2011. Mobile phone use: a growing problem of driver distraction

[10] World Health Organization, Geneva 2011. Mobile phone use: a growing problem of driver distraction

congestion in traffic, which means where the speed is lower, the use of mobile phones in traffic is higher.

Research in the municipality of Samac:

• Data obtained by the survey indicate that the use of mobile phones in the municipality of Šamac is considerably higher than for handsfree devices, by 9%. The increased use of mobile phones from handsfree devices in Samac, unlike London, can be justified by the insufficient distribution of new technologies in our country.

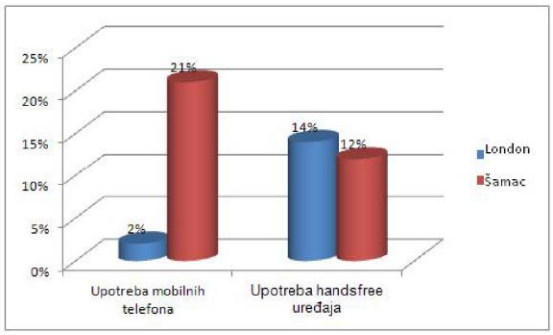

Diagram 2. Relationship between use of mobile phones and handsfree Samac and London

4.2. Estimating the level of use of text messages while driving

There is limited information about the scope of writing text messages while driving, partly because of the difficulty in observing such behavior in vehicles.

Research in the world:

• Research in the UK, London found that 45% of drivers reported reading or writing SMS messages while driving.

• Research in Australia shows that one in six drivers regularly write SMS for driving time.

• A survey in the United States showed that 27% of Americans reported writing or reading text messages while driving.

Research in the world also shows that the share of drivers who write text messages while driving seems larger among young or inexperienced drivers:

• Australian research (above) showed that 58% of drivers aged 17 to 29 regularly read or write text messages while driving.[11]

Research in the municipality of Samac:

• A survey by drivers in the municipality of Samac revealed that 49% of drivers are reported writing and reading SMS messages while driving.

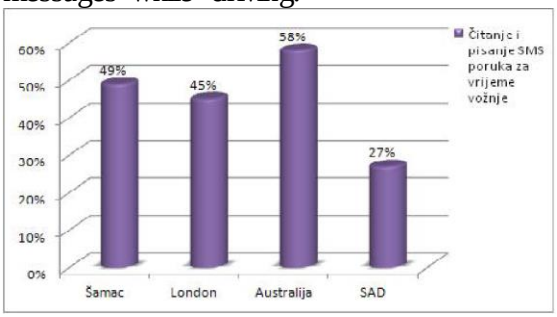

Diagram 3. The ratio of reading and writing SMS messages while driving in Samac, London, Australia, and the United States

4.3. The impact of mobile phones on driving behavior and involvement in accidents

As noted earlier, some jobs are considered essential for the safe driving, and are called "primary tasks." Other, such as the use of mobile phones, constitute "secondary tasks". Research shows that it is difficult for drivers to perform, the primary tasks necessary for the safe management of motor vehicles when they are involved in secondary tasks. The result is that their driving efficiency is reduced in many ways. Most research on how distraction leads to a worsening of driving behavior refers to to use mobile phones, although other sources of interference can also affect it

[11] World Health Organization, Geneva 2011. Mobile phone use: a growing problem of driver distraction

behavior. The impact of mobile phones on driving behavior can be expressed in two ways:
- Impact of driving behavior
- The impact of text messages on driving behavior

4.3.1. Impact of calls on driving behavior

Assessing the connection between the use of mobile phones and the risk of collision is not easy. Some of the difficulties relate to the fact that information about whether or not drivers use mobile phones at the time of a traffic accident are rarely recorded. In addition, the risk of miscibility can make accidental locking impossible (for example, if drivers drive too fast, the mobile phone can not be the cause of the collision).
However, surveys conducted to assess the risk of collision show that drivers who use mobile phones while driving have a greater risk of collision than those who do not.

The estimated increased risk varies depending on the research, and ranges between two and nine. Some criticisms were also made that examined the positive and negative aspects of all research related to this problem and are based on the estimation of how much research methodology is robust. They indicate that the use of a mobile phone increases the risk of driver collisions by a factor of four, the risk associated with the use of mobile phones while driving, and the use of a handsfree device. The effects of gender and age on collision risk are unclear, despite studies suggesting that these factors influence driving behavior.[12]

Figure 3. Traffic accidents on the highway
Source: http://www.subotica.com/vesti/dan-secanja-na-zrtve-saobracajnih-nesreca

4.3.2. The impact of text messages on driving behavior

The effects on driving behavior when sending or receiving SMS messages are potentially very important. While there is still a lack of research in this area, existing research (mostly experimental) suggests that text messages lead to an increase in cognitive requirements to write text messages, physical interference as a result of holding the phone, and visual impediments arising from writing or reading message, this has a significant impact on driving skills. For example, one experimental survey showed results among drivers who wrote text messages:
- The amount of time the drivers spent with eyes turned from the road rose to 400% at reading and writing SMS messages.
- Drivers made 28% more excursions from the road and 140% more wrong maneuvers when sending and receiving SMS messages.
Writing messages or e-mails during driving doubles the time needed for a reaction,
reveals a study conducted by the University of Texas Transportation School at 42 drivers at the age of 16 to 42 that measured the response time to the yellow light. The average time it takes to react to the flashing light at the traffic light, the driver who does not write the SMS is one to two seconds

[12] Farmer, C., Braitman, K., & Lund, A. (2010). Cell phone use while driving and attributable crash risk.

Figure 4. Writing SMS messages while driving
Source: http://www.visokoin.com

However, drivers who write messages during driving, the reaction is slowed down to three to four seconds.[13] Drivers who write messages while driving are almost 11 times more likely to not see a blinking light than those who do not use mobile phones while driving. Drivers who send messages try to make up for distracting attention by increasing their safety distance or speed reduction, which again impacts traffic safety.

5. WHAT DID THE SURVEY SHOW

According to the sex in the observed sample, there were slightly more men, ie 68% compared to 32% of female respondents. In the structure of the observed sample there were slightly more respondents of the younger age, so that from 19-25 years of life there are more than half of the respondents of the observed sample (64%). The representation of respondents from 26-45 years was 25%, while the elderly from 45 years were only 11%, and younger than 18 are not. So we can conclude that very
the low and very high age of the driver will not significantly affect the results. According to driver's experience, the dominant group of drivers has a driver experience of up to 5 years (49%). The fact that 78% of respondents declare that they use one, 17% two, and 5% do not have one mobile phone pointing to the size of this communication medium in the driver's population, so it can be safely stated that there are rare drivers that do not own at least one mobile phone.
The general information about the frequency of using a mobile phone while driving gives us the answer to the question "Do you use mobile phones while driving a vehicle?", Only 1/3 (32%) stated that they never use a mobile phone, while the other 68% It does. Depending on the mode of use, this primarily refers to the interview with the holding of a mobile phone, which is sanctioned by law as an offense, as it leads to physical and cognitive interference of the driver. Conversation with the use of handsfree devices that are generally considered to prevent interference and, therefore, in some countries such conversations are permitted, only sometimes 12% of respondents use it. The fact that 32% of the driver of the observed sample, that is, 1/3 reads and writes messages while driving, is especially worrying because reading messages leads to all three types of distractions: visual because the view is focused on message words, physical, because as a rule the mobile phone also includes keeps in hand and cognitive, because the content of the message is being contemplated. The most difficult form of combined visual, physical and cognitive distraction is when writing messages while driving. Encouraging data on the number of drivers using mobile phones for landscape photography or video recording, only 5% of drivers photograph or record video material while driving, while 95% do not. Photographing and recording video materials undoubtedly represent the most risky forms of behavior, as they completely exclude the possibility of driving a vehicle. In the end, it is significant that GPS navigation is not used

[13] http://www. psihologija/zbog-sms-anja-tijekom-voznje-vozac-sporo-uocava-opasnosti-237754

by 83% of drivers of our sample, while the other 17% use occasionally, while no driver uses it frequently. To the question "Do you use mobile phones more in urban or rural areas?" 44% of respondents said they use more in urban and 24% in rural areas, while 32% do not use it at all while driving. 26% of respondents (mostly female) said they were worried that they could be victims of a traffic accident due to the negligence of other drivers in driving when talking, 58% are not worried while 16% are not worried because they consider that there is no risk of collision due to telephone calls driving. In spite of the fact that 74% of respondents are not concerned that they might be victims of a traffic accident or consider that there is no risk of collision due to telephone calls while driving, as many as 98% believe that the use of mobile phones while driving is dangerous and only 2% is not. By adding the answer, we received exposure to risk, drivers (respondents) due to a particular visual, physical and cognitive distraction. This exposure of the driver to risk is presented in diagram 32.

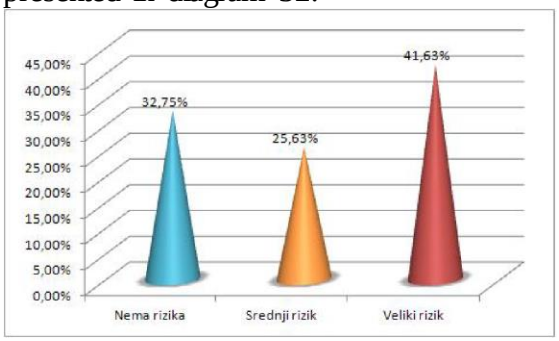

Diagram 4. Exposure to risk due to expressive visual, physical and cognitive distractions

In this way we have obtained a diagram showing that 32.75% of respondents do not have risk because it does not exhibit any kind of interference during driving due to the use of a mobile phone. The average risk is 25.63%, most often because it occasionally uses a mobile phone for data exchange or calls while driving. In the high risk category, individuals are often classified as two or more of these risky actions. According to our data, such individuals are 41.63%.

CONCLUDING CONSIDERATIONS AND PROPOSED MEASURES

Driving obstruction is a serious and growing problem of traffic safety. More and more people have mobile phones, and the rapid introduction of new in-car communication systems will make this problem even greater in the coming years at a global level because technology is rapidly evolving. Evidence clearly indicates that driver interference is an important issue of road safety. At the same time, the quality and quantity of existing evidence is insufficient to believe how much disturbance affects driving, and among the many disruptions that pose the greatest danger, and under what conditions. Although the problem of driving interference can have many causes, internal or external in relation to the vehicle, this thesis was focused on the risk associated with the use of mobile phones while driving. This is briefly what is known about interventions, and tries to draw attention to some preliminary recommendations. Using mobile phones in a vehicle requires more interaction from other sources of interference, such as drinking coffee or eating sandwiches. When using the phone by the driver, the driver is more guided by the technology itself, when the phone rings the driver will automatically react, regardless of the traffic or driving conditions at that moment. The use of mobile phones while driving has shown that it has a number of adverse effects on driving behavior. This is because drivers are not only physically hampered by the simultaneous holding of the phone and driving, but also cognitively disturbed, share their attention between conversations that include driving related tasks. Also at the time of writing this thesis, no convincing evidence was found that the use

of a handsfree device is more secure than the use of mobile phones in hand, due to the cognitive impairment that is present in both types of device. Research shows that using mobile phones, whether manual or handsfree while driving leads to increased collision rates compared to when drivers do not use a mobile phone. What is clear is that the relative impact on the ability to drive during interference may vary depending on the type of phone, age, gender or driving mode, the use of a mobile phone while driving absolutely increases the likelihood of collision for all drivers.

A significant number of research suggests that writing text messages also leads to significant physical and psychological disturbances, and driving performance is reduced. Young drivers use mobile phones more often while driving and appear to be at a special risk of the effects of interference resulting from this use. Text messages appear to have a particularly damaging impact on driving behavior, and this is a problem that is likely to increase in frequency, as this is usually a cheaper form of communication than a phone conversation. There are a number of challenges to successfully addressing the use of mobile phones while driving. First, more efforts need to be made to improve the systematic collection of data on the use of mobile phones in traffic accidents in order to assess the scale of problems in individual countries and to understand more about the distribution of problems, for example, which groups of drivers are most affected, in in which geographical areas, in what period of time. These data will enable the prevention measures to be effectively carried out. In addition, although available evidence suggests that the use of mobile phones negatively affects a range of performance driving, more research is needed to better understand the impacts of different forms of mobile phone use, for example, talking, sending or receiving text messages, driving behavior, and real-life accident risks. Also, the overall contribution of interference to the use of mobile phones on the occurrence of road traffic crashes in relative to other risk factors.

Numerous countries have taken measures to pass laws on the use of mobile phones in traffic, as well as a wide range of laws. Regardless of whether you need to introduce laws that prohibit the use (and how to use) of mobile phones, and who needs to apply them, the effectiveness of these laws will in part also depend on the ability to execute it continuously. However, the data that exist indicates that it is very difficult to detect and maintain law enforcement regarding mobile phones, partly because of the difficulty in detecting this behavior. Awareness raising campaigns of the broadest public in the fight against the use of mobile phones are also very important, in order to increase the public's understanding of the hazards of driving in the event of interference and to encourage safe driving. Although the focus of this work is primarily on the interference caused by the use of a mobile phone, the technology systems inside the vehicle can also be used to protect against interference. There are several new technologies that can reduce injuries in road traffic caused by driver interference. For example, warning functions that alert the driver to sudden out-of-band traffic exits, or the technologies used by sensors in the vehicle, to estimate the scope of the driver's work and redirect mobile phone calls. However, having a mobile phone in the vehicle also has good sides as it creates security that if needed, it can be called for help. However, the driver should not use them while driving, but, if already, must stop by the carriageway and perform an interview.

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INNOVATIVE TECHNOLOGIES IN FUNCTION OF IMPROVEMENT OF ROAD SAFETY

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***Abstract**: The purpose of this paper is to show the importance of new innovative technologies and new technological systems of active safety of vehicles, in contribution to improving road safety and sustainable mobility. Data at indicators point to an increase in mortality and deterioration of road safety. Current measures applied have not contributed to the expected improvement and reducing the number of deaths in traffic accidents. After making inquiries, among 50 potential measures of application of innovative technologies, the most effective measures can contribute to a significant reduction in the number of road accidents and the number of those killed in these accidents. Given the expected effect, reducing the mortality individual use from 7 % to 30 %, the best prospects for the application of intelligent systems have to adapt speed, automated emergency braking, warning in case of leaving the lane, Alcoholic switch and a reminder to use the safety belt. The results of application indicate the potential for improving road safety and sustainable mobility. Implementation of new technological systems of active safety of vehicles requires the adoption of legislation and establishing minimum common standards of installation in all Member States.*

***Keywords:** innovative technological systems, traffic accidents, measures to improve.*