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INFLUENCE OF NOISE WHOSE SOURCE ARE VEHICLES ON CITIZENS OF KRAGUJEVAC AND THEIR QUALITY OF LIFE

Abstract: After emission, noise is biggest factor that affects people and its source is vehicle. Source of noise on vehicle can be many, from internal combustion motor to movement of vehicle itself. Noise has major impact on quality of life in big cities like Kragujevac. Often it is necessary to rate noise and how it affects population and quality of life. Best results are obtained interviewing population. Based on a survey from engineer aspect it is needed a solution for reducing noise, improvement for the ecosystem and population. In this paper it is explained how noise affects quality of life and results of interviewing citizens of Kragujevac and proposed some of engineer solutions, based on results of interview, how noise can be reduced.

Keywords: Noise, vehicle, population, quality, life..

1. INTRODUCTION

If we look at negative effect on population and on ecosystem, world is in big crisis. Main source of negative effect are industry's and its products. One of products are vehicles.

Traffic has big influence on Earth ecosystem and quality of ecosystem, how people are part of ecosystem it has influence on us too. Traffic is source of many harmful effects like emission, vibration, use of fossil fuels etc. Biggest influence are in urban areas like cities, where number of cars is increasing every day.

In this paper is represented analysis of how big influence have noise on population, started from how noise of vehicles is created and its effect on population and quality of life. For analysis need a survey was conducted with residents of Kragujevac which is one of the biggest urban areas of Serbia. In survey were questions that will help to determine how big influence have noise on everyday life and how much residents are aware that their cars make noise.

2. NOISE IN URBAN AREAS

With development of production, need for mobility and transportation different goods caused need for bigger number of vehicles which is in connection with noise. According to Law protection of noise into the environment in Serbia, noise is defined like harmful and unwanted sound.

According to the research that took place in countries that industry is developed, noise is on third place on polluting the environment, just behind water and air.

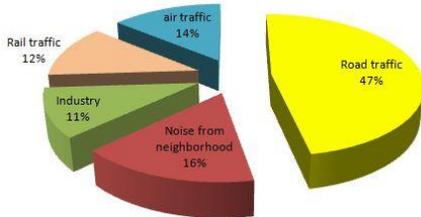
Noise is most prominent in areas where is big rise of population and vehicles. In urban areas each year level of noise is increasing, as example we have that noise is increased, after 1945, for dB, while in a period of '70 and '80 level further increased. Noise in environment or municipal noise how many are calling, is defined like noise that is created by sources that are in human environment, including noise from industry. Municipal noise was always very important problem that men needed to face with and control it. In developed countries, population recognize noise as a problem that burdening the population.

In 70's and 80's noise was recognized as a problem and it got attention, in cities like Belgrade noise was 80 dB or higher. Today, noise is still a problem that many engineers try to eliminate. Most polluted hubs in cities are intersections.

3. ROAD TRAFFIC AS SOURCE OF NOISE IN URBAN AREAS

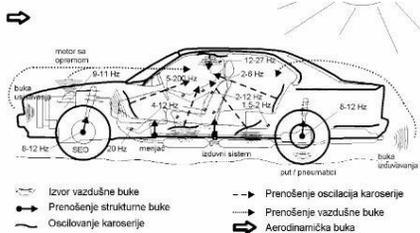
In urban areas, one of the major pollutants of the environment is noise from the vehicles. That's because of specific construction of vehicles and big number of vehicles on our roads. On histogram 1. are showed results of research that was done in one town in Germany, topic was which noise is mostly

complain. Noise from traffic is on first place.



Histogram 1. Display influence of traffic noise on overall noise according to research in Germany [4]

Noise is one of the most widespread sources of noise in all countries and primary cause that disturbs human activities. On figure 1. is displayed vehicle with all systems that can be source of noise on vehicles. So there is noise from exhaust system, aerodynamic noise that is product of friction surface of vehicle and air, noise because of friction between tires and road, noise from engine etc. Research show that vehicles are dominant source of noise in normal exploitation conditions were speed of vehicles are between 30 km/h and 40 km/h. At these speeds main source of noise is friction between tires and road.

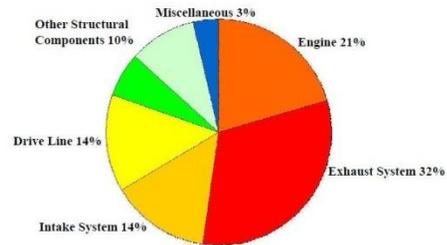


Picture 1. Display source of noise on vehicles, [3]

However, it is important to notice the fact that vehicles in urban areas have lower speeds so the dominant source of noise are engine and noise that comes from exhaust system.

It was already told that in urban areas we have bigger population that means a larger number of vehicles on roads.

According to research and according to experts that number is increasing and it is displayed on diagram 1.



Histogram 2. Display of noise from components of the vehicles [4]

Constructor of vehicles are aware of this negative effects of noise which source are vehicles and because of that each year we have new norms by which regulates amount of noise that vehicles can produce. Because of that, vehicles today makes lower level of noise that vehicles constructed in 1960's even for 12 times lower. It is important to further develop this systems on vehicle because every day number of vehicles on roads are lager and that increase negative effect on quality of life in urban areas.

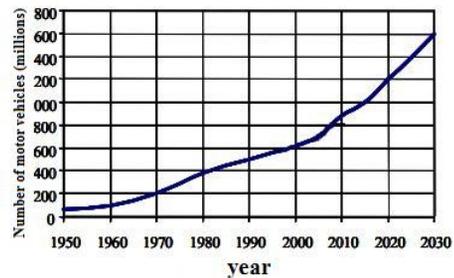


Diagram 2. The tendency of increase in the number of vehicles

4. INFLUENCE OF NOISE ON QUALITY OF LIFE AND ECOSYSTEM

Influence of noise on humans are numerous but till today influence isn't examine and all medical research are very important to determine how big influence have noise on disease like hypertension, neurosis, endocrine diseases and impairment of hearing.

In big cities noise have big influence especially on older population so 40% of population feels ailments that come from noise.

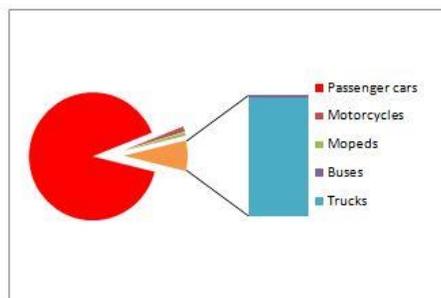
Noise also have influence on psychological state on man, on which way and how much

depends of level of noise, sound spectrum, time of exposure etc. Larger level of noise is cause if lower hearing ability, premature fatigue, also in big cities noise have negative influence on vacation, comfort, regeneration etc. If level of noise is larger than normal values it cause overload of nervous system of man, man have more brain activities and it is reflected on capability of man to take information. Noise is one of the biggest environmental problems in urban areas of our country, Europe and the whole world. European Union regulates for 20 years level of noise with standards in order to reduce noise pollution. Noise is treacherous enemy of hearing, because it destroys hearing slow and insensibly. This process is slow but with progressive advancement. Hearing have big influence on man's organs, how physical and mental state of man. This connect him with nature and allowing communication with other peoples. Also hearing is most sensitive and most important mechanism that alert us on danger, because it collects impressions whether we are awake or we are sleeping. Hearing never shut down. Noise have influence on human health on numerous ways, causing anxiety, lack of dream, interference with communication, lack of work capability, consequences in social behavior and hearing loss. Excessive noise lowers quality of life, in extreme cases can destroy it totally.

5. CITY KRAGUJEVAC AS ONE OF LARGEST URBAN AREAS IN SERBIA

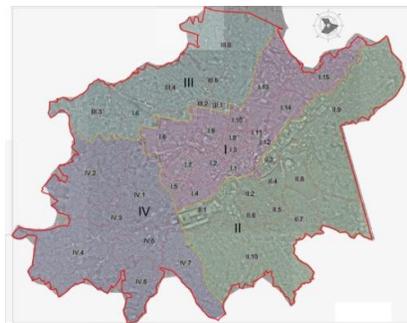
City of Kragujevac is economic, cultural, education, health and political center of Sumadija, Pomoravlje and neighboring regions. It is placed in heart of Sumadija and Serbia, south of capital city Belgrade for 140 km with highway E10. It spreads on 835 squarekilometers. It was built on banks of Lepenica in Kragujevac basin and touches branches of Sumadija Mountains: Rudnik, Crni Vrh and Gledic mountain. Factor that decided this place was watercourses. Through the narrow city area is river Lepenica and its tributary. Valleys of mentioned watercourses and gentleledger between them, in past Kragujevac linked Gruza, Lepenica and Rudnik with Pomoravljem, where are roads of international interest. Territory of Kragujevac is divided on four big areas that are further

divided on twenty-seven urban zones. Population of Kragujevac is 178263 citizens. According to Agency for Traffic Safety in Kragujevac are registered 47448 vehicles, histogram 3. shows number of registered vehicles by category.



Histogram 3. Display of divisions of vehicles by category, [4]

How is already mentioned city of Kragujevac is divided on four big areas and that are Stari grad, Aerodrom, Pivara and Stanovo. On figure 1. is shown territory of city with marked areas.



Picture 1. Display of territory city of Kragujevac, [5]

6. METODOLOGY OF RESEARCH

Research of noise influence on quality of life in urban area (in our case city of Kragujevac) can be done in many ways.

In this paper research of influence of noise on quality of life was done by interviewing a certain number of citizens, to be accurate 100 citizens. Every citizen who was interviewed answered on 10 questions that was mainly related to living place, influence of noise on life quality in Kragujevac, awareness of citizens

about influence of noise on life quality and awareness about level of noise that comes from their personal vehicles.

Questions in a survey are divided in several groups by the way how examinee answer on questions. Answers on one group of questions is just yes or no, second group are questions on which examinee have three answers and can pick one, on third group of questions examinee evaluate influence of noise of scale from 1 to 10 and fourth group are questions where examinee can answer freely.

Advantage of these type of questions is possibility to determine how noise influence on life quality in city and its effect on everyday activities, by subjective ratings. However, we can also see awareness about noise in urban areas and level on noise that produce personal vehicles. Lack of this type of testing's are lack of data about accurate level of noise in critical parts of city, because we get data based on subjective feelings.

7. RESULT OF RESEARCH

Results of research which are gained by interviewing of citizens are given in percent compared to total number of respondents. First question of a survey that we can analyze and which is very important is in what extant noise effect in everyday activities. Respondents had three possible answers on this questions, noise effects on activities, noise don't affects to a large degree and not affect at all. 57% of examinee answered that noise don't affects to a large degree on everyday activities while 12% answered that noise affects their activities. Diagram 2. shows number of answers on this questions in percentage.

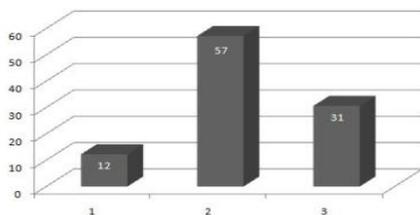


Diagram 2 .Display of answers on question related to effect of noise in everyday activites in percentage

Next question was like previous question with possible answers and question was related

what they think in which extent city of Kragujevac is affected by noise whose source are vehicles. On this question 77% of respondents think that Kragujevac isn't the city that is too polluted by noise from vehicles. The share of respondents on this question is given on diagram 3. in percentage.

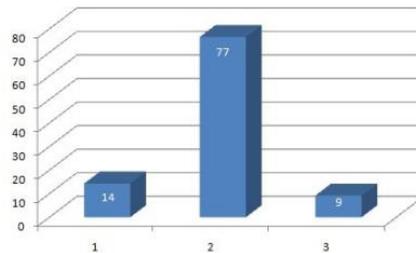


Diagram 3. The share of respondents on question about pollution of Kragujevac in percentage

Next group of questions was questions on which answers could be yes or no, and first question was whether respondents think that vehicles have largest negative effect on environment. 63% of respondents answered that cars don't have largest negative effect on the environment. Answers on this questions are displayed on diagram 4. in percentage.

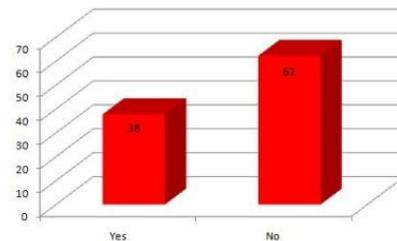


Diagram 4. Display of answers of respondents on question related to negativ effect of vehicles in percentage

Next question on which respondents answered was do they think that vehicles are the main source of noise. On this question 52% of respondents answered yes, vehicles are the main polluter by noise. In diagram 5. is given in percentage, answers of the respondents.

Next question in related to question concerning in which extent is Kragujevac polluted by noise. Results shows that citizens think that Kragujevac isn't polluted by noise in large extent that should be for city like this.

53% of respondents thinks that Kragujevac is polluted by the noise more than it should be which is shown on diagram 6.

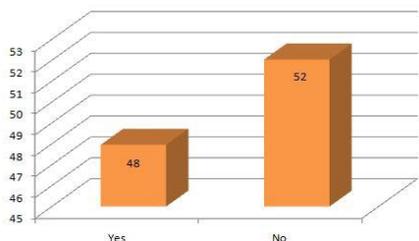


Diagram 5. Answers of respondents on question related to biggest polluter by noise in perecentage

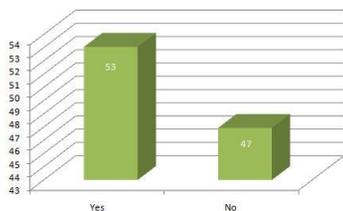


Diagram 6. Display of results of research how citizens of Kragujevac think of pollution of their city in perecentage

Next question is related to area where respondents live, do they think that the environment in their neighborhood is polluted. 67% of respondents thinks that the environment in their neighborhood isn't polluted with noise whose source are vehicles in bigger level than it is allowed. Results of this questions are given on diagram 7. in percentage.

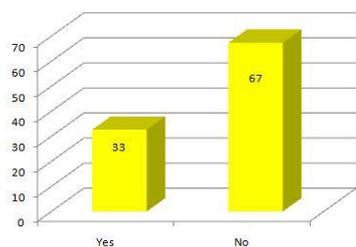


Diagram 7. Display of answers of respondents on question about noise in their neighborhood in precentage

Next question is related to awareness of respondents that their personal vehicles make larger noise than allowed. On this question 84%

of respondents answered that their car doesn't make larger noise than allowed. On diagram 8. is displayed percentage of answers.

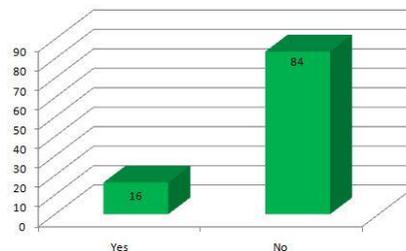


Diagram 8. Display of answers on question about noise level of personal vehicles in perecentage

Next question is in group of question where answer can be given on a scale from 1 to 10 and is related to awareness of citizens of Kragujevac about noise pollution which source are vehicles. With statistical progress of answers average rating given by respondents is 6.2. Based on this answers and all other answers given by respondents and questions related to place of living, zones of the city we came to conclusion that the biggest rating about pollution with noise which source are vehicles were given by respondents that live in central zone of the city.

In addition to the questions beside vehicles that is the biggest polluter by noise, respondents answered that factories, workshops or some smaller facilities for producing that are nearby are the second polluter by noise. That type of answers are generally given by citizens that live in Pivara. Also what is important that respondents often answered that the neighborhood is source of noise.

8. CONCLUSION

One of the biggest problems in urban areas is traffic or concrete vehicles as a part of traffic. Reason for that are many negative ecology effects but one of the biggest effects have influence on citizens and their life quality is noise which source are vehicles. Increasing the population increase the number of vehicles and therefore increase the noise from vehicles.

Problem is bigger if it is known that it have negative impact on citizen because it is possible that noise effects on life quality and health of population.

In the purpose of the research, a survey was done with help of citizens of Kragujevac like one of the biggest urban areas in Serbia. Based on results of interviews and answers of the respondents it can be concluded that city of

Kragujevac isn't polluted by noise in larger scale relative to other urban areas in Serbia. Also can be concluded that most polluted zone of Kragujevac is central zone of the city. Based on respondents answers also can be concluded that there are other pollutants in Kragujevac beside of vehicles.

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