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TECHNO SCIENCE
Međunarodni naučni časopis iz oblasti tehničkih nauka

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Sadržaj (nastavak)**:**

Dear reader,

Driven by the need for the area of scinetific research in the field of technical sciences to receive a publication in which the reference method to publish scientific papers will contribute to understanding, monitoring and development of Technical Sciences, we have launched the first international scientific journal **Techno Science**.

The Magazine was conceived as a publication intended to recognize technical sciences in international environment as a unique area in which joint action, cooperation and exchange through professional and scientific researh work is possible. In the perception of the *Techno Science* publication, the field of technical sciences is not limited to specific areas and branches, but is open for all contents which are in the function of technical sciences, with the aim of achieving the highest academic standards and monitoring flows of modern technology and the needs of society at the global, international level.

The magazine was published by **NIA „The Association for Research, Education and Development"**, which aims to improve the current situation and will offer a new concept through publications of scientific - research results in the field of technical studies. *NIA* will place *Techno Science* in the center of all events and will offer networking, partnership and acquiring all requirements for entry and indexing in international reference scinetific bases as main strategic goal and task of the publication.

Techno Science is the result of team work of managerial, editorial and editorial staff board, which have, through mutual ideas, made a mutual vision in which quality is a condition for action and excellence as a prestige need to be achieved.

We would like to wish a warm welcome to all of you who are interested to achieve the vision of quality for excellence! We want to create new values that will build the future!

The first issue is dedicated to the International Symposium "GeTID&teh" which is organized and held for the fourth time by the Faculty of Technical Studies, University of Travnik. Selected authors and their work were given the honor and privilege to be part of the content that has a historical value. *NIA* Association is in partnership with the Faculty of Technical Studies and considering the international character and diversity of the scientific fields and branches of technical areas that were represented at the 4th International Symposium "GeTID&teh" the selected concept has fully satisfied the requirements for quality and content of the first issue of the publication *Techno Science*. We truly hope that you will share our opinion and that our positive energy is going to be a good motive and the initiator of your ideas to us.

The magazin will be published two times per year. On the last pages of this publication you can find the instructions for authors. These, as well as additional important information, can also be found on the web site www.technoscience.ba.

We want you to feel free to contact us with all your proposals, suggestions and comments in order for the quality and progress of the publication.

We are looking forward to our future cooperation and we would like to welcome you!

Amra Tuzović, Ph. D.
Editor in chief of Techno Science

Dragi čitatelju,

Vođeni potrebom da naučno–stručni i istraživački prostor tehničkih nauka dobije publikaciju u kojoj će se na referentan način objavljivati naučni i stručni radovi koji će doprinijeti razumijevanju, praćenju i razvoju tehničkih nauka, pokrenut je prvi međunarodni naučno–stručni časopis **Techno Science.**

Časopis je zamišljen kao publikacija čija je namjera da se tehničke nauke u međunarodnom okruženju prepoznaju kao jedinstvena oblast u kojoj je moguće zajedničko djelovanje, saradnja i razmjena preko istraživačkih radova stručnog i naučnog karaktera. U percepciji publikacije *Techno Science* oblast tehničkih nauka nije ograničena na posebne oblasti i grane već je otvorena za sve sadržaje koji su u funkciji tehničkih nauka sa ciljem postizanja najviših akademskih standarda i praćenja tokova savremene tehnologije i potreba društva na globalnom, međunarodnom nivou.

Časopis izdaje ***NIA* - Udruženje za istraživanje, edukaciju i razvoj** koje želi kroz publikovanje rezultata naučno-istraživačkog i stručnog rada iz oblasti tehničkih nauka unaprijediti trenutno stanje i ponuditi novi oblik koji će svoju primjenu naći u praksi. *NIA* će kroz svoje koncepte djelovanja publikaciju *Techno Science* staviti u centar svih dešavanja i ponuditi umrežavanje, partnerstvo i stjecanje uslova za ulazak i indexaciju u međunarodnim referentnim naučnim bazama što je osnovni strateški cilj i zadatak publikacije.

Techno Science je rezultat timskog rada menadžerskog, uredničkog i redakcijskog odbora koji su kroz zajedničke ideje napravili putokaz zajedničke vizije u kojoj je kvalitet uslov za djelovanje, a izvrsnost prestiž koji se želi dostići.

Svi koji vide sebe na putu u ostvarenju vizije *Kvalitet ZA Izvrsnost* dobro su došli u *NIA o*kruženje i publikaciju *Techno Science*! Želimo stvarati nove vrijednosti koje će graditi budućnost!

Prvi broj časopisa je posvećen Međunarodnom simpoziju „GeTID &teh“ koji se u organizaciji Fakulteta za tehničke studije Univerziteta u Travniku održao po četvrti put (23.–25.10.2015.), a odabrani radovi su dobili čast i privilegiju da budu dio sadržaja koji ima historijsku vrijednost. Udruženje *NIA* je u partnerskom odnosu sa Fakultetom za tehničke studije Univerziteta u Travniku, a s obzirom na međunarodni karakter i raznovrsnost u naučnim poljima i granama tehničkih oblasti koje su bile zastupljene na 4. međunarodnom simpoziju „GeTID &teh“, odabrani koncept je u potpunosti zadovoljio zahtjeve za kvalitet i sadržajnost prvog broja publikacije *Techno Science*. Nadamo se da ćete i vi dijeliti naše mišljenje i da će naša pozitivna energija biti dobar motiv i pokretač Vaših ideja prema nama.

Časopis će izlaziti dva puta godišnje. Na zadnjim stranicama ove publikacije nalaze se uputstva za autore koja će biti dostupna i na web stranici www.technoscience.ba kao i ostale značajne informacije.

Želimo da imate otvoren pristup prema nama, sa svim svojim prijedlozima, primjedbama i sugestijama koje ćemo staviti u funkciju kvaliteta i napretka publikacije.

Radujemo se zajedničkom putu na kojem vam želimo dobrodošlicu!

Glavna urednica časopisa Techno Science

doc. dr. sc. Amra Tuzović

ELECTRIC FIELD OF THE EARTH ONE OF THE FACTORS OF THE MICROCLIMATE

Professional paper

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Abstract

Living beings on Earth are simultaneously in the „ocean" of fields, the macro-level point of view. Sources fields are known. Source of gravitational field is mass. Source of electrical field is charge that is carryng paricles, for example electrons or protons. An imbalance of these two charges on a body acts as source of electric field. The same charge in - movement- acts as a source of magnetic field.Quality as a source fields, in a free interpretation, field of love, is in all living beings: soul, spirit, Ruh, etc.

Interaction of field is required cognition.

This work aims to review the static electric field of the Earth.

Complexity of issues requires experimental research and cognition. This work will examine the impact of the electric field on the microclimate of living space.

Keywords: *mass, charge,electrical field, spirit*

Introduction

Since ancient times, man observes phenomena around him and trying to explain them. On the basis of the centuries-old observation, human knowledge of nature was constantly enriching and expanding. Thus was born one of the oldest science of nature: PHYSICS.

Man was always interested in natural phenomena, especially those of which depended. He watched them and then tried to explain them. Produced knowledge developed the science of nature.

The world we live in, the entire nature, is made of matter. Matter exists in the form of a substance, and in the form of physical fields.

$$E(r) = \frac{F(r)}{q} = \frac{1}{4\pi\varepsilon_0}\cdot\frac{Q}{r^2} \qquad [E] = 1\,\frac{\text{Newton}}{\text{Coulomb}}$$

All material bodies are made of a substance. The substance is composed of atoms and molecules.

Items operate remotely via physical fields. The physical field is a form of matter existence and interaction carrier.

Gravity is the attraction between bodies, as a result of their mass. It is one of the four basic forces acting in nature and is the force of attraction between all the bodies. Overall, the whole structure of the universe is based on the force of gravity.

Living beings on Earth are simultaneously in the „ocean" of fields, the macro-level point of view. Sources fields are known. Source of gravitational field is mass. Source of electrical field is charge that is carryng paricles, for example electrons or protons. An imbalance of these two charges on a body acts as source of electric field. The same charge in - movement- acts as a source of magnetic field.

Quality as a source fields, in a free interpretation, field of love, is in all living beings: soul, spirit, Ruh, etc.Interaction of field is required cognition.

1. Electrical field

Body of man, as well as other living biengs on Earth, mainly used their capacity of adaptation and more difficult to adapt to rapid changes in the environment. Is particularly intense influence on the physiological integrity of the genetic structure of a living organism.

Studies of many authors shows that the causes of the occurrence and wide prevalence os diseases like cardiovascular patology, malignant neoplasms, diseases of nervous systemm traumas, genetic anomalies, etc. Very often connected to disruption of natural environment and natural balance, especially unexplored communication between the fields and living systems.

Electrical field above Earth ground. The electric field is a physical field in which impact of the charged body can experiance. The body is electrified if the

balance of two kinds of electrical charge, charge on electron and charge on proton is disrupted. Source

$$E = \frac{F}{q}$$

of field is charge as a overage or deficit of electrons

This imbalance is achived with external energy influence; friction, for example ...

Effect from source field is transmitted radially, decreases with the square of the distance.

The field strength is taken as the value of action at the unit value of the body charge in an electric field (**V/m**.)

Earth as a celestial body acts as **negativly** charged body

Total charge is **500.000 C**

$$\mathbf{Q = -5\ 10^5\ C}$$

The intensity of the Earth field is changing, during the day, especially with the changes of atmospheric conditions.

In not distrubed relations values of the electric field has a value typically 50 V / m to 150 V / m in the open, stationary atmospheric electrical field. With this valuses of electrical field, life is normaly – adjusted progressing. Truly, artificially separated electricity to achieve the flow of electricity, electric power in environment changing the value of a static electric field.

Figure 1 a) - Even when device is not pluged, electrical field is present
Figure 1 b) - When device is turned on electric field is presend around conductor as well

2. Mesaurement of stationary electric fields

Measuring the intensity of static electric field is achived directly with device changing the disposition of electricity, whenn body is in electrical field, image....

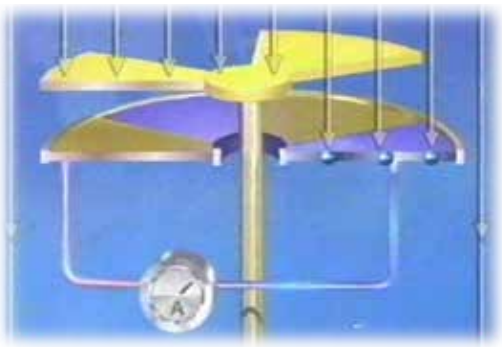

Figure 2 - Measuring the intensity of static electric field, the principle

The intensity of the electric field of the Earth is dependent on the weather meteorological.
On sunny day there is a field of 150 V/m.

Figure 3 - Intensity of static electrical field, measured on sunny

On cloudy daj field is 200 V/m.

Figure 4 – Intensity of static electrical field when is cloudy

Nearby charged sphere field depend of sheper's charging and distance

Figure 5 – Intensity of static electrical field of charged shpere

TV screen shows electrifying board. Values are to 1000 V/m.

Figure 6 - Intensity of static electrical field in front of TV is significantly higher then in the open

3. Strenght of electrical field on household

According to the Federal Office for Radiation Protection, Germany, in 1999. caracteristical values of electrical field strenght of household devices on 30cm distance from device are:

Electrical devise	Electrical field strenght [V/m]
Stereo	180
Flatiron	120
Refrigerator	120
Mixer	100
Toaster	80
Hairdryer	80
Color TV	60
Coffee maker	60
Vacuum cleaner	50
Electric stove	8
Light bulb	5

In general, any type of radiation energy is spreading into the surrounding space. More precisely energy exchange with its surrounding is happening.

People are exposed to this fields every day. Any artificially created electromagnetic radiation from a variety of electronic devices and electricity distribution lines is by its nature generally harmful to human health.

This harm is mainly result of „unfortunate“ frequency selection that disrupt functioning human being as fine harmonized bio-electrical suptile body.

The exceptions are electronic devices that can generate electromagnetic radiation which has a beneficial effect on human health.

Research conducted in Austria, on cows, freely interpreted shows that cows in a wooden barn were more productive then cows with the same genetic origin that were in the same microclimate conditions, in the barn with reinforced concrete.

Figure 7 - Electrical field inside space enclosed with conductive material is zero (0)

Figure 8 - Intensity of static electrical field in wooden buildings is equal to electrical field outside the building, atmospheric stationar electrical field.

Everything was the same except elecrical field in barns. Electrical field in room surrounded with electricly conductive net in reinforced concret is equal to *ZERO – FARADEY CAGE.*

In wooden barn there was *STATIONARY ELECTRIC FIELD OF EARTH.*

5. Legislation in the domain of protection from electric fields

The most important international organization in the field of protection against electromagnetic fields is

the International Commission on Non-Ionizing Radiation Protection ICNIRP., It is formally recognized as an official collaborating non-governmental organization (NGO) by the World Health Organization (WHO) and the International Labour Organization (ILO)., collects scientific results from all over the world and based on that recommends limit values for exposure to electromagnetic fields. Thereby anatomize exposure into two categories: general population and occupational exposure.

In the general population childern, the elderly, generally more vulnerable categories of the population, can be exposed, 24 hours a day. At occupational exposure it is about healthy persons, able to work up to 8 hours a day.

Electric field limits, by ICNIRP recommendation from 1998:

Electric field strenght	E (V/m)
General population	5000
Occupational exposure	10000

Council of EU accepted this recommendation and on July, 5. 1999 in Bruxell issued document: "Council Recommendation on the limitation of exposure of the general public to electromagnetic fields (0 Hz - 300 GHz)".

The document of the Council of the European Union ws used as a basis for determining the limit values of electromagnetic fields in the some countries, as well as in Croatia.

Start of activities related to the protection from electromagnetic fields in the Republic of Croatia was the Law on the protection of non-ionizing radiation (Official Gazette 105/99).

On the basis of the Law on Protection from non-ionizing radiation (Official Gazette 105/99) was adopted by the Ministry of Health and Welfare Ordinance on protection from electromagnetic fields (further Regulation) (Official Gazette 204/03).

Regulations, among other things, provides:

- Limit levels of electromagnetic fields, checking procedures and conditions for obtaining the authority to perform these procedures, as well as specific requirements for devices, installations and buildings that are sources of electromagnetic fields or contain sources of electromagnetic fields;
- Sources of electromagnetic fields that are required by the Minister of Health for their traffic and use;
- Legal or natural- perosns need to meet legal conditions for the traffic and use of sources of electromagnetic fields, as well as the terms and manner of periodic tests to verify compliance with the prescribed conditions
- Conditions for granting authorization to carry out professional tasks of protection against non-ionizing radiation, as well as keeping records and submission of reports and data for authorized legal entities.

Borderline levels of certain fields in this Regulation show that the limit values are:

Electric field strenght	E (V/m)
General population	2000
Occupational exposure	5000

The Ministry of Health and Croatian Social Welfare opted for considerably more stringent limits than those recommended by the ICNIRP, the World Health Organization (WHO) and the Council of the European Union.

Electric field limits are below 2.5 times (general population) or 2 times (occupational exposure).

According to Article 19 of the investor of a stationary source of electromagnetic fields for the construction or placement of such sources is required to obtain approval from the Ministry of Health and Social protection. The application for approval must be accompanied by calculation or estimate the level of electromagnetic fields stationary sources.

According to Article 20 of Rule Book user of the stationary source of electromagnetic fields for the use of that kind of source need to obtain approval from the Ministry of Health and Social protection, for wich, among other things, report on the first measurements of electromagnetic fields in stationary source surrounding must be enclosed.

According to article 41. of Rule Book legal person that is the user of more than 300 existing stationary sources of electromagnetic field, is obligated to deliver credible study to Ministry of health about importance of use sources considering level of emitted electromagnetic fields, within 12 months from Rule book entry.

6. Conclusion

Living systems including mankind are continually exposed to natural fields trough their lives. Life takes place in the „sea“ of fields.
As a result of the interaction of electric fields with the human body, there is the flow of electric charge (electric power), the polarization of bound charge (formation of electric dipoles) and divert electric dipoles that already exist in the tissues. As a result of the interaction of time varying magnetic fields with the human body induce electrical fields and circular electrical power has been induced. Exposure to low-frequency electromagnetic fields do not cause significant energy absorption and measurabele body temperature increase. However, exposure to electromagnetic fields at frequencies above 100 kHz can lead to significant absorption of energy and temperature increase. The measuring equipment, measurements, norms, standards, assessment of sources and effects and protection against electromagnetic radiation needs to be continually refined and adjusted.
Interaction of physical fields and fields of living systems is the required knowledge.

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ELEKTRIČNO POLJE ZEMLJE JEDAN OD FAKTORA MIKROKLIMATA

Sažetak

Čovjek i drugi živi sistemi zahtijevaju u svojoj neposrednoj okolini određene vrijednosti fizikalnih veličina , koji obezbjeđuju normalno odvijanje životnih procesa. U definisanim životnim prostoroima skup tih veličina određuje mikroklimat. Temperatura, vlažnost vazduha, osvjetljenje, strujanje vazduha i obezbjeđenje uslova da ne dođe do požara. No, život se odvija u fizičkim poljima definisanim, a često ne definisanim.

Živa bića na Zemlji su jednovremeno u moru polja, makroskopski gledano. Izvori polja su poznati. Izvor gravitacionog polja je masa. Izvor električnog polja je je naboj koji nose čestice, za primjer elektroni, odnosno protoni. Neravnoteža ova dva naboja na nekom tijelu djeluje izvorom električnog polja. Isti taj naboj u –pokretu- djeluje kao izvor magnetnog polja.

Kvalitet kao izvor polja, u slobodnoj interpretaciji, polje ljubavi, je i u živim bićima: duša duh ruh i sl., nazvano...

Interakcija polja je tražena spoznaja.

Ovaj rad ima za cilj razmatranje statičkog električnog polja Zemlje, kao utjecajnog faktora na odvijanje procesa u živim sistemima.

Složenost poroblematike traži eksperimentalna istraživanja i saznavanja. U radu će se razmatrati utjecaj električnog polja na mikroklimat životnog prostora

Ključne riječi: *masa, električni naboj, električno polje, duh, mikroklimat*

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THE STANDARDIZATION OF OFFSET AND FLEXOGRAPHIC PRINTING PROCESS ACCORDING TO ISO STANDARDS

Professional paper

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Abstract

The concept of the PSO as an upgrade in the process of standardization of the offset printing house is explained. The procedure for harmonization of the printing process in the printing house with relevant ISO standards is proposed. The potential problems which could complicate the standardization due to the complexity of the flexo and offset printing processes are analyzed. An overview of the novelties brought by ISO 12647-2:2013 comparing to the version from year 2004 is presented. The effects in printing production that can be achieved by standardization of printing process are presented.The results of the research of implementations of standards in printing companies in Bosnia and Herzegovina are analyzed.

Keywords: *PSO standardization, offset printing, flexographic printing*

Introduction

The standardization process of reproduction in the printing industry is a very important process that requires some effort and investment, but, properly understood and applied, standardization can bring significant improvements in technological, technical, organizational and financial terms.

The term standardization in the common sense includes two proceses:

• the development of standardsand

• their application.

Other aspects of standardization will be considered in this paper such as – application and introduction of standards in the printing companies of offset and flexographic printing, but before that it is necessary to mention the most important international standards brought by the ISO Technical Comitee TC 130 for graphic technology.

Among these standards is the most important series of standars ISO 12647:

Graphic technology – Process Control in the making of separation of more tones, test proofs and proofs from circulation.This series includes seven standards which prescribe conditions of color separation, Proofing and print circulation for all classic proceedures of printing and digital print (Part 1 – general Remarks; Part 2 – offset; Part 3 – Newspaper offset, Part 4 - Process Standard Gravure Part 5- flexographic printing, Part 6 - screen printing, Part 7 - Digital Proofing, Part 8 – validation of printing processes which work directly with digital data).

In addition to ISO 12647 series of standards, for Standardization of the printing process more or less are important the following standards from the scope of the Technical Committee ISO TC 130:

- ISO 12643: Graphic technology – Safety requirements for graphic technology equipment and systems (series of five standards);
- ISO 12637: Graphic technology – Terminology (dictionary);
- ISO 15930: Graphic technology – Application of PDF formats, files for digital data exchange in preparation for printing(series of seven parts);
- ISO 5776: Graphic technology –Symbols for text corrections;
- ISO 12646: Graphic technology – Screens to display any color which will be in the proofs (soft-proofing) –Characteristics and conditions of observation;
- ISO 11084-2: Graphic technology – Register of systems for photographic materials, foils and paper, Part 2: Register of systems for making plates;
- ISO 12218: Graphic technology – Process control-Development of offset plates;

- ISO 13656: Graphic technology – Application of reflection densitometry and colorimetry of process control or estimate prints and proofs;
- ISO 3664: Graphic technology and photography – Termsof observation.

Considering that ISO 12647 standard is not sufficient to complete the standardization process of graphic reproduction, from the receipt of the files to the finished prints, but also that there are a number of ISO standards, not all of which are equally important for Standardization of the process of reproduction. Relevant institutions, including the most influential FOGRA developed concept called PSO, PS or PSG (PSX), depending on which the printing process applies:

- Process Standard Offset – PSO;
- Process Standard Gravure – PSG;
- Process Standard Newsprint – PSN;

The aim of introduction of the PSX procedure is to ensure that the printing companies in the right way, on the basis of recommendations and instructions of accredited institution for certification, fully harmonize the overall process of graphic reproduction with ISO standards and good manufacturing practices.

According to PSU procedure, the number of ISO standards which must be taken into consideration is reduced to the following five graphics, and a general standard, which is not mandatory, although its introduction eases the introduction of graphic standards [1]:

- ISO 9000, for the organization and documentation (is not a condition, but it is recommended that there is at least partial compliance).
- ISO 15930;
- ISO 12646;
- ISO 12647-2;
- ISO 3664;
- ISO 12647-7.

It may be noted that modern production of printing forms using the CTP device is not covered by modern standards, but if such standard is enacted, it will certainly be included in the PSO procedure.

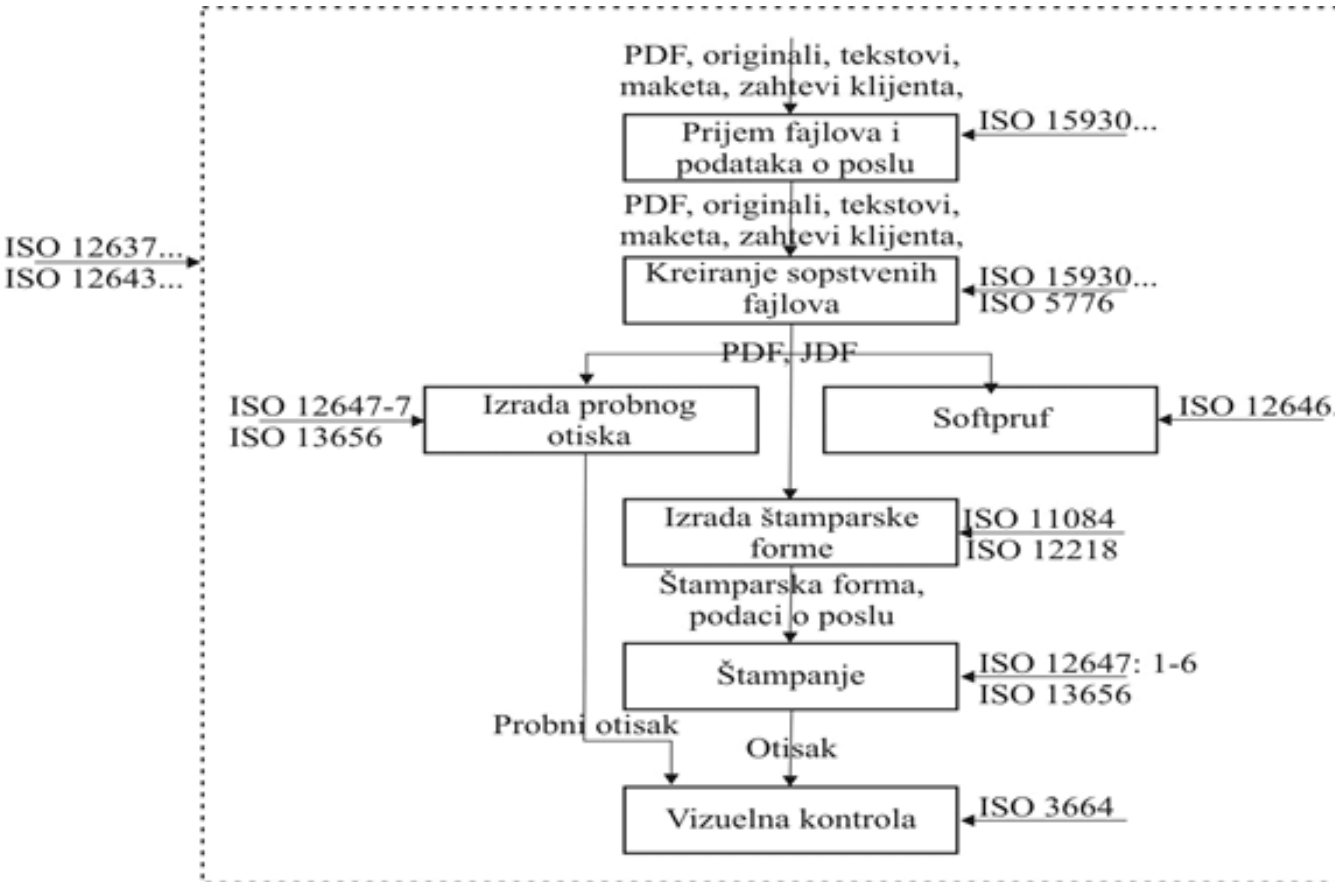

Figure 1. Schematic representation of workflow of graphic reproduction according to the concept PSO, with presentation of relevant ISO standards

Figure 1 schematically shows the process of playing with systematization adopted for PSO certification, as well as connection with certain ISO standards for graphic technology.

It can be noticed that the concept of ISO certification of graphics reproduction is broken down into seven steps:

- Receipt and control of PDF files from clients;
- Development of own PDF files;
- Preparation of the proof;
- Preview of the colors on the monitor which will be obtained in the press;
- Printing form Production
- Printing;
- Visual control of the print.

Each of these phases is separately evaluated during the certification of the whole process of reproduction, and to obtain a certificate for each there must be received a satisfactory score and achieved a satisfactory overall score. Certification may be partial, whereby in the certificate that part of the reproduction process that complies with the ISO standard is emphasized For example, the printer can receive a certificate which states that its printing proof complies with the ISO standard.

With the PSO certification of printing and studies for the preparation for printing in Europe, deal several companies, including the most famous German FOGRA [2] and the Swiss UGRA [1]. Besides these also operating are the Dutch IGT Testing Systems [3] and the less known German Print Quality [4]. There are a number of partner companies that operate under the auspices of FOGRA or UGRA.

Regardless of the potential benefits of the harmonization process of reproduction with ISO standards, the process of introducing standards in this area is not very far, at least not formally. Table 1 presents the number of printing companies that have FOGRA PSO certification by country (about 1/3 of the total number has only partially certified reproductive process).

Table 1. Number of PSO certificated printing companies by countries [5]

Country	Number of PSO certificated printing companies *	Country	Number of FOGRA PSO certificated printing companies
Austria	10	Germany	187
Belgium	1	Poland	1
Czech Republic	1	Portugal	1
Estonia	1	Romania	1
France	2	Singapore	7
Croatia	3	Slovakia	1
Netherlands	6	Slovenia	1
Italy	5	Serbia	3
Japan	16	Spain	7
SAR	1	Turkey	17
China	4	UAE	3
Luxemburg	1	UK	1
Malaysia	6	Total	287

Given the enormous number of printing companies (for example, in the UK there are about 8600 companies engaged in the press [6], and only one has the PSO certification), it can be concluded that the number of PSO certified printing companies is still insignificant. However, one can, with certainty, assume that the number of printing companies in which they realized that it pays of to harmonize reproduction process with the appropriate ISO standard, even without a certificate, is significantly higher, but for various reasons, the certification process has not been finalized . In the coming paragraphs the procedure of certification will be explained and the effects will be analyzed

2. Preparation of the printing company for PSO certification

In order for a printing company to receive ISO certification, it is necessary to pass certain steps, which based on past experiences are rather well defined. One of the possible ways from a non-standardized to a certified printing company is shown in Figure 2. In order to obtain the certificate, it is necessary to-do all the steps, but every journey begins with the first step - in this case it is the decision of the controller of the company to fix its production. In the decision, there are several motives, which sometimes act in synergy:

Participation in tenders. This is in our area one of the most important reasons that managers are at all interested in the ISO 12647, or PSO certification. As the number of tenders is increasing for large (government) jobs in which as a qualification condition ISO 12647 is listed, and well-organized private companies increasingly seek evidence from suppliers on standardization of production, it is expected that the number of PSO certified printing companies will begin to significantly increase.

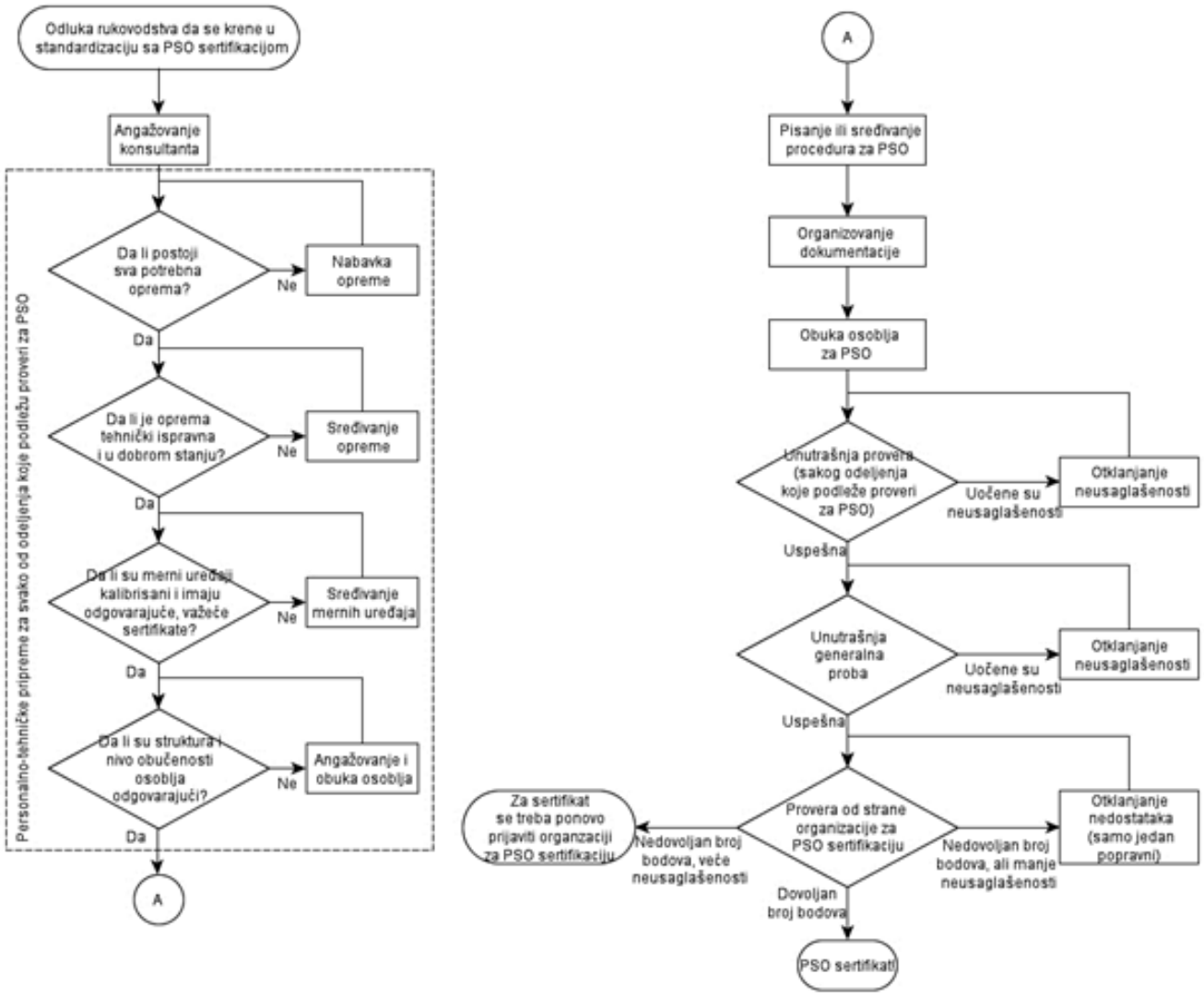

Figure 2. Schematic representation of the procedure for obtaining ISO certification in the printing that was not standardized

- The savings, increased efficiency. Some managers of companies have realized that it is not important how much something that should be invested in improving of the production costs, but how much money it can bring.
- Prestige. There are managers who want their company to be one step ahead in every possible way, and at the top in its market, so obtaining a certificate is sometimes a way to emphasize the excellence.

All three reasons to make the decision on the certification basically still have the most important one in common: to obtain higher quality jobs and achieve higher profits.

Practice has shown that printing copanies should hire a consultant, certified by the PSO certification body, which will:

- Objectively evaluate the initial state.
- Develop a plan of preparation for the certification.
- Control the implementation of the plan.
- Assist in the improvement of procedures.
- Assist in writing and organizing of the documentation.
- Conduct training related to PSO certification.
- Do internal checks by departments.
- Do a rehearsal of the certification.
- Be responsible for the full certification process.

Although the scoring system throughout checks for obtaining the certificate does not require to reach 100% of the possible number of points, meaning that it is not necessary to have everything from equipment, it is necessary to have a lot of things: measuring devices, software, hardware etc. People must be well trained for their jobs. It usually requires initial investments in order to meet a set of conditions that are required before the general approach to the preparation for the certification, and harmonization process of reproduction with ISO standards.

If in the printing company already exist a good practice, existing procedures should not be changed. It does not exist a standard prescribed form to the procedures that is written or shown. During checks it needs to be controled:

- Do procedures exist.
- Are they correctly written down.
- Do employees know where they can find them.
- Are the employees familiar with their contents.

However, if the initial state in the printing company is unregulated and there are not any procedures, then throughout the preparation for the certification they must:

- Check that the tasks are done in the best possible way.
- Improve the existing mode.
- Write a document describing the procedures.
- Ensure that employees are familiar with the new procedures and that the procedure is respected.

The organization of documentation for PSO is largely facilitated if the company already has a certificate ISO 9000. If not, then it is necessary to prescribe:

- A document form with the procedures and work instructions.
- A way of saving documents (paper and / or digital form, location).
- Availability of documents to individual employees.
- The system of work on the creation of new and revision of existing documents.

Staff training for the PSO certification consists in getting acquainted with the approved procedures, and to get used to working strictly by them. It is understood that employees have a solid basic education in graphics and they have the expertise for the specialty they deal with in their workplace.

During preparations for the certification, by achieving a certain level of preparation and training there are internal checks organized often with the assistance or under the supervision of an engaged consultant, by individual departments and workplaces. These internal checks are there to show, first of all employees, how much they adopted a new way of working. The number of these internal checks is not defined, it should be done as many times until achieving the results that guarantee to obtain a positive assessment during the official PSO checks.

When a satisfactory level of preparation in all departments is achieved, it is necessary to perform a general rehearsal of certification in all departments, which should be very strict. Only after a successfully crafted general rehearsal it makes sense to hire an accredited organization to come and do a check in order to obtain PSO certification. In Serbia, for example, there are several printing companies that have complied their production with the ISO 12647-2 standard, but have not yet decided to verify with the help of the accredited organizations PSO certification.

We will now give an overview of the most important requirements in the printing company and preparations for printing prescribed by standards of the series ISO 12647, and for commercial and flexographic printing.

3. Presentation of the conditions prescribed by the standard for offset printing ISO 12647-2

At the end of 2004 the second edition of this standard was published, and still represents the basis for the PSO certification of commercial offset printing. However, in late 2013 the third edition was published, and has brought several significant changes. [7, 8]

Standard ISO 12647-2: 2004 defines a broad set of conditions that must be achieved in order to get the proof from the printing machine that was compliant with this standard:

- The properties of a raster structure (Line screens, screen dot shape, the angles of individual colors).
- Tolerances of dimensions between the individual separation.
- The total sum of the tonal values of raster (TVR) in the darkest places.
- Paper types, their optical properties and permitted tolerances.
- The sequence of colors in print.
- Referential CIE L * a * b * values of process (primary) colors (c, m, y, k), printed in full tone on standard paper and tolerances (deviation and variation).
- Referential CIE L * a * b * values of secondary colors, which are obtained by combining two full tones of the primary colors.
- TVR range reproduced in print.
- The tolerances in the positioning of some separation on the common imprint (tolerance reign of terror in color).
- Reference values to increase TVR on the print (Tone value increasing - TVI) in low ranges for standard paper types in certain situations and tolerances (deviation and variation on the proof sheet, approved during printing and print circulation).
- Referential dependency TVI of nominal TVR (reproduction curve) for different types of paper.
- TVR scattering in the midtones.

The third edition of this standard in 2013 brought considerable changes:

- Expelled is everything related to the application of the film.
- Altered are some of the requirements for the proof.
- The term “printing conditions” (Printing conditions - PC) is introduced, which includes the type of substrate, the spectral characteristics of color and tonal value increase foreseen date raster Line screens (AM raster) or point size (FM grid) in the press. Defined are eight printing conditions.
- A new classification of “print substrates” (Print substrates - PS) is made, which now are eight, and among them is a final and specially defined card for making boxes (PS3).
- Optical properties of a printing sheet are no longer normative but informative.
- Changed are also the reference of CIE L * a * b * values of the full tones of primary and secondary colors (Colorant description - CD).
- The reference values obtained by measuring on a white background (white backing) are not more informative but normative.
- Permitted values of deviation (variation and deviation) in full color of process color tones on the print of the reference values are given according to the equation ΔE2000, but just as informative. Normative is still calculated according to the equation for ΔEab.
- There is a new systematization of the conditions for the spectrophotometric measurement (M1).

- Range of reproduced TVR on the print was expanded (considering that there is no copy from the film).

- Defined were new reference dependencies TVI of the nominal TVR (all reproduction curves) for different printing conditions. There are five (previously there were six) and are marked with large alphabet letters.

- New reference dependencies TVI of the nominal TVR are no longer defined only graphically (typically curvy line in the diagram), but also a table.

- A more precise determination of the allowed TVI on the print to a TVR, which was not given in the table is defined by equation (polynomial fourth degree) and coefficients to calculate for all five of the nominal dependencies TVI TVR.

- The increase in tonal values of raster for the black is equalized with other process colors.

- Scattering of TVR individual process color is no longer given only for the middle tone, but also for the tones less than 30% and greater than 60%.

- Specified are non-periodic raster structures.

- Defined are procedures for printing with integrated drying (UV, IR, heat-set).

- Defined is a way of determining whether the gray balance is achieved. The informational section is dedicated to achieve greater attention for printing conditions that lead to obtaining the gray balance.

The impression is that the third edition removed the lack of logic and brought detailed specifications where deficiencies in the previous version were pointed out. However, it still has not sufficient time passed since its adoption, so that the new ICC profiles can match the specifications of the new CD and TVI that are still in beta version. So, it is too early to be able to have a more detailed insight into the effects achieved with the new edition of ISO 12647-2: 2013, compared to the previous version. [9]

However, no matter which version of the standard is used, printers often face a number of technologically conditioned problems that interfere with compliance with the standards and require increased attention and efforts to eliminate, as will be discussed in the next chapter.

4. Potencial problems for standardization in offset printing

Classical offset printing is based on the application of two fluids - printing inks and fluids for hydration, and indirect transfer of ink from printing form to the surface, via offset rubber. As the number of variables increases, the system is more complex and more difficult to keep under control, within the allowable limits. Here will be shown some of the problems that the authors encountered in their practice, during the harmonization process of offset printing from ISO standard.

- The low level of automation of the printing machine.

Printing machine must have a high degree of automation initial setup and control during printing runs. Theoretically, proof compliant with ISO standard can be obtained on a monochrome machine with a manual setting, but it requires a lot of time, which in a real production there is not. Thus, the ideal would be that a standardized printing machine which is is equipped with:

- o System presetting of color application by zones based on readings from “CIP” or TIF files.
- o Scanning spectrophotometer.
- o The system for automatic regulation of the paint coat by zones on the basis of measurement.
- o Automatic paser.

Thus equipped printing machine allows printing parameters to maintain close tolerances with any job regardless of the print run and whether the best or average machinis works with it.

- Using raw materials from reliable suppliers.

Some procedures (determination of the optimal color application, TVI, System of the setup proof) are made during the preparation for certification and subsequently at regular intervals or when changing suppliers of raw materials. If the ink or paper differ from delivery to delivery, the mentioned procedures must be done far more common than it was the case when there is a reliable supplier of the raw materials of uniform quality. In addition, the ink must enable a sufficiently small color deviations on the print, which is within the allowable standard.

• Condition in which there is a printing machine.

PSO certification is difficult to obtain if the machine was not in a technically good condition (on a scale from 1 to 5 the machine should be at least a strong 4). If the printing machine is in a poor condition it can lead to unstability in production and the inability to achieve a relatively narrow tolerance prescribed by ISO standard. For example, if the supply of offset rubber is worse than those with which the proof for certification is printed, if they disrupt the work grabs on the impression cylinders, or the relationship between the cylinders in a printing machine system, it can all lead to an increased TVI in relation to the prescribed value by standards, or to the defects on the print, such as duplicating or moving, which a measurement device will also detect as increase of TVI.

• Fluids for hydration.

If the system for hydration does not dose well chemicals or can not maintain a constant water hardness, it will cause instability in production.

• Poor regulation of the atmospheric conditions in the printing company.

The temperature in the printing company should be 22 ± 2 ° C, relative humidity 55 ± 5% [10]. In practice, especially in summer and winter, to achieve such strict tolerances is difficult, but as fluctuations are bigger, one can expect greater difficulty of maintaining constant printing conditions. Thus, for example, increasing the relative humidity slows the drying of paint, reduction leads to problems with the static electricity, lowering the temperature lowersthe color intensity etc ... Changing the color changes the viscosity coefficient of ink that transfers to the surface and TVI, so all adjustments made on another temperature crumble.

• Resistance to application of of standards or fire employees.

Some employees experience work according to strictly defined rules as destruction of their creativity or increased, unnecessary effort. In this case it may be concluded that standardization was not successfully implemented, because it was not essentially received by those who need to use the advantages that it brings. It is often the case (not only in printing companies) that after a while people relax, begin to assess what work needs to be done according to the rules, which can pass without measurementand they avoid to measure proofs and follow the proper procedure.

If the PSO certification is properly understood and consistently implemented, the benefits it brings are many, but there will be mentioned only the most obvious ones.

Through introduction of the presetting system and possibly automatic control of color application by zones, the duration of settings can be significantly shortened and the technological dependent of addition of color and paper machine adjustment can be reduced.
If a reliable soft proof is introduced, in which, first of all believes a typo, clients who come “for approval,” do not have to enter the printing company.
Previous two effects can save several hours a day, which then can be applied to print and making profit.

The introduction of an organized system of work, in which every step is controled will lead to the reduction of waste and the number of complaints.

Above mentioned effects of standardization are sufficient to feel the positive financial effects - higher profits in a not so long period of time.

The negative sides of standardization are that it demands increased engagement of a company that wants to standardize at some time, as well as financial investments. However, you should always watch forward, not just how much something costs, but how much benefit it can bring.

5. Review of conditions which are shown by the standard for flexographic printing ISO 12647-6

The standardization process for flexographic printing is much less advanced in the development of standardization than in offset printing, but there is not a corresponding ISO standard and its application procedures can be carried out on the model of offset printing. However, the concept of PSO was not introduced for flexo printing, but only the offset and gravure printing.

Existing standard ISO 12647-6: 2006 is by the structure very similar to the standard for the offset printing and prescribes a slightly smaller set of requirements [11]:

• Properties of raster structure (Line screens, dot shape and angles of the grid in certain separations).

• Tolerances on dimensions of some separation on

film or printing forms.

- The total sum of the tonal values of tone raster on the darkest places in the printout.
- Five types of substrates and their optical properties.
- Reference CIE L * a * b * values of process (primary) colors (c, m, y, k), printed in full tone in all five types of bases and tolerances (deviation and variation).
- Reference CIE L * a * b * values of secondary colors, which are obtained by combining two full tones of the primary colors.
- TVR range reproduced in print.
- The tolerances in the positioning of some separation on the common proof (tolerance reign of color fit).
- Reference values of TVR increasing on the print (Tone value increasing - TVI) in low ranges for standard types of surfaces and tolerances (deviation and variation) in the light (25%) medium (50%) and dark (75%) tones.
- TVR scattering in the midtones.

It is obvious that, due to the specificity and complexity of the procedure of flexographic printing, a set of defined conditions of printing is less and the tolerance is more free than in offset printing. However, practice has shown that the flexographic printing can be standardized in a similar way as offset printing, but taking into account the technological specificities that are explained in the next chapter.

6. Potential technologically determined problems of flexographic printing and benefits of standardization

In the flexographic printing are used:

- Printing inks of low viscosity.
- Anilox roller that transfers color from the bowl to the printing elements of the printing form.
- Printing Forms of photopolymer composition that with their mechanical properties look like rubber.
- Sticky ("duplofan") foils that are used for fastening the printing form on the form of body cylinder.
- Substrates for printing different origin, raw material composition, optical, surface and mechanical properties.

Harmonization of products with ISO standard in the printing of flexographic printing can be reduced to the following few steps:

- Determination of the optimal color application on the print to a deviation from the reference colors of standards within acceptable limits.
- Determination of TVI in the press in relation to the TVR on the printing forms.
- Correction of TVR on the RIP in order to comply with by ISO standard of TVI on the print compared to the nominal values of TVR.
- Check of color fit.
- System proof setup that gives color as the printing machine.

The main problem for the the standardization of flexographic printing is that it is difficult to maintain constant printing conditions over a longer period of time, for the following reasons:

- On most machines printing pressure is adjusted manually by the feel of the operator without the control of proof.
- Printing Forms must be extremely high and of uniform quality.
- The viscosity of paint must always be the same, which is not easy to accomplish without an automated system for dispensing solvents, which is rarely seen in printing companies. During printing, the solvent in the color evaporates, density and viscosity grow and it changes the coefficient of transmission of color, which leades to a change in appearance of the proof.
- Surface volume of the cell of anilox roll must be constant. To ensure this, it is necessary to clean the rollers in ultrasonic baths and check the volume of the cell transmission with a microscope which can measure the depth of the cells (the microscope is still a common occurrence from the automatic metering of the solvent). In addition, the volume of the cells changes as the anilox roller changes with time. This leads to a change in optical density of the full tone process color print so the print becomes paler.

- Double-sided adhesive foil which is fixed to the printing form cylinder has a significant role in reducing TVR on the print, so it is necessary to always use the same, and if they change, they must re-do the tests.
- Atmospheric conditions in the printing company of flexographic printing must be constant, identical to when the tests were made.
- Flexo printing is used for printing a large number of different materials, including, paper and cardboard, and in addition transparencies of various plastic and metal materials, most often aluminum. Printing companies working on a number of materials that behave differently in the printing machine have to do a large number of tests to comply the production with ISO standards.
- Harmonization of printing on foils with ISO standards depends largely on the application of covering white paint over or under other colors. It takes great technological discipline to do this base layer, which is an imitation of white paper that was uniformly printed in the long run.
- In the flexographic printing used are non-process colors, often in combination with the process colors, to correct limitations of procedures and expanded gamut, especially when during printing of packaging materials, printing of non-process colors is not processed by ISO standard.
- A particular problem is the preparation of the proof, which often needs to imitate printing on transparent material and metal foil. Simulating print on transparent material and non-process color printing simulation requires the use of specialized systems for the proofing.[http://www.epson.com/cgi-bin/Store/jsp/Pro/SeriesStylusProWT7900/Overview.do?UseCookie=yes], [http://www.gmgcolor.com/products/flexoproof/]

Therefore, precondition for compliance of flexographic printing with ISO standard is to achieve a high level of technological discipline and to keep stable printing conditions over a longer period of time. Printing inks that are used must be of high quality, or the printout will be given in small deviations from the reference values prescribed by the standard.

The main benefit of standardization of production is sorting the process of reproduction, which is in a large number of printing companies of flexographic printing rather chaotic, based solely on experience and unstable in the long term. With the introduction of a reliable digital proof shortening the duration of machine adjustments and release this time for the productive work will be achieved.

7. Research of application of standards for offset and flexographic printing

In Bosnia and Herzegovina, on the introduction of standards (in particular ISO 9000 and other ISO 14000, ISO 18000, ...) has begun to work intensively after the war and with ten years of delay compared to other countries in the region [13]. Mainframes, as well as a number of smaller companies recognized the importance of introducing the quality system according to international standards of the series ISO, especially from the point of sale of their goods and services to foreign markets. It was founded by the Association for Quality in Bosnia and Herzegovina that is dealing with initiating, coordinating and organizing activities aimed at promoting the culture of quality in all areas of human activity, in accordance with national and international standards [12]. In Bosnia and Herzegovina, there are 31 consulting companies for the introduction of quality systems and 11 certificated companies operating on the territory of Bosnia and Herzegovina [13]. Quality Center of Foreign Trade Chamber of Bosnia and Herzegovina has, based on data obtained from certifying companies that operate on the territory of Bosnia and Herzegovina, made a database of certified organizations that refreshes monthly. From this database, which includes all activities (about 1,029 companies), it is evident that all these economic entities (9 printing) dealing with the graphics business have introduced the ISO 9001 quality management, two packaging manufacturers have introduced standard ISO 14001 for the implementation and maintenance of the environmental management system, and one introduced HACCP standard for preventive food safety [14].

The introduction of the ISO 9000 quality management system within the printing companies is adjusted to the international requirements for the systems of quality management in all business segments. However, ISO 9000 does not address the technical aspects of production, and is, for the modern printing company, insufficient to ensure the fulfillment of the increasingly complex demands of the modern, well-informed and very demanding customers. Therefore, it is necessary to introduce a group of technical standards, such as, for example, ISO 12647-2 for the offset printing.

In addition, for the preparation of the content of this work, a survey was carried out on the process of standardization of the printing companies of offset printing (49 interviewed printing companies), and the introduction of ISO 12647 or someone from the scope of ISO TC 130, or standards developed by FOGRA (PSO, PSG and / or PSN). The analysis has revealed devastating results showing that a few printing companies use ISO 12647-2, or PSC (heat-set printing - FOGRA with appropriate ICC profiles according to the type of substrate (paper) to be printed on (SC, LWC, MWC etc ...).

Table 2. Number of certified printing companies according to the type of standards

Standard	Number of printing companies	
	certificatedor which apply without a certificate	in the implementation phase
ISO 12647-2	1	1
FOGRA PSO	2	1
ISO 14001	2	1
ISO14351	1	
FSC standard	1	1
OHSAS 18001	1	
HACCP	1	
Other standards	1	

The majority of respondents considered sufficient the introduction of quality standard ISO 9001, only one has introduced FSC standard for responsible forest management, and a few some are in the implementation phase of some of the standards (eg, ISO 14001, HACCP standards).

8. Conclusion

The process of standardization of printing companies in accordance with ISO standards has not gained momentum, except in some industrially most developed countries, such as Germany, Japan, Turkey and Austria.

In all countries of the former Yugoslavia, the largest organization for the PSO certification, FOGRA, has certified only seven printing companies.

The introduction of ISO standards in printing will significantly expand only if the contracting activities require the PSO certificate as a condition for providing work, and if managers of companies realize that their standardized production process provides an advantage over non-standardized competition.

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STANDARDIZACIJA OFSET I FLEKSO ŠTAMPE PREMA ISO STANDARDIMA

Sažetak

Objašnjen je pojam PSO kao nadgradnja u procesu standardizacije štamparije ofset štampe. Predložena je procedura po kojoj treba da postupi štamparija koja želi da svoju štampu usaglasi sa odgovarajućim ISO standardima. Analizirani su potencijalni problemi koji mogu otežavati standardizaciju zbog složenosti postupka flekso i ofset štampe. Dat je pregled noviteta koje je doneo standard ISO 12647-2 u verziji iz 2013 godineu odnosu na 2004. Analizirani su efekti koje može da donese usaglašavanje proizvodnje sa standardima. Analizirani su rezultati istraživanja primene standarda u štamparijama u Bosni i Hercegovini.

Ključne riječi: *PSO, standardizacija, ofset štampa, flekso štampa*

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MEASURABLE CHARACTERISTICS OF INFORMATION PROTECTED BY THE INFRAREDESIGN®

Professional paper

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Abstract

All information necessarily contains a certain value. The full meaning and full value information contains within, but the useful, pragmatic value is determined by user in the moment of perception that is processing. Mere meaning and value of information for users are, from the standpoint of historic development, the reason for protecting information and providing materials and technologies that enable its protection. Paper analyses the process of infraredesign® protection from the aspect of information science and information processing. By exploring the features of infrared-protected objects through their virtual projections and manifestations, authors imply their code specificities and a need for a specific treatment of objects in communication.

Keywords: *protection, infraredesign®, measurability, attribute information, the amount of information*

Introduction

Definition of a certain concept should fulfil conditions that connect it with a closer original concept by simultaneously setting the specific characteristics which provide unique and unambiguous definition. When these conditions cannot be fulfilled, but the concept or phenomenon is recognizable, it is usually perceived as the axiomatic concept. Definition of a concept requires determination of three items: content, broadness and scope. Content settles the important characteristics of concept. Broadness includes lower generic concepts, while scope represents a number of individual realisations connected to the concept. Pragmatic approach is usually applied in concept's definition while it underlines efficacy and availability of concept or a phenomenon. Consequently, a definition can often loose its clarity and unambiguity.

Information can be perceived as a concept that has almost the same number of definitions as it has the contexts within which it can be defined. The concept of information is usually connected to the cognition and knowledge being transferred or received and at the same time to the specific facts or specific circumstances. Though information has characteristics of axiomatic concept, it cannot be completely treated as such. This is due to the fact a strict definition of information is based upon closer generic concept, while context in which information is defined is pragmatically obtruded by specificities and differences.

Misconception can develop if data or fact, knowledge and/or wisdom are considered as synonyms for information (that usually happens). Therefore it is necessary to consider all characteristics which can express their specific differences. When information is perceived as a product of processed data, no specific definition is required. If information is being organised and its structure determined, one talks about knowledge. Knowledge necessarily assumes certain human activities, so information is given a human aspect. Categorisation and classification of specific information fundus is formed as science, while its operationalisation within concrete context represents a human wisdom. According to this standpoint, information, knowledge and wisdom cannot be seen as synonyms.

When information is materialized and saved in/on a memory unit, it is necessary to consider all circumstances in which it can be used and applied. Protection of information connotes a line of activities that necessarily support materialisation and usage of information. Press connotes a physical materialisation of information. It enables certain forms of protection. Protection of information in forms produced by

infraredesign technology certainly represents a highly reliable protection.

This paper tries to consider an attempt to evaluate characteristics of information in publishing. It is assumed there are characteristics of information in a practical field of developing a carrier of information and these characteristics can be measured.

This paper is especially focused upon physically materialized forms of information. The hypothesis starts with a possibility of developing certain realities and circumstances, while the protection itself is implied.

1. Infraredesign®: characteristics, forms of information carriers and the problem of measurement

When raw data is settled into the specific context it becomes, though not necessarily, information.

However, according to Yurij Yatsko, information represents the same category as the notion. [6]

This level cannot be materialized or it cannot be materialized to a higher level. On the other hand, data can be materialized. Whether such data can be transformed into information depends upon circumstances in which the whole process of analysis is executed. Operationalisation, materialisation or simply the usage of information is determined by the context of a process itself.

For the purpose of this paper it is necessary to consider the complexity of process in which information is being transferred to data and vice versa. Information necessarily has a source, while the process of using data and information necessarily requires a receiver or user. The whole process makes sense only if the relation source – receiver exists. The process is usually pragmatically defined as communication. Accordingly, message is the assumed form of data or information exchange. More precisely: conceptually the process is materialized as communication channel which corners include the source and receiver of information. It should be underlined that communication channel in human communication is a vis-à-vis type with a possible alternation of channel's corners. The physical dislocation of elements necessarily requires a form comprehendible to the participants of communication. Regardless to the form of communication, the reliable transmission of information and protection are necessary.

For the purpose of this paper, it should also underline that communication represents historical category. Historical aspect is visible through a temporal change of forms and modalities but also the conditions of change that require certain technical solutions.

Clearly, speech and letter are historical categories articulated as a need to determine communication as a process. It should also be mentioned that both corners of communication channel should necessarily apply the same "language" or otherwise use moderators or translators.

Subsequently, information and data in communication channel should be considered as the exchanging substance. That form is usually named a message. Message prepared in such manner usually has certain characteristics.

Though communication is temporarily placed within frames of information technology, computers and Internet, it is not a necessary precondition. On the contrary, ICT is just one form and possibility of communication. Written or published form of message is precursor and contemporary of ICT so it does influence its development. The influence is mutual. Communication in a virtual environment reduces a need for "hard" forms of data and information carriers. Still, when printed forms are required, communication should be supported by some "hard" material form.

This paper considers printed information and infraredesign® form of its protection. It is therefore needed to specify the most important characteristics of information due to its protection as additional characteristics and information and communication as a process in which information is being consumed. Nevertheless, simple definition of information characteristics isn't sufficient when its value is being determined. All characteristics that define information should be measurable.

This is the main issue of this paper.

The literature provides rough or more profound raster of information characteristics. The Johnstone High School [1] for instance considers information from the standpoint of substance which usage provides value. Besides these characteristics, some additional can also be considered [7]. These are:

- Accessibility/Availability – reflected in an easy approach to information and its simple usage. Information is available in the moment it is required (it implies its care)

- Punctuality – information can be checked and proved, without inconsistent meaning for its user. A level of punctuality depends upon circumstances and it can vary.
- Integrity – refers to punctuality and comprehensiveness of information and its accuracy in relation to the system of values and expectations.
- Reliability and objectivity – user should have confidence in source and content without verification. These characteristics are strongly connected to information punctuality.
- Relevance and adequacy - relevance is determined by the purpose of information and so is its adequacy. The user requires and specifies both characteristics.
- Conciseness/the level of specificity – form and mode that is simple and can be easily modified.
- Mode of presentation – standardized form which user can modify.
- Agility – information should be agile and purposeful. The importance of information is determined by its agility.
- Value of information – the importance of information has characteristics of relativity but it sets the value of information.
- Price of information – modality of providing the information sets its price.
- Completeness – it should encompass all aspects required.
- Effectiveness – information is relevant for the system and can be temporarily delivered as correct, consistent, usable and complete.
- Efficacy – information can be used with optimal allocation of resources.
- Confidentiality – information is protected from an unauthorised approach.
- Compatibility – information is compatible with legal regulation and contractual obligations of user.

Obviously, the list of characteristics isn't final and some additional characteristics can be added if these are important for the present circumstances.

It is important to mention that a group of characteristics or attributes, as it is defined by information science, can be described in terms of logical variables of Boolean type with no changes caused by more delicate raster. In other words, information is correct or incorrect, but the circumstances can make information even partially correct so characteristics can be ranged.

The price and value of information can be analysed from the economic aspect. These two characteristics are usually perceived as synonyms which is wrong. Information's value is equal to the price the decision maker is willing to pay for it before making a final decision. That is also the maximal price someone is willing to pay knowing the actual value of uncertainty before making a decision on planned actions. [8]

Information has absolute and relative value. Relative value is set by user upon circumstances in which he uses the information. The relative value of information is actually set by the level of information's usability. One can define a ratio: Relative value of information = level of usability x absolute value of information

The price of information is economic category. However, setting the price of information as unphysical category can be problematic since each economic category usually connotes its monetary equivalent.

Even if this is possible, the question remains: the price of information is monetary equivalent of which information's characteristics? Quantity of information isn't a relevant indicator of value and reliable modality to set information's price, but it does represent a measurable size.

2. Semiotic aspect of Infraredesign®

When a product – in a material form – is developed by using infraredesign® technique, two important facts should be considered. These are:

- Protection achieved through double layers (multiple layers)
- The necessary material form of product

The concept of product is conditionally used for the purposes of discussion and it represents a form in which information is saved, while material form indicates physical realisation or materialisation of information. Material realisation is media that carries information and it represents message in a communication channel. It also represents an important

tool that must be recognized by all participants of communication. If information is formed in a visually clear manner, obviously a specific form of customization will be shaped.

Holistic observation of information or their carriers demands understanding of semiotic characteristics of message. Semiotic analysis equally considers semantic, syntactic and pragmatic characteristics of information. This paper analyses all three mentioned areas. Still, it is necessary to divide shape or form from content. Insisting on detachment is necessary due to the fact form itself can be carrier of information. To paraphrase: Pear doesn't contain information upon apple though both can be yellow!

In infraredesign® technology a colour has especially important meaning. From the information science' point of view a colour can be the main carrier of information. To put it in a real time environment, red colour on traffic lights has its own meaning. When colour is the carrier of information, its perception is relevant. Scanning of infraredesign® objects in a certain way can lose this form of information. From technical aspect such information isn't lost but its reproduction demands a specific procedure, thus completely protecting the information.

If information management is settled in infrared segment of spectrum, then the concept of information is limited to the colours used in printing and editing. The paper [3] explains mathematical models which explain concrete processes in application of colours visible in infrared segment of spectrum. The historical aspect is better explained in [4] on examples of graphics and editions made by infraredesign® technology. This technology prints two pictures, one visible under the IR (infrared light) while other is visible in daylight. Paper [5] offers more detailed information upon theoretical basics of infrared systems.

3. Measurability of information's characteristics with Infraredesign®

Infraredesign® technique is a stenographic procedure with a possible broader application. This technique is used in press preparations for objects made of two pictures respectively two texts or generally two objects A and B. One of these objects, for instance A, is visible in day light, while object B can be seen under the infrared light. The issue of quantifying and qualifying information that such object/form/message contains primarily refers to the measurability of characteristics or attributes that describe it. Though measurability requires established system of measures, it is not relevant for this paper while it demands a broader approach. Hereafter, the authors elaborate on the attitude relevant for information evaluation.

Let us assume the object A+B is developed through infraredesign® technique and is available. The following issues should then be considered [9]:

- What is the correlation between object A and object B, that is, are they mutually dependent?
- If the quantity of information carried by object A – Qi(A), and quantity of information carried by object B – Qi(B), how relevant is total information, respectively, is the ratio $Qi(A)+ Qi(B) \leq Qi(A+B)$ relevant if the expression A+B represents infraredesign® print?
- In case of any transformation that isn't related to infraredesign® is the quantity of information carried by object visible under the infrared light lost?
- What should user know or posses in case of disposing the object A+B?

Objects can be, though not necessarily, mutually dependent. If information carried by objects can be connected since they are supplementary or complementary, then the objects are mutually dependent, and they make unity. When object B has exclusively protective role, then they are not mutually dependant, respectively object A can be protected by any object of the B type. The reason of their dependence isn't relevant for this paper, but if it influences or conditions the measurability of certain characteristics, then it should be observed.

Paintings 1. and 2. display the works of art of the academic painter Nada Žiljak. In nature these are double paintings. One of these is made by colours visible under the infrared light. The author can connect contents of these two paintings through the artistic expression. The content should be carrier of message or information. Hence, painting can but not necessarily make an item. Physically, these are an item since they are painted on the same media. Semantically, they are divided and make an independent artistic expression of the author, so they can be observed as such.

Figure 1. *Pictures visible under the infrared light*

Assume the complete quantity of information Qi(A+B) is relevant for user. However, any transformation of objects A+B which doesn't connote infraredesign® also implies a partial loss of information. This applies to information carried by object visible under the infrared light.

If objects are mutually dependent, the user will be deprived of information carried by the object B. The question remains: if there is a connection, can the remaining part be used for specification of information missing thus providing any form of reconstruction? If the objects aren't connected in described manner, then the object A has executed its protective role. All this becomes exceptionally relevant in virtualisation of objects and their transmission to the digital forms.

Figure 2. Pictures visible in the day light (paintings on the same carriers as those on painting 1.)

Displayed paintings imply a possible separated display or separated preservation of both objects, though with a specialized equipment. From the pragmatic point of view a question is raised: can user recognize he owns the object A+B if he doesn't own equipment and can he thus receive the full information? Painting 3. displays equipment that can be used for observing the object A+B. When lighted by the infrared lights, paintings allow reflection on the screen of equipment which is sensitive to infrared lights so the object B can be seen, respectively painting made with colours sensitive to the infrared lights. However, tough both paintings are made in colours the picture made in object B looses information upon the sort of colour while it is reflected in grey shades thus making it visible in virtual shapes. If colour has some semantic characteristics, then these characteristics may be lost. Naturally, this isn't relevant if the purpose of B type painting is solely to protect the object of A type.

Microsoft owns (for devices) software for the infrared detection [4]. What is the correspondence between these devices and equipment displayed on painting 3. is beyond the scope of this paper, so reader should make his own conclusions. If we observe the quantity of information carried by paintings 1. and 2. as measurable size in computer frames, then format actually has an important role. Different formats make a visible difference in size of files. Painting 1. has 1,1 Mb while painting 2. has 1,4 Mb. Obviously this parameter cannot be used in a more meaningful manner, but it can be registered as additional characteristic in object's description. The paper [tiskars] elaborates also electronic types of *.bmp, *.tif and *.gif. The results of measurements indicate similar differences.

Figure 3. Device for scanning the objects designed according to the infraredesign® rules

From the aspect of steganography, information upon preparation mode of the objects type A+B can be important only for those users who need this kind of protection. User who only accepts given objects doesn't necessarily have to be introduced with the forms and shapes of protection. Protection is needed to eliminate material and nonmaterial consequences of the possible misuse of the protected object. Therefore, the consumer of object A+B doesn't require data on form and mode of protection, either individually or as a part of other object or product. If a need for protection of this type is primarily protection of

economic resources possessed by user, providing information isn't necessary if it doesn't cause damages. This protection is used for preserving the product's originality.

4. Conclusion

Objects made by infraredesign® technique may produce an effect of secrecy and conspiracy for user. The circumstances of the first contact are usually accompanied by effects of impression and thrill. The fact is such performance achieves protection and prevents any kind of misuse. This is exceptionally important in protection of gilts and personal documents which can be made by such technique. Pragmatic side of usage is protection of vital and economic interests of user. In such circumstances, as long there is a need for making documents or generally objects of this type, such preparation of documents will remain without any flaws. A great success with such technology can be obtained in any situation, that aside the primary protection, can apply infraredesign® rules in preparation of materials, data and information in a modality that will provide user with much more than information and qualitative protection of material.

This paper tried to present an approach to infraredesign® as a modality for preparing objects which carry certain information from the aspect of theoretical postulates of information science. Though the purpose of this technique primarily has economic meaning, a broader analysis is needed especially in the area of communication, specifically shaping, transferring and protecting the information.

Described characteristics do not necessarily have to be measurable, but they can contribute to making a comprehensive picture on value of certain information.

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MJERIVA SVOJSTVA INFORMACIJE KOD INFRAREDESIGN® ZAŠTITE

Sažetak

Svaka informacija nužno sadrži određenu vrijednost. Puno značenje i punu vrijednost informacija sadrži sama po sebi, ali korisnu, pragmatičku vrijednost određuje korisnik u trenutku poimanja, uvjetno rečeno obrade. Upravo značaj i vrijednost informacije za korisnika, povijesno su razlogom i povodom za zaštitom informacije i iznalaženjem materijala i tehnologija kojima se informacija može zaštiti. Rad razmatra proces infracrvene zaštite s aspekta informatike i obrade informacija. Istražujući svojstva infracrveno zaštićenih objekata kroz njihove virtualne projekcije i manifestacije autori ukazuju na kodne specifičnosti istih i na potrebu specifičnog tretmana takvih objekata u komunikaciji.

Ključne riječi*: zaštita, infraredesign®, mjerljivost, svojstva informacija, količina informacije*

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THE SEMIOTIC ANALYSIS OF ADVERTISING POSTER

Professional paper

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Abstract

To a visual information, has always accorded great importance, maybe because the man has always been easier to show his thoughts, desires, fears, aspirations and feelings by drawing or painting, than to put into words, and in addition to understanding or interpretation of drawings did not or not required language skills. The public information was and still is transmitting ina a written shape for thousands of years. The poster begins his life when multiplies, overwhelmed the public space and audiences. Production of posters has always flourished in times of war and social upheaval. Their main role was to raise morale, collecting war bank loans, recruitment of soldiers or inflaming national pride thru media.

Keywords: *semiotic, poster, advertising, war*

Introduction

Well known is thought to be preparing for the future by drawing on the experience and wisdom of the past. Design has its roots in the arts and various crafts, even thousands of years ago. This is witnessed extraordinary examples of art and everyday objects back to ancient Egypt and ancient Greece. Development of industrial production at the end of the XIX century brought about a series production, which is the market offers a great quantity of products that were functional but monotonous and unimaginative. Therefore, first in France and then in other countries in 1905, originated the theory of rational aesthetics. It is meant to everyday objects become both functional and beautiful.[1]

Start design development marked a movement called Art Nouveau, which appeared in Vienna in the early XX century, and the head of this movement was a group of artists, architects and designers (most important was Josef Hoffmann). At the same time, the United States changed their views on architecture and design defined by Louis Sullivan, which is particularly promoted that the shape oAf the product should follow its function, and this attitude is particularly pronounced in contemporary design.[2]

In Germany in 1907 was founded the movement Verkbund, with Peter Behrens at the on forehead, which is considered the first industrial designer in Europe to 1919 in Weimar (Germany) famous architect and designer Walter Gropius founded a famouse school "Bauhaus". It was very successful nursery for designers and significantly influenced the development and application of design in the world. For further development amounts design great influence conducted the School for Industrial Design in Ulm (Germany), which was founded in 1953and aimed to continue the tradition of the Bauhaus. In the development process, especially from the 70s of XX century when it starts wider use of computers, design becomes an integral creative disciplines. He includes in itself, in addition to computers, various scientific and technical disciplines, such as engineering, technology, economics, art, ergonomics, sociology, psychology and others.

They differ in different disciplines within the general design:˝ industrial design, fashion design, stage design, interior and exterior design, web design, graphic design, etc. In the contemporary theory of popular media culture deals with the meta-design or design of the information post-industrial society that deals with the public or media events, everyday life, that is, the notion of design extends to the different areas of the organization, promotion, and the political and Marketing talking about designing a work of art, design information, the design of public opinion, the design character of politicians, designing in behavior.[3]

Graphic design is the art of selection and arrangement of visual elements (such as typographic elements, images, illustrations, symbols, colors)

1 Vasiljević, M., Dizajn, Borba, Beograd, 1996., str. 32
2 Ibid, str. 33
3 Šuvaković, M. , Pojmovnik suvremene umjetnosti, Horetzky, Zagreb, 2005, str. 149

in order to transfer certain messages. That is why graphic design is often called visual communication. Development of graphic design through history has always been closely associated with the development of technology and social needs. Graphic design traces its roots back to ancient times, illustrated manuscripts were made in ancient Egypt, China, ancient Greece, Rome. The most beautiful examples of early graphic design can be seen in the form of the Ancient Egyptian Book of the Dead. Book of the Dead was made in order to be a help to bypass obstacles deceased in the afterlife. It is usually written on papyrus and placed in a coffin or the tomb of the deceased. Pictures, images and text illustrated in the form of various hymns, spells and instructions were mandatory part of the book.

The subject of my research is semiotic analysis of graphic design respectively posters as a medium for propagnadu and reporting. The research will be based on an interdisciplinary approach, because the very concept and practice of design are the cultural, social and economic phenomenon and an indispensable part of the creative industry in each segment, as part of popular culture and the arts. I'll make a special reference to the war / propaganda poster as a communication channel or medium, which must meet several conditions in order to achieve the ultimate goal, which is the call to action.

1. Art designed Poster

The poster as a means of informing belongs to the mass communication media. It allows for easier social interaction, and thus affect social change. By integrating its elements, creating a visual organization by some impact on the perception and interpretation vizulne messages. The way in which the designer uses his visual composition, the way watching and shapes, different from how it is observed and experienced man in whose field of action is not design. For this reason it is difficult to define the rules of designing posters, because every person perceives visual messages and visual environment on the basis of their visual experience.
Art designed poster has long been recognized not only as an important testimony about what informs, but also has artistic value, unavoidable in the assessment work of an artist. That is why the artist retrospectives include equal involvement in the illustration of books or making posters, permanent exhibition with sections achievements of an epoch or direction exhibit posters, and cultural institutions such as museums and libraries have collections of posters in their collections as a cultural and historical material.

The emergence of artistic design posters associated with the emergence of a series of lithographs by French painter and graphic artist Honore Daumier in the first half of the XIX century, which produces a range of theatrical, literary, political and satirical posters. Development and improvement of graphic and printing techniques creates the conditions for high quality reproduction, and acceptance of artists to try in this new medium with the result that the poster next to the utilitarian function and advertising character, becomes a kind of form of artistic achievement.[4] At the beginning artistic poster is shaped through drawing and coloristic effect that brings topical brevity, and thus provide greater impressiveness notice that the poster is transferred.

Poster design, as an autonomous art works is mostly supported by Henri Toulouse Lautrec and his posters which advertised programs Parisian theaters, circuses, etc., which still represent a significant part of his artistic creativity, artistic design posters through time monitors properties and aesthetics of the prevailing artistic trends, particularly evident in the period of Art Nouveau, through the works of Austrian painter Gustav Klimt.

2. Semiotic Analysis of advertising Poster

Studying posters issignificant because of their informative and illustrative value. They are, at the same time, historical documents, important for the history of art and iconography of a time, and the holders of the aesthetic and artistic values. Posters have a special place in society because of their functional roles. Content and text posters, as well as their artistic treatment are focused on what convincing performance. The poster remains in memory (it is simply impossible not to notice the posters pasted to different places while walking down the street), and on the other side, the printed word may be unread, and television / radio we can simply switch off and do not look / do not listen.

Billboard as a special kind of historical source has its own specific language, created by merging the iconographic characters and text messages, so he

4 H.V. Janson, Entoni F. Janson, Istorija umetnosti, Abrams (Stanek Varaždin, & Prometej Novi Sad, 2005.

needs to devote a lot of attention and apply specific methodology to decipher the layers of propaganda messages, their origin, parallels and specifics.

Contemporary political poster was created during World War II, when it played an important role in communicating with the people of the state. The poster was, first, incited patriotism and national morale, referring to the aid of the fatherland.[5] Posters from this period were characterized by cruelty motive because it should provoke strong emotions and reactions in people. The enemies were represented as grotesque, evil beings, as opposed to their own personifications of goodness, honesty and courage.[6]

During the second and third decades of the XX century there was a massive use of posters for political purposes, particularly in the former USSR and Germany. The poster is formed on an ideological exclusion for forced from state institutions, when there was one of the biggest changes in the development of political posters.[7] Due to the richness and diversity of ideological content, mobilizing forces, prevalence and popularity, has become an indispensable psychological weapon. A specific type of promotional action included the organized and deliberate dissemination and explanation of political and ideological goals. The main function of such propaganda is in limiting the cognitive abilities of those who receive the message and create a distorted, unrealistic images of current events.

One of the main roles of the poster was to be associated with the already known events, shapes and controls collective opinion. Of course, the basic sense of artistic design is completed by the message that the poster was wearing. The language used was exclusive, especially for ideological explanations. Concepts are changing the meaning and in placing the appropriate propaganda framework.[8]

Henri-Pierre Jeudy believes that the symbolism of the object based upon the function and is reduced to a monovalent structure that can reproduce the performance and community values. The symbol becomes a reference character that goes beyond the function and meaning obtained exclusively from the game different relationship that governs its conception and role in space. Upon execution of the design, his creation (building), facing the environment as a whole, establishing the best possible relationship between the functions and needs of reality and becomes a symbol. Then the symbol coincides with ideology.[9] Design is looking for a symbol to be rooted in the world in order to fulfill its task of intermediaries and agents of change. The symbolic person or function design provides meaning-making by providing basic support facilities-signs.

According to Umberto Eco "Aesthetic function gives us something we did not know nor expected, and it gives us because parts of the information delivered through the levels of the message; because in an unexpected way and combines levels; because it leads us to look at new idiolet which represents the structural legality of individual acts; because it calls into question the code, and even codes from the background, and reveals its unexpected opportunities. "[10]

In everyday life, from political propaganda to religious incentives, from advertising to ordinary speech, convince us or to something contradictory allegations places such as: "there is no man in the world who would not do: therefore, you should do the same do ", or the opposite," everybody did that, if you do otherwise, you'll be the only one who stands out. "[11] But the rhetorical figures do not operate only within the verbal language, but can be found, for example, at the level of visual messages.

The study of communication techniques of propaganda posters showing us how a whole series of classical rhetorical figure reconstitute the image. In them we find a metaphor, metonymy and so on. It's amazing how one advertisement/ propaganda image is always used with signs already adopted iconographic value that would cause the connotation rhetorical premise of which are known throughout the community.[12]

Nations and national communities and national identities, as contemporary historical phenomena, they are modern phenomena. Created and built up

5 Rikards, M., Uspon i pad plakata, Beograd, 1972, str.3

6 Ibid., str.27

7 Barnicot, J., A concise history of posters, London, 1972, str.226

8 Nikolić, K., Nemački ratni plakat u Srbiji 1941-1944,Bonart, Nova Pazova, 2000, str.85

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10 Eko, U., Kultura, informacija, komunikacija, pdf, str.45

11 Ibid, str.107

12 Ibid, str.102

during the process of social change and of long duration, in the modern era and modern society not only as individual and group identities, but also as a modern national ones and at the same time as the collective identities. Both (the modern nation) and second (modern ethnic and national identities) and third (modern ethnic and national ones) and fourth (collective identities) appear in Europe in the late 18th century, with the beginning of the modern era, and build up and constantly changing during the 19th and 20th centuries. This is the period when European nations, within modern society (and of industrial civilization) achieved relative progress in all areas of life, creating new national values and searching for multiple social identities that arise in the process of construction. It is a process of constant social and national changes, but also the social, ethnic and national antagonisms, which is not yet finished.[13] Modern society through social systems, social relations, social interaction and institutional order significantly influences the construction of modern nations and nation.

The word "nation" connotes the whole sphere of moral and political views, because certain ways of understanding social relations and the importance of "the state" into a certain way of his expression. One fascists and nationalists recognizes their co in that they "land" in which they live as "nation". But ideology, too, can affect the context of communication and to completely distort its action. "Sign the camera indicates the ideological apparatus, and vice versa, and semiotics, as the science of relations between the codes and messages, while turning into continuous disclosure ideology that lies beneath the rhetoric. Semiotics us in the sphere of signs, organized in systems of codes and sub-code, a sphere reveals the ideology, which is reflected as it is predetermined in the language. "[14]

For example, in Nazi Germany overall creativity in culture was strongly influenced by the extreme right. The Nazis wanted to, in accordance with its racist and irrational aspirations, create a national culture, strongly politicized and without independence and human content in it.[15] They insisted on the nation and the race as a starting point for the creation of cultural values. Outlined are the only "cultural" values that were in absolute service of ideology. Thus, the poster was an ideal vehicle for their goals especially when it comes to any and uneducated population to which it could not reach otherwise. The poster had to be overwhelming and full of passion, in which nothing is not a distraction from the main message he was wearing and was not allowed to forget. The most common motives were peasant working in a field which called for persistence in agricultural work, due to their country, as well as performances of soldiers proclaiming, "He is the ideal German." His willingness to fight for the nation is presented as the highest virtue.

Benedict Anderson in his book, Nation, imagined community encourages analysis of nationalism as a narrative. In his opinion, the nation is an "imagined political community and designed as both inherently limited and contemporary" is conceived because some member of a particular nation will never know most of the other members of their nation.[16] Despite every member can imagine your own fellowship with other members. The nation is the result of a creative, collective social imagination in different parts of the world.

Different ethnic groups and classes are included in the joint imagining, as a consequence of symbolic processing time and space, as well as the choice of those elements of the cultural past that at a given moment can provide the confirmation of the idea of belonging to the national community. The idea of the nation as imaginary community refers to the problem of its neuhvatljivoti or inability to grasp its objective basis. Thesis that the nation is a community conceived in the minds of its members Anderson stood up to the earlier theories that are also defined with respect to the objective characteristics such as language, origin, common history and territory. Instead, he offered a theory which advocates the idea of socially constructed national identity. Anderson's analysis played a significant role in the framework of postcolonial theory and the study of nationalism, in which each story of unity and identity in a networked imperialism.[17]

The main feature of the German propaganda was simplicity. The messages are emphasized or repeated one or two basic facts with a maximum simplification

13 Korunić, P., Nacija i nacionalni identiteti, Zgodovinski časopis, Ljubljana, 2003, pdf

14 Ibid, str. 105

15 Mitrović, A., Angažovano i lepo. Umetnost u doba svetskih ratova 1914-1945, Beograd, 1983, str.161

16 Anderson, Benedict, Nacija: zamišljena zajednica. Razmatranja o porijeklu i širenju nacionalizma, Zagreb: Školska knjiga, 1990. str18.

17 ibid

and displaying events such conflict between good and evil, making them concrete and personal. In addition, we used the positive and negative stereotypes. The positive is implied that is what the propaganda advocating good, useful and necessary, and negative all German opponents nejrazličitijim indoctrinated with negative characteristics. Of course, depending on the state where the leading propaganda against the German enemy they are portrayed as enemies of the state. Advertising messages on billboards consisted of basic symbols, messages and buzz words, sometimes it is used only a poignant word, phrase, character or symbol. Such messages are supposed to produce emotional reactions with an association of a certain specific meaning of symbols, images, cartoons or illustrations.[18]

On the other hand, the British posters had the feeling of romantic militancy and called for a nostalgic responsibility to oneself, and thus the state. The most famous is the poster Your contry needs you, in which a Marine who finger pointing at the viewer call-up. Later this motif over and the Americans, under the slogan I want youfor US army, to which are added elements of American patriotism.

Over time, a complete art, and especially the poster has become an everyday and ordinary. It has become a tool for roughing political propaganda and manipulation. Art symbols that should provoke in the viewer's deepest and noblest feelings, served for causing a sensation of ideological and political primitivism.

Engaged poster, as a form of propaganda summary presentations of political and ideological messages sppecifičan the source because it contains visual and typographical elements. He has to communicate a specific message in the proper art form. To do this, it uses its dual power: the power of the printed word and the power of artistic expression or to form specific unity of the written word and the visual forms. One of the features posters that do not have other forms of advertising is extended exposure time and repeatability over a wide area. In this way, the poster is integrated into the life of passers-by. Propaganda poster must be concrete, realistic and mobilizing. It has to be omnipresent, that calls on all sides to replace the speaker.

3. Conclusion

The modern world is in many ways a phenomenon visible. Area visible today takes on new dimensions of the object, ie. our world, new technologies (telescope, microscope, plane, space letielica ...), new media (posters, commercials, photography, television, film, advertising, Internet, etc.) or new ways of communication which prevails exactly visually. Visual world and the way we see it is not possible itself rationally understand and explain the world to us before the eyes occurs enigmatic and symbolic role, leading us to ask endless questions: "Is what we're seeing the equivalent of truthfulness? To what extent do we need to believe in what you see? Is this element of the visible and the means by which we come to know him sociallyconditioned? Most theorists attempts to answer these sometimes difficult odgovoriva, questions. In this regard, theobservation is the basis of all social and cultural studies, and visual language becomes the way we approach understanding.[19]

The essence of the author's approach is that in order to say something, or in any way disclose crucial fact. The posters, some idea or a current social problem is housed in an authentic visual content, which its simple visual language does not jeopardize the clarity and readability of the basic visual messages. Design has always been, and still is, resp. poster, as one of the most important forms of mass communication, was obliged to take an active social role, criticizing the world around them. Design is not just a process that is associated with mechanical production, it is also a means of conveying a convincing ideas, attitudes and values about how to make the individual, corporate, institutional or national objectives something could or should look like.

I will conclude with the sentence J.Bergera: "The vision precedes words. Child visually recognize things before they learn to speak. Seeing, however, preceded him in another sense. It is seeing what defines our place in the world that surrounds us. The world explain the words, but words can never undo its existence around us. The relationship between what we see and what we know is never fully established. "[20]

18 Barnicot, J., A concise history of posters, London, 1972. str.226-230

19 Čačinović, N., esej Vidljivo i spoznaja, sa skupa Vizualna konstrukcija kulture, Centar za vizualne studije, Zagreb 2007.

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SEMIOLOŠKA ANALIZA PROPAGANDNOG PLAKATA

Sažetak

Vizuelnoj informaciji oduvek se pridavala velika važnost, verovatno zato što je čoveku oduvek bilo lakše prikazati svoje misli, želje, strahovanja, težnje i osećanja slikom/crtežom nego ih pretočiti u reči, a osim toga za shvatanje/interpretaciju crteža nije bilo/nije potrebno poznavanje jezika. Bez obzira nude li robu ili informacije, prenose li snažnu političku poruku ili su tek lepe slike, zahvaljujući napretku štamparstva i reprodukovanja u boji – plakati su više od stotinu godina stara umetnost. Javnosti se razna obaveštenja u pismenom obliku prenose već hiljadama godina. Plakat započinje svoj život kad se multiciplira, osvaja prostor i publiku. Proizvodnja plakata oduvek je cvetala u doba rata i društvenih previranja. Njihova glavna uloga je bila podizanje morala, skupljanje ratnih zajmova, regrutacija ili raspaljivanje nacionalnog ponosa.

Ključne reči: *semiologija, plakat, propaganda, rat*

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THE CROATIAN MARKET OF PRINTED MAGAZINES AND PERIODICALS: THE DECREASE TRENDS OF PUBLISHING IN THE WAKE OF THE GLOBAL DECREASE OF PRINTED PUBLICATIONS

Professional paper

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Abstract

The aim of this paper is to analyze trends in the Croatian media market, the sector magazines and other periodicals. The global media market in the sector of printed publishing is facing decreased circulation for several years now. The largest national market at the global level, the one in the United States, first saw the crisis in sector of publishing newspapers, magazines and other forms of print media. The trend of print circulation decrease has expanded globally, and especially after the collapse of real estate funds and global financial crisis. This trend of print editions has not bypassed Croatia and this led to a noticeable decline in circulation, as well as to the bankruptcy of publishers. Convergence of the media industry, and thus the book publishing, the decline in sales circulation print media, is compensated partially by digital edition subscriptions. The continued decline in print circulation and increase of digital edition subscriptions set up a completely new situation before the scientists who study the media and publishing industry. Printed editions have not returned to the level before the global financial crisis, but the total amount of coverage in 2015 grew, thanks to new ways of content distribution. Analysis of the Croatian market of printed magazine shows the trend of decreasing sales which is in line with global trends. At the same time, Croatian magazine and periodicals industry does not receive additional revenue from digital edition through subscriptions and other forms of monetization of content.

Keywords: *financial management, magazines, the media industry, publishing, postmodern*

Introduction

The history of the magazine industry in printed form is related to the newspaper industry and the development of different forms of media outlets. Turow (2011: 296) points out that the beginning of magazine editions is found in the diversification of the newspaper editions with regard to the period of publication. The origins of the development of the newspaper industry are based on the production and distribution of daily newspapers that will, through time, keep the largest circulation of publications. Daily editions will join the weekend editions, which will be directed to specific target groups, and all of this will result in the appearance of the magazine which will stay to this day.

Special weekly publications, or magazines, according to the Croatian language portal is defined as periodic publications in various fields and for different purposes (illustrated magazine, informative magazine, journal), and the word magazine is used equally. The word magazine comes from the French word which, when translated, means a warehouse. Turow (2011: 296) finds an explanation for the word magazine (warehouse) in the fact that the editors of print media saw it as a good metaphor for saving, storing various artistic and journalistic forms (poems, essays, story, etc.).

Magazines have been printed in the UK since the 1700's. They were oriented towards wealthier classes. The contents were filled in the most famous writers and journalists of the time and covered topics from political debate to the criticism of artistic trends. The first magazine that was a remarkable success in Britain was Tit-Bits, and it appeared in 1882. With the combination of interesting content and, during that time, revolutionary graphics and other solutions in advertising, it reached a circulation of 700,000 copies (Gough-Yates 2013: 155). In America, the first magazine came out on the market in 1741 in Philadelphia, and soon in Boston and New York.

With the beginning of the Civil War the printing of magazines in America ceased and it will take many years to renew printing (Turow 2011: 296).

Major renovations in the publishing of magazines in America occurred in 1830. Publishers employed professional and experienced editors who select and edit the contents of what will be published in magazines. At the same time, they attract the most famous writers of that time in America, Edgar Alan Poe, Margaret Fuller, Henry Wadsworth Longfellow and others, who publish their work in magazines. Special impetus to the distribution of the magazine was given by the Postal Act in 1879 where the law determined the reduction of postage distribution of the magazine to a minimum (Turow 2011: 297). While newspapers oriented themselves mainly on the local market, magazines have turned to the national market. Large market coverage enabled them large circulation and the reduction of high input costs per unit of product.

Magazines become cheaper and more accessible to the general public. Circulation surplus and a large number of readers led to and increased advertising in magazines and increased revenues from magazine ads. By combining readers with advertisers, magazines are among the most responsible actors in the process of creating brands and modern product development. In developing the model of broad market coverage, an orientation to a special segment of the market, the ability to attract large advertisers that were interesting to the readers of magazines, in 1901 women's magazine Ladies` Home Journal published a circulation of more than one million copies. Kosut (2012: 442) notes that the women's magazine Ladies` Home Journal, since its publication, focused on high levels of society, fashion and branding, and with breaks it has been published till today.

1. A review of literature

Kung (2013: 42) points out that the newspaper and magazine industry uses the same business model in manufacturing and selling media content. Distributing and selling a physical product while at the same time making contact with the audience and the advertisers. Summer and Rhoades (2006: 5) compared this process with mousetrap and emphasize how in this process it is most important to have good bait. At the same time, good bait is content and productions that will attract readers, in this case in the mousetrap, and the advertiser, in our case a fat cat is drawn to the mouse in the mousetrap. Picard (1989), was the first to emphasize the dual character of media products. The product was also designed for the market through the sale of contents that that readers look for, but at the same time it is also facing the advertising market in order to earn additional income through the sale of advertising space.

The successful business process of a magazine publisher is built on three main pillars (Summer, Rhoades 2006: 5): 1) attractive, well-formed and rounded editorial content leading to the next step; 2) large number of editions, and this leads to; 3) advertisers. We can conclude that a successfully designed business policy of a magazine publisher is not solely focused on selling advertising space to advertisers at the best price they can achieve. The primary goal is to bring and connect the readers of the magazine with advertisers who offer them products they are interested in. Blanchard (2013: 197) notes that magazine revenues are between two extremes. Of those who achieve most of their revenue from advertising to those who achieve most of their revenue from sales. According to surveys conducted in 1991, 47% of revenue was realized from advertising and 53% from sales in the market in the American magazine industry.

Since the mid-1970's, magazines have become very specialized and focused on a target audience. They cover different areas of interest such as the automotive industry, crafts, hairstyles, but also cover areas of political interest, business, environmental pollution problems, and alike (Blanchard 2013: 197). The economic crisis of the late seventies resulted in unstable economic circumstances, all of which led to a decrease in advertising revenues. The market was strongly entered by other media as well, especially television, and magazines were forced to change existing business practices (Gough-Yates 2013: 155). In the early seventies, Time's Inc. launched People magazine on the market, which marked a turning point in the magazine market through innovation in content, theme and design (Talbot 2009: 500).

Summer and Rhoades (2006: 5) performed the division of magazines to three basic types: a) consumerist magazine - intended for markets of consumer goods, and sales is done through traditional outlets; b) Business-to-business magazine - which can be found in literature under the name commercial magazines and are sold by subscription or financed entirely from ads. This type of magazine is primarily intended for communication between businesses; 3) organizational magazines - in which the publishers

are from different organizations that can be of a religious character, alumni organizations, professional associations, sports associations, but also professional and scientific institutions.

The division into three basic is also noted by Kung (2013: 44), but points out the difference with organizational magazines. The basic types are divided into consumerist magazines, business-to-business magazines and academic magazines. Academic magazines are separated from the others according to the criteria of availability. While consumerist magazines can be purchased on the open market, business-to-business magazines are financed by subscriptions, advertising or other sources of financing, academic magazines are not subject to sales as merchandise. They are intended for a narrow segment of the academic community and the public with an interest in specific topics that deal with these magazines. Turow (2011: 299) notes that people who work in the media industry perform very extensive and different kinds of magazines divisions, but all of these divisions can be summarized in five basic types of magazines: a) business-to-business or trade magazines, b) consumerist magazines, c) literary publications and scientific magazines, d) bulletins and e) entertainment books.

The development and tradition of the magazine is directly connected with modern and its influence on the development of various societies (Brooker et al. 2013: 11). Doyle (2011: 466) connected the development of magazines with increased free time and links magazines with the term economy of free time. The largest growth of magazine publications was achieved between 1980 and 1990, as a result of increasing income and more free time. Postmodern philosophers express concern for the future of printed magazines due to the growing power of digital media, especially cable and satellite television, and combined with technological advances and computerization, it could destroy the magic of classic mass media and current cultural consumption (Blanchard 2013: 346).

2. Methodology

Research and analysis of the Croatian market was created by a specialized agency for the media industry, Ipsos Puls. The database of readership for daily, weekly and periodical printed editions was made according to international methodology which takes into account the factors of gender, age, personal income and the like. The study covered the entire population of Croatia from the age of 10-74 years. In the period from 2010 to 2013, it covered a population of 3.7 million people, and in 2014 3.5 million people. The survey used the telephone method. The last period of analysis, in 2014, covered the period from January to October of that year.

The analysis of advertising costs covered several types of media in order to obtain precise data on the total volume of advertising costs. The media covered by the research and analysis were: TV, printed media, radio, outdoor advertising and web advertising. In web advertising, the agency pointed out that the data is not completely accurate because of the small sample on which the study was performed. Total gross amounts for advertising were obtained according to the gross price of space in the media. Differences in costs arising in the course of business processes were not included in the calculation because it is part of the business policy and business secrets of organizations that organize the production of media content.

Data on the amount sold prints were taken from the sales departments of several businesses that compete in the media market. Analysis of the Croatian market is related to the consumerist segment. All other information on the global market have resulted from the research and analysis of the author. As a source they used professional and scientific papers, official database, audit reports, reports of various international government agencies and the like.

3. Hypothesis

1. The market of printed magazines in the Republic of Croatia followed the global trends of decreased circulation.
2. The industry of magazines and other periodical prints in the Republic of Croatia significantly depend on the volume of advertising activity.

4. The industry of magazines and other periodicals on the global market

The crisis hit the publishing industry is the United States as the world's largest media market even before the appearance of the global financial crisis and recession. According to Wirtz (2011: 118), in the period from 2004 to 2008, the total revenue of US newspaper corporations decreased by an average of 20 percent. Publications and advertising revenues were falling at approximately the same ratios. The market of consumerist magazines had a similar situation with falling circulation and advertising revenues and in the same period they fell by 18.1 percent, which made up 19.4 billion dollars.

Table 1. Total circulation in North America (2002 – 2011)

Total sales in North America (2002 - 2011)					
Year	Subscription	Single copy	Total	+/- (%)	Total (%)
2002	305.438.345	52.932.601	358.370.946	14,8%	0
2003	301.800.237	50.800.854	352.601.091	14,4%	-1,6%
2004	311.818.667	51.317.183	363.135.850	14,1%	3,0%
2005	313.992.423	48.289.137	362.281.560	13,3%	-0,2%
2006	321.644.445	47.975.657	369.620.102	13,0%	2,0%
2007	322.359.612	47.433.976	369.793.588	12,8%	0,0%
2008	324.818.012	43.664.772	368.482.784	11,8%	-0,4%
2009	310.433.396	36.138.517	346.571.913	10,4%	-5,9%
2010	292.237.864	32.999.207	325.237.071	10,1%	-6,2%
2011	282.919.614	29.558.699	312.478.313	9,5%	-3,9%

Source: Miller, Washington 2013: 128-134; (own illustration)

The people that read printed magazine in North America increased from 2002 to 2010 by 11 percent, and then it was followed by a drop in the number of readers of magazines in 2011 compared to 2010 by 1.3 percent (Miller, Washington 2013: 128- 134). The sales of magazines recorded a decrease compared to the previous period, already in 2003, after which there was a turbulent period of recovery and falling circulation until 2007, when circulation remained at the level of the previous year. 2008 started a circulation decrease from year to year. The overall drop in circulation for the period amounted to 12.8 percent. Preview in Table 1.

It is interesting to note that the decrease of the share of sales of individual pieces, by retail networks, was through the entire period of observation. In 2008, when the continuous downward trend in sales began, sales at newsstands decreased by 1 percent and the next year by 1.4 percent, which was the biggest decrease in the observed period. The total decrease in sales of individual pieces through retail distribution networks, in the period from 2002 to 2011, was 44.2 percent. While the decrease in total sales stood at 12.8 percent, the decrease of classical forms of sales was four times higher. All of this speaks in favour of the claims of scientists who notice differences that the post-modern and post-industrial society leaves in the print sector of mass media. Subscriptions and digital editions are slowly removing the traditional forms of distribution and consumption of magazines. The younger audience is accustomed to digital forms of distribution and use, but this also results in less advertising revenue. At the same time, advertising and ad space loses the magic they created in modern times when brands were being made.

Table 2. Total circulation in 2011 (North America)

Total circulation in 2011			
	Magazine	Total circulation 2011	2011 vs 2010 (%)
1.	AARP the Magazine	22.401.546	-5,6
2.	AARP Bulletin	22.204.197	-5,8
3.	Better Homes and Gardens	7.633.372	-0,4
4.	Game Informer Magazine	6.734.672	42,7

5.	Reader´s Digest	5.606.743	-3,7
6.	National Geographic	4.463.196	-0,7
7.	Good Housekeeping	4.339.069	-1,9
8.	Woman´s Day	3.876.053	-0,8
9.	Family Circle	3.846.672	0,0
10.	People	3.563.410	-0,4
11.	Time – The Weekly Newsmagazine	3.338.071	0,7
12.	Ladies' Home Journal	3.248.211	-15,3
13.	Taste of Home	3.248.744	-0,7
14.	Sports Illustrated	3.193.596	0,0
15.	Cosmopolitan	3.036.112	2,0

Source: Miller, Washington 2013: 128-134; (own illustration)

Miller and Washington (2013: 128-134), referring to the Association of Magazine Media, state that the sales of magazines from the group Top 100, in 2011 had a total circulation of 229,278,649 pieces and it was 1.1 percent less than in the previous year. Comparing this with the number of copies printed in 2011, we notice that one hundred best-selling magazines make up three-quarters of the total number of magazine titles that are printed. Furthermore, the hundred best-selling magazines posted a sales decrease of 1.1 percent, while the total circulation recorded a three times greater decrease in sales of 3.9 percent. It is obvious that magazines with greater prestige and tradition endured the crisis and changes in the market of magazines than those who failed to secure such a position. Movement of sales according to individual titles are shown in Table 2.

The top four best-selling magazines in printed editions did not change their position even in 2014. Among the best-selling magazines are only two magazines, the first and third in the ranking, achieved a growth in circulation in 2014, while all the others recorded an average decrease. If we take the average, although this information is not completely accurate because of the large difference in the number of printed copies on average, a drop in circulation in 2014, in comparison to 2011, amounted to 8.3 percent. Preview in Table 3.

According to research by the Pew Research Centre, a downward trend of consumerist magazines was also followed by magazines that focused on the publication of news. The research included printed and digital editions. The total decline amounted to one percent compared to 2013, which is much less than the overall magazine market decline of 14 percent. The Pew Research Centre monitors the movement of the 15 best-selling magazines that focus on news and this is the lowest average annual decline in the past ten years.

Table 3. Total circulation in 2014. (North America)

Total circulation in 2014				
	Magazine	2014	2014 vs 2011	2011 rank
1.	AARP the Magazine	22.920.161	2,3%	1
2.	AARP Bulletin	22.111.843	-0,4%	2
3.	Better Homes and Gardens	7.649.173	0,2%	3
4.	Game Informer Magazine	6.723.581	-0,2%	4
5.	Good Housekeeping	4.336.758	-22,7%	7
6.	Family Circle	4.037.592	-9,5%	9

7.	National Geographic	3.538.623	-18,4%	6
8.	People	3.537.318	-8,7%	10
9.	Woman´s Day	3.288.115	-14,5%	8
10.	Time	3.281.557	-7,9%	11
11.	Reader´s Digest	3.067.649	-8,1%	5
12.	Cosmopolitan	3.066.070	-5,6%	15
13.	Sports Illustrated	3.021.065	-7,0%	14
14.	Taste of Home	2.551.239	-20,1%	13
15.	Ladies' Home Journal	-	-	12

Source: Miller, Washington 2013: 128-134; (own illustration)

Miller and Washington (2013: 128-134) state that the total advertising revenues, which are of primary importance to the magazine industry, in 2011 reached 24.5 billion dollars which was 0.4 percent less than in 2010. Consumerist magazines were at the level of last year and achieved revenues of 20.1 billion dollars. Business-to-business magazines were down 0.8 percent and revenues achieved 2.2 billion dollars. Weekly magazines have fallen by 7.2 percent to 1.6 billion dollars, and local magazines have fallen by 2.9 percent to 298 million dollars.

5. The magazine industry and other periodicals in the Republic of Croatia

The global crisis of publishing was felt on publications and magazine sales in Croatia as well. In the period from 2010 to 2014, the number of titles dropped from 126 to 62, a drop of 50.8 percent. According to data presented in Table 4, the largest decline occurred in local weekly magazines. The number of weekly magazines fell from 37 to just 9, or by three quarters (-75.7 percent). Travel, IT and design are very heterogeneous groups and are difficult to assess how precise the data is that tells us that the decline in sales was only 8.7 percent. However, it is interesting to note that out of eleven magazines that have stopped with printing, six were in the field of IT technology. Male and female magazines recorded approximately the same drop in the number of titles and in 2014 had approximately ten titles.

Health and family and politics and the economy recorded the lowest percentage drop. These two groups are interesting also because of the different trend movement. The group of Health and Family magazines presented an increased readership compared to the previous year, 2011 and 2012. This trend was not shown in any of the other groups of magazines. Display in Figure 3. The group of Politics and Economy magazines, despite the decline of eight to six titles, showed a growth trend in the number of readers from 2013 to 2014. The segment of magazines for Children and young people dropped titles by 50 percent. This trend was accompanied by a decrease in readership.

Table 4. Type and numbers of magazines on Croatian market (2010 – 2014)

	Croatian magazines market			
Type	2010	2014	+/-	%
Local	37	9	-28	-75,7
Travelling, Planning, IT	23	12	-11	-8,7
Women's	19	10	-9	-47,4
Men's	17	10	-7	-41,2
Health and family	16	12	-4	-25
Politics and Economy	8	6	-2	-25
Kids and Teens	6	3	-3	-50
Total	126	62	-64	-50,8

Source: Ipsos Puls (own illustration)

6. Average readership according to the type of publication

Readership by type of publication, is divided into four categories: monthly, bi-weekly, weekly and other periodicals. The greatest readership in 2010, on the Croatian market, was achieved by monthly newspapers with a 34.8 percent market share. They were followed by weekly newspapers with 29 percent, and bi-weeklies and other periodicals which had 8.9 and 7 percent of the readership. Preview in Figure 1.

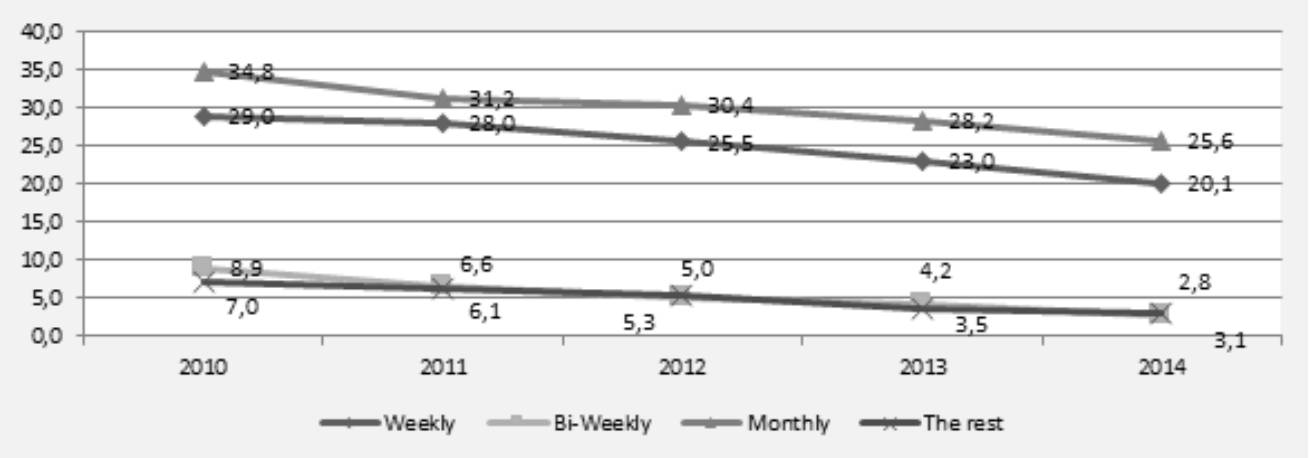

Figure 1. Croatian print market / average readings

Source: Ipsos Puls (own illustration)

All magazines in the Republic of Croatia showed a drop of readership from year to year. The downward trend was accompanied equally all types of publications and, in 2014, monthly magazines were top-ranked regarding readership with a 25.6 percent market share, and in second place were weeklies with a 20.1 percent market share. An exchange in places in 2014 occurred between bi-weekly magazines that have fallen to a 2.8 percent market share and are now in last place. In front of them are all other publications with 3.1 percent market share which were in last place in 2014.

According to declining readership every year, the biggest decrease in readership in the input observation year, 2010, had a bi-weekly with a decrease in comparison with 2009 by 26 percentage points. Likewise, the biggest decrease in readership was made by bi-weekly magazines in the last period of observation, with a decrease of 36 percentage points in 2014 compared to 2013. A decrease of 36 percentage points, compared to a decrease of 16 percentage points recorded by other periodicals, bi-weeklies have fallen to last place in terms of the share of readership with a 2.8 percent share. Preview in Figure 2.

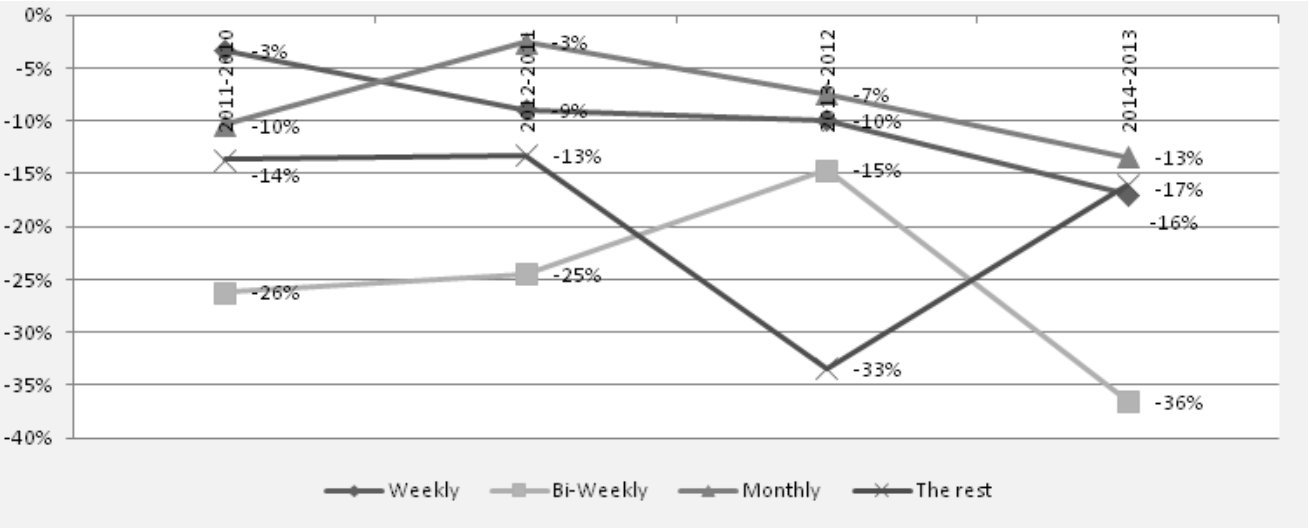

Figure 2. Change of readings / yearly

Source: Ipsos Puls (own illustration)

Weekly magazines had a readership decrease of 3 percent in 2011 compared to 2010, and then the trend of decreasing readers began; 9 percent in 2012, 10 percent in 2013, and a further increase in the fall of 17 percent in 2014 compared to 2013. The readership of monthly magazines decreased by 10 percent in the input observation period, but in 2012 compared to 2011, it fell by 3 percent, which was the smallest decline in readership of all other types of publications. This recovery was immediate and in future periods, readership continued the downward trend. Seven percent in the next period and 13 percent in the last period.

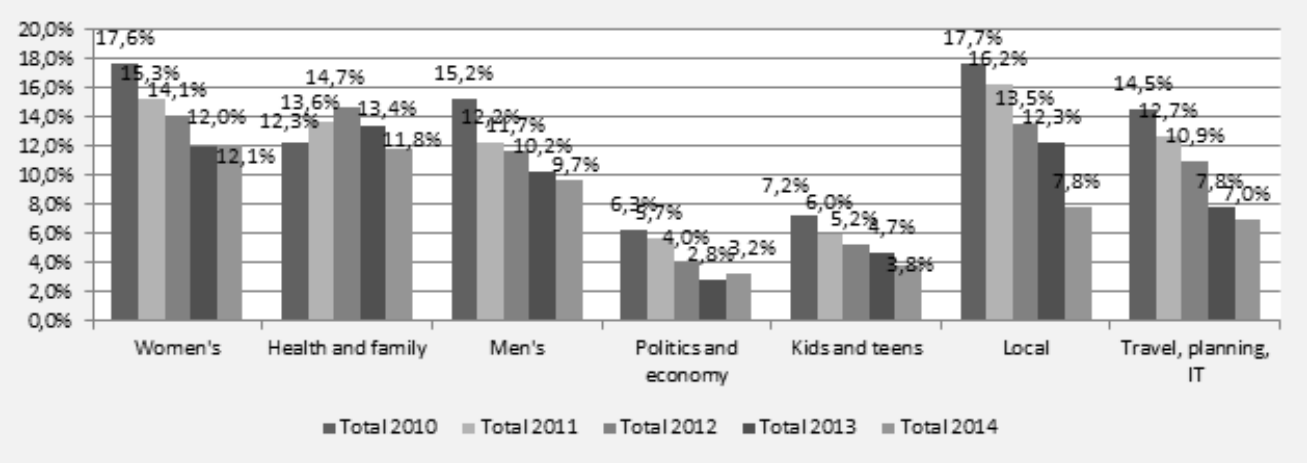

Figure 3. Change of readings / types
Source: Ipsos Puls (own illustration)

According to the types of magazines, all groups followed the trend of decreasing readership. A preview of readership is shown in Figure 3. All groups, except Health and family had a falling trend in readership. Still, there are significant differences between the trend of individual segments of the market. Homogeneity of trend shows the last three groups of magazines in Figure 3. Groups of magazines Children and Youth, Local magazines and Travel, Ordination and IT, have negative trends in readership. In addition, in the groups Local and Children and Youth have the biggest decline in titles in the reporting period.

The negative trend in readership was stopped in Women's magazine. Throughout the period, nearly half of the titles disappeared from the market, and the negative trend in the number of readers stopped and showed signs of a market recovery. The group of Men's magazines has a similar trend, but a negative trend has still not stopped. The group Health and Family had gradually different readership trend of the entire group. While other market segments fell, magazines from the group Health and Family increased their readership in the first three observed periods, and then the negative trend in readership began. Magazines Politics and economy stopped the negative trend, but in this group the results should be interpreted with caution because of the prominent domination of subscription sales rather than the retail sales network.

7. Publication sales of magazines

The largest sales were realized by monthly magazines, followed by weekly magazines. The movement of the trend of sales largely coincides with the trend of readership. With monthly magazines we have an increase in circulation in 2011 and a reduced downward trend in the number of readers. After that is the trend of falling circulation similar to the trend of falling readership. Weekly magazines follow a continuous downward trend in circulation, which coincides with the trend of falling readership. Preview in Figure 4.

Bi-weekly magazines recorded a slight decrease until 2013, when the sales circulation increased. In the last reporting period, we again have a drop of sales in circulation for bi-weekly magazines.

Other magazines or other periodicals recorded a slight increase in sales in 2011, and then this was followed by a general trend of falling circulation for magazine.

The analysis of movement of the circulation of other periodicals should be separated from the analysis of other interesting magazine publications for two reasons. The first reason is their periodic characteristics of publishing that does not involve firmly established dates. And second, often the purchase of such issues

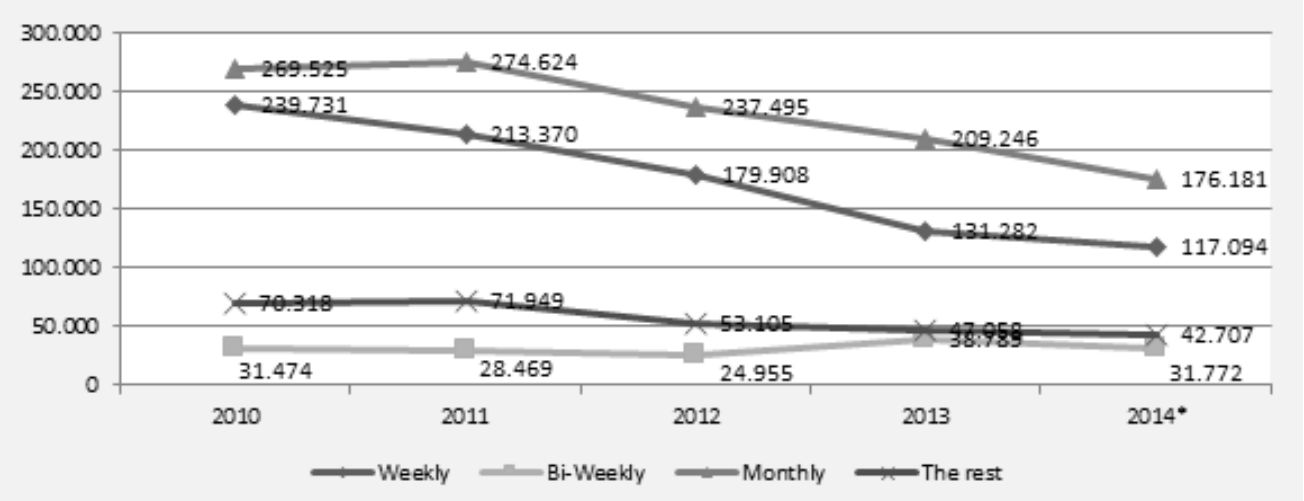

Figure 4. Croatian magazines market trend 2010 – 2014
Source: Ipsos Puls (own illustration)

is with other printed issues so the size of their circulation, sold as an individual copy, is very uncertain.

8. Gross advertising space in magazines

Already in the 19th century, advertising space became a significant source of income for magazine publications. Modern magazine industries achieve more than half of the revenue of publishing from advertising. The leaders of this are consumerist magazines who are oriented towards special segments of the consumer or the public, and equally-developed ad collection techniques are also used in the business or business-to-business magazines.

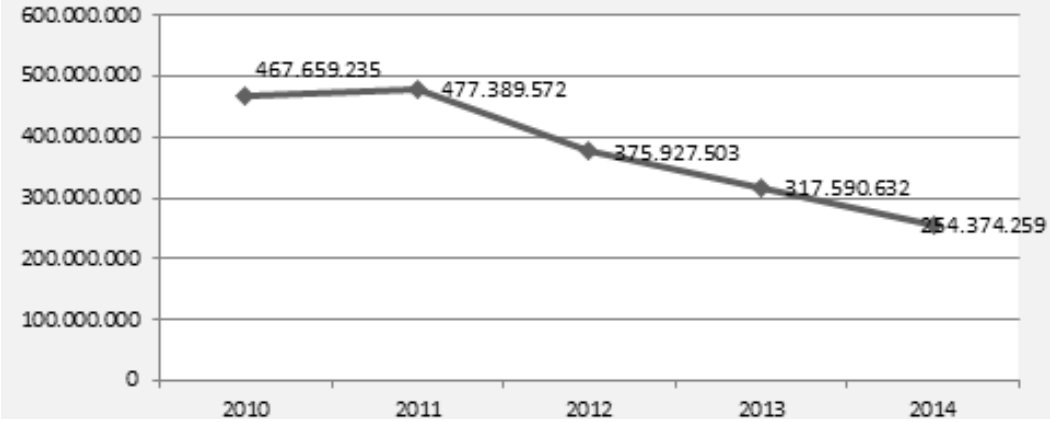

Figure 5. Gross advertising space in magazines 2010 – 2014
Source: Ipsos Puls (own illustration)

The size of the gross advertising space, measured according to the reported prices of the publisher, had an average negative trend in the reviewed period. Preview in Figure 5. Total revenues in the Croatian newspaper industry grew from 2010 to 2011 by just over 10 billion kunas. The increase in the value of the advertising space corresponds to an increase of sales of the monthly editions, but does not correlate with the sales of other types of magazine editions. At the end of the previewed period, the size of advertising space does not show signs of significant recovery. It is obvious that the global financial crisis and the recession in the economy in Croatia have left significant effects on the volume of advertising in the media industry.

9. The movement parameters of the magazine industry and periodical publications

The average readership of Croatian magazine editions, from 2010 to 2014, fell by an average of 21 percent. The market of weekly magazines, which achieved the highest revenues, recorded a decrease in readership by 34.2 percent. In the other three categories, the decrease in readership was even greater, with the largest drop recorded with bi-weekly magazines with a 69.8 percent drop in readership. Preview in Table 5.

Table 5. Average magazines readings in Croatia

Average magazines readings in Croatia (2010 – 2014*)					
	2011 vs 2010	2012 vs 2011	2013 vs 2012	2014* vs 2013	2014*vs 2010
Weekly	-3,3%	-8,9%	-9,9%	-17,0%	-34,2%
Bi-Weekly	-26,2%	-24,5%	-14,6%	-36,5%	-69,8%
Monthly	-10,4%	-2,6%	-7,5%	-13,4%	-30,0%
The rest	-13,6%	-13,2%	-33,4%	-16,1%	-58,1%
Total	-6,1%	-3,3%	-3,7%	-9,9%	-21,2%

Source: Ipsos Puls; own illustration (2014* - from January to October)

According to indicators of distribution by magazine groups, only the group Health and Family marked an increase in readership in two consecutive periods, 2011 and 2012, followed by decline in readership in the following periods. Women's magazines are showing signs of recovery in the share of total readership as a result of the disappearance of a large number of other magazines from the market. The average number of readers of women's magazines fell the entire observed period, and the average overall decrease was 34.5 percent. Men's magazines showed similar trends as well as Women's, but the average total readership decrease was even higher, amounting to 39.3 percent.

All other groups recorded decreases in readership from year to year, and a total at the level of the previewed period marked a decrease by 50 or more percent. Preview in Table 6.

Table 6. Trend of average magazines readings in Croatia by type

Average readings by type (2010 - 2014*)						
	2010	2011	2012	2013	2014.*	2014.* vs 2010.
Woman's	651.860	566.611	522.464	445.592	427.286	-34,5%
Health and family	454.256	504.692	543.301	495.008	417.504	-8,1%
Men's	562.255	449.707	431.628	378.240	341.445	-39,3%
Politics and Economy	232.516	212.258	148.847	105.088	111.229	-52,2%
Kids and Teens	266.720	220.449	193.748	172.550	135.507	-49,2%
Local	655.198	599.321	499.898	454.781	273.720	-58,2%
Travelling, Planning, IT	537.587	470.890	404.216	287.985	246.941	-54,1%

Source: Ipsos Puls; own illustration (2014* - from January to October)

The data that should particularly concern publishing organizations is the decrease of sales for weekly magazines by 51.2 percent in the period. The decrease in sales of weekly magazines is greater by nearly 20 percent from the decrease of readership and almost 30 percent higher than the decrease in the overall level of readership for all magazine editions. In addition, the decline in weekly magazine sales is greater by 11.4 percent of the total decrease in sales of all other kinds of weekly magazines. If we take into account how weekly magazines generate the most sales revenue, the question remains how will the reduced income from weekly magazine sales reflect on their further production and the production of other magazines and daily publications.

Table 7. Trend of average magazine's circulation

Trend of average magazine's circulation (2010 2014)					
	2011 vs 2010	2012 vs 2011	2013 vs 2012	2014* vs 2013	2014* vs 2010
Weekly	-11,0%	-15,7%	-27,0%	-10,8%	**-51,2%**
Bi-Weekly	-9,5%	-12,3%	55,4%	-18,1%	0,9%
Monthly	1,9%	-13,5%	-11,9%	-15,8%	-34,6%
The rest	2,3%	-26,2%	-11,4%	-9,2%	-39,3%
Total	**-3,7%**	**-15,8%**	**-13,9%**	**-13,7%**	**-39,8%**

Source: Ipsos Puls; own illustration (2014* - from January to October)

According to data in Table 7, bi-weekly magazines only achieved an increase in sales of 0.9 percent, but it should be emphasized that in the middle of the period of 2013, two new magazines appeared, which raised the overall level of sales for bi-weekly magazines. Their share of the market, in 2013 and 2014, is at 20 percent, and the total circulation decreased already in the second year. The sales circulation of monthly magazine and other periodicals marked a decrease in circulation sales at the average for the entire industry.

Table 8. Average magazines gross market space

Average magazines gross space				
2011 vs 2010	2012 vs 2011	2013 vs 2012	2014* vs 2013	2014* vs 2010
2,1%	-21,3%	-15,5%	-19,9%	-45,6%

Source: Ipsos Puls; own illustration (2014* - from January to October)

The analysis of market trends of magazines would not be complete without examining the trends and business activities related to the collection of advertisements and selling advertising space. While the trend of total magazine sales decrease year after year, in the reviewed period, revenues from advertising have recorded growth in the first reviewed period. Table 8 shows the results of the analysis of movement of the total gross advertising space. Data processing is shown in Figure 6, but here it should be stated that the collected and processed data represent the sum of the inventory of all newspaper publishers, including the publishers of the magazines, because gross advertising space is not recorded only in magazines. Regardless of the partial data inaccuracy, because the data relates to newspaper publishing companies as a whole, not just the magazine editions, the trend shows a decrease in the total gross advertising space from 2011 until the end of the period. The decrease in total gross advertising space is 45.6 percent, with a further downward trend. We can see an obvious correlation between decreasing readership, decreasing circulation and the decrease in gross advertising space in the printed editions.

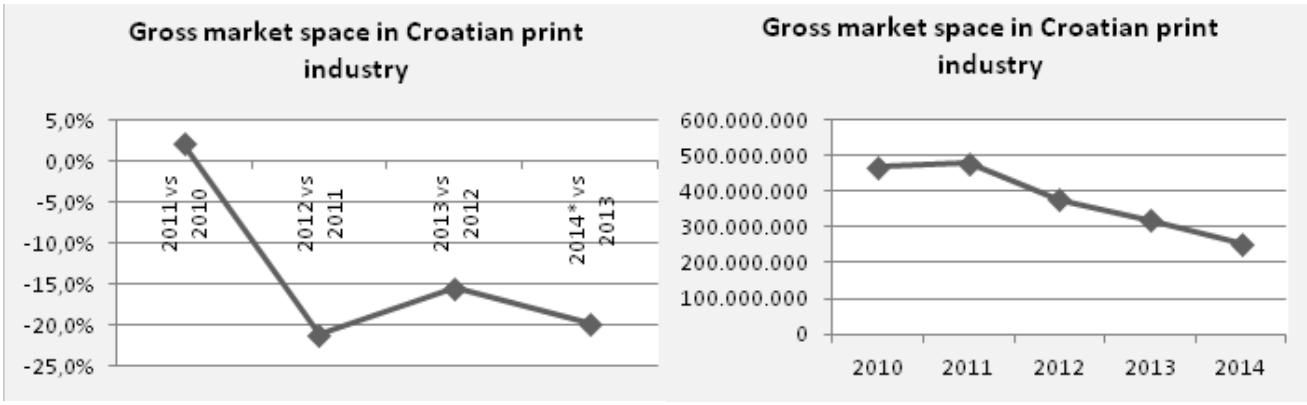

Figure 6. Gross market space
Source: Ipsos Puls; own illustration

Table 9 shows a short recapitulation of the most important results obtained from the analysis of data on the Croatian industry of magazines and other periodicals. The total weekly readership was decreasing year by year in the reviewed period, and the overall decrease in readership was 34.2 percentage points. The decrease in the level of readership of the entire magazine industry is 21.2 percentage points, which is less than the fall of weekly magazine readership, but here two new bi-weekly magazines entered the process which repaired the average of bi-weekly magazines as well as the overall average. The biggest decrease of all presented results was by the sales of weekly magazines, which can be particularly concerning for the owners of publishing organizations. The decrease in sales at the level of the whole industry is less than the decrease in sales of weekly magazines, as well as by the decrease in gross advertising space.

The gross advertising space grew in 2011, although all other parameters decreased. Already in the second reviewed period, in 2012 compared to 2011, the gross advertising space decreased more than all the other parameters analyzed.

Table 9. Recapitulation of the most important results (Own illustration)

Recapitulation of the most important results					
	2011 vs 2010	2012 vs 2011	2013 vs 2012	2014* vs 2013	2014*vs 2010
Weekly (readings)	-3,3%	-8,9%	-9,9%	-17,0%	-34,2%
Total (readings)	-6,1%	-3,3%	-3,7%	-9,9%	-21,2%
Weekly (circulation)	-11,0%	-15,7%	-27,0%	-10,8%	-51,2%
Total (circulation)	-3,7%	-15,8%	-13,9%	-13,7%	-39,8%
Gross market space	2,1%	-21,3%	-15,5%	-19,9%	-45,6%

This downward trend continues until the end of the reviewed period. Gross ads are decreasing faster than the decrease in total readership and decrease of total circulation sales. This result is even worse if we take into consideration two very important factors: 1) a decrease in gross advertising space is linked to the level of all publishing organizations, which means that the problem will spill over to other products from which funds could be drawn in order to cover insufficient revenue from the ads that have appeared in magazines and 2) the gross advertising space is calculated according to the amount of space reserved for ads by a price that is defined at the beginning of the business period; from this we can conclude that the decrease in revenue from ads will be even greater because the publishers try different rebates to attract advertisers in order to partially reduce the losses on advertising space.

10. Conclusion

The global financial crisis has left a mark in the media industry. The publishing part of the media industry already at the end of the twentieth century entered its mature phase, and with full digitization of production and distribution of content, the rate of decrease in the circulation of printed editions have increased faster than decreased readership. The market in North America was pounded with the pace of change in the media industry, and due to this it was the first to reach the saturated phase of the publishing segment. With the start of the global crisis, the decline in circulation and a drop in revenues from advertising in printed media, the fate of modernist segments of the media industry were left bare. The circulation of printed newspapers and magazines is marked with red markers.

The process of transformation of print to digital editions, due to declining demand for printed publications, has not been completely copied to the Croatian market. Printed editions have followed global trends of decrease but have failed to develop the growth segment of the digital market. Revenue from digital editions is completely absent, and the real reason for this situation is the subject of other research. The industrial era has set new requirements also to scientists who explore and analyze the media market. Digital publishing and revenue from web advertising can no longer be collected and analyzed with the help of existing instruments of professional and scientific approach.

The first hypothesis; the markets of printed magazines in Croatia followed the global downward trend in circulation, and we can fully accept this with the amendment that a positive assessment can be given to the part that refers to printed editions. The fall in the number of readers of magazines, which expanded globally, confirmed the trend in the Republic of Croatia as well. Within four observed years, magazine readership has dropped by 21.1 percent, while the decrease in sales was 39.8 percent. The decrease in sales was much higher than the decreased readership which was also a global trend. The difference between the Croatian magazine market in relation to the most developed markets is reflected in the absence of income from digital editions. While in developed markets, one part of revenue is compensated by digital publications and other forms of income related to the sale of content on multiple platforms, the media market in Croatia has fallen asleep and did not develop in this direction. In regards to this, there is even no scientific research that would shed light on the distribution platforms through which the public accesses content.

The second hypothesis, which refers to the importance of sales of advertising space in printed media, has been confirmed in its entirety. The decrease in revenue from advertising in magazines was 45 percent. Since the data are taken as a gross amount, and the correct information about specific contracts with clients cannot be accessed, with absolute certainty we can conclude that the decrease in revenue was

greater than specified. During the reviewed period, a large number of magazines and periodicals stopped publishing which is directly related to the lack of advertising revenue. The largest decrease was in the number of titles recorded by local magazines, and then magazines for children. We can conclude that advertisers, who have felt the effects of the global financial crisis, were least interested in advertising in media that gives the least indirect returns.

The readership of magazines on a global level slows the decrease trend. The sales of printed editions, in part, are trying to make up with subscriptions to digital editions. Coming out of the recession, there is an increase of advertising revenues. These trends do not spill over to the market of magazines in Croatia. The decrease in readership is constant. Sales fall faster than the number of readers and advertisers are thinned out with further potential withdrawal from advertising. The transformation of the magazine industry in Croatia does not show positive signals.

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HRVATSKO TRŽIŠTE TISKANIH MAGAZINA I PERODIKA: TRENDOVI PADA NAKLADA NA TRAGU GLOBALNOG PADA TISKANIH IZDANJA

Sažetak

Cilj je ovog rada analizirati trendove na hrvatskom medijskom tržištu, u sektoru magazina i drugih periodika. Globalno medijsko tržište u sektoru tiskanog nakladništva, bilježi pad naklada već duži niz godina. Najveće na-

cionalno tržište na globalnoj razini, ono u SAD-a, prvo je osjetilo krizu novinskog nakladništva, magazina kao i drugih oblika tiskanih medija.

Trend pada tiskanih naklada proširio se na globalnoj razini, a posebno nakon sloma nekretninskih fondova i globalne financijske krize. Takav trend tiskanih naklada nije zaobišao ni Republiku Hrvatsku te je sve to dovelo izrazitog pada naklada, kao i bankrota dijela nakladnika i izdavača. Konvergencijom ukupne medijske industrije, a time i nakladništva, pad prodanih naklada tiskanih medija, jednim dijelom se nadoknađuje pretplatom na digitalna izdanja. Analiza hrvatskog tržišta tiskanih magazina pokazuje trend stalnog pada prodaja što je u skladu sa globalnim trendovima, a istovremeno ne ostvaruje dodatne prihode kroz monetizaciju sadržaja u digitalnim izdanjima.

***Ključne riječi**: medijska industrija, nakladništvo, financijski menadžment, magazini, postindustrijsko razdoblje*

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CYBER SURVEILLANCE IN BOSNIA AND HERZEGOVINA FROM THE PERSPECTIVE OF CYBER SECURITY PROFESSIONALS IN B&H

Professional paper

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Abstract

This paper project is about the issues concerning cyber surveillance in Bosnia and Herzegovina (B&H). It is an attempt to put into perspective the current status of cyber space and its surveillance, the issues at hand from a perspective of pioneer cyber security experts attending the master's program at the American University in B&H. It is an effort to answer the following questions:

1. *Is there any cyber surveillance in B&H?*
2. *What are the main struggling issues and challenges in B&H?*
3. *The perspective of cyber security and surveillance in B&H?*

Keywords: *Cyber surveillance, cyber space, critical infrastructure, Cert, security*

Introduction

In this project paper, we will try to answer the main questions proposed by a group of student working together in finding the right answers. The questions are:

1. Is there any cyber surveillance in B&H?
2. What are the main struggling issues and challenges in B&H?
3. The perspective of cyber security and surveillance in B&H?

First of all, keep in mind the fact that all involved in this project feel the need to develop a cyber-security strategy on a state level in B&H, and with that regard, the issue of cyber surveillance.

Starting at the point of the definition of cyber surveillance, we will try to answer the questions, propose concrete solutions and steps to be taken with a goal of reaching a solution for proper definitions of rules and regulations for the development of cyber surveillance in B&H according to the needs of the cyber space of which B&H is a part of.

Cyber surveillance has different motives and goals, especially when we take into consideration the world's super powers, but in this paper we will concentrate on the need to provide surveillance on a state level with the intention of protecting the common user and the critical infrastructure in B&H.

1. Definition of cyber surveillance and its uses

Cyber surveillance is a mechanism for the surveillance of persons, objects or processes that is on new technologies and that is operated from and on data networks, such as the Internet. Its purpose is to facilitate surveillance, in keeping with the quantity, rapidity or complexity of the data to be processed. As with surveillance as a whole, it refers to gathering and analysis of information in the persuit of various finalities-in particular, preventing cetain risks, orienting human behaviour and in the vent of a problem, locating the persons responsible. [1]

Cyber surveillance as is the case with any other surveillance, can be motivated with a number of various reasons. Nation states use surveillance methods to prevent the potential risks that might endanger a countries Critical Infrastructure (CI), to prevent and reveal crime and the persons involved in it. States are also using surveillance to gather information to prevent terrorist attacks, and sometimes to invade you privacy without your consent (this of course is hard to prove). It could be used for espionage, preparation for an attack of a criminal activity and etc. All of the mentioned can be and is used in cyber surveillance. Just to emphasize, cyber surveillance does not recognize physical boundaries of geo-locations and countries. When you connect to the internet, you never know which server you are using, for example when you access Facebook or for that matter, any web lo-

cation, or online service. This is one of the major reasons why cyber surveillance is a mulita disciplinary subject with very exciting rule-less environment.

Even though several countries like the USA, Germany, China, and Russia are trying to take control, it is impossible to do so. The rules and regulations we have in the physical world, simply do not apply to the cyber space. But still, countries are able to provide services in order of protecting their CI and their way of living, but it is a constant struggle to fight off all the challenges of the cyber world. This paper will concentrate on the creation of a positive environment of cyber security and cyber surveillance with all legitimate and noble intentions of protection of B&H citizens and the countries CI with the supporting entities.

2. Is there any cyber surveillance in B&H?

In the attempt to answer the first question, we have to look at the situation we have on the ground. Working from the smaller fragments up to the global view, we can start with the industries. First of all most of the industries and businesses in B&H have governing regulatory bodies which enforce rules with the intent of protecting the CI of a certain industry.

First of all we have the Internet Service Providers (ISPs) and the telecommunication companies, which provide the services of connecting to the cyber realm to their users. In B&H the governing body for these industries is the Regulatory Agency for Communications (RAC). The Bosnian RAC follows the general rules of the EU, since B&H is attempting to meet the EU standards. This is the case, because B&H has the goal of becoming a full member of the EU family. Other reasons are motivated by the geographical location of the country and its need to cooperate with the neighboring countries.

The ISPs and the telecommunication companies, are using their in-house cyber surveillance tools which are mandatory and as such enforced by the RAC for the companies and businesses in these fields of the industry , and if they do not meet the regulations, their license to operate will be terminated. Using different kinds of software tools to monitor the services and users they provide, the companies involved must report to the RAC. Besides the RAC, ISPs and telecommunication companies must cooperate with the state governing bodies, the police and other security agencies.

The information which they collect is provided to the state bodies and security agencies, mostly based on the court order.

The police and security agencies, which in B&H form a web of forces form Cantons, Entities and the state agencies. Both the Ministries of interior of Republic of Srpska and the Federation of B&H, try to cooperate on a local level with the intent of fighting crime. The police and security agencies, have established international connections and cooperate with other security bodies on an international level. For example, both of the ministries of interior are known for their cooperation with the American Federal Bureau of Investigation (FBI).

Unfortunately, the mentioned do not have a state monitoring body which conducts surveillance in order of prevention. Most of their efforts are triggered when a cyber-incident occurs.

The financial sector and Banks, are a very popular target for cyber-attacks. With the development of online services for Banks, online payments and the user of payment cards, have shown to be a very lucrative goal for cyber-attackers. It is because of this that the Federal Banking Agency and the Banking Agency of RS, have enforced rules and regulations for financial institutions, for cyber surveillance with the intent of preventing and discovering cyber-attacks and incidents which could lead to loss of data and money. These rules are enforced through the provisions of the Decision of Minimal Standards on Management of Information Systems in Banks [2], [3].

The standards cover major issues in respect to the protection of ICT systems in Banks, providing guidance on preventive measures and internal and external cyber surveillance on users and clients.

The most popular tool for conducting surveillance is the Security Information and Event Manager, called the SIEM. The controls are conducted by an independent body called the Information Security Officer (ISO). The ISO's job is to coordinate activities using surveillance methods for fighting and preventing cyber incidents. The ISO should work with the authorities and the Banks management board in order of maintaining control and enforcing preventive and reactive measures towards potential and executed cyber-attacks.

The trend in B&H is for any major organization to have an ISO, which is the case for organizations which control the CI. For example this is the case with electric power companies in the country.

Besides the mentioned, the ISO in an organization also must play by the rules of the national law on the Protection of Personal Data in B&H. Along with the Personal Data Protection Agency of B&H, the ISO surveilles the handling of databases and storages containing personal data for their protection in accordance with the law. This is a point where ISOs play the role of Personal Data Protection Officers in organizations. [4]

Still the only puzzles missing in order of full national oriented cyber security with cyber surveillance as part of it are the National Cyber Security Strategy (NCSS) and the national Computer Emergency Readiness Team (CERT).

So it is safe to say that there is to some extent in existence of cyber surveillance in B&H, but there is no governing body on the national level. B&H is the only country in Europe that does not have a national CERT.

3. What are the main struggling issues and challenges in B&H?

Cyber security experts in B&H are in most cases left to fight the challenges alone. It is only in the case of a cyber-incidents occurrence that other parties might get involved. The major issue is setting up cyber surveillance to prevent, assist and properly educate all in the fight against cyber treats on a national level in B&H. As mentioned before, B&H is the only country that does not have a national CERT. So we are left without guidance and assistance in the challenges we face every day. Along with the mentioned another problem evolves since it is very hard to ask for assistance on an international level, because only national CERTs are playing the role of a national point of contact.

On the other hand groups of enthusiasts have created communities where they share valuable experiences, information and knowledge which has given some results. Now we have a Cyber Security Center for South East Europe (SEECSC). Goals of this center is explained in the following: The SEECSC offers quality cybersecurity education, research, and services to overcome the region's challenges of securing and protecting the cyberspace. Our primary goal is to bring valuable projects to enhance region's capability in cyber security and further cyber security-related research and education activities in the region. [5] It is important to note that SEECSC is an international initiative coming from B&H, but including the countries of the region. (Croatia, Serbia, FYR Macedonia, Montenegro and Albania)

The financial sector with Banks in B&H has showed the initiative to cooperate on a national level where valuable information will be shared. It is not a secret that one of the goals is to create a CERT for financial institutions. As this paper is being written, the initiative has been passed to the Union of Banks in B&H (UBBiH). Banks from every part of the country want to be a part of this initiative, since the need has been discovered for a governing body on a national level. Since most banks in B&H are international banks, the realization of this initiative will also produce cooperation on the international level as well. Some international exchanges have are already been made with efforts to prevent cyber incidents which some countries in the region have experienced.

The third initiative is from the Ministry of Security in B&H, which has passed the initiative for the establishment of a national CERT to the respective government bodies. Unfortunately, the politicians in B&H do not see the global picture and this initiative is very slow in realization. But still we hope that it will see the light of day.

So the answer to the question at hand is that there are several struggling points to realize ideas on a national, state level, but progress has been seen in the last couple of years. As long as there are people fighting to reach the mentioned goals, there is hope.

4. The perspective of cyber security and surveillance in B&H?

Cyber security and cyber surveillance along with it is a new and young multi-disciplinary science in B&H. From the perspective of cyber security pioneers in B&H, we feel that there are several challenges and battles to be fought and overcome. The constant problem being mentioned in this paper is regarding national level activities and the lack of support.

One of the goals of this paper was to show that cyber security has a bright perspective in B&H like in every other country of the world. The constant growth of use of internet and its services, creates the need and motive to stay in the fight for this science.

Just the fact that this paper is being written as a part of a Master's program in cyber security, shows that steps are being taken in the right direction every day. The steps might be small, but they are significant.

B&H has a national strategy of becoming an EU member, which can be seen as a light at the end of a tunnel in the aspect of government involvement in the process of creating all the need tools, laws and regulations for a cyber-security 'aware' country. We hope that major improvements will be made towards reaching the mentioned goals, and that it will not be a case of reaction to a major cyber-security incident. This was the case with many other countries, and we hope that a national CERT and supporting cyber security tools will not be triggered by a serious incident.

Many cyber security specialists have left the country, leaving the fight behind in B&H, while proving to be very good at cyber security. This trend has had a fall in the recent years, since people in B&H are becoming more aware of the need for professionals in the fields of cyber security and information security.

We have a growing mass of security specialists taking up the fight to achieve goals which other countries have overcome in a much easier manner. The time has come to make the final push towards national level activities, and if the government won't make it, the industries and other levels of organizations will.

Maybe the steps taken in B&H towards cyber security are being taken from the inside out, but they are being made.

To conclude all of the mentioned, the perspective of cyber security and cyber surveillance in B&H is a bright one. All of those who know how the government apparatus is slow in B&H, might think otherwise, but it is our goal to prove them wrong.

5. Conclusion

Cyber surveillance to some extent exists in B&H. It is mostly driven by the private sector, but nevertheless it exists.

The challenges are being assessed and positive results can be seen by the day. Like it is with every science, it will be a constant struggle to meet the need of cyber security as a science.

Although there are no national level bodies to support cyber security at this time, it is just a question of time, when they will be formed. It is our job to support the efforts and make new ones in the process.

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[5] http://seecsc.org/about.php#overview

CYBER NADZOR U BOSNI I HERCEGOVINI SA STANOVIŠTA STRUČNJAKA IZ OBLASTI CYBER SIGURNOSTI U BIH

Sažetak

U ovom istraživačkom radu će se govoriti o problemima vezanim za nadzor cyber sigurnosti u Bosni i Hercegovini (BiH). U radu će se pokušati staviti u perspektivu trenutni status cyber prostora i nadzora istog, postojeće probleme iz perspektive pionira stručnjaka iz oblasti cyber sigurnosti koji pohađaju master studij na Američkom Univerzitetu u BiH. Rad će pokušati dati odgovore na sljedeća pitanja:

1. *Da li postoji cyber nadzor u BiH?*
2. *Koji su glavni problemi u BiH?*
3. *Kakva je perspektiva cyber sigurnosti i nadzora u BiH?*

Ključne riječi*: Cyber nadzor, Cyber proctor, Kritična infrastruktura, Cert, sigurnost*

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APPLICATION FOR STUDY TESTS, THE DRIVING TEST IN JAVA TECHNOLOGY

Professional paper

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Abstract

Driving test is almost an obligation of modern man. Preparation for the exam and only has been legal provided. This paper describes the development and implementation of an application that allows to learn and prepare for the test exam. Treated simulation, unregulated intersections, simulation intersection with traffic lights and trams, as well as all legally prescribed tests and examination result of learning. The implementation is done in Java technology so that it is ready to install in the Internet environment as well as the desktop version.

Keywords: *test study, driving, application, Java*

Introduction

Driving schools prepare exams for study tests and driving test. Schools are interested for better quality in education in less time and no waste. Authors have interviewed many driving schools and analysed these cases of usage:

- Driving simulation
- Study tests
- Analisys of exam results

User authentication – case of usage 1. Application authentication and evidence of registered and anonymous users is made in this case of usage.

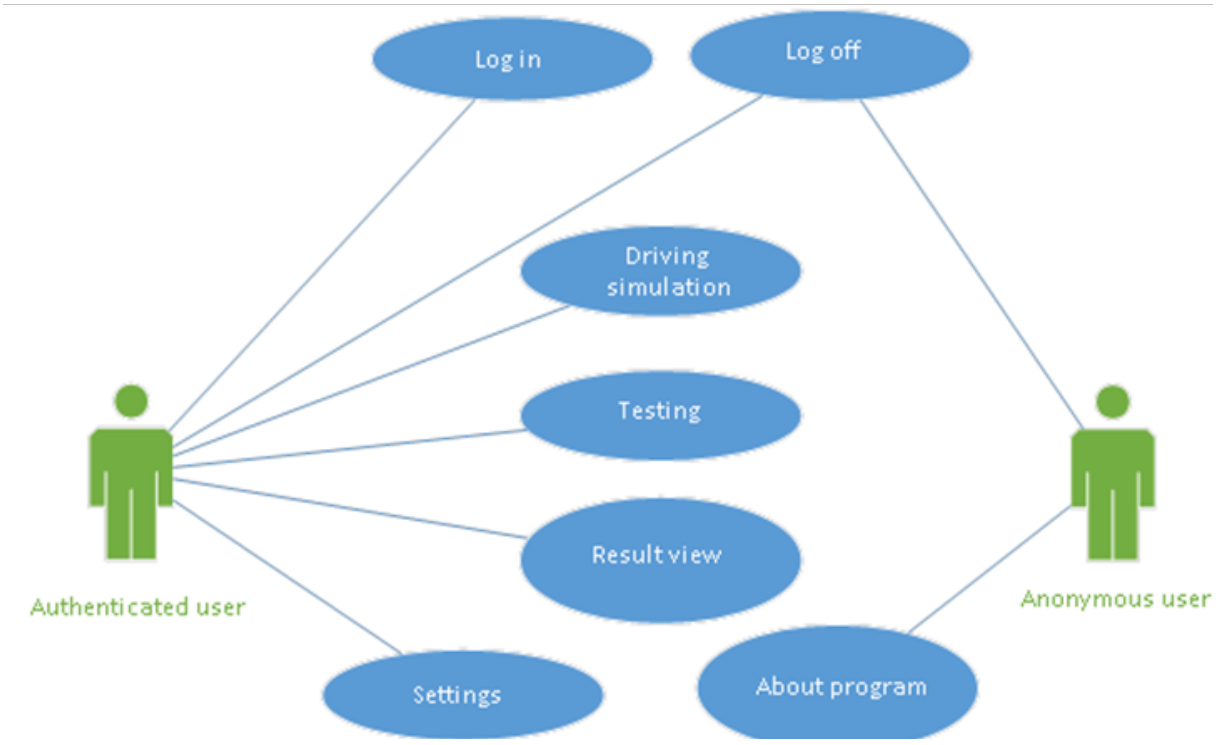

Figure 1: Regular application usage

Driving simulation – case of usage 2. Driving simulation and problem solving in traffic should let user manage situations on non-regulated crossroad, crossroad with traffic lights and crossroad with tram.

Study test – case of usage 3. Enables knowledge testing with tests made by the law, tests Test1... Test13 and Test C and Test D

1. Research

Application works under these technical conditions:

- 95% of the time online: web page must be available at least 95% of the time. Software update, hardware changes, failures and other problems should not affect this availability.
- Security identification and protected authentication: user names and passwords must not be saved to regular text fields or files.
- Protected personal user data: personal user data, such as addresses, telephone numbers and numbers of credit card must not be available to anonymous users.

Scalability: It is not yet inspected in this early stage because expected number of connected users or database size storage can not be predicted. However, architecture of the web aplication hosting place must be ready to work with scaling when great number of new users register and begins to use.

2. Problem solving

This program is built using Eclipse Software Development Kit tool. To go to the screen shown on the image below, import project „Auto Škola“ (File – Import Project and find the file). Then find „Default Package“ and open class „PrikazRezultata“ on the left side of the tool on Package Explorer.

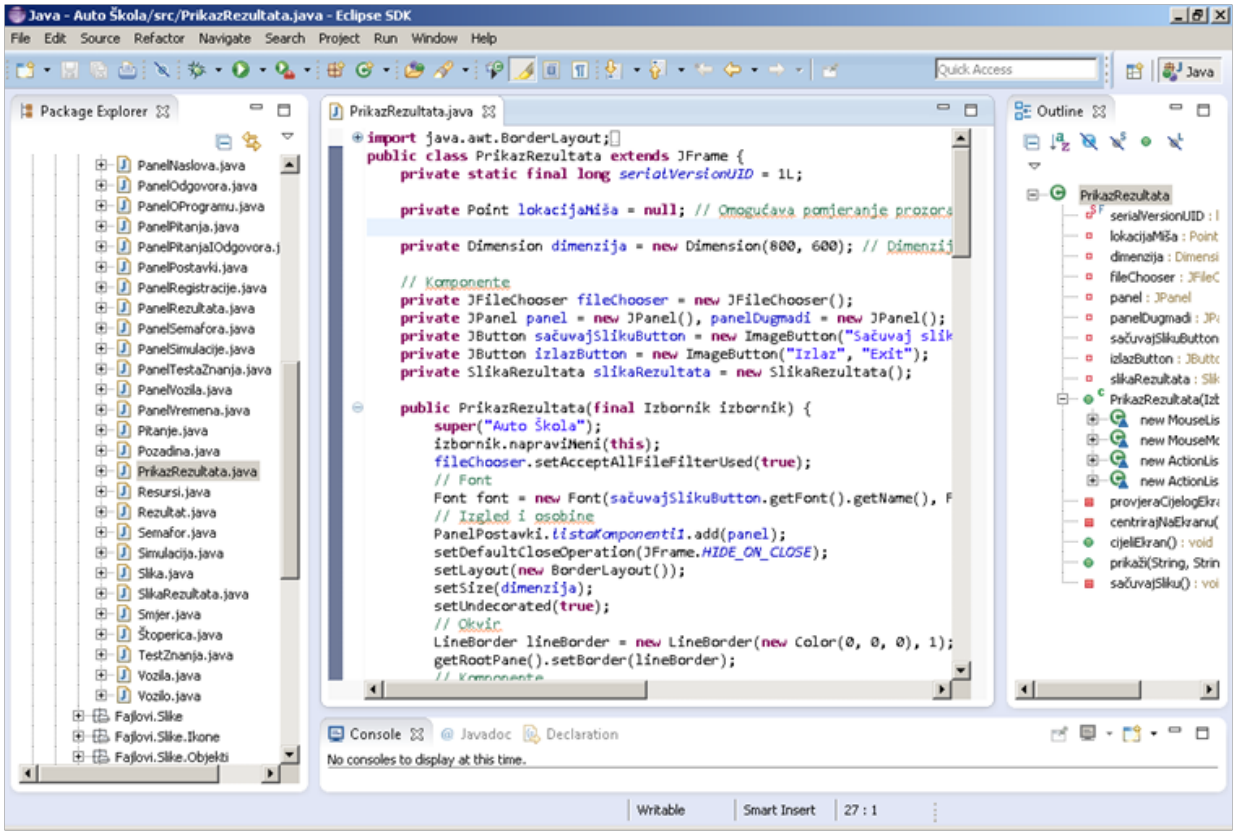

Figure 2: Eclipse Software Development Kit

Program contains 49 classes. Class *Prikaz Rezultata* (*Result View*) enables viewing of the results from the tests. Program is designed without using visual editor (component properties and layouts are made by code).

Variable *Lokacija Miša* (*Mouse Location*) enables window movement with left mouse click because window does not have control bar. *Dimenzija (dimension)* is the size of the window which is 800 pixels in width and 600 pixels in height.

Description of the components in the class:

JFileChooser is used in case if user wants to save the picture of the results.

Panel and *PanelKomponenti* (*Panel of Components*) are the background panels for components.

SačuvajSlikuButton (Save Image Button) – clicking on this button will show *JFileChooser* dialog and that is how user can save the picture of the results.

IzlazButton (Exit Button) – used for closing the current window and going back to previously opened window.

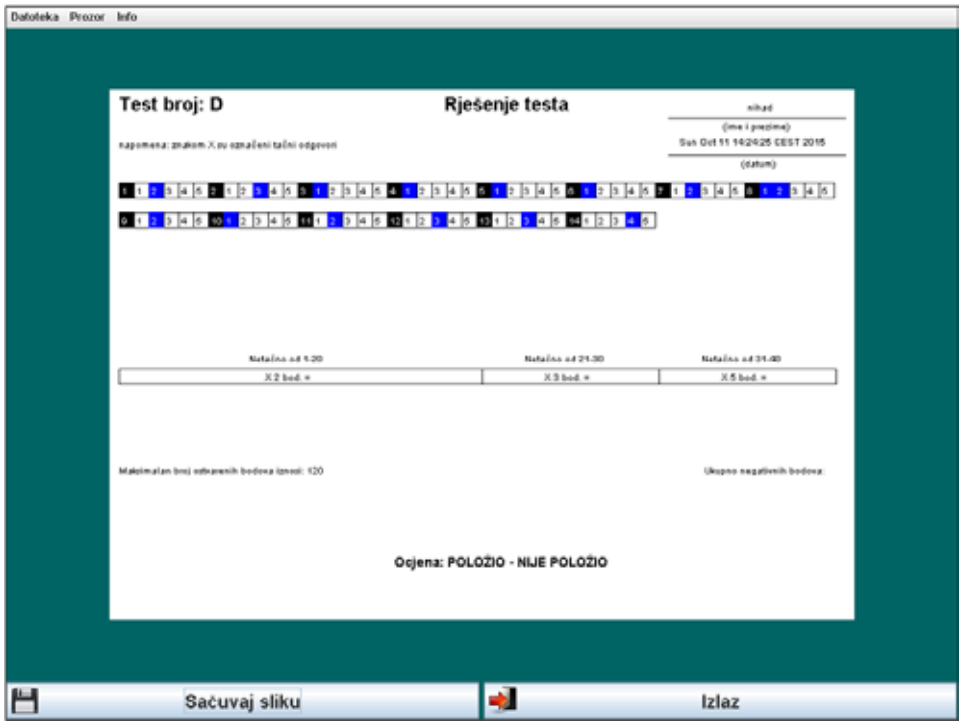

Figure 3: Results of the test

Command super („*Auto Škola*“) is added in constructor of *„PrikazRezultata“* class which is called for changing the title of the window. Command *izbornik.napraviMeni(this)* calls the function for creating window menu.

Next code shows layout, window properties, font, border...

Image of results of the test shows user name, date of the test and score. Every user can see if he has passed or failed the test.

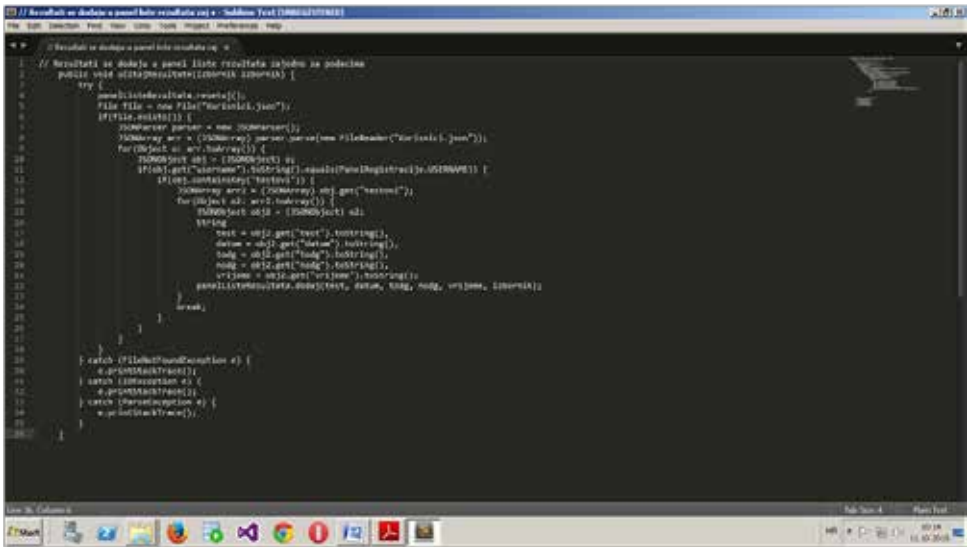

Figure 4: Function for loading user data from JSON database

The above image shows function which loads all results of single logged user from *JSON database*. Function uses class *„Izbornik“ (Menu)* as an argument which is the main form of the program. To free the program from possible errors which could make program stop responding we must use try – catch function for loading data. Errors which may show up are: *FileNotFoundException* (in case if the file does not exist), *IOException* (in case if loading of the file fails), *ParseException* (in case if the file could not be parsed to JSON format type).

The loading is free from errors which could occur so here goes the code for loading data from the file. *JSONParser* is the file parser for parsing files to *JSON data* format type. *JSONArray* is data array contained in parser when process of the parsing is completed. The goes for – each function which takes all data from the array one by one and creates structure (extraction) of necessary data for specified user.

Required data for database:

1. Test – name of the test,
2. Datum – date of the test,
3. Todg – number of correct answers,
4. Nodg – number of wrong answers,
5. Vrijeme – elapsed time.

When the process of data searching is over, found data is added to the list of the results for viewing.

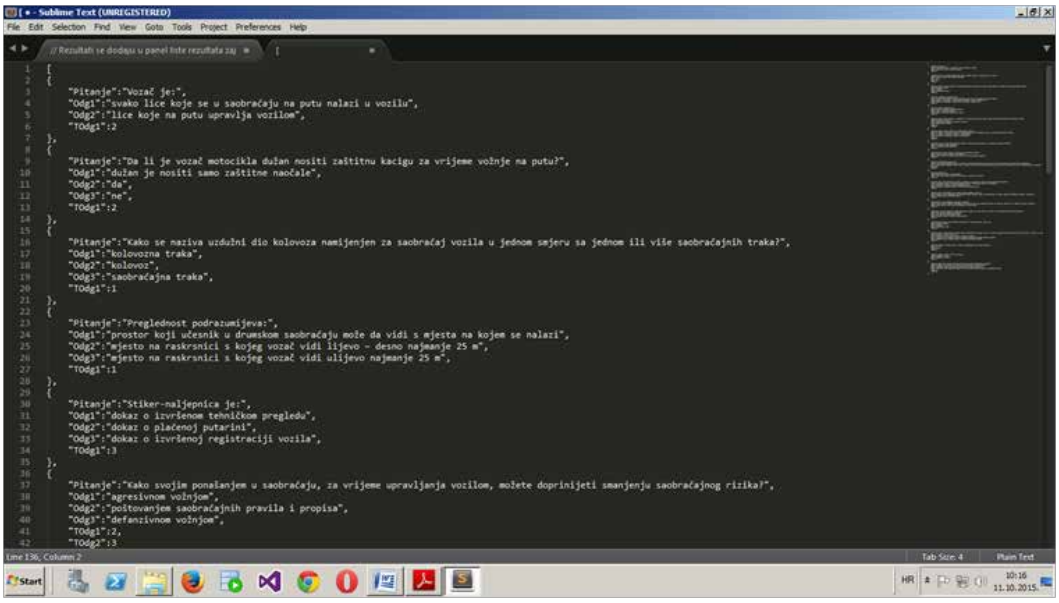

Figure 5: Primary database structure for tests

While working on this project, authors thought of using XML or JSON database type. JSON database type fits application needs better because it is more readable and data searching is faster comparing to XML database type.

All data such as user personal data and data of the tests which contain questions and answers is created in JSON database.

This picture shows one of the study test data structure. That structure contains: *pitanje (question), answers: odg1, odg2, odg3 and todg1 (correct answer).* So, every question can have more answers. Question structures are connected into one database which is an array and that array is the one group of the test. Tests can be divided to 3 groups: theoretical questions, traffic signs and rules on the crossroads.

3. Implementation

Main menu contains eight elements:

1. Simulation – opens simulation menu with settings,
2. Study test – opens study test menu which shows test names,
3. Fullscreen – toggles fullscreen mode,
4. Results – shows the list of results of the current user account,
5. Settings – options for managing graphic user interface (GUI) and account password,
6. About program – shows author information, version and other program info,
7. Log off – switching user account,
8. Exit – closing the program.

Figure 6: Application main menu

Figure 7: Crossroad with traffic lights

Explanation of how to use the simulation:

- *Brzina (speed)*: shows the vehicle movement speed which can be set from 1 to 10,
- *Dodavanje vozila (adding vehicles):* Combo-Box list shows names of the vehicles which can be added to the crossroad, user can add vehicles clicking on the arrow buttons, and clicking on x button will remove all vehicles from the cross-road,
- *Semafori (traffic lights):* click on the arrow button to change traffic light state (left – previous state, right – next state) and on *„isključi“* (turn off) option to turn off all traffic lights and vehicles will act like there are no traffic lights on the crossroad.
- *Kontrola (control):* clicking on the button which shows all directions will move all vehicles de-spite of the rules on the crossroad, clicking on the door will close the simulation window.

Every vehicle has its own id or number which is shown on the top. Press keys from 1 to 9 on keyboard to move vehicles through crossroad. If the vehicle can be moved by the rule of traffic it will be moved otherwise it won’t move through the crossroad.

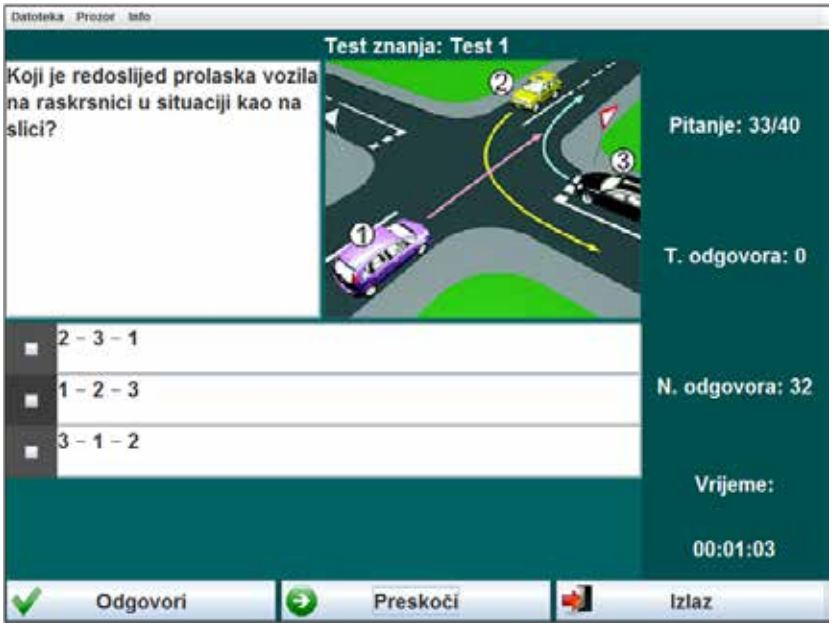

Figure 8: Study test

Test window contains question, picture (which can be showing traffic sign or traffic on crossroad), answers and test stats like number of question, number of correct and wrong answers and elapsed time.

To answer the question, user must choose correct answers and click on the button *„Odgovori" (Answer)*. Study tests may contain five answers. If user doesn't know the answer or simply wants to skip the question, he can click on the button *„Preskoči" (Skip)*. When user finishes the test, the results are writing into database so they can be viewed later.

4. Conclusion

Program for preparing and testing a study test is made in this work. Driving licence is the necessarity of everyone so this program makes learning and understanding traffic rules a lot easier. Every user can test its knowledge on more interesting way by using simulations and tests before taking the real test. This program is created in Java programming language and that made this application available to large number of operating systems (cross - platform). A lot of program improvement has come from analisys of this problem. One of the possible improvements could be work on 3D simulation and creating one virtual reality before the driver really sits in the vehicle and starts driving with the driving instructor. This area opens possibility of using artificial intelligence for simulating reality.

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APLIKACIJA ZA UČENJE TESTOVA VOZAČKOG ISPITA U JAVA TEHNOLOGIJI

Sažetak

Polaganje vozačkog ispita je skoro pa obaveza modernog čovjeka. Priprema za polaganje i samo polaganje ispita je zakoski propisano. U ovom radu je opisan razvoj i implementacija aplikacije koja omogućava učenje i pripremu za polaganje testova za ispit. Obrađena je simulacija neregulirane raskrsnice, simulacija raskrsnice sa semaforima i tramvajim, te svi zakonom predviđeni testovi te pregled rezultat učenja. Implementacija je urađena u JAVA tehnologiji tako da je spremna za instalaciju u Internet okruženju kao i desktop izvedba.

Ključne riječi: *učenje testova, vožnja, aplikacija, Java*

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MEMORY SPACE: MEMORIAL COMPLEX STARO SAJMISTE

Professional paper

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Abstract

This paper will present project for the Memorial complex Staro Sajmiste. The project is proposal for mapping this place of remembrance. Silent remembrance of Belgrade citizens, on the Holocaust which happened in the area of Staro Sajmiste, is a consequence of not facing the past. The concept of this project is based on analysis of the Holocaust, in terms of terminology and phenomenology, using the theoretical platforms which deal with the issue. The power and the violence will be shown as initiators of evil. The memorial complex will be dedicated to the memory of the Holocaust and the crimes committed in the period 1941 - 1944 in this area. The ambition is to confront the Serbian society with the void created after the twilight of civilization. The project proposes the solution for the area of the Staro Sajmiste, including the river band, as a visual signifier where the suffering of a large number of Jews, Roma and Serbs, as well as other nations occurred.

Keywords: *design, Holokaust, power, violence, memorial complex, place of remembrance, Staro sajmiste.*

1. Staro sajmiste

Belgrade remained silent at the traumatic events that have deeply entered into the collective memory of the inhabitants of this Balkan city. Dim circumvention of the awareness, transporting it to the field of silent memory, and almost forgetting it completely is a consequence of the difficulties facing the past. The difficulties come from the fact that in the area of Belgrade, called Staro Sajmiste, the Holocaust occurred. In the book – Staro Sajmiste, The Place of Remembrance, Forgetfulness and Disputes, Jovan Byford gives a thorough description of the history of the Staro Sajmiste.[1]

Sajmiste represented a symbol of technological and industrial progress, as well as a symbol of demonstration of domestic and foreign policies- circles of power. It was announcing a new era that was suddenly and traumatically interrupted by a Second World War. Ambience ensemble, had a function of the exhibition space, remained a symbol of power in the next historical phase even though the function changed. Henri-Pierre Jeudy argues that the symbolism of space is reflexive. [2]

Figure 1 – Staro sajmiste, 1936.

The bombing of Belgrade was not fatal for Sajmiste, the buildings in this area have suffered almost no damage. The area itself became a part of Croatia as a result of administrative divisions of Yugoslavia. In December 1941, Sajmiste was transformed into prison camp. Since the camp was located on the territory of NDH, and under the administration of the local command in Zemun (in German Semiln), the camp was named Judenlager Semlin.

By the end of 1941, the camp has accepted more than 5,000 prisoners, generally Jews from Belgrade and Banat.[3]

1 Jovan Bajford, Staro sajmište – Mesto sećanja, zaborava i sporenja, Beogradski centar za ljudska prava, Beograd, 2011.

2Henri-Pierre Jeudy, „Simbolička funkcija i dizajn“, Kultura i dizajn, Ješa Denegri, ur. (Beograd: SIC, 1985), 139-147.

3 Jovan Bajford, Staro sajmište – Mesto sećanja, zaborava i sporenja, Beogradski centar za ljudska prava, Beograd, 2011, 36.

It should be noted that a large number of prisoners died of inhuman conditions, in particular by very cold winter of '41/'42. In the spring of 1942, the occupying authorities have learned that the planned deportation of the Jews was canceled thus the local administration has devised the solution of the Jewish problem. In the summer of 1942, Serbia has been named one of the first territory cleansed of Jews (Judenrein). The Staro Sajmiste area marked the launch of a wider plan to extinguish European Jews.[4] As a direct result of such action, in a period of just about a year and a half, approximately 15,000 Jews were killed in Serbia, 7,000 of whom in Staro Sajmiste.

Figure 2 – The prisoners of the Staro Sajmiste camp

In 1942, the concentration camp at Staro Sajmiste changed its purpose and became Anhaltelager Semiln or detention camp for, largely, Serbian hostages, political prisoners and partisans. Over 31,000 prisoners passed through the camp in the period of almost two years, from 1942 to 1944. The prisoners were mainly Serbs, but furthermore Croats, Bosnians, Greeks, Albanians. Approximately 10,000 detainees were killed in that camp. Only after the Allied bombing of Belgrade in 1944, when the camp Sajmiste got hit and destroyed, the camp was disbanded.

2. Trauma: Forceful damge

Phenomenological as well as terminological consideration of the Holocaust forms the basis for the development of the conceptual design of the project, which should aid in the process of healing of the Serbian society. Analysis of the Holocaust and the related terms represent a context in which the project should be considered. Terms that are related to the Holocaust - the power and violence - will be presented as initiators of evil from the theoretical point of view.

4 Ibid, 43.

Staro sajmiste represents the scar, the absence of meaning, the endless emptiness of what was and what can hardly ever be restored. This is, perhaps, the cause of the decades-long complications preventing Serbian society to adequately mark this area in the light the traumatic events that have occurred.

Holocaust (*wide-ranging fire*, in Hebrew HaShoah - disaster, destruction) is the term used to indicate a systematic governmental persecution and genocide of the different ethnic, religious and politically ineligible groups of people during World War II. The theories that tend to explain the Holocaust are very different regarding the narrative of a *universal evil or universal human crisis*. One of these theories is the Zygmund Bauman's theory, which is based on the thesis that the Holocaust was a mistake and not a product of modern society.[5] After the Holocaust, civilization now includes death camps among its material, moral, the spiritual heritage. According to Bauman, one of the theories that are often used when one wants to define the Holocaust is that the Holocaust was the breaking point of European antisemitism. The Holocaust is associated with very similar records from the past that describe a centuries-long legal discrimination, ghettos, pogroms and persecution of the Jews living in Europe. It is alleged that the mass systematic extermination was due to the temporary suspension of civilized human behavior that can be characterized as normal.[6] This never before seen terror, entered into the collective memory, explained as the denial of progress.

This kind of evil was not possible without violence arising out of power. Hannah Arendt makes a clear distinction between terms such as *power, force, strength, authority and violence.*[7] Arendt interprets these terms as separate phenomena, and points out that misperception regarding these terms, thus reducing them to a single meaning, arises from the conviction that the most important political question *is of who rules whom?*[8] Power, force, authority and violence are indeed the terms that indicate the means by which man rules over man. Actually, it's about power over life. Within this context, Arendt defines the meaning of these terms. The term power corresponds to not only the human ability to act, but to

5 Zygmund Bauman, "Sociology after Holocaust", The British Journal of Sociology, Vol. 39 (4), 1988, 469 – 497.

6 Ibid, 475.

7 Hana Arent, O nasilju, Alexandria Press, Beograd, 2002, 45–71.

8 Ibid, 47.

act in compliance. When it is stated that someone is in power, the fact of the matter is that he or she is authorized by others from the group to implement that power. Force is a term that is used in everyday language as a synonym for violence, predominantly when talking about the means of coercion. The term authority corresponds to unquestionably recognition by those who are expected to obey in every sense, without the need for coercion or persuasion. And finally, the term violence is distinguished by its instrumental characteristic. *Violence* is linked to power because the tools of violence are formed and used for amplification of natural power until the moment they replace it. Arendt argues that nothing is more common than the combination of *violence and power - violence and power trigger evil.*

Every behavior and any form of implementation of human life, even evil, does not come by means of biological predispositions, it always leaves possibility of choice; in other words, - power and choice are interchangeable.[9] Giorgio Agamben defines human life as processes of living that are not predefined by some higher biological force, they represent possibilities above all power.

Michel Foucault defined power as the right over life and death. This right is derived from the *patria potestas.*[10] The 'right over life and death' is, in fact, the right of imposition of the death and allowing life.[11] Power is exercised by detracting. Withdrawal of income, seizure of products or services. Every aspect of endangering human life entails the right to terminate the life that puts in harm another, even if the stake is s human life itself. Foucault defines managing of life on two levels. Control over body as a machine and, on another level, observing the body infused with the mechanics of life, the body that is the basis of biological processes of birth, death, health, longevity of life and so on. In other words, the body discipline and regulation of the population represent the unique entity over which power can be implemented. The Nazis built up a system of mechanisms for managing life. Evil is not created due to the number of criminals or because of the public opinion, but for an elaborate and well developed tools for the implementation of the evil that has increased the power of criminals.

Bauman suggests that the Holocaust should be seen as a failure of civilization which by its nature has a morbid tendencies.[12] The mass killings that occurred in the history teach us to prevent such events. It is therefore necessary to have a strategic approach to subvert of the collective recollection that comes from history. Pierre Nora[13] dealt with the relationship between history and recollection. Nora was interested in those instances (*lieux de mémoire* [14]) where points of recollections are crystallizes in a particular historical moment, where consciousness discontinuities from the past. In these instances, recollection is torn in such a way that it represents a contrast to the sense of historical continuity. According to Nora, history and recollection are concepts that cannot be put in the same plane; they stand in opposition. History is only reconstruction under the influence of the collective recollection. Recollection is absolute, history is relative. He believes that history would like to keep the sites of remembrance, but would prefer to delete the content, or what those sites stand for.

The moment when remembrance occurs is the moment when, due to the time elapsed, there is huge deposit of intimate, personal recollections. History and society are trying to suppress memories by creating archives, organized commemorations, and celebrations so the recollection no longer seems natural. Points of remembrance exist in three sublimated forms - material, symbolic and functional. These three aspects are always in coexistence and act together. In order to function there must be a desire to remember, and that is how they differ from the points of history. Points of remembrance have multiple characteristics that make possible the relief mapping, setting limits and dictate the scope of understanding.

9 Giorgio Agamben, "Form of life", Radical Thought in Italy – A Potential Politics, Virno, Paolo & Michael Hardt, ed. (Minneapolis: University of Minnesota Press, 2006), 150-155.

10 Mišel Fuko, „Pravo smrti i moć nad životom", Volja za znanjem – Istorija seksualnosti I, Jelena Stakić, prev. (Loznica: Karpos, 2006), 150-194.

11 Ibid, 152.

12 Zygmund Bauman, "Sociology after Holocaust", The British Journal of Sociology, Vol. 39 (4), 1988, 469 – 497.

13 Pierre Nora, „Between Memory and History: Les lieux de Mémoire", Representations (26), Special Issue: Memory and Counter-Memory, 1989, 7–24.

14 Lieux de mémoire is the concept which developed Pierre Nora in the period between 1984 and 1992. History is written under the pressure of the collective memory. Lieux de mémoire may be subject, monument, archive or geographical findings. The building became lieux de mémoire when runs away from oblivion and appears when it is difficult to identify the memory related to a specific location. These are the places where memories crystallize; where there is historical continuity despite the collective memory. The memory can not happen by itself a society.

3. Design solution

Concept. The memorial complex of Staro Sajmiste would be devoted to the Holocaust that had occurred in Belgrade as well as to other later on crimes committed in this area. Conceptual design is based on the affirmation of urban continuity with the goal to protect the remaining buildings in the cultural and historical entirety.[15] The starting point for the development of the concept, based on which the project was developed, is the desire to fully utilize the symbolic function of design and be considered as an open air museum. The memorial complex would contain and kept a collection of objects, in this case architectural structures, and provide the space for exhibitions and research. Facilities would be classified, protected and preserved.

The idea is to use design solution to create a space that would with its symbolism be able to preserve the memory of the Holocaust in Belgrade, and allow visitors to comprehend the Holocaust in general. The paradox occurs. The museum has to preserve and protect the items that are exposed to the ravages of time that they would remain available for future generations. In order to accomplish that, museum must remove objects from regular use, in order to give it back once again to the people, during expositions. In this process, there is a transformation going on that makes objects lose the content.[16] The fundamental paradox of the museum, in terms of a spatial area, lies in the relationship between narrative and structures. Once the objects are withdrawn from use and positioned in the museum, they become exhibits. Jeffrey Karl Ochsner points out that the task of the Holocaust Museum is primarily to display facts about the incident that led to the Holocaust. [17] In other words, it must clearly and comprehensively expose those objects that convey true narrative and offer physical evidence about the events that occurred to the public. It is crucial for the Museum of the Holocaust that the authenticity is preserved; the difference between the reconstruction and the artifact must be absolute. The design concept of the Memorial complex Staro Sajmste adopts this attitude.

Design. Floorplan of the complex is divided into two zones: a park-museum zone (which includes the long-standing objects) and a zone for newly constructed buildings along the river. The design of the park-museum works on two levels, symbolic and functional. In the floorplan you can see preserved buildings surrounded by water, walkways and ramps, then obelisks and massive triangular forms. At the symbolic level, it represents stylized German uniform. The idea is to represent those who have left a mark. Between uniform patterns the area is simply covered with concrete. The scattered concrete obelisks in the lakes actually represent victims of genocide. On the concrete space between the lakes, massive triangular concrete elements are scattered, repeating alternately in space, giving the impression of broken glass, shattered hopes and so on. The ramps and gangways that are raised off the floor and are provided for visiting the park are important part. With this design the park exudes a dark, dreary and unpleasant atmosphere. The feeling of powerlessness. The elements incorporated into the design suggest the smoke and fire as symbols of the extermination, torture and human suffering. This atmosphere reflects the despair, without a trace of optimism as an attempt of the identification with the detainees. Emotional and instinctive stimulus itself would not have done the job. It is therefore necessary to inform visitors of the Holocaust and subsequent crimes. Because of this, the project envisions a second, spatially smaller part of the complex, which offers hope and informs the visitors. The element of hope occurs at the end of the visit to the park because all the ramps lead to a large plateau in front of the newly built structures. Plateau is spacious and wide with a view of the river so it could give visitors a chance to take a little break before they visit newly built structures located along the river. The plan envisages the construction of five identical objects that should contribute to the unity of the form, and to the monumental/memorial atmosphere. The structures are simple and colossal, made of concrete without fine finishing.

15 Of the old building which has been preserved there are few. Central tower, which is the most visible object in the area – landmark – the management of the fair, the Italian pavilion, the Czechoslovak pavilion, Turkish pavilion, Hungarian Pavilion, entrance building and Spasic foundation. At the area there are a number of illegally constructed buildings that should be demolished.

16 Pierre Nora, „Between Memory and History: Les lieux de Mémoire“, Representations (26), Special Issue: Memory and Counter-Memory, 1989, 7–24.

17 Jeffrey Karl Ochsner, “Understanding the Holocaust through the U.S. Holocaust Memorial Museum, Journal of Architectural Education, Vol 48 (4), 1995, 240–249.

4. Conclusion

The design concept of the project is built the notion that this place of remembrance should primarily be reserved for a memorial complex dedicated to the Holocaust in Belgrade. There is no reason for restoration of pre-war appearance of Staro Sajmiste, because it would, in a certain way, obliterate historical facts. It is unacceptable that this area of suffering, recollection, and anguish become a cultural elite's gathering place or a part of a larger megalomaniac project. Thus, the idea promoted by this project is to convert Staro Sajmste into a memorial complex dedicated to the Holocaust and all the crimes committed in the period from 1941 to 1944, hence to confront the society with the emptiness formed after the dusk civilization. It would be a place of contemplation and intuitive comprehension of the events that took place at that location.

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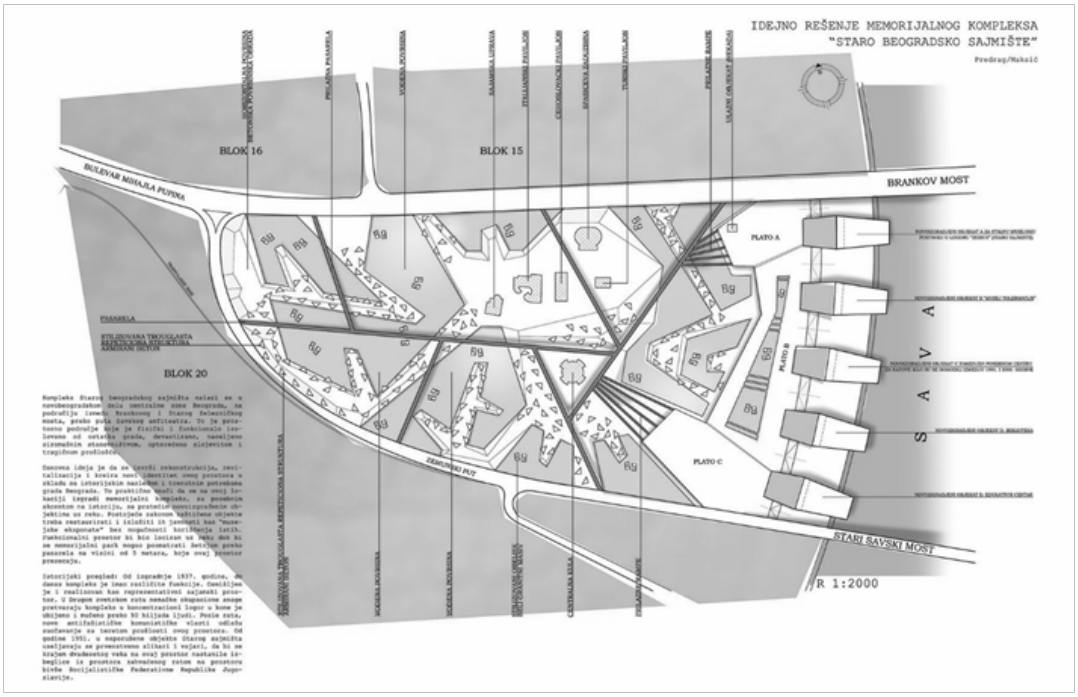
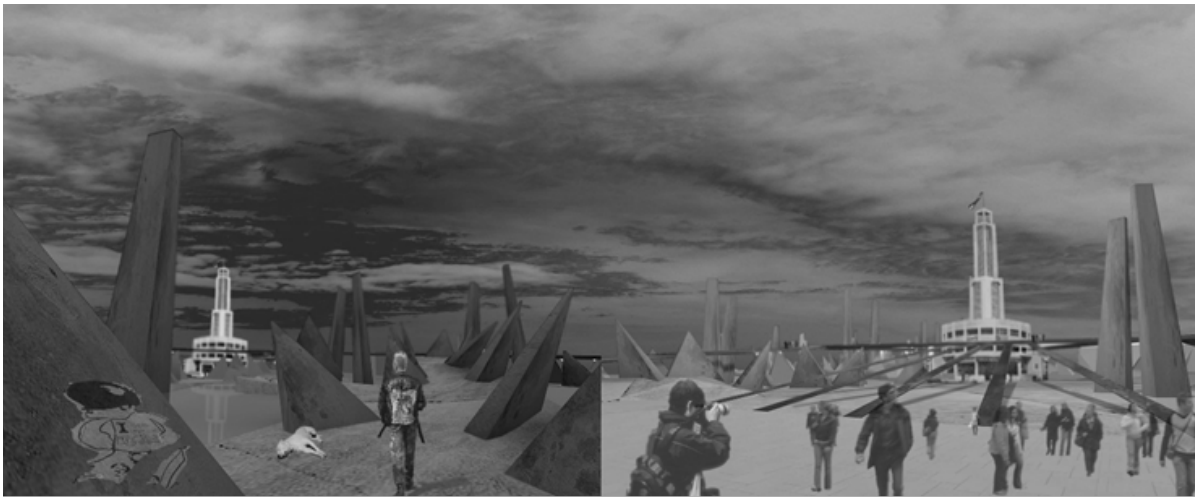
Appendix



Appendix A – Floor plan of the conceptual design of the Memorial complex Staro Sajmiste.



Appendix B – A perspective view of a park-museum.

Appendix C – Perspective view of the newly constructed pavilions and other design elements.

MESTO SEĆANJA: MEMORIJALNI KOMPLEKS STARO SAJMIŠTE

Sažetak

U ovom radu prikazaću projekat Memorijalnog kompleksa Staro sajmište. Projekat je predlog mapiranja ovog mesta sećanja. Nemo sećanje Beograđana na Holokaust, koji se odigrao na prostoru Starog sajmišta jeste, posledica problema suočavanja sa prošlošću. Projekat se konceptualno zasniva na analizi Holokausta kako terminološki tako i fenomenološki, a sve u svetlu teorijskih platformi koje su se bavile ovom tematikom. Moć i nasilje biće prikazani kao pokretači zla. Memorijalni kompleks biće posvećen Holokaustu i sećanjima na zločine počinjene u periodu 1941. – 1944. godine na ovom prostoru, sa ambicijom suočavanja srbijanskog društva sa prazninom koja je nastala posle sumraka civilizacije. Projekat predviđa rešenje prostorne celine Starog sajmišta, uključujući i priobalni deo, kao vrstu vizuelnog označitelja mesta na kome se desilo stradanje velikog broja Jevreja, Roma, Srba, kao i drugih naroda.

***Ključne riječi**: dizajn, Holokaust, moć, nasilje, memoerijalni kompleks, mesto sećanja, Staro sajmište.*

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ROLE OF VERMICULITE IN ENERGY EFFICIENCY RELATED TO CIVIL ENGINEERING

Professional paper

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Abstract

In order to improve communication with the nature and to give contribution in domain of green architecture, vermiculite is recommended. Discovered in the geological environment as a raw material, vermiculite has offered wide range of physical features interesting for civil engineering. The most significant characteristic of the material is thermal insulation, not only at high, but also at low temperatures. In the paper, features of vermiculite, as well as its application, are presented.

Keywords: *vermiculite, temperature, energy efficiency, green architecture.*

Introduction

Vermiculite as mineral - occurence in the nature. Vermiculite (from the Latin word *vermicu-lare* – vermiform), according to the chemical term (Fig. 1), $(Mg-Fe)_3Al(AlSi)_4O_{10}(OH)_2$•4H20, belongs to the group of hydrated minerals.

Although it crystallizes monoclinically, it must be noted that the crystals are very rare way of occurrence of this mineral. Vermiculite occurs in terms of surface weathering of mica (biotite) and transition into chloride.

It may also contain variable amounts of calcium and a small amount of alkali metals. Recently, vermiculites with significant content of sodium, nickel and copper, have been discovered [2].

Figure 1. Vermiculite as mineral.

Color of vermiculite is grim to nankin, rarely darkly green or brown/yellow. It is transparent to translucent mineral, characterized by vitreous luster.

At high temperatures, particularly when heated by flame (approx. 700^{0}C), it expands, significantly increasing its volume.

This procedure is known as exfoliation and it is usually achieved in purpose-designed commercial furnaces. By its physical - chemical characteristics, it is distinctive. Some of the characteristics are presented in the Table 1.

Vermiculites are similar to mica from which they are formed, but both of them are fundamentally different.

Table 1. Characteristics of vermiculite

General data	
Chemical formula	$(Mg_{0,5},Ca_{0,5},Na,K)_{0,7}(Mg,Fe,Al)_3$ $[(OH)_2\|(Al,Si)_2Si_2O_{10}] \cdot 4H_2O$
Molecular weight	504.19 g/mol
Crystal system	Monoclinic
Cleavage	Perfect for {001}
Mineral hardness Mohs scale	1.5 – 2
Sheen	
Scratch colour	Pale yellow
Relative density	2.3 – 2.7 g/cm³

Vermiculite almost does not exist in a pure form in the nature. In an octahedral part of the layer, ions of magnesium and aluminum are stored. This mineral has a high value of cation exchange capacity and expandable crystal lattice.

According to the certain properties, vermiculite is a typical member of the group of smectites, when it occurs in a fine disperse form as a clay mineral. However, it also appears as macroclastically layered silicate. According to MacColme, vermiculite possess the mixed type of layer (2:1:1), which is present in the chlorite, or with additional layers of water molecules (Fig. 2).

It can be formed through sedimentation, too and in that case, it is present in different sedimentary formations, but also clay and soil.

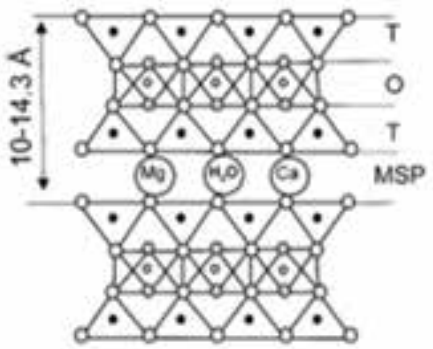

Figure 2. Structure of vermiculite $(MgFeAl)_3(SiAlO_5)_2 \cdot 4H_2O$)

It is existent in the Earth's crust, but in some parts of the land is distinguished more. In Table 2, distribution of vermiculite in various countries is presented.

The mentioned features are reason why vermiculite can be widely used.

Table 1. Vermiculite – production in tonnes per year (POTTER,1995).

	T	%
South Africa	221.748	46.4
USA	171.000	35.8
Russia	40.000	8.4
Japan	15.000	3.1
Brasil	16.000	3.3
Zimbabwe	9.000	1.9
Others	5.252	1.1
Total	478.000	100

Vermiculite has not been explored enough and it is expected to get information related to its characteristics and use in the future.

1. Features of Vermiculite

Physical features. Density of vermiculite is up to 2500 kg/m^3.

Hardness is measured by Mauss scale and it shows that vermiculite is relatively soft mineral (1.5-2). At the temperatures over 700°C, it expands significantly.

Depending on the origin, its volume can be enlarged 30 to 40 times.

Expansion occurs because the amount of the air inside the material increases. In that way, a very low coefficient of thermal conductivity is provided, which classifies it as a very good thermal insulators.

Coefficient of thermal conductivity varies in the range of 0.05-0.2 W/mK, depending on the bulk density achieved by the expansion (Fig. 3).

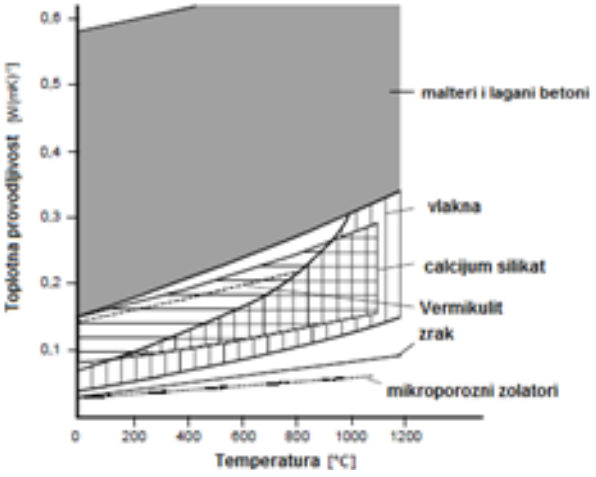

Figure 3. Thermal conductivity of some materials.

Microporosity, which results after expansion of vermiculite, gives the most convenient very small coefficients of thermal conductivity. That is also way of energy management and energy efficiency!

Expanded vermiculite characterized by micropores has very favorable absorption characteristics of sound frequency values.

Under the frequency of 1000Hz, the absorption coefficient is between 0.7 and 0.8, and that is why it can be considered as a very good protection related to the sounds of speaking.

It is not hygroscopic and its thermal resistance to the heat conductivity is stable and very high, not only at low, but also at very high temperatures.

As it is non-flammable, it can be expected only a phase change at very high temperatures (Fig. 4).

Melting point of vermiculite is 1350 ^0C, and the beginning of the sintering starts at 1280 ^0C.

Chemical features. Naturally occurring vermiculite is chemically stable, with pH value as distilled water, that is 7.0 . It shows neutral reaction. Therefore, it can not be classified as a base or as acid. It is inert to organic solvents and insoluble in water. It can not be decomposed, but also it is without smell and irritating properties.

It has good absorption properties in the gas and liquid environments. Absorption is of physical character.

Chemical content is the following:

- SiO_2 38.0-49.0%
- MgO 20.0-23.5%
- Al_2O_3 12.0-16.5%
- Fe_2O_3 5.4-9.3%
- FeO 0-1.2%
- K_2O_5 7,9%
- Na2O 0.8%
- CaO 1.5%
- TiO2 1.5%
- Cr_2O_3 0-0.5
- MnO 0.1-0.3%
- Cl 0-0.5%
- CO_2 0-0.6%
- S 0-0.2%
- H_2O 1.2-1.5%

Figure 4. Example of extremely low heat conductivity.

During heating, there are no dangerous pollutants emitted. Further, vermiculite collects impurities in the gas and liquid substances. Vermiculite is a sterile, non-toxic, durable, resistant to oxidation, does not lead to the formation of fungi and pests.

Thanks to the mentioned characteristics, vermiculite is used for different purposes (Fig. 5).

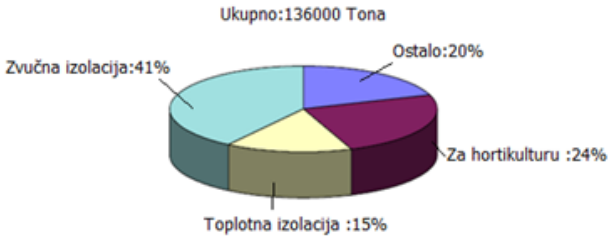

Figure 5. Example of vermiculite use in Western Europe 1999 (Eliot, 2000).

2. Use of Vermiculite.

2. 1. Vermiculite boards for fire protection and thermal insulation:

- Creation of fire and thermal insulation units of industrial zones (vermiculite panels)
- Industrial fire walls (plates) with a very high fire resistance time t = 2.5 h 1300^oC (production of fire doors and partitions)
- Fireproof pastes, coatings of metal structures
- Brake pads filled with vermiculite

- Completing the cast steel molds
- Ceramic vermiculite panel for insulation of profitable parts castings
- In places where it is necessary to withstand 1300 ^{o}C
- Lining of furnaces, doors and other parts of boilers and furnaces.

Vermiculite plates are made from pure vermiculite, and when heated, do not emit harmful and toxic substances.

The plates withstand temperatures of (-260 to 1350) °C, and are very practical for use.

Vermiculite boards have multiple roles:

- fire protection, thermal insulation, sound insulation and as decorative elements, but also
- for stoves and fireplaces (Fig. 6).

Figure 6. Vermiculite as insulation material in stoves and fireplaces.

Thermal insulation of fireplaces, stoves and boilers is the most important step in their safe use. For this purpose, various materials are used, but vermiculite plates are recommended as the most reliable.

Characteristics of such boards are:

- plate density.....650-900 kg/m^3
- maximum resistance to bending.....1.0 mPa
- maximum strength pressure..... 1.2 mPa
- maximum thermal conductivity .....0.18 w/mK
- sound conductivity coefficient.....0.45 (f=500gC)
- **Better combustion.** Vermiculite plates are characterized by significantly lower heat capacity of fireclay. The heat remains in the combustion chamber and does not withdraw from the process of combustion. Higher temperature in the combustion chamber significantly enhances the value of heat transfer. The formation of soot and tar is less and glass fireplaces remain cleaner.
- **Visual effect.** Light beige form surface of the vermiculite plate is uniform and smooth, with no discoloration at the surface. Edges are cut or processed, and never crumbled. Cover of these panels improves the look of the fireplace and achieved very good thermal radiation of space is achieved.

2.2. Agrivermiculite

The main raw material of vermiculite is mined in open pits and it is subjected to thermal treatment at approximately 1000ºC. In doing so, the material is autoclavable, i.e.. becomes aseptic. Due to the porous structure of vermiculite, this mineral is very suitable as a means for the retention of water.

Mixed with the garden soil, land becomes loose, while airflow is improved. The used binders contain phosphate and silicon dioxide as well as potash. These are valuable nutrients for plants. Phosphates are needed for the growth of plants and in particular for the formation of the root, while potash facilitates growth of a flower and fruit (Fig. 7).

Figure 7. Vermiculite as fertilizer.

Therefore, it is recommended that the remains should not be thrown away or deposited, but to be used as an aid for processing the flower garden or land. For this purpose, it is enough to just chop material into approximately 5 mm granules and mix with soil. The best results are achieved with the addition of (5-10) volume %.

Agrivermiculite is a 100% natural product, sterile, free from pathogenic bacteria, seeds, insects and has excellent water absorption.

Vermiculite is a good addition to substrates, and it serves to cover the land after sowing as a substrate for growing hydro plants, for the transmission of microorganisms, increases the capacity of the air and water when the plant needs. It allows the plants easier access to potassium, calcium and magnesium. It is resistent to the attack of rodents and insects and will not rot as stable.

2.3. Thermal insulation materials in civil engineering on the basis of vermiculite

2.3.1. Thermal insulating concrete

Vermiculite is used for thermal and sound insulation of floors, roofs and attics (Fig. 8).

Figure 8. Floors thermal insulation.

By installing insulating concrete based on vermiculite, space quickly reaches the desired temperature and maintains it. It can be used as a dry fraction and for the thermal insulation of floors (Fig. 9).

Figure 9. Example of use of dry vermiculite.

2.3. 2. Thermal insulation mortar

Vermiculite is a special, unique thermal and sound insulator for interior and exterior insulation of walls. By application of these insulating materials, thermal insulation with unlimited shelf life is obtained. While other insulation materials after 10-12 years loose their properties, this plaster becomes even more stronger and better thermal insulator.

2.3.3. Insulating plasters

The plasters contain expanded perlite, and so it gives a certain degree of thermal insulation (Fig. 10).

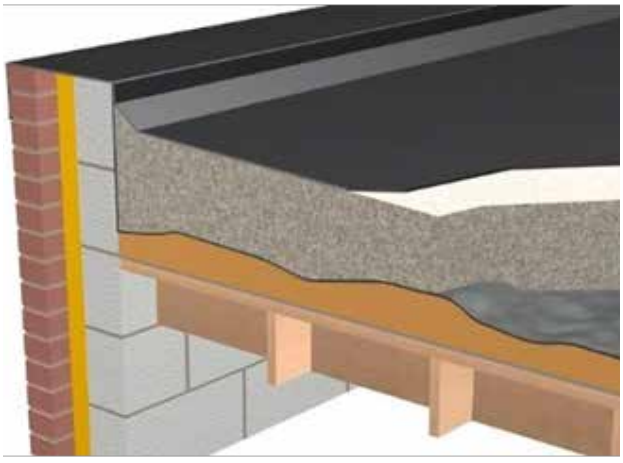

Figure 10. Vermiculite as plaster.

3. Conclusion

The nature offers the materials and regulations, and the inventiveness of a researcher gives possibilities of utilization.

The generated heat, if it is necessary to keep from scattering, is a feature that characterizes vermiculite as an insulating material for use on low and high temperatures.

Mechanical properties of vermiculite dominate among the other heat insulators. Inflammability of vermiculite secures its use even in very difficult places such as vessels.

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DOPRINOS VERMIKULITA UPRAVLJANJU ENERGIJOM U GRAĐEVINARSTVU

Sažetak

Komunikacija sa prirodom i htjenje da se iz ponuđenog upotrijebi materiajl koji ima povoljnije karakteristike od saznatih, niklo je upotrebljavanjem vermikulita. Otkriven u prirodi kao sirovina i pružio je široki spektar fizikalnih veličina za upotrebu u građevinarstvu. Dominatna karakteristika ovog materijala je toplotna izolacija i na visokim i na niskim temperaturama.Rad ima za cilj da da pregledno svojstva vermikulita i njegovu upotrebu.

Ključne riječi*: vermikulit, temperatura, građevina.*

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THE MOST SIGNIFICANT POST-TENSIONING PROJECTS OF 2014. IN CROATIA

Professional paper

Predrag Presečki, Želimir Bodiroga

BBR Adria, Zagreb, Croatia

Abstract

In this article we will present two examples of Post-tensioned constructions.

The first one is VMD Towers in Zagreb, Croatia, where we have achieved savings with construction speed and simplicity of construction.

The second is International Airport Zagreb New Passenger Terminal where Investors wanted to avoid prefabricated construction for such representative building. Post-tension technology was the only solution for span dimensions 14.4 x 14.4 m, This Project is still under construction and it is going according to the plan."

Keywords: *Post-tension, savings, construction, spans, BBR*

1. VMD towers, Symbols of European Croatia

1.1. Team & Technology

Owner/Investor: VMD PROMET d.o.o.

Main contractor: TEAM d.d., Mursko Središće, Croatia

Designers: Josip Galić, Croatia

Predrag Presečki, Croatia – for Post-tensioned (PT) slabs

Technology: BBR VT CONA CMM 0106

BBR Network Member: BBR Adria d.o.o., Zagreb, Croatia

1.2. General building characteristics

Figure 1. A view on the smaller tower which is finished and on bigger under construction

Attractive location near the city center has many advantages one of which is good transport connection, and especially closeness to the infrastructure of urban and suburban traffic, which makes customers everyday communication easier. In the near vicinity there are bus and railway station. One of the most important elements of green building that was used in this project is a system for collecting rainwater from the roofs and the environment which is stored in a separate tank ,and is then used for irrigation of green areas and for the car wash.

Figure 2. View of the taller tower during construction and the finished phase

When designing and building special attention was paid to details in order to ensure durability and reliability over a long lifetime of the building. For this purpose material of best quality and long lasting were used, together with PT system, which also contributes to the quality.

The complex consists of an underground garage and 6 overhead structure (2 residential and 4 commercial).

- 83,000 BRP total (51 000m^2 overhead and 22000 underground m^2)
- 60,000 BRP's business section
- 23,000 BRP residential section

The underground part of the 4 floors consisting of 839 parking spaces and garages

Overhead part consists of:

- 4 commercial buildings (one of 25 stories is the tallest building in Zagreb (after the Cathedral) with approximately 30 000 net sales office space
- 2 residential buildings (110 apartments)

The project shall be in function from January 2015.

40 different companies worked as subcontractors at this site with 500 to 1000 employees throughout the past period of 2 years.

The project value is approximately 100 million EUR.

High technology solutions including energy efficiency category A for office space allowed the sale and rental for very demanding companies (foreign and domestic).

Two skyscrapers , as a part of commercial buildings, were built with BBR VT CONA CMM -Unbonded Post-tensioning System.

Skycrapers are 14 floors and 25 floors high with area around 850 m^2 per floor.

Tower A has a trapezoidal shape footprint with dimensions 35.6 x 39.15 meters (longer side) and 32.2 x 15.9 meters (short sides). Post-tensioned slab has a thickness of 18 cm, with a capital above the central pillar. Along the edges there are peripheral beams with the cross section 100/45 cm. For Tower B due to a smaller spans, slab thickness is 16 cm, and the beams are 100/50 cm.

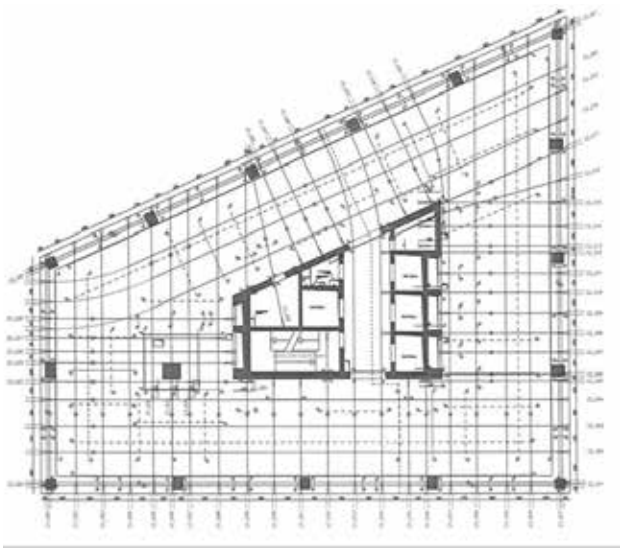

Figure 3. Structural drawing, with PT tendons, of typical floor layout

Figure 4. Reinforcement and unbounded tendons (smaller tower)

Construction speed of each floor was the key for wining this job. We worked following the system „each week – one floor". That was at least 3 days faster than the speed of the classic reinforcement floor.

Also the constant slab thickness was one of advantages of PT technology instead of 3 different heights as it was in design with classic reinforcement slab.

Figure 5. View on a slab after removing of the formwork (smaller tower)

The tendons in the slabs and beams are placed following the rule „Free tendon layout“. Modeling Post-tensioned slab was done by the software program called GRAFeM using kinematic connections for nodes. The concept of the main structure with a core located in the central part of the plan (zero zone displacement of elastic shortening of the slab), so the afterward monolithic connection between slab and core walls is not necessary.

130 tons of tendons were embedded in Project Strojarska.

This project is one of the most significant projects of BBR Adria in the last 10 years.

2. International Airport Zagreb, New passenger Terminal, Croatia

2.1. Team & Technology

Investor: International Airport Zagreb, Pleso bb, 10150 Zagreb

Main contractor: KAMGRAD d.o.o., Zagreb, Croatia

Designers:

Jure Radić, Croatia

Milan Crnogorac, Croatia

Predrag Presečki, Croatia – for Post- tensioned (PT) slabs

Technology: BBR VT CONA CMM 0106

BBR Network Member: BBR Adria d.o.o., Zagreb, Croatia

2.2. General building characteristics

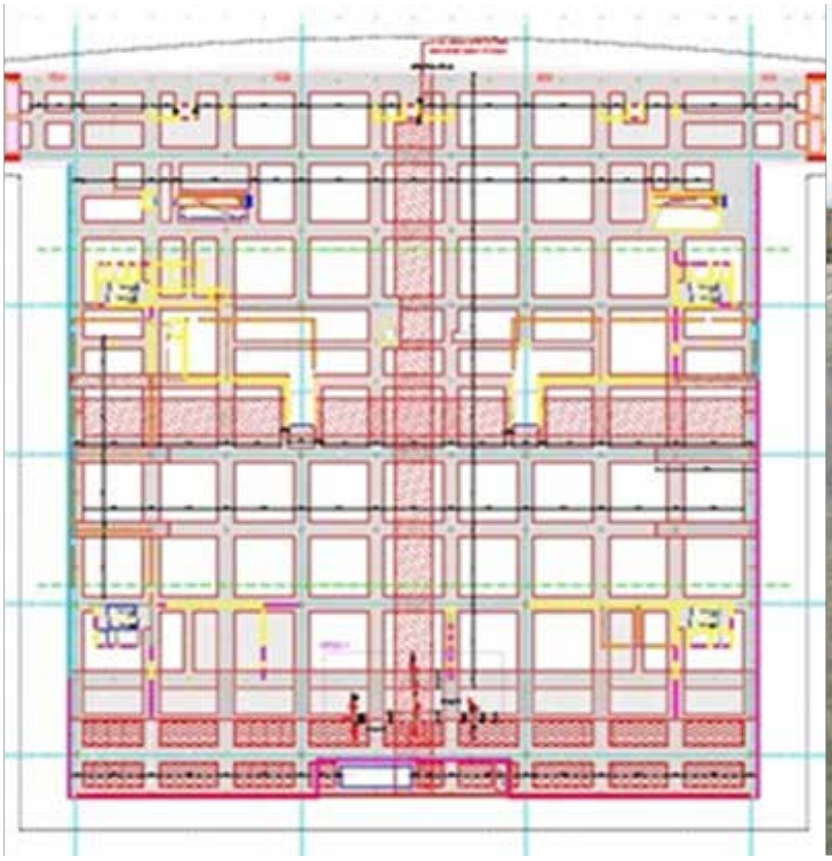

Figure 6. Plan of the first floor slab, usual span is 14.4x14.4 m, horizontal and vertical pouring strip will be closed after

Figure 7. Tendons on parterre slab

The new airport terminal is being designed and carried out in accordance with the international tender's winning design (authors Kincl, Neithard, Radic). The funds are provided by the French concessionaire (concessions for the period of 30 years), and project documentation holder is IGH Zagreb.

Start of construction was planned for the summer of 2014. Concrete construction should be completed in January 2015, and the opening of the new airport is planned for late 2016. The total area of the corrugated steel roof is 65,000 m^2, while three concrete floors have an area of about 45,000 m^2.

The central unit of the terminal building footprint is 130 x 136 meters, without dilatation, due to an unfavourable distribution of seismic walls located near the very ends of the ground plan. The structure was initially designed as prefabricated concrete construction, and at the proposal of the contractor in a very short period was redesigned to the monolithic post tensioned concrete construction.

Horizontal ceiling structure solved as post tensioned-concrete construction. All three levels of ceiling panels have longitudinal a3nd transverse work interruption ("fly"). These interruptions reduce the surface area of the first phase of construction on the sections of maximum length of 60-70 meters. The predominant ranges plates are 7.2x14.4m at ground floor slab (Item 200) and 14.4x14.4m slabs of first and second floors (item 300 and 400).

Figure 8. View of the building site form one of six cranes

PT slabs are designed as reinforced shallow wide beams. At the 1st floor slab (Item 200),beams are extending in the direction of larger, 14.4 meter range. These beams are in dimension 160/55cm, between which is a slab thickness of 18cm. Beams of the upper plate of the ranges 14.4x14.4 meters (item 300 and 400) are provided in both directions with the strips in dimensions 300/55cm. The slab between beams (11.4x11.4m) has a thickness of 25 cm.

Larger openings that interrupt the continuity of these beams are solved with reinforcements by the edge of openings so that the loads are transferred to the adjacent beems. A special case is the situation when the pillars of the top floor (item 300) are offset from the line of the major axis and their forces are taken by reinforced beams. These beams therefore have a greater thickness (300/85cm).

Prestressing is made by cables BBR VT CONA CMM 0106 (single), area Ap= 1.5 cm^2, characteristic tensile strength FPK = 1860 MPa. The rope is in a plastic tube with a protective grease (called unbonded tendons).

This technology gives positive effects due to the factory solved corrosion protection, speed and ease of laying, larger arrows, and small losses of friction allowprestressing on large sections (60-70 meters). A large number of cables are grouped in a reinforced straps, while passing through the slab at equal distances. Guidance line in beams in the range 14.4 m is divided into thirds so that towards supports makes parabola 2", while in the middle third of the guiding is in a direction. Radius of curvature of the cable above the columns is R = 4 m, which gives the optimal reduction of the breaking force component.

Line keeping of the cables out of the beams zone to the slabs which are 18 and 25 cm thick is free (the free tendon layout) which significantly simplifies and accelerates their installation. According to the

Figure 9. A view on the first floor slab with span 14.4x14.4 m, middle zone, columns height 10meters thru two levels

agreement with the investor cable grouping is done in such way that in beams 300/55 in the zone of columns provide a zone (4 places footprint 40/40 cm) in which later could cut openings without the risk of interruption of cable. Modeling Post-tensioned slab and beams was done by the software program called GRAFeM using kinematic connections for nodes of finite elements. Analysis, according to EC2, contains control of vertical oscillations, deflections, stresses and design of reinforcement. The final deflections of rheology generally not exceed L/500. The compressive stresses, as is common in the plate PT, are far below the permissible compressive stress. Some seismic walls due to the high stiffness will be subsequently monolithed with the slab, and until then will rely on temporary short columns.

Figure 10. Pouring strip zone before monolithization

Figure 11. View of the roof structure

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NAJZNAČAJNIJE NAKNADNO PREDNAPETE GRAĐEVINE 2014. U HRVATSKOJ

Sažetak

U ovom radu predstavit će se dva primjera prednapetih konstrukcija.

Prvi je VMD Tornjevi u Zagrebu, Hrvatska, gdje smo postigli veliku uštedu vremena pri gradnji i pojednostavljenje konstrukcije.

Drugi primjer koji smo uzeli je nova Zračna luka u Zagrebu, Hrvatska, gdje je želja investitora bila izbjeći prefabriciranu gradnju za tako reprezentativnu konstrukciju. Tehnologija prednapinjanja bila je jedini mogući izbor kojim bi se postigli rasponi od 14.4x14.4 m. Ovaj projekt je još uvijek u izgradnji i sve ide prema planu.

Ključne riječi*: prednapinjanje, ušteda, konstrukcija, rasponi, BBR*

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DETERMINATION OF LIVING ORGANISMS ON STONE WALLS OF THE ARCHITECTURAL HERITAGE BUILDINGS IN SOUTHERN HERZEGOVINA (STOLAC, POČITELJ, HUTOVO)

Original scientific paper

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Abstract

This paper deals with the issue of biocolonization on stone walls of architectural heritage buildings. By applying an interdisciplinary approach, the authors shed light on this phenomenon from the perspective of heritage protection theory and from the aspect of stone conservation. The problem of biodegradation of historical stone is placed in the context of comprehensive procedure of diagnosing and conservation planning, which, while applying an interdisciplinary scientific approach and state-of-the-art technology, must rely on the doctrine of conservation.

Biological colonization was examined on three historical monuments of different age, form and function located at three different sites in Southern Herzegovina. Different research methods were used, including the review of literature, analysis of the existing documentation, and field and laboratory work.

Finally, the paper identifies types of microorganisms found in the samples taken and proceeds to discuss the results from the aspect of their effect on stone material, suggesting avenues for further research.

Keywords: *Architectural heritage, Stone, Conservation, Biodegradation, Deterioration, Remedial treatment, Preservation, Počitelj, Ošanici, Methodology, Diagnostics*

Introduction

Note: during the research and writing this paper, both authors were employed with the International Burch University Sarajevo.

The issue of biocolonization on old stone walls of the architectural heritage buildings is an under-researched topic in the conservationist milieu of Bosnia and there is almost no scientific or professional literature dealing with the subject in any systematic fashion. There are a few possible causes for frequent misperceptions and poor understanding of the problem, including the lack of solid scientific platform and virtually no papers presenting the relevant experience and results of empirical research, e.g. probes in situ or laboratory testing. This lack of relevant information not infrequently results in inadequate treatment of the products of biocolonization. Aggressive cleaning of large surface areas of walls of buildings classified as architectural heritage has even become trendy, although unfortunately it is not always aimed at saving a monument by, for instance, removing the devastation caused by human activity (graffiti), uncovering decorative finish hidden beneath the layer of moss or lichen or removing harmful products that are a result of chemical mechanisms of degradation (disintegration or dissolution), but the aim is rather to refresh the stone, i.e. to attempt to restore original visual characteristics to the material of which the monument is made. As part of these stone-cleaning campaigns, which in some cases are entirely independent projects supported by substantial resources and funding, it often happens that traces of all surface alterations, including deposits, products of decay and even patina, as well as all traces of living organisms, are arbitrarily removed without any prior analysis of its potentially harmful effect. Apart from being methodologically wrong, this approach and uninformed decisions directly resulting from it may cause speeding up of the degradation process and even lead to new physical damage to the monument.[1]

1 "A number of authors have emphasized the damage that can be caused by cleaning: loss of surface, staining, deposition of soluble salts, or making the stone more vulnerable to

Still, we are very far – both in our general approach and in this paper – from advocating a romantic view that has its roots in the history of architecture. It is well-known that extreme interpretations of Ruskin's theory sometimes implied complete passiveness and leaving the ruins "to perish in their beauty" in the belief than only an intact and untreated original is valuable and that the visible traces of decay will add to the value of the object because they ensure presence of history through the *"scars of time"*. [2] The aim of this research is not to try to prove that plants, algae and fungi cannot have harmful effects on a monument's stone structure and that they should not be removed since a greenish film or biological growth in the cavities between stone blocks should be seen as part of a historical character of a monument. Through the methodology that we applied and the results of our research, we wish to point to the necessity of making informed decisions when it comes to remedial treatment of stone surfaces, be it in relation to biocolonization or more generally in response to registered alterations. Accordingly, and in line with the existing principles of modern conservation, we believe that both in the area of prevention and when it comes to active effect on the structure's material, it is necessary – prior to taking any concrete intervention – that mechanisms of the effect of agents to which the material is exposed and their possible consequences be clearly determined. Interpretation of the above in the specific context of our research, implies that we first need to identify living organisms that colonized the stone and then establish what is happening on the surface (or even substrate) of the stone material as a result of their colonization.

Manifestations and consequences of activities of different kinds of living organisms on the same petrographic type are different and the mere presence of living organisms on stone walls cannot a priori, in each and every case, be characterized as a direct cause of degradation. Accordingly, the efficiency of a certain type of treatment, e.g. biocide can vary significantly from one case to the other depending on the concrete circumstances.

On the other hand, recent research has introduced the term "bioremediation" in the conservation of architectural heritage too, particularly through experimental technologies of biocleaning and bioconsolidation.[3] It is obvious that in recent years there is an increasing focus on the issue of biological growth on historical stone, both in terms of coming up with more efficient and targeted interventions aimed at preventing their harmful effects without detrimental side effects and finding alternative cleaning and consolidation technologies.

In light of all of the above, we believe that the issue requires due attention and is to be analyzed within a comprehensive diagnostic-analytical procedure. With respect to determining the causes and level of degradation caused by the physical-mechanic or chemical mechanisms, scientific methodology requires both laboratory and in situ research, and similarly, upon observation of living organisms on the historical stone walls, the required minimum is to identify the types of these living organisms in order to look into their potential effect or take it into consideration in the assessment of synergetic effect of different factors.

This research involves determination of living organisms on stone walls of three important architectural heritage monuments on three different locations in Southern Herzegovina: Ošanići near Stolac, Hutovo and Počitelj. This research was conducted in 2013/2014 and it involved different methods: the review of literature, field observation and documentation, sampling and laboratory work. Apart from resulting in the insight that may be used in future conservation efforts on these heritage sites, this research formulated – in the methodological and factual sphere – a solid platform for further development of this topic, to be undertaken soon.

pollutants or biological growths. They include Maxwell (1992); MacDonald, Thomson, and Tonge (1992);Young and Urquhart (1992); Andrew, Young, and Tonge (1994); Maxwell (2007); and Delegou and others (2008).", Stone Conservation, An Overview of Current Research, Eric Doehne and Clifford A. Price, The Getty Conservation Institute, 2010, p. 30.

2 "(…) how is the new work better than the old? There was yet in the old some life, some mysterious suggestion of what it had been, and of what it had lost; some sweetness in the gentle lines which rain and sun had wrought. There can be none in the brute hardness of the new carving." The Seven Lamps of Architecture, John Ruskin, 1849.

" Maneuvering between the idea of reconstruction,which crops up sometimes even today, and the occasionally advocated idea of letting the ruin "perish in beauty" (...) the conservation plan must seek the correct path for each individual case (..)",International Principles of Preservation, Michael Petzet, ICOMOS, 2009, p. 20.

3 The safety of biocleaning technologies for cultural heritage, Pilar Bosch-Roig, Giancarlo Ranalli, Microorganisms pro- and against cultural heritage, A Frontiers Research Topic, 2014, http://frontiersin.org/microbiotechnology,_ecotoxicology_and_bioremediation

1. Biocolonization or biodegradation?

Terminological differences and nuances in the conservation vocabulary reflect very well the essence of our paper. The following terms are in use:[4]

- "Biocolonization" – refers, exclusively, to presence of living organisms on stone surfaces and does not have connotations relating to its potentially harmful effect. It implies "colonization of the stone by plants and micro-organisms such as bacteria, cyanobacteria, algae, fungi and lichen (symbioses of the latter three)."
- "Biofilm" – which is defined as mono- to multilayered microbial colony attached to surfaces with varying thickness of up to 2 mm. By itself, this notion does not suggest a necessarily harmful influence on the material.
- "Biodeterioration", as a term, clearly points to alterations that have the character of stone degradation (or of other material), i.e. depreciation of its characteristics.

It is clear based on the above definitions that any type of colonization of the stone by living organisms cannot a priori be considered harmful. One recent research concerns the protective role of lichen on oolitic limestone buildings. Observing the forms of rock decomposition as a result of atmospheric conditions indicated that products of lichen colonization can modify and "... fill the superficial porous network with a dense network of lichenised fungal hyphae." The results of capillary coefficient measurement on samples suggest that "... endolithic organic matter can waterproof the stone and could act as a sulfate contamination barrier." [5]

In his overview of current research on stone conservation, Price reports that "[w]hile additional work is needed, research in this area suggests that some surface patinas may be an effective natural protection for carbonate stones, while other biofilms, particularly in polluted environments, may be deleterious." [6]

Finally, the concept of "bioremediation", mentioned earlier in the text, implies natural treatment based on specific metabolic activities of micro-organisms, for instance, "the use of microbial cells and enzymatic activity to remove organic material", or the application of certain bacteria to remove harmful salts through denitrification and sulfate reduction. [7]

2. Manifestations of biodegradation on built-in historical stone

The growth and activity of micro-organisms on stone elements of historical buildings, that is, on stone material of artworks, may result in five basic types of alterations:

- Bioweathering
- Staining or color alteration,
- Surface alterations (pitting, etching, stratification, etc),
- Biocorrosion, and
- Transformation of crystal into small size one." [8]

The types of damage according to internationally accepted classification applied in the area of stone conservation that we can relate to the above-mentioned alterations on stone material include:[9]

4 The terms "biocolonization" and "biofilm" are interpreted according to definitions provided in: ICOMOS-ISCS : Illustrated glossary on stone deterioration patterns, ICOMOS International Scientific Committee for Stone (ISCS), 2008, p. 64.

5 Bioprotective Role of Lichens on Oolitic Limestone Buildings , Nicolas Concha-Lozano, Jacques Pages, Gisel de Billerbeck, Pierre Gaudon, Dominique Lafon, 12th International Congress on the Deterioration and Conservation of Stone, Methods and Materials of Cleaning, Conservation, Repair and Maintenance; The Role Of Biology in Stone Conservation, Session XIII, 2012, Proceedings.

6 Stone Conservation, An Overview of Current Research, Eric Doehne and Clifford A. Price, The Getty Conservation Institute, 2010, p. 21.

7 Heterotrophic microorganisms in deteriorated medieval wall paintings in southern Italian churches, O. Pepe, L. Sannino, S. Palomba, M. Anastasio, G. Blaiotta, F. Villani, G. Moschetti, Elsevier, Microbiological Research 165, 2010, pp. 21-32.

8 The visible manifestations of activity of microorganisms on historical stone are described in literature in more or less detail. The review of consequences of their activity is provided here according to: "Microbially induced deterioration of architectural heritages: routes and mechanisms involved", Tikam Chand Dakal, Swaranjit Singh Cameotra, Environmental Sciences Europe, 2012, pp. 5-13.

9 Classification - types of damage according to: ICOMOS-ISCS: Illustrated glossary on stone deterioration patterns, MONUMENTS AND SITES XV, 2008.

1. Microkarst,

2. Discoloration, with sub-types:

- Coloration
- Bleaching (or fading)
- Moist area
- Staining

3. Pitting

4. Delamination

Note: Efflorescences and biological colonization can be detected in-between the laminae.

5. Erosion

Note: Erosion may have natural and/or anthropogenic causes. It can be due to chemical, physical or/and biological processes.

6. Film, sub-type: Biofilm

7. Patina, sub-type: Oxalate patina

Note: Calcium oxalates are formed as a result of depositing of calcium carbonate with the help of the release of oxalic acid which is a metabolic by-product of lichen and fungi.

8. Crust, sub-type: Black crust

9. Encrustation

Note: The term encrustation is used when the feature is clearly due to a precipitation process, following any kind of leaching. If there is no evidence of leaching and precipitation, the term crust will be employed. [10]

3. Bioreceptivity

The intensity of growth of microorganisms, that is, potential of a rock for biocolonization depends on a number of factors such as "... mineral composition, nutrient availability, pH, salinity, surface texture, moisture content, porosity, permeability, climatic and micro-environmental conditions." [11]

In 1995, Guillitte introduced and explained the notion of bioreceptivity, distinguishing between primary, secondary and tertiary bioreceptivity.[12]

The primary bioreceptivity is connected with the initial potential for colonization of a rock – in this case intact – which implies its relevant characteristics. The alterations that appear over time on the surface of built-in stone as a result of environmental factors may have a significant effect on the initial bioreceptivity, and it is in this fact that we find explanation for "secondary bioreceptivity". Finally, determination of "tertiary bioreceptivity" depends on anthropogenic factors – potential use of consolidants, protective coating or other type of conservatory treatment on historical stone. The link between the use of consolidants or protective coating and changing the degree of bioreceptivity has already been proven. While, for instance, "... alkoxysilane consolidants have been shown to slow or suppress growth" [13] on stone material, the use of some types of water repellents is not efficient from the aspect of passivization and stopping of biodegradation, and "some of them could [even] be a source of nutrients for microorganisms." [14]

If we put definitions of primary, secondary and tertiary bioreceptivity, as provided by Guillitte, in the context of practical conservation methodology, we would interpret them in the following manner: primary bioreceptivity is determined by the type of rock and when it comes to establishing the causes and mechanisms of biodegradation, it is necessary

10 Descriptions of deterioration patterns according to: ICOMOS-ISCS: Illustrated glossary on stone deterioration patterns, MONUMENTS AND SITES XV, 2008.

11 The relevant literature provides, in more or less detail and with some terminological differences, the same factors that influence the susceptibility of stone material to biocolonization, that is, its potential for the growth of microorganisms. The factors indicated in the text are cited from: „Microbially induced deterioration of architectural heritages: routes and mechanisms involved", Tikam Chand Dakal and Swaranjit Singh Cameotra, Environmental Sciences Europe 2012, p. 5.

12 Biodegradation of Cultural Heritage: Decay Mechanisms and Control Methods, Piero Tiano, p. 2.

13 Alkoxysilanes and the Consolidation of Stone, George Wheeler, Getty Trust Publications, 2005, p. 74.

14 "The results of most laboratory studies indicate that some of these water repellents and consolidants—including organosilanes, silicones, acrylics, epoxies, and polyvinyl acetates—appear to have practically no effect on the growth of microorganisms on stone and that, on the contrary, some of them could be a source of nutrients for microorganisms (Price 1975; Bradley 1985; Richardson 1988; Salvadori and Nugari 1988; Santoro and Koestler 1991; Krumbein et al. 1993).", Biodeterioration of Stone in Tropical Environments, Rakesh Kumar, Anuradha V. Kumar, The Getty Conservation Institute, 1999.

that mineralogical-petrographic and chemical characteristics be considered within a diagnostic procedure. Laboratory examination of undegraded samples would be one of the necessary steps to be taken here, especially if the presence of microorganisms that have a harmful effect on historical stone is confirmed. Secondary bioreceptivity would involve the analysis of degraded samples given the synergetic effect of chemical, physical-mechanical and biological agents. Deposits, products of decay and reaction with external agents, differential erosion and other changes to the texture of stone surface are a result of the effect of different factors that may, depending on the concrete conditions, influence in one way or the other the growth of living organisms, the intensity of colonization and spatial distribution of different species. Finally, determining the level of tertiary bioreceptivity would imply establishing any prior use of water repellents or consolidants, which may also be relevant for diagnostics in this context.

4. Field and laboratory work

4.1. Selection of locations

Convinced that the analysis of the effects of biodeterioration and determination of optimum conservatory treatment must be done in the context of general assessment of the condition of stone walls that cannot exclude the agents of physical, chemical and anthropogenic character, in making a final decision on the selection of locations we particularly took into consideration the existence of prior analysis of the condition of historical objects that we wanted to include in our research. For two out of three architectural heritage monuments (Ošanići and Počitelj), there were detailed conservation analyses of stone walls: highly relevant photo-material that also included mapping of deterioration with the relevant classification (Mujezinović, 2005, 2009, 2010).[15]

One of the factors that influenced our choice was the assumption about a different degree of bioreceptivity, that is, different potential for the growth of vegetation and microorganisms.

The following locations, or objects, were chosen:

1. Hammam (Turkish bath) in Počitelj
2. Hillfort in Ošanići near Stolac – Megalithic wall
3. Hutovo old town

Figure 1: Hammam (Turkish bath) in Počitelj

15 See detailed conservatory analyses in: Study on results of investigative work on Šišman Ibrahim pasha's Hammam in Počitelj, with photos of the monument's condition and the analysis of preservation of the existing stone material, Nermina Mujezinović, Cantonal Institute for the Protection of Cultural-Historical and Natural Heritage, Sarajevo, 2006; Main project of restoration, conservation, partial reconstruction, consolidation and adaptation of Šišman Ibrahim pasha's Hammam in Počitelj into a museum/gallery space, Nermina Mujezinović, IGA plan, Sarajevo, 2007; Program of conservatory protection of the archeological site "Hellenistic urban complex at Gradina (Hillfort) in Ošanići near Stolac", Nermina Mujezinović, National Museum of Bosnia and Herzegovina, Sarajevo, 2009; Hellenistic urban complex at Gradina (Hillfort) in Ošanići near Stolac, Determination and classification of deterioration and the condition of megalithic wall with the towers, photo-documentation concerning different types of degradation and graphical documentation, drafts 1- 8, Nermina Mujezinović, National Museum of Bosnia and Herzegovina, Sarajevo, 2010. See also the following papers: Hellenistic town of Daorson – Methodological approach to protection and preparation of the project of conservatory-restoratory works, Nermina Mujezinović, Journal of the National Museum, National Museum of Bosnia and Herzegovina, 2010, Sarajevo and Šišman Ibrahim pasha's hammam in Pocitelj: researching, condition analyses and revitalization project, Nermina Mujezinović, ICOMOS Bosnia and Herzegovina, FIRDUZ-BEY'S HAMMAM: Revitalization of the archaeological site, Sanković Simčić, Vjekoslava (ed.), Mulabegović Ferhad, Mujezinović Nermina, Pravidur Andrijana, Sanković Simčić, Vjekoslava, Simović Snježana, Šekarić Branka, Škarpa Dubreta Darija, Sarajevo: ICOMOS National Committee in Bosnia and Herzegovina, 2013, ISBN 978-9958-9094-6-7, p 62-77.

Figure 2: Hutovo old town, detail

Figure 3: Hillfort in Ošanići near Stolac – Megalithic wall

4.2. Field work and determining the sampling positions

Samples in all three cases were taken from walls, in different areas, where macroscopic examination enabled us to register visible effects of colonization and activity of living organisms, as well as different types of surface alterations. Having done careful observation of stone surfaces and potential different origin and types of stone, we selected our sampling positions. In cases where the available documentation and prior analyses pointed to clear manifestations of stone degradation and prior presence of algae, lichen and fungi (Počitelj and Hutovo), it was possible to make informed decisions about the relevance of samples and adopt a targeted approach in determining the sampling positions.

We faced objective limitations in conducting our field work, mainly in the form of physical accessibility of objects and related hazards. The improvised door in the wall surrounding Šišman Ibrahim pasha's hammam in Počitelj was locked during our field work, blocking our access to the object. The inner yard space is completely overgrown with bushes and high vegetation growing next to the walls, which also blocked our access. Finally, entering the hammam was not possible either.[16]

16 In the course of the investigative work that we conducted a few years ago in relation to establishing the authentic elements of the interior of Šišman Ibrahim pasha's hammam, under the preserved parts of the˝ floor and backfilled material within the hammam, we discovered hypocaustum (floor heating systems) in two rooms in which physical material was mostly preserved in its original form. After that, the hammam was closed and its doors remain closed to this day.

At the location of Hutovo – a desolate, relatively isolated architectural complex which is not in use, nor is it maintained in any way, we faced an entirely different type of danger. Being situated in an environment entirely free from permanent human activity the complex proved conducive for the intensive growth of living organisms, including different types of snakes.

After we spotted them in several places during our initial examination of walls inside the complex, we made a decision to take our samples from the stone wall on the outer side of the complex near the road. Although more recent in origin and physically detached from the hillfort, this wall was built using the same type of stone, and based on visual observation we registered the presence of the same or similar species.

4.3. Sampling and microscopic analysis

The samples of lichen, moss and stains (black stains) were taken by removing the layer from the stone surface. They were placed in clean sterile containers and stored at the temperature of +4 degrees Celsius until further analysis.

The algal samples were taken by scraping the surface layer and placing them in dry and sterile closed containers. Then, the algal samples taken from the stone surface were resuspended in ultra-clean water with a few drops of Lugol's solution. These samples were then stored at the temperature of +4 degrees Celsius. They were kept in the laboratory at this temperature until final analysis.

All samples were taken to the laboratory on the same day.

In the laboratory, the algal samples were shaken up and then a few drops were pippeted out into the well unit, covered with a cover glass and observed under a light microscope.

5. Discussion

5.1. Bioreceptivity

The three locations are situated in the unique zone of Mediterranean climate of flatland Herzegovina, and hence there is no potential for the growth of significantly different species. Small variations in the average annual precipitation, maximum and minimum temperatures, wind frequency, direction and speed cause minor micro-climatic differences that may have more influence on intensive stone degradation caused by other agents than on biodeterioration, which would be a result of more intensive colonization of stone by certain types of vegetation and microorganisms because of conducive climatic conditions.

The altitude for these three locations is different, as is the position of stone structures in relation to the nearest road communication and the settlement to which they gravitate, that is, a larger settlement in the surrounding area that may potentially create specific microlocation conditions due to the presence of pollutants. While Hutovo old town and Šišman Ibrahim pasha's hammam in Počitelj are located either next to or in the immediate vicinity of the road, Hillfort in Ošanići is located at a great distance from the road and it can be accessed only by a dirt road. As for urban environment, this is applicable only in the case of hammam which is situated in the heart of the old town of Počitelj and not too far from another larger town (Čapljina). Hutovo old town is located in an off-the-road area quite distant from a small settlement. The hillfort in Ošanići is located on an isolated plateau in a natural ambience free from any human activity.

The analyzed stone structures are of different age, original purpose and form. None of them are in use. Hutovo and Ošanići are architectural complexes that have the character of archeological sites, while the hammam in Počitelj is an abandoned building that is not in use nor is it maintained.

The stone structures of Hellenistic town of Daorson in Ošanići near Stolac, including the megalithic defense wall with towers and town gates, were built in prehistoric fortified settlement that existed in continuity from the beginning of the early (17/16th century BCE) until the late Bronze Age (9/8th century BCE).

Šišman Ibrahim pasha's hammam, old Ottoman bath, is mentioned in historical records in connection with the name of secretary to the Grand Vizier Fadil Ahmed pasha Ćuprilić, Ibrahim, son of Omeraga, born in Počitelj. A few of the buildings in Počitelj are mentioned in connection with his name, among others han (inn) and hammam. According to Evliya Celebi, these two buildings were constructed by Šišman Ibrahim pasha in 1665.

Hutovo is mentioned in written sources in 1525. A massive round tower, later surrounded by ramparts, is known to have been in existence in 1714 as a derebend /Transl. note: from the Turkish word derebend meaning a mountain pass or gorge/ tower in the Stolac captaincy. Hajji Mehmed bey turned the tower into a fort before the Hutovo captaincy was separated from Vidoška captaincy in 1802. Two of the eight stone slabs erected in various places in the fort record the dates 1796 and 1806. These dates mark the time when a small fortified town was created by erecting ramparts around the tower.[17]

Samples were taken from stone blocks of three different types of walls on three different locations. These blocks differ in their natural (petrographic variety) and artificial characteristics (types of blocks: rough, partly-dressed, dressed stone blocks; dimensions and type of masonry).

Megalithic wall in Ošanići complex is a dry stone wall built with huge stone blocks (standard size of blocks is 0.7-0.9 m thick and 1 m long). The stone blocks on the sides forming the joints are finely cut while most of the blocks on the outer facing sides (excluding the town gates) are roughly dressed. The texture varies from one stone block to the other.[18]

17 Historical information about Hutovo, Hutovo (the Hajji bey's fort) in Hutovo, historic site, Decision on designating Hutovo as a national monument of Bosnia and Herzegovina, available at www.kons.gov.ba.

18 It is noted in many relevant research studies that surface roughness is among factors that have an influence on bioreceptivity. "The surface roughness of concrete has also been previously suggested to influence biofouling susceptibility; specifically, smoother surfaces have been observed to harbor less growth (Pinheiro, 2004).", Molecular characterization of microbial communities fouling concrete infrastructures, David John

Depending on the type of deterioration and condition, the degree of roughness differs because of the effects of fragmentation, peeling, erosion, differential erosion, microkarst, and other different manifestations of the loss of cohesion resulting from different factors (chemical and physical).

In the case of Šišman Ibrahim pasha's hammam, samples were taken from the fence wall built with rough stones of different dimensions and forms joined with mortar. The surface texture is mostly rough, which is partly a result of the cutting of stone and partly of surface deterioration. With respect to entire surface area of the wall, the texture is relatively homogeneous both quantitatively (degree of roughness from one stone to the other) and qualitatively.

The wall surrounding the Hutovo fort is built of partly-dressed stone blocks, more regular in shape, and laminated stones without any binding material. Looking at the entire surface area of the wall, the texture is not homogeneous and surface roughness varies both quantitatively (degree of roughness) and qualitatively (profile and morphology). Sporadically, it is very rough mostly as a result of erosion, differential erosion and other types of deterioration, and some stone blocks are visibly patchy due to the loss of material.

Limestone was used for the construction of all three structures. Based on the visual characteristics of the built-in stone blocks, it may be assumed that the varieties of stone differ in terms of their mineralogical-petrographic and physical-mechanic characteristics, as well as their chemical composition, although it should be said that our best guess is that there are no extreme variations in the relevant values of these parameters.

5.2. Biodegradation

5.2.1. Mechanisms of action

The formation of blue-green algae (cyanobacteria) on surface of walls of the stone structures in the region is facilitated by a gelatinous polysaccharidic sheath of these single-celled organisms.

The sheath acts as a reservoir of water and nutrients during dry spells and prevents drying of algae. At the same time, it serves as the medium for adhesion of the algae to the surface on which they live and for communication between organisms of the same species. Sheaths may be pigmented or not, depending on the type of algae.

The algae, in symbiosis with other microorganisms, create a biofilm on stone monuments that has an impact on the visual characteristics of the architectural heritage monuments. Apart from this aesthetic effect, there are other, more deteriorating, effects caused by these microorganisms.

The first type of deterioration is biogeophysical, which implies mechanical damage caused by biological growth. With the sheath's swelling during humid spells, there is an increased pressure on the stone cracks colonized by the algal growth. The cracks expand and in more serious cases the stone gets fragmented resulting in more damage. Moreover, this process contributes to longer retention of water in the cracks, which in turn enables colonization of stone by many other microorganisms and their uncontrolled growth on the surface of stone structures.

The sheath is directly associated with the other type of deterioration – biogeochemical, because it favors the adherence of airborne particles (dust, pollen, spores) and pollutants (soot, products from combustion of coal, fuel and oil), thus forming deposits that may cause different surface alterations on stone blocks.

Other biogeochemical damage concerns metabolic processes. The biogenic release of corrosive acids (biocorrosion) causes dissolution of stone, sequestering of metallic cations from stone, or the conversion of inorganic substances to acids by redox reactions. Endolithic photosynthetic organisms use these acids (lactic, acetic, glycolic, pyruvic, and other) to dissolve carbonate surface and penetrate deeper into the stone. Cyanobacteria (blue-green algae) have this ability. The algae first colonize a damaged portion of the stone.

Lichen play a major role in biodegradation of stone structures. With their hyphae they penetrate the substratum and damage it further by expanding and shrinking through cycles of drying and moistening. Lichen acids (primarily oxalic acid) dissolve the stone material, and as a result lichen talus accumulates 1-50 percent calcium oxalates depending on the surface (Macedo et al., 2009).

Giannantonio, A Thesis Presented to The Academic Faculty In Partial Fulfillment of the Requirements for the Degree Master of Science in the School of Biology, Georgia Institute of Technology, August 2008, pp. 8-9. „[A]s a ratio of surface area to projected area... [s]urface roughness can be an indicator of porosity, as well as aggreggate size and texture." Ibidem, p. 9.

5.2.2. Visible manifestations of biocolonization on stone blocks of the Počitelj hammam, Ošanići hillfort and Hutovo old town

Based on preliminary research and without further laboratory analysis and the necessary in situ tests that would also include instrumental analyses, it is not possible to reach, with any certainty, conclusions about the extent of biodegradation caused by the colonization of stone by identified microorganisms, nor is it possible to exactly quantify their harmful effects. Below are the results of visual observation and our analysis of the existing documentation on the prior condition of stone walls of these monuments.

General condition of the megalithic stone blocks in Ošanići hillfort is not homogenous either quantitatively or qualitatively (this also applies to biological degradation). From one segment to the other, the number, order and position of blocks vary in terms of characteristic pathology, or some type of deterioration of stone material. Almost all types of deterioration are present more or less: discoloration and deposit, detachment, material loss, dislocation, cracks, completely destroyed missing elements and parts. Deterioration caused by anthropogenic factors reflected here in the consequences of previous restoration efforts is a separate deterioration category. (Figure 1, Figure 2).[19]

Biological colonization is most prominent on the north-east facade and on the top of the megalithic wall. Lichen dominate, along with the algal growth while moss is very rarely observed. There is a diffused pigmentation on the stone blocks in the form of white, black and colored stains, and on some surfaces in the wall's interior, visibly moist, we sporadically came across blue-green film. The orientation numerical data about the colonization of the facade by microorganisms and vegetation relating to the condition of stone walls in 2010 is quite illustrative.[20]

Similar biocommunities were found on the wall surrounding the hammam in Počitelj although biocolonization of stone walls by lichen here is much less represented here compared to the megalithic wall in Ošanići. The growth of plants in the stone cavities, however, is more intensive here. Some sections of the wall evidently retain water and dry harder, and it is in these areas that we detected greenish film on the stone blocks. There is also a sporadic presence of white and yellowish stains affecting a small surface area of the wall.

The characteristic manifestation of colonization of the wall in front of the Hutovo fort is mostly pigmentation, that is, the presence of white, black and brownish stains on stone blocks. There are no moist areas on the observed surface area or areas with greenish or blue-green biofilm.

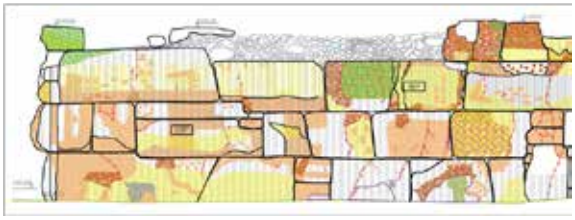

Figure 4

Figure 4 i **5:** Mapping of deterioration with classification of different types, megalithic wall in Ošanići, 2009, prior recording of stone structures was done by a laser scanner. From: Mujezinović, N. 2010. Determination of deterioration patterns and the condition of megalithic wall with the towers; Hellenistic urban complex at Gradina (Hillfort) in Ošanići near Stolac, study on conservation and protection of the archaeological site. Sarajevo: National Museum of Bosnia and Herzegovina.

19 For detailed description of all types of deterioration, see the studies and technical documentation: Hellenistic urban complex at Gradina (Hillfort) in Ošanići near Stolac, Determination and classification of deterioration and the condition of megalithic wall with the towers, photodocumentation concerning different types of degradation and graphical documentation, drafts 1- 8, Nermina Mujezinović, National Museum of Bosnia and Herzegovina, Sarajevo, 2010; and article: Hellenistic town of Daorson – Methodological approach to protection and preparation of the project of conservatory-restoratory works, Nermina Mujezinović, Journal of the National Museum, National Museum of Bosnia and Herzegovina, 2010.

20 We obtained the data about surface areas affected by biocolonization by calculating the areas from mapping of the damage in 2010, Hellenistic urban complex at Gradina (Hillfort) in Ošanići near Stolac, Determination and classification of deterioration and the condition of megalithic wall with the towers, photo-documentation concerning different types of degradation and graphical documentation, drafts 1- 8, Nermina Mujezinović, National Museum of Bosnia and Herzegovina, Sarajevo, 2010. Surface areas here should be understood as projected areas.

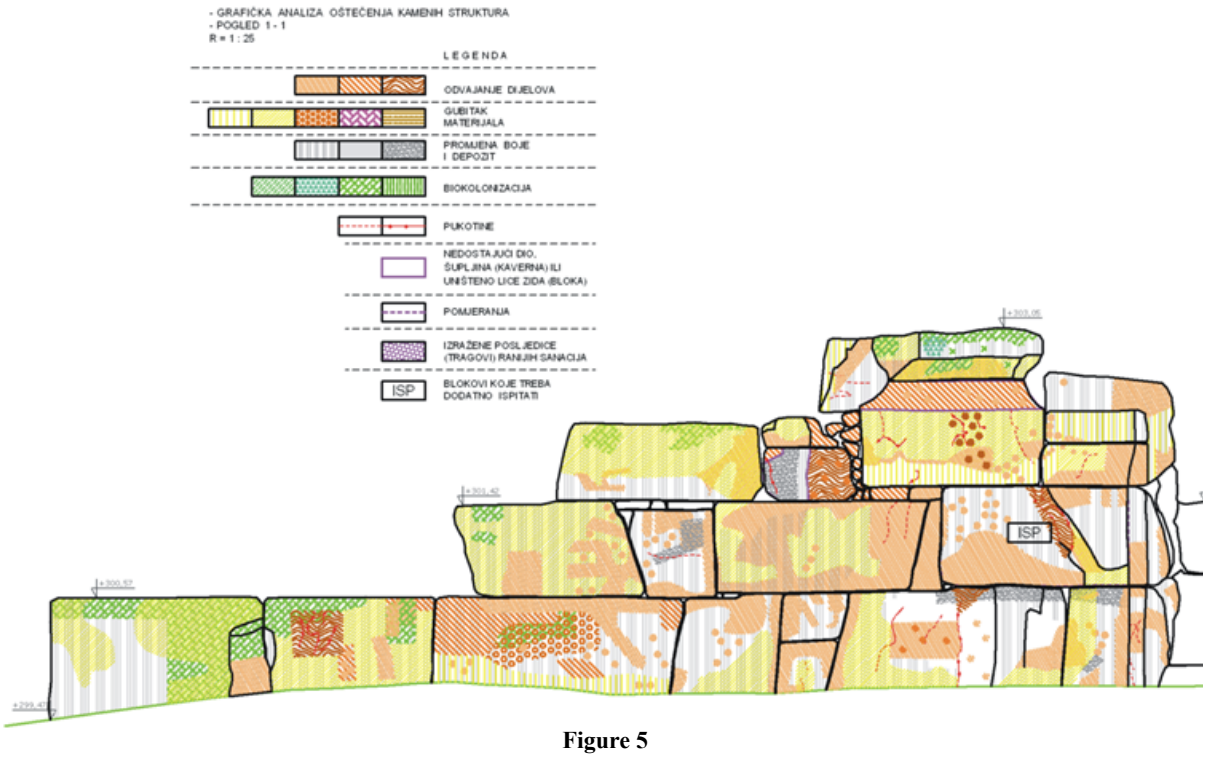

Figure 5

5.2.3. Identified species

At the locations in Ošanići and Počitelj (fence wall), there is a confirmed presence of blue-green and green algae that form a biofilm on stone surfaces affecting the aesthetic appearance of these structures. They result in biogeophysical and biogeochemical types of deterioration, which involves swelling of the algal sheath creating cracks in the stone material that is subsequently further corroded by various acids released by the blue-green algae.

In the samples taken from the wall in front of the Hutovo fort, a type of moss called hair cap moss (Polytrichum commune) was registered. Its effect on stone is mostly physical in nature as it penetrates with its stems the surface layer of stone structure and adheres to the substratum.

The identified species are provided in the table below. (Table 1, Figure 6-10)

Table 1

LOCATION	TYPE	DESCRIPTION
POČITELJ "HAMAM I":	Nitzchia sp.	Diatom
	Scytonema sp.	Blue-green algae
	Pediastrum sp.	Green algae
	Gloeocapsa sp.	Blue-green algae
POČITELJ "Algae (stone) HAMAM VI" / "HAMAM VII"	Phormidium sp.	Blue-green algae
	Scytonema sp.	Blue-green algae
	Cladophora sp.	Green algae
	Pediastrum sp.	Green algae
	Nitzschia sp.	Diatom
	Gloeocapsa sp.	Blue-green algae
HUTOVO OLD TOWN "black moss"	Polytrichium commune	Moss
HUTOVO OLD TOWN "black stains"	*Thiobacillus sp.*	Bacteria
OŠANIĆI II - orange stains /	*Chroococcidiopsis sp.*	Blue-green algae
OŠANIĆI VIII - green algae	*Gloeocapsa sp.*	Blue-green algae

Figure 6. Sampling position "I", Počitelj, hammam

Figure 8. Sampling position "VII", Počitelj, hammam

Figure 9. Sampling position "VIII", Ošanići hillfort, megalithic wall

Figure 7. Sampling position "I", Počitelj, hammam

Figure 10. Sampling position "VIII", Ošanići hillfort, megalithic wall

5.3. Possible conservation treatment, preliminary recommendations

As the first phase of the project, this research involved a preliminary assessment of biodegradation on walls of stone structures in Počitelj, Ošanići and Hutovo through simple determination of the present species.

In this context, it may be noted that the effects of biodegradation are relative in the quantitative sense too, i.e. its consequences are not equivalent on stone structures in general, and the stone structures included in our research in particular. The possible material loss caused by the dissolution of calcium carbonate and other metabolic activities of microorganisms on rough stone blocks of the megalithic wall of Ošanići hillfort, some of which are over a meter long and 80 cm thick, does not carry the same weight as in the case of, for instance, a stone statue, fine decorative finish or a very shallow relief (rilievo stiacciato). The effect of biodegradation at the location of Ošanići

hillfort is obviously incomparable to the effect of physical-mechanical and chemical agents, which are the primary causes of extreme deterioration. In support of the above, it should be noted that on the stone wall in Hutovo old town, we observed very similar visual manifestations of the growth of living organisms and the level of colonization of the surface area by lichen is equally high (both in Ošanići and Hutovo). The stone blocks in Hutovo, however, are in much better condition so that can not even be compared with previous.

In view of the observations noted above and after having studied the effect of micro- and macro-organisms on the structure and appearance of stone blocks in the walls of historical monuments, we may give the preliminary guidelines on further development of solutions on possible treatment.

Thus, general recommendation would be to remove lichen because the review of literature shows that their deleterious influence is the strongest. However, techniques and degree of intervention to be applied on each particular position should be proposed and evaluated in the following stages of the project.

The algae, blue-green and green, also have a harmful effect, but their removal and aggressive clearing off the stone surface can create conditions conducive for the colonization by lichen, which then more easily penetrate the substratum of such deteriorated stone material. In the long run, this type of cleaning would cause more damage than benefit and hence a very careful assessment should be made in each concrete case.

If understood generally, aforementioned preliminary recommendations, can relate mostly to historical buildings and stone assemblies preserved at the level of ruins, stone structures in archeological parks, and generally uninhabited structures of historical importance. As for walls and other stone elements in the interior of historical residential buildings or structures intended for rehabilitation and use, we surely recommend detailed cleaning and complete removal of all micro- and macro-organisms as they pose a health hazard.

5.4. Further research

The continuation or follow-up on this research would entail a clearer quantification of some forms of biodegradation, but also identifying optimum, non-harmful conservation treatment for stone structures in Počitelj, Ošanići and Hutovo.

As a first step in the next stage of the project, we recommend that the types of lichen that colonized the stone structures included in this research be identified. Methods to be applied should include the review of literature, morphological analyses and molecular research of genetic material of unknown species.

The next step would be to study and test different non-aggressive means for the removal of harmful organisms aimed at identifying optimum fungicides for the removal of lichen and mild bactericides and algaecides for partial or complete removal of blue-green and green algae. This is intended to provide for appropriate, non-aggressive remedial treatment of stone surfaces, tailor-made to the condition of monuments in question, where the potentially harmful secondary effects of the used substances and technologies, or their potentially negative interaction with the existing materials, would be reduced to the minimum.

We also propose the examination of short- and long-term effects of micro- and macro-organisms on the thickness and the level of degradation of stone surfaces by using physical-chemical methods, as well as methods of in-vitro examination of the use of nutrients.

6. Conclusion

In the course of our research we established the presence of microorganisms on all three stone walls of architectural heritage buildings in Počitelj, Hutovo and Ošanići near Stolac, first visually in situ and then in laboratory, mostly of algae, fungi and cyanobacteria that, in symbiosis, create a biofilm on stone surfaces. Depending on their level of bioreceptivity, these stone surfaces are more or less affected by biodegradation and more or less altered as a result of biological activity.

At the locations of Ošanići and Hutovo, there is a dominant presence of lichen, less so in the case of wall of the hammam in Počitelj. In the samples taken from the wall of Šišman Ibrahim pasha's hammam in Počitelj, we identified diatoms, green and blue-green algae, whereas samples from the hillfort in Ošanići revealed the presence of blue-green algae only. In the samples taken from the surface of stone blocks of the wall in Hutovo old town where visual observation indicated black stains, we identified the presence of bacteria.

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DETERMINACIJA ŽIVOG SVIJETA NA KAMENIM ZIDOVIMA OBJEKATA GRADITELJSKE BAŠTINE U JUŽNOJ HERCEGOVINI (STOLAC, POČITELJ, HUTOVO)

Sažetak

Rad se bavi problematikom biokolonizacije na kamenim zidovima objekata graditeljske baštine, koja je vrlo malo naučno i stručno obrađivana u Bosni i Hercegovini. Primjenjujući interdisciplinarni pristup, autori rasv-

jetljavaju ovaj fenomen iz dva ugla: sa stanovišta teorije zaštite baštine, te s aspekta konzervacije kamena kao discipline koja razvija istraživanja orijentirana problematici degradacije, liječenja i preventivne zaštite fizičke građe kamenih spomenika. Problem biodegradacije povjesnog kamena stavljen je tako u kontekst cjelovite procedure dijagnostike i planiranja konzervatorskih intervencija, koji bi se, primjenjujući interdisciplinarni naučni pristup i najsavremenije tehnologije, morali oslanjati na doktrinu konzervacije.

Biološko naseljavanje istraživano je na tri povjesna objekta različite starosti, forme i funkcije, smještena na tri lokaliteta južne Hercegovine. Primijenjene su različite istraživačke metode: pregled literature, analiza postojeće dokumentacije, te rad na terenu i u laboratoriji.

U konačnici, identificirane su vrste mikroorganizama pronađenih u uzorcima, a rezultati prodiskutovani s aspekta njihovog uticaja na fizičku građu, daljih istraživanja te preliminarnih preporuka za razvijanje solucija konzervatorskih tretmana.

***Ključne riječi**: prednapinjanje, ušteda, konstrukcija, rasponi, BBR*

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HEALTH INSURANCE FUND OF THE REPUBLIC OF SERBIAN

Professional paper

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Abstract

Insurance companies are financial institutions engaged in risk-taking on behalf of their clients for a fee, called a premium. Insurance is a complex system with two basic characteristics. Property and personal insurance is voluntary. In the cases listed, property and life insurance may be mandatory in cases prescribed by law. Insurance operations are activities of life insurance and non-life insurance operations.

Keywords: *insurance companies, insurance, life insurance, non-life insurance*

Introduction

Insurance companies are financial institutions engaged in risk-taking on behalf of their clients for a fee, called a premium. It realized gross profit premium payment that is sufficient to pay expected claims for damages or the sum insured plus the net profit.

Insurance is a method of transfer of risk from the insured to the insurer, who accepts to reimburse incidental damages those in which they are incurred and distribute them to all members of the community at risk.[1]

Insurance is a complex system with two main features: [2]

- The transfer of risk from the individual to the group or community risk, which should be understood as the awareness of individuals about the vulnerability of the same dangers of which can effectively protect you if you get involved in the insurance system in large numbers,
- Distribution losses on an equal basis to all members of the group, which is a system dividing incurred losses to all insured and cover these losses in the form of premiums paid by.

From the standpoint of individual, insurance is an economic instrument which the individual is replaced by a relatively small amount of the premium for a relatively large and uncertain financial loss. From the standpoint of society in general, insurance is an economic instrument that by combining and homogenizing the risk in accordance with the law of large numbers reduce the total losses the company planned schedule of costs and premiums .[3]

Business entities pay insurance premiums at regular intervals in order to avoid and eliminate sudden large losses and unplanned expenses. Policyholders make their payments and premiums for them represents a cash outflow, while for insurers to represent cash inflow. However, when performing various types of insurance risk does not prevent the occurrence of damage or reduce the likelihood of their occurrence as many would think, but the insured careless behavior and lack of care can lead to the initiation of the risk and occurrence of adverse events.

To be able to talk about the status of the insurance companies, we have first to define all institutes related to this particular form of the company, which is different from other types of companies that are not engaged in specific activities. One of these activities is to ensure the insurer or the insurer's legal entity that is engaged in insurance business. To the insurance company could perform the insurance industry, it has concluded an insurance contract with the insured. The obligations of the insurance company representing all the obligations which it is claimed

1 http://www.elitaplus.hr/rjecnik.htm

2 Ćurak, M., Jakovčević, D., Osiguranje i rizici, RRIF plus, Zagreb, 2007., p. 21

3 Isto, p. 21-22

by the insurance contract, such as various forms of payment of the agreed sum or fee, which are defined in detail in the insurance contract, insurance policy and insurance terms. So, the insurance contract concluded between the policyholder and the insurer, in which the policyholder is obliged to pay a certain amount to the insurer or insurance company, and the insurer is obliged, if an event occurs, which is the insured event, the insured or pay a third party compensation or agreed sum or do something else. From this we can conclude, that the parties policyholder and the insurer, but that, when the insured event, there are other parties, that is, either the insured or the insured person or a third person, called and user security.

1. Role of Insurance companies

Insured is a natural or legal person concluding the insurance contract in its own name and for its own account[4], providing of adverse events covered risk. In order to obtain insurance protection, the insured person should be competent, which, as a full Contracting Party, is set against the insurer, with all the rights and obligations arising from their relationship. In practice, it often happens that the insured at the same time the contractor and the beneficiary (when his good or himself at risk), but this is not always the case. It happens that they are exposed to hazards and people's good or other personality - all of this of course has to have close links with the insured. For instance, property insurance policyholder may not always be the owner of the insured object has, for example, its beneficial owner. In personal insurance risk of death or accident can threaten another person (spouse, children or parents of the insured).

User security is a natural or legal person who is entitled to compensation from insurance. In the capacity of the beneficiaries and policyholders occurs, most often, one and the same entity - insured. Therefore, the name of the beneficiary should be used, especially when the person using the insurance was out of contract at the time of its conclusion, not appearing, either personally or through a representative. The difference between those roles in practice, in particular, occur in insurance contracts in its own name and for the account of third parties. User security for someone else may not always be known in advance to the insurer, even policyholder. It is sufficient that the contract be determined by impartial criteria for its determination.[5] Therefore, the user can be determined by any, any definable, for example, in covering the face of uncertain account. Insurance for someone else originated in marine insurance, but has found application in many other types of insurance. The term users is set aside and for insurance in favor of a third party, usually for life insurance, where it can represent anybody (relative, guardian or other person, a charity, a company, association, etc.).

The insurance industry, which is engaged in a joint stock company for insurance and mutual insurance companies are businesses of insurance, coinsurance and reinsurance, as well as the activities directly related to insurance activities. Insurance operations are concluding and executing insurance contracts and take measures to prevent and combat the risks jeopardizing the insured property and individuals. This insurance can be called direct insurance, since the insurer directly conclude an insurance contract with the contractor. The direct insurance will be done and when the company concludes a contract for insurance, that is, an insurance agent.

On the other hand, coinsurance are concluding and executing insurance contracts with several insurers who have agreed upon joint coverage and risk diversification. So, here we have several insurers who, collectively, conclude an insurance contract, in proportion to bear the risk, that is, in proportion paid the agreed sum, if there is damage or the insured event. [6] It is a direct, horizontal distribution of risk between the insurer who individually taking their share of responsibilities. No co-insurers are not liable for the obligations of other co-insurers.

With insurance applies only in exceptional cases where it is a large and heavy risks, which can not take one insurer. The coinsurance creates a chain of liabilities several co-insurers according to the same insured. One horizontal division of risk, each of the co-insurers take over their part of the obligation, ie, covering their part to participate in the sharing of risks. For coinsurance implies the presence of two or more insurers directly in the conclusion of one of the insurance contract, so that every insurer assumes coverage of a specific part of the risk. Coinsurance, in essence, is the allocation of a risk in several parts which each insurer takes the direct coverage of the joint agreement or joint insurance policies.

4 Šulejić, P., Pravo osiguranja, Dosije, Beograd, 2005., p. 155

5 Isto, p. 245

6 Čaruk, M., Jakovčević, D., Osiguranje i rizici, Zagreb, 2007., p. 282

The insurer, which is the driving duties from the insurance, through coinsurance, is called the leading insurer. He usually other co-insurers entrust the execution of the calculation and payment of insurance premiums, which he then partitioned the other co-insurers. The provision for the co-insurance there is the independence of the obligations of each co-insurers. The obligation of each of the insurer solely his, and in any case is not transferred to the other co-insurers. In other words, as if the policyholder concluded with each co-insurers particular insurance contract.

Coinsurance is necessary to distinguish from multiple insurance, or when an object is insured by several insurers of the same risk, same interests and the same time. The co-insurance is concluded one contract of insurance, and in multiple insurance concluded several individual agreements. At this stage, some insurers at the time of conclusion of the contract do not know for other contracts.

And co-insurance is a direct insurance, provided that, here, we have several insurers as counterparties. Otherwise, the organization of the distribution of risk in the co-insurance can be complicated in relation to the organization of risk in reinsurance.[7]

Reinsurance activities are concluding and executing contracts on reinsurance of the insured surplus risks exceeding the retention of one insurance company to another insurance company that is licensed to perform reosi- pushing. If an insurance company can not take a big risk, arising from an insurance contract or, if the excess risk exceeds the retention, by which we mean the amount of the contract assumed the risk that the company retains as its own coverage and who can cover their own means, then concludes reinsurance contract.[8]

Reinsurance provides even more safety, because the risk is distributed to a larger number of insurance companies, in particular, as a rule, a company that takes over the function of reinsurance stronger. Institution reinsurance, which combines insurance companies, increases security of the insured with a technical and financial potential. In this way, opportunities are created to provide the most difficult risks in the modern highly developed economy. As far as the legal relationship between the insured and the insurer, reinsurer, nothing changes - the insured and the insurer immediately enter into a contract of insurance, and in the next stage, the contractual relationship between the insurance company who has committed insurance (insurers) and organizations that accept reinsurance. However, although there is no legal relationship between the insured and the reinsurer, it is of importance to the commitment of the insured, who will, as a rule, rather opt for insurance with reinsurance.

2. Division of Insurance companies and insurance

Insurance companies may be established in the form of a joint stock insurance company in the form of a mutual insurance. [9]

Joint stock insurance company is a legal entity that engages in insurance of property and persons for profit. Joint stock insurance company founded at least two legal or natural persons. [10]

A foreign natural or legal person may, under conditions of reciprocity, establish a joint-stock insurance company together with a domestic legal or natural persons. Joint stock insurance company may conduct business:

- One or more types of insurance and
- Reinsurance.

Accordingly, it follows that a joint-stock insurance company may conduct insurance activities as well as specialized (when performing one type of insurance) or general (when it performs many types of insurance). [11]

Also, a joint stock company may conduct only reinsurance activities. Regarding the legal status of joint stock insurance company, it is important to emphasize that the organization to ensure the legal entity that engages in insurance of property and persons. A joint stock company has been operating as a single organization, the original legal personality, which is acquired by incorporation. Parts of the joint stock company are: Authority, head office and branches. Directorate parts of the joint stock company within which to combine certain functions of the joint stock

7 Jankovec, I., Saosiguranje kao pravni odnos, Anali PF u Beogradu, br.1-4, Beograd, 1983., p 369

8 Andrijanić, I., Klasić, K., Tehnike osiguranja i reosiguranja, Zagreb, 2002. p. 141

9 Šulejić, P., Pravo osiguranja, Dosije, Beograd, 2005., p. 129

10 Šulejić, P., Pravo osiguranja, Dosije, Beograd, 2005., p. 129

11 Isto, p.4

company. Main Branch is part of the joint stock company which in legal transactions with third parties that have the authority on behalf of and for the account of the joint stock company performs all activities in industry stock company, except for reinsurance. The branch is part of the joint stock company in legal transactions with third parties have the authority, in the name and on behalf of the joint stock company performs conclusion and execution of the insurance contract. Exceptionally, if the branch or business unit as part of a joint-stock company has certain powers in legal transactions with third parties, and they are entered into the court registry.

In theory, the generally accepted rule, that has found its application in practice, there are two basic ways of establishing joint stock companies: the first, when the founders of the joint stock company set up a joint stock company by purchasing all shares in the establishment of what is called the simultaneous establishment and another where the points public call for the purchase of shares, which is called the successive establishment. [12]

The mutual insurance company, too, as well as a joint stock company, a legal entity that engages in insurance of property and persons in the interests of its members - the insured. The main difference compared to a joint stock company that is a mutual insurance company is not established for profit. The Company may only engage one or more types of insurance. A mutual insurance company can not carry on reinsurance business and affairs of compulsory insurance.

2.1. Brokerage and agency

Insurance brokerage activities performed by the company for the insurance brokerage company which has obtained permission from the competent authorities to carry out these tasks. Agent activities performed by the company for insurance and a natural person, who received the permission of the competent authority to carry out these tasks. Activities directly related to insurance activities are mediation and representation in insurance, identification and assessment of risks and damages, brokerage in sales and sales of salvage operations and rendering other intellectual and technical services related to insurance activities. With this, the last mentioned, jobs dealing with insurance brokerage and agency, as well as agencies providing other insurance services. The legislator pays special attention to these kinds of companies, anticipating them different conditions of establishment and operation. Of course, here we must distinguish between business mediation of agency activities, so that representation can be seen as a stronger connection between insurers and insurance agencies. In addition, the agent has greater powers of a mediator.

2.2. Property and personal insurance

Property and personal insurance is voluntary. In the cases listed, property and life insurance may be mandatory in cases prescribed by law. Insurance concluded free will, from a purely economic rebellion to stakeholders - policyholders, ie, to protect the insured property, proprietary interest, responsibility, health or life. Thus, it follows from the development of awareness of the need that is satisfied by signing a contract of insurance with an insurance company. Most insurance spa just to give voluntary. According to our legal solutions, and the like in other countries, property insurance and life insurance are generally voluntary.

Insurance operations are activities of life insurance and non-life insurance operations. Here are types of life insurance. That are:

- Life insurance,
- Annuity insurance,
- Supplementary insurance with life insurance,
- Voluntary pension insurance,
- Other types of life insurance.
- The common features of life insurance are:[13]
- The risk is expressed in premiums,
- There is a long period of time,
- Fixed premium for the duration of insurance,
- Permanence, immutability of the conditions agreed at inception,
- The possibility of payment policies to the height of its redemption value and
- The possibility of pledges or security policies.

12 Mrkšić, D., Pravni položaj osiguravajućih organizacija u jugoslovenskom pravu osiguranja, SORS 2001., Sarajevo, 2001., p. 5

13 Pešić, M., Ulaganje sredstava životnog osiguranja bitna sastavnica marketing miksa, UDK 368.91, JELL Classification G22, Ekonomski fakultet Sarajevo.

In non-life insurance include all types of insurance that do not belong in life insurance.

Types of non-life insurance are:

- Accident insurance,
- Voluntary health insurance,
- Motor insurance, which covers damage to motor vehicles under its own power, other than rail vehicles and vehicles without their own drive, or loss of such vehicles,
- Goods in transit insurance, which covers damage to the goods or loss of the goods, regardless of the type of transportation,
- Property insurance against fire and other hazards, which covers damage to property caused by fire, explosion, storms and other natural disasters, nuclear energy, sliding and soil settlement, and others.

3.3. Life insurance

Life insurance is a form of protection of the insured or a person close to the accident which it can happen. In this way, man is at times providing against the risk of death or loss of or reduction in earning capacity. Life insurance eliminates both the risk of damage consequences. Although long banned, because of explanation, it is immoral to benefit from the death or injury, today's agreement on life insurance generally accepted in all legal systems.

From the standpoint of the state payment of life insurance premiums accumulating assets that have importance of saving, which is long-term, pre-determined and dedicated. Therefore, it can be used as a source of lending and investing. From the standpoint of the individual, of the life insurance can be used as collateral for a loan, which the insured can provide funds for investments or meet unexpected needs. Given the importance of life insurance is to the economy of each country, it requires a special attitude of the state in the field of tax policy. Therefore, in most countries, life insurance premiums tax exempt.[14]

14 Ćurković, M., Ugovor o životnom osiguranju, Svijet osiguranja, Zagreb, 1998.,, broj 1, str. 31-32. Autor navodi da su premije životnog osiguranja oslobođene poreza u slijedećim evropskim zemljama: Danska, Njemačka, Holandija, Portugal, Španija, Velika Britanija, Finska, Island, Norveška, Švedska i Švajcarska

Life insurance has a savings and represents a good form of life savings. Upon expiry of the insurance policy, money is paid at once or in installments, depending on the choice of the insured.

Life insurance is a specific financial business that is not only interesting for the insured and the insurer, but is very interesting for the country, because life insurance means the accumulation of large financial resources for a long time that, as such, may be placed on the capital market, or used for other purposes. Of special importance is the fact that life insurance funds by nature long-term assets. It may be, from the standpoint of the national economy, rational focus in development financing primarily infrastructure projects. This is done primarily by buying government securities, and that the issue of municipal bonds to finance development of its environment.

3.4. Annuity insurance

Annuity insurance is insurance at the same time safe and profitable form of investment that allows the payment of monthly annuity for life or a limited period, if it chooses this form of annuitant. In the case of the monthly premium payment, the duration of payment, insurance coverage and Death to the agreed amount of insurance. Height annuity depends on the access age of the insured, the height of insurance premiums, time premium payment, if it is paid in yearly or monthly or quarterly installments, as well as the duration of annuity payments (depending on whether you are contracting a life or temporary annuity payments) . Annuity insurance is compatible with other types of life insurance, so that the sum insured, which is paid after the expiry of the insurance, can be used as a one-time payment of insurance premiums for a life or temporary annuity.

3.5. Voluntary pension and health insurance

Voluntary pension insurance is insurance which, on the basis of a contract, may provide rights to old age, disability, death and other risk insurance, to the extent prescribed by the law governing the mandatory pension and disability insurance or to a greater extent. The first pillar pension insurance is a mandatory state pension insurance, that is, the system of intergenerational solidarity. The second pillar is a mandatory supplementary pension insurance, which applies

only to employees and administered by private pension funds. It works by making the law determined to be part of the percentage of compulsory contributions intended for the financing of the first pillar pointed to another, so that the employee is entitled to two pensions, the state of the first and the second private pillar. Finally, the third pillar is a voluntary supplementary pension insurance, intended for all citizens, regardless of whether they are employed or not, whether they have a regular income, study, engage in independent company, etc. Voluntary pension insurance in the Republic of Serbian will become even more important, given that the current system of pension and disability insurance in our country, based on the so-called pay-as-you-go basis, increasingly at a crisis of financial sustainability. Activities undertaken in the last decade have made some results, which, however, are not enough to, in the future, provide stable and sufficient pensions for all and increase the fairness of the pension system. Therefore, further reform processes imposed as a necessity, where its place is a voluntary pension insurance.

Voluntary health insurance is insurance which, on the basis of a contract, may provide rights to health insurance for persons who are not insured under the law, which regulates the mandatory health insurance, as well as persons who are insured under that law, and to ensure a greater scope of rights volume, which is provided by this law and other types of health insurance that are not provided by that Act. Voluntary or private health insurance should not be confused with the mandatory national health insurance, which in respect of employment exercised employed, and a social program of each country. Voluntary or supplementary health insurance payments can be made by insurance companies. This type of insurance provides economic protection of the individual and his family during the illness. In the Republic of Serbian, currently, additional health insurance, may be paid with a life insurance policy, but may be paid as a special form of insurance.

3.6. Compulsory insurance in traffic

Compulsory insurance in traffic are defined and regulated by a separate law. Speaking of compulsory transport insurance, talk, first, about the liability insurance. In addition, it is common that when we talk about mandatory insurance, then we think, in the first place, the automobile liability insurance and automobile liability. Because of different conceptions about the above terms, as well as the possibility of using other, we will, nevertheless, that, in this paper, use the term most often used in the literature and practice, and it is auto insurance. However, the obligatory insurance does not fall only car insurance, but also other types of compulsory insurance. Types of compulsory traffic insurance are the following:

- Insurance of passengers in public transport against accidents,
- Insurance of owners of motor vehicles against liability for damage caused to third lychee,
- Insurance of aircraft owners against liability for damage to third parties and passengers and
- Ensuring boat owners against liability for damage to third parties.

Compulsory insurance can not occur if there is no agreement on compulsory insurance, ie, the vehicle - a means of transport can not be put into operation if it is not concluded. So, the owners of the means of transport for public transport of passengers and owners of other vehicles, we, above mentioned, shall conclude a compulsory insurance contract, before the means of transport is put into operation. One of the topics, which will be given special attention, and concerning the status of contracts on compulsory insurance, is the bankruptcy of insurance companies. If you initiate bankruptcy proceedings against the insurance company, then signed contracts on compulsory insurance shall remain in force until the expiration of the period for which they are concluded.

The insurance company is obliged to conclude a contract of compulsory insurance in accordance with the terms of insurance and premium tariffs in force at the time of conclusion of the contract. However, the insurance company can not refuse an offer for conclusion of a compulsory insurance if the policyholder has accepted the conditions of insurance and premium tariffs Society for the type of insurance in force at the time of submission of tenders for the conclusion of insurance contracts

3.7. Other issues related to the functioning of insurance companies

The insurance company is obliged to provide liability insurance contract exceeding the retention. Retention is the amount the insurance company contract

accepted risks that company retains as its own coverage and who can cover their own means. The insurance company shall always retain part of the risk retention. The insurance company is obliged to part of the retention reinsure risks in reinsurance. A reinsurance company is obliged to part of the risk can not cover its assets or reinsurance in the country, reinsure abroad. In this connection, the insurance portfolio is a collection of all the risks insured by an insurer. One can express the total number of the insurance contract, the sum of the sum insured or the sum of the insurance premium.

The founder of an insurance company or other legal entity which carries out activities directly related to insurance provides cash portion of the share capital in the amount prescribed by law. The insurance company is obliged to ensure that its operations basic capital of the company is always in the amount that is not less than the amount provided for by law.

Insurance companies that are ahead, mentioned, for its obligations with all its assets. Assets of insurance companies make money, ownership of immovable and movable property, securities and other property rights. Also, a significant portion of the assets of an insurance company there and in kind. The basic capital of the Company consists of its founders, who have to be in cash. Contributions in kind founders and shareholders expressed monetarily. All the funds which insurance company operates and which corresponds to can be distinguished in:

- Funding of the share capital,
- Insurance premiums,
- The means of technical reserves,
- Guarantee reserve assets and other resources.

Particular attention will be paid to the property and income of the insurance company. In a world, otherwise, it also supervises the operations of insurance companies through supervisory bodies representing the organizational part of the Ministry of Finance or through agencies which are directly responsible to the government.

For insurance companies, brokerage companies, insurance agencies and insurance agency providing other insurance services, the law governing the legal status of companies, if by law the special matters were not differently regulated. For natural person performing insurance agency, the law governing the legal status of contractors.

Insurance companies and face, providing services directly related to insurance, due to its activities in accordance with professional standards, best business practices and business ethics.

These are the most important issues related to insurance companies, ie, the joint stock company and mutual insurance company, as well as the companies and persons involved in the mediation, advocacy and other activities related to insurance. It is very important to bear in mind the business of insurance companies in other countries. Getting to know the basic characteristics of the status of insurance companies in other countries is essential and due to the future performance of the insurance industry in our territory by these companies.

4. Conclusion

In the insurance market of the Republic of Serbian in 2014 operated 12 insurance companies. Out of 12 insurance companies, with headquarters in the Republic of Serbian, 9 is engaged in activities of non-life insurance, and 3 insurance companies have performed the activity of non-life and life insurance. Also, in 2014 in the RS and operated 10 branches of insurance companies from FBiH and 7 companies from the RS had a license to conduct insurance business through a branch office in the Federation.

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FOND OSIGURANJA REPUBLIKE SRPSKE

Sažetak

Osiguravajuća društva su finansijske institucije koje se bave preuzimanjem rizika u korist svojih klijenata za naknadu koja se zove premija. Osiguranje je kompleksan sistem s dva osnovna obilježja. Osiguranje imovine i lica je dobrovoljno. U slučajevima koji su propisani, osiguranje imovine i lica može biti i obavezno u slučajevima propisanim zakonom. Poslovi osiguranja su poslovi životnih osiguranja i poslovi neživotnih osiguranja.

Ključne riječi: *osiguravajuća društva, osiguranje, životno osiguranje, neživotno osiguranje*

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UNDERWATER PHOTOGRAPHY

Professional paper

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Abstract

Underwater photography is an unusual and a specific form of photography. Alongside knowledge about photography, it is necessary to have insight into plant and animal life of the sea bed as well as diving. Being that the scenery is under water, the photographer is greatly limited which makes this type of photography a very challenging task. The paper analyses filming/shooting conditions, various equipment being used, underwater moving, lighting, duration and all other relevant parameters.

Keywords: *Underwater photography, underwater photography equipment, photographic session techniques*

Introduction

Underwater photography is a great challenge. It requires special equipment and provides only a limited time that a photographer has to achieve his goals. It reveals a part of the world that most of us don't have a chance to see. It covers a wide range of photos taken with disposable underwater cameras, waterproof cameras, cameras in waterproof housings, and even camers in unmanned submarines.

Underwater photography is the artistic representation of the underwater environment that has for years provided curiosity to most people because of the countless forms of marine life in all colors, shapes and sizes. Fortunately, today's diving is more accessible than ever, whether snorkeling or scuba diving. But underwater photographer should always be a diver first.

To record underwater photography is a difficult task. It is necessary to find, feel and wait for the perfect moment under water and react in an instant. People are used to see underwater photos with strong and intense colors, however, the colors of the underwater world are not like they are in terrestrial world. They see the rich, vivid reefs, corals and fish in the split second when the flash lights up the object, but in reality, the object is seen in different shades of blue, green and gray. That's why underwater photographers must train their eyes.

1. History of underwater photography

At the beginning of underwater photography, many photographers had to devise, develop and improve their underwater equipment to be able to record an unknown underwater world. William Thompson is considered the first underwater photographer, who in 1856., in the UK, recorded the first underwater photograph.

He used a camera in a waterproof box mounted on a pole. After 37 years, Louis Bhutan captures underwater photo using scuba gear. He photographed a diver under water, which is also the first underwater photograph ever published (Figure 1).

Figure 1. The first underwater photographs ever published

The first underwater color photograph was captured by Dr. William Longley and National Geographic photographer Charles Martin in 1917, but was published only in 1926. They used cameras in waterproof cases and flashes for underwater lighting that required large amounts of explosive powder magnesium.

2. Underwater photography equipment

Cameras. Today, the market offeres a huge number of cameras, both classic film cameras and digital cameras, where the image is recorded on a disc and which are increasingly flooding the market. There are 3 types of cameras: compact, SLR and D-SLR cameras.

Housings. Underwater housings are waterproof boxes that can help descend cameras into water. There are solid and flexible housings. Solid housings can be submerged to much deeper depths than flexible housings. Those kind of housings will ensure the safety of the cameras by withstanding mechanical stress at certain depths due to increased pressure.
They seem safer than flexible housing, but the price is much higher. Flexible housings are made of plastic film, and feel quite uncertain. During the immersion, the volume of a flexible housing is reduced due to increase in pressure.

Figure 2. Solid and flexible housings

Lenses. Quality underwater photo requires quality lenses. A lens is a transmissive optical device that affects the focus of a light beam through refraction onto a sensor. Depending on which lens is chosen, it determines what kind of picture will be recorded. Each lens has its own set of characteristics. There are normal, macro, zoom, fisheye, telephoto and wide angle lenses.
Illumination. Since one part of a light beam is reflected onto water surface, the water below the surface has less light available than above. Therefore, artificial lighting is necessary for displaying colors of marine life, except in shallow water. Due to very poor lighting conditions, underwater photography requires the use of flash that is positioned further away from the camera itself. Less expensive devices however don't have "extended hands" with flash devices but rather have a flash integrated within the camera itself. For such conditions, a photographer should have in mind that the photo taken will have a part of light reflected back into the sensor due to sediments and planktons in the water, and the photography itself could have big bright white spots on it.

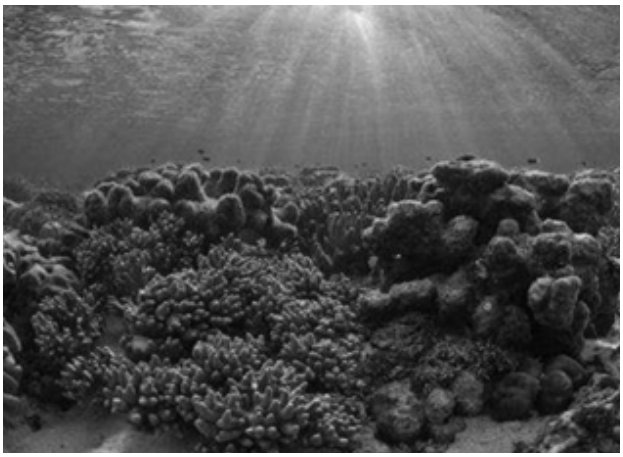

Figure 3. Photograph taken in daylight, Nikon D300

3. Working with human models in underwater photography

Models are used to have a human element filling the blue water void in the background. Not every photographer has the possibility to dive with trained models, but all of them have the opportunity to record their friends while diving. Placing models into underwater photography can be used to increase human interest, drama or an incentive to laugh. Before you start to photographing a model, it is important to agree on some hand signals for mutual understanding and always practice within safe boundaries.

Figure 4. Copyright photo recorded with compact underwater camera

4. Techniques for underwater photography

Macro photography. Macro photography is one of the simplest, but also the most rewarding techniques of underwater photography. It's a technique of taking a photo from a small range. It provides the highest quality images due to fast and accurate auto focus system. This technique can successfully record tiny marine organisms and their representative colors.

Wide angle photography. When using wide angle lenses, the real size of the objects that are near and far are distorted. Objects that are closer, look bigger and closer than they are in reality, and distant objects appear smaller and more remote. Due to the bending properties of straight lines and the ability to see 180 degrees, make this lens artistic and imaginative. This is a way of capturing large objects such as dolphins, sharks or even whales.

Night photography. When the sun is setting, coral reefs are undergoing dramatic changes. The creatures are unreachable during the day because they hide, but at night they are active and wander along the ridge. During recording, the photographer must constantly be on guard against dangerous animals which are hardly noticeable at night.

Figure 5. Night Photography

First of all they should be well informed about the place where they record and about the behavior of nocturnal fish.

Ambient photography. The best opportunity to catch some color and detail with no flash, is shooting in very shallow water where you can increase the amount of sunlight. There is no use of artificial lighting and natural light is simply dominant. The ambient photo is best record in clean waters at a depth of 20 meters or less. Ambient photography is the mostly used when shooting large fish, shipwrecks, silhouette and rocks.

5. Conclusion

nderwater photography is a merger of two very complex disciplines: diving and photography. As much as it seemed difficult and problematic, underwater photography is very pleasurable and rewarding.

The underwater world provides an excellent opportunity for every photographer to free his own creative thoughts. Due to the different possibilities of lighting, the sea is an ideal setting for experimentation. Shallow depths, where the water is still penetrated by enough natural light, are an excellent opportunity for rich and colorful photographs. Diving magazines are flooded with colorful motives of coral reefs, colorful fish and divers in all varietys of colour. If you look closely at the photos, you can see that the majority is taken in shallow waters. Tropical underwater worlds are filled with colorful living beings which live in shallow waters contrary to the Adriatic for instance, where the marine life is much more scarce and at a safe distance from divers.

The biggest obstacle is the lack of time. It all depends on the amount of oxygen in the bottle on the back of a diver. At a depth of 50m, a diver can be carried out for about 20 minutes a day to try and capture the best possible image in the enviroment that it is extremely dark. This makes it a very challenging technique of photography.

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PODVODNA FOTOGRAFIJA

Sažetak

Podvodna fotografija je jedan neobičan i specifičan vid fotografije. Uz znanje o fotografiji potrebno je i znanje o biljnom i životinjskom svijetu podmorja te ronjenja. Samim time što se odvija ispod površine vode, fotograf je ograničen što podvodnu fotografiju čini još zahtjevnijom. Kroz rad se analiziraju uvjeti snimanja, oprema koja se koristi, kretnje u vodi, osvjetljenje, vremensko trajanje samog snimanja te ostali parametri podvodne fotografije.

Ključne riječi: *Podvodna fotografija, podvodna fotografska oprema, tehnike podvodne fotografije.*

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APPLICATION OF POLYESTER IN WASTEWATER TROUGHT THE CONCEPT OF BEST AVAILABLE TECHNOLOGY

Professional paper

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Abstract

There is a very large offer in the market with regard to polyester materials, as well as a wide range of products in the field of construction. Its largest application is in the pipe material for water supply and wastewater disposal, as well as plants for waste water treatment. This presentation will describe how modern technology / (BAT) and the legal framework in terms of environmental impact on the application of these materials in construction.

Keywords: *Polyester materials, wastewater disposal plant, wastewater treatment, environmental protection*

Introduction

At the end of the 20th century the production of polyester, polyester resin and other synthetic polymers increases and expands in terms of materials for water supply and wastewater disposal. At that time the polymers technology develops in order to find a product with wide application on this market. Today's construction industry is unthinkable without plastics and polymers and the most frequent application of this material is for wastewater disposal, and for facilities to treat these waters. We can freely say that this is the age of plastic and modern technology but with the aim to protect water, air and soil. At the state level there is a constitutional provision that was used to define the existing activities in the field of our environment and at the entity level a law has been passed in this domain. Sustainable development is development that meets the needs of the present generation in term of their environment without compromising the needs of future generations which means that the sustainable development of a harmonized system of technological, economic and social activities in the overall development in which natural and created values are used economically and reasonable in order to preserve and improve the quality of the environment for present and future generations. Sustainable development is achieved through adoption and implementation of decisions that ensure balance of the economical interests and environmental protection, it is a long-term concept includes and integrates environmental, economic and social / social development.

1. Production of polymers in the world and Europe

Analyzing the market of products and materials, it can be concluded that the plastics and rubber fundamentally changed the human life and it is very difficult to find any modern product, that has no polymer parts. World's production of polymers in 2004 exceeded 250 million tons. If this quantity is expressed in volume, it is then almost twice higher than the production of steel, and is expected that the production of polymer materials after 2010 will reach 300 million tons. It sets new demands on manufacturers of polymer products, which have to produce high-quality and profitable products. Because of its specific properties, plastics and rubber have a very wide range of applications, and make these materials very useful from the standpoint of growing concern for the environment and reducing the consumption of natural raw materials. Among more than 50 different types of plastic materials that are manufactured today, the majority (or more than 65%) makes five so-called widely applicable thermoplastics: low density polyethylene (PE-LD), linear low density polyethylene (PE-LLD) and high density polyethylene (HDPE), then polyvinyl chloride (PVC), polypropylene (PP), polystyrene (PS) and polyethylene terephthalate (PET). In the European Union in 2004, 32.3 million tons of these materials was consumed (3.3 more than in 2003), and due to the economic crisis since 2005 there has been no increase in production. Almost 20% of the plastic from the total production in Europe is spent in the construction industry.

2. Chronology of the pipe material within hydraulic structures

The EU requirements for BAT document "Strengthening the capacity for implementation of integrated pollution prevention and control in Bosnia (IPPC-BiH)" and the protection of water, air and soil from pollution, and the introduction of economical friendly technologies and new materials and systems for wastewater treatment. Not so long ago, (50 years ago) tubes were manufactured from different materials: reinforced concrete, prestressed reinforced concrete, steel (welded and seamless), cast-iron, nodular cast iron - ductile, made of synthetic materials of various types (plastic and other synthetic materials) ceramic clay lead, copper and many other.

Today, these pipes have been replaced with the polyester materials and basic division is on: pipes of PVC, pipes from polyester materials, pipes of hard polyethylene (PE). The good side of the plastic pipes: high resistance to corrosion (aggressive soil and water), low weight (easy transportation and installation), frost resistance, resistance to stray currents, low thermal conductivity, good hydraulic properties (smoothness), light processing (cutting, trim). Disadvantages of plastic pipes: much stretching at high temperatures, flammability decline in strength at temperatures greater than 20°C, the stiffness of PVC pipes at temperatures below 0ºC.

When we look at waste water, pipe materials and cleaner technologies we can conclude that there has been significant progress. The development of new technologies and ever more stricter legal framework, special attention is paid primarily to the industrial waste waters, their treatment and limit values for waste water before there are discharge.

3. General aspects of the best available techniques for industrial wastewater

Federal Ministry of Environment and Tourism , on the basis of Article 87 of the Law on Environmental Protection ("Official Newspaper of Bosnia", no. 33/03) and the Regulations on the adoption of best available techniques for achieving environmental quality standards (Official Newspaper of Bosnia and Herzegovina no.92/07) has rendered a decision that includes technical instructions for the best available technology - BAT documents, published in the Official Newspaper of Bosnia no.61/09 of 28.9.2009, which have become obligatorily in structural design and installation of equipment, management and process control, equipment maintenance, and the adoption of measures to prevent pollution of water, air and soil.

Waste water treatment can be divided into several groups:

1. Coarse and fine mechanical separation of waste water with equalizing
2. Flotation it is practiced before settling and biological treatment process;
3. Precipitators for sand and other similar materials;
4. Precipitators for organic mass,
5. Biological waste water treatment with pipelines and concrete pools with equalization.

Based on the above mentioned wastewater treatment technology the industry for treatment products und devices to treat municipal wastewater, and industrial wastewater is growing. The design of these devices is based on environmentally friendly materials - polyesters and the function is based on the biological wastewater treatment.Very often designers and technologists decide to use devices with biological methods in pool. In the secondary sedimentation tank separation of the "activated sludge" and biological thin layer of the treated wastewater is made. The precipitated mixture of bacteria and microorganisms are pumped back at the entrance to the pool as sludge. SBR devices (Sequencing Batch Reactor) the pool and secondary settling are not spatially separated. The process of biological treatment and subsequent deposition takes place in the same pool (SBR reactor). SBR-reactor is for a certain time used as biological methods in pool and after the blowers as secondary settling.

4. Conclusion

Given that within my work I design sewerage system's and prepare studies for less complex technology, I believe that very little is invested in the protection of the environment in terms of pollution. Among other things, most of the investor fails to comply with the recommendations and do not invest in wastewater treatment. Also, most of the districts maintain a mixed sewage system because it is cheaper and more acceptable for the budget. Power distribution sys-

tems are costly as well as systems for waste water treatment. So the waste water is discharged uncontrollably often in waterways.

By following legal provisions, good practice and technologies, we can influence this issue. Production equipment for waste water treatment and competition in the market in terms of producers can expect some progress but only in the domain of foul water and very little in terms of industry.

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PRIMJENA POLIESTERA KOD OTPADNIH VODA KROZ KONCEPT NAJBOLJE RASPOLOŽIVE TEHNOLOGIJE (BAT)

Sažetak

Postoji veoma veoma velika ponuda na tržištu u pogledu poliesterskih materijala, kao i širok spektar proizvoda u oblasti građevinarstva. Njihova najveća primjena je u cijevnom materijalu za vodoopskrbu i odvodnju

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Ključne riječi: *poliesterski materijali, odvodnja otpadnih voda, postrojenja, tretman otpadnih voda, zaštita okoline*

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