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XIII INTERNATIONAL CONFERENCE ON SOCIAL AND TECHNOLOGICAL DEVELOPMENT

BOOK OF ABSTRACTS

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NOTE:

The authors have full responsibility for the originality and content of their own papers.

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PLENARNA PREDAVANJA

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Marija Blagojević

University of Kragujevac, Faculty of Technical Sciences, Svetog Save 65, 32 000 Čačak, Serbia,
marija.blagojevic@ftn.kg.ac.rs

ABSTRACT

The research provides an examination of the Artificial Neural Networks (ANNs) appliance across diverse domains of creativity. In addition to exploring the theoretical background of machine learning and artificial intelligence, numerous practical applications of ANNs are discussed, in the fields such as education, agriculture, traffic, environmental protection and healthcare. The primary aim of these studies is to enhance predictive capabilities across various parameters, thereby facilitating automation of processes or generating valuable insights within specific domains. The outcomes of these applications result in user-friendly interfaces designed to disseminate useful information to individuals without advanced IT proficiency. Future endeavors in this area are anticipated to involve the integration of additional sensors to get more precise results and ensure the incorporation of all relevant input parameters.

Keywords: artificial neural network, education, agriculture, traffic, environmental protection, healthcare.

RECENT CHANGES IN THE GEOGRAPHY OF GLOBAL MERCHANDISE TRADE – GEOPOLITICAL AND SUSTAINABILITY ISSUES

László Erdey, Veronika Fenyves, Ádám Márkus

University of Debrecin, Faculty of Economics and Business, Böszörményi út 138, 4032 Debrecin, Hungary, erdey.laszlo@econ.unideb.hu

ABSTRACT

Is Global Merchandise Trade Heading Towards Sustainability?

In recent decades, there has been an unprecedented increase in global trade volumes, world exports, and GDP ratio, bringing progress that has positively impacted billions of people in numerous countries. However, the sustainability of these developments in terms of the environment, economy, and society presents significant challenges in the 21st century. Our research relies on highly detailed international trade databases to support our findings quantitatively. By examining qualitative impact factors, we highlight that current global events may lead to suboptimal trade scenarios but could enhance environmental sustainability. However, the effects on economic and social sustainability and global welfare are uncertain. Although recent technological innovations such as AI may not provide immediate relief, they hold some faint promise for the future.

Keywords:global trade, sustainability, development, inequality, gravity modeling.

STUDYING OF "PATCH LOADING" AT THE UNIVERSITY OF MONTENEGRO

Biljana Šćepanović

University of Montenegro, Cetinjski Put, 81000 Podgorica, Montenegro, biljazs38@gmail.com

ABSTRACT

Studying of "patch loading" was initiated at the Faculty of Civil Engineering, University of Montenegro (FCE UoM) in the early 1990s. The series of studies, still continuing, encompassing experimental, theoretical and numerical investigations, including AI application, was a logical follow-up of the projects that previously had been conducted over a period of more than thirty years at other universities and research centres around the world.

The term "patch loading" refers to both – specific load type assuming concentrated or locally distributed load, as well as behaviour of thin-walled girders resulting from this type of loading. The most common case is steel I-girder, loaded over flange, in or parallel to the web plane. Hence, two specific load cases are analysed – centric and eccentric patch loading, regarding the web plate. In both cases localised problem, i.e. local yielding in the web and/or flange, in the vicinity of load, may result in the failure of structural element, while analysis of global stresses does not imply that.

For the case of centric patch load, characterised by web buckling leading to local stability loss of I-girder, research team of the FCE UoM proposed several new collapse mechanisms and mathematical models for collapse load. Influence of web stiffening, initial imperfections and load length was analysed.

Collapse mode of eccentrically patch loaded I-girders varies from the same one as in case of centric load to the completely different one, characterised by web bending and flange warping, depending on numerous parameters. Consequently, determination of ultimate load is much more complicated than in case of centric patch load. FCE UoM research revealed certain dependences among influential parameters, providing differentiation of collapse modes. In collaboration with the

researchers from the University of Granada, proposals for collapse load determination were formulated and influence of certain parameters, such as load length, were analysed in detail. Artificial neural networks were employed as a suitable tool in the analysis of eccentric patch loading issues.

Keywords: patch loading, load eccentricity, collapse mode, ultimate load, artificial neural networks.

BOSNIA AND HERZEGOVINA IN THE WORLD MIGRANT CRISIS: POLITICAL AND SOCIAL ASPECTS

Vlade Simović, Drasko Gajić

University of Banja Luka, Faculty of Political Sciences, Bulevar vojvode Petra Bojovića 1A, 78 000 Banja Luka, Bosnia and Herzegovina, vlade.simovic@fpn.unibl.org, drasko.gajic@fpn.unibl.org

ABSTRACT

For most of their history, people have lived a "migration culture". By moving from one place to another, they created conveniences for themselves, but often also conflicts. The system of states established since the Neolithic revolution has created barriers for the movement of people in the form of political borders, but also cultural ones, because each political area built its own specific sociality and norms of behavior. Today, the world of the poor and the rich is set in motion in the direction of East and South towards West and North. In 2014, Europe demonstrated its inability to receive all migrants and integrate them. The migrant crisis has become a dominant political issue in Europe. It is particularly reflected in divided and post-conflict societies. Such is Bosnia and Herzegovina, which maintains peace and political order through systemic solutions of "checks and balances", and policies of mutual negotiation, accommodation and consensus. However, major geopolitical, economic and social crises, such as the migrant crisis, are a test for political parties in divided and post-conflict societies, from which such societies often emerge even more divided and conflicted. The migrant crisis showed inter-party differences, the complexity of national-party relations, and especially the structural and functional weaknesses of institutions in Bosnia and Herzegovina. She opened up two key questions: the possibility of changing the national-religious map of Bosnia and Herzegovina and the social capabilities of its authorities, primarily entity authorities, which primarily implement social policies. This work is multidisciplinary in nature. It belongs to the field of political theory and the field of social policies

Keywords: Migrant crisis, Bosnia and Herzegovina, political parties, social policies and conflicts.

DESIGN AND CHARACTERIZATION OF ACTIVE BILAYER COATING FOR CHEESE PACKAGING WITH IMPROVED FUNCTIONAL PROPERTIES

Tamara Erceg[1], Olja Šovljanski[1], Ana Tomić[1], Biljana Lončar[1], Miroslav Hadnađev[2], Milica Aćimović[3], Vesna Teofilović[1]

[1]University of Novi Sad, Faculty of Technology, Bulevar cara Lazara 1, 21102 Novi Sad, Serbia, tamara.erceg@uns.ac.rs
[2]University of Novi Sad, Institute of Food Technology in Novi Sad, Bulevar Cara Lazara 1, 21102 Novi Sad, Serbia
[3]Institute of Field and Vegetable Crops, Maksima Gorkog 30, 21101 Novi Sad, Serbia

ABSTRACT

In addition to potentially resolving environmental issues that come from plastic and food waste, active biodegradable packaging is being developed to increase the shelf life, quality, and safety of packaged food. In order to overcome the drawbacks of monolayer hydrocolloid-based coating, such as poor mechanical and barrier properties, the design of bilayer hydrocolloid-based coating has been structured using modified pullulan and chitosan. Modification of pullulan has been performed with the aim of incorporating carboxylic groups in its structure to form a polyelectrolyte complex with positively charged chitosan. Modification of chitosan has been carried out in order to improve its hydrophobicity. Immortelle essential oil and hydrolat have been used as antimicrobial compounds incorporated in both layers. This design avoids surfactants while keeping cheese sensory properties, extending its shelf life by at least 50%. The improved mechanical and barrier properties along with incorporation of antimicrobial compounds, as well as the order of lamination and good coverage of the cheese surface by spraying, contribute to better cheese storage conditions when utilizing this packaging.

Keywords: modified pullulan, modified chitosan, essential oil, sustainable packaging.

ECOLOGY, ENERGY EFFICIENCY
EKOLOGIJA, ENERGETSKA EFIKASNOST

USING MULTI-CRITERIA DECISION ANALYSIS AND GIS FOR DEFINING SPATIAL RISK OF LAND SALINIZATION IN THE VOJVODINA PROVINCE

Boško Blagojević, Atila Bezdan, Jovana Bezdan

Faculty of Agriculture, University of Novi Sad, Trg D. Obradovića 8, 21 000 Novi Sad, Serbia,
bosko.blagojevi@polj.edu.rs

ABSTRACT

This paper presents methodology for defining spatial risk of land salinization in the Vojvodina Province (Serbia). Based on previous works and the available data, the group of agricultural experts identified 11 criteria that play an important role in land evaluation for salinization risk. The selected criteria are not sufficient on their own, because policy-makers need spatial information on where the most vulnerable land is located. This is analyzed by using a combination of the geographic information system (GIS) and multi-criteria decision analysis (MCDA) – a sub-discipline of operations research, which is used to support decision-making. MCDA is concerned with formally structuring and solving decision problems, typically involving the explicit weighting of criteria and the trade-offs between them to represent the preferences of the decision-makers. In this paper, the purpose of GIS is to represent all criteria as maps or raster layers with a set of geographically defined spatial units, while MCDA is used for defining weights of criteria. Then, land salinization risk map is developed by multiplying the cell values in each of the criteria' layers by the corresponding weights of the criteria and then summarizing weighted cell values.

Keywords: land salinization, geographic information system (GIS), multi-criteria decision analysis (MCDA).

THE USE OF BIOSTIMULANT IN THE PRODUCTION OF ORNAMENTAL PLANTS

Svjetlana Zeljković

Faculty of Agriculture, University of Banja Luka, Bulevar vojvode P. Bojovića 1a, 78 000 Banja Luka, Bosnia and Herzegovina · svjetlana.zeljkovic@agro.unibl.org

ABSTRACT

There has been a plethora of research undertaken to identify functional amendments to be used in plant production to improve plant growth, productivity, and quality, as well as to help plants overcome different types of environmental stress. In organic agriculture, the use of chemical fertilizers and pesticides is limited, so there is a need for different plant amendments suitable for such production. An environmentally friendly innovation is the use of natural plant biostimulants that are a sustainable solution to overcome this serious problem. Biostimulant can be any substance or mixture of substances of natural origin or microorganisms that improve the condition of the crop without causing harmful effects. These substances can be applied to leaves, seeds or roots with the intention to stimulate natural plant defence processes, but can also increase nutrient use efficiency and tolerance to abiotic stress. In the last few years, at the Faculty of Agriculture, University of Banja Luka has been conducted a lot of research on the application of various biostimulants in the production of ornamental plants. The evaluated biostimulants have had positive effects on vegetative growth, nutrient acquisition, antioxidative capacity, stress tolerance, and flower quality. In general, the research presented here implies possible benefit of biostimulant application in horticultural production, especially in stressful growth conditions such as reduced fertilization or other abiotic stress incidence.

Keywords: biostimulant, abiotic stress, horticultural plants.

ANTIFUNGAL ACTIVITY OF ARTHROSPIRA (SPIRULINA) STRAINS

Dajana Blagojević, Petar Davidović, Vanja Stanišljević, Anita Konc, Jelica Simeunović

University of Novi Sad, Faculty of Sciences, Trg Dositeja Obradovića 2, 21 000 Novi Sad, Serbia, dajana.blagojevic@dbe.uns.ac.rs

ABSTRACT

Fungal infections represent a considerable cause of morbidity and mortality, whereby several species of the genus *Candida* cause invasive candidiasis. Considering the growing problem of resistance to conventional antifungal drugs in *Candida* strains, the development of new natural antifungal agents represents promising alternatives. Cyanobacteria (blue-green algae) have been identified as one of the most promising groups of organisms for the isolation of new and bioactive compounds, whereby species of the genus *Arthrospira*, known as "Spirulina", have a particular commercial value. This study aimed to assess the antifungal activity of two *Arthrospira* strains against *Candida guilliermondii* spp. and *Candida* spp.^{L}, using four types of extracts: aqueous, ethanolic, methanolic, and chloroform. There have been applied two methods; disk diffusion where on each sterile disk was added 30-50 µL of cyanobacterial extract, and microdilution method where the extracts were tested in series of double dilutions. Using the disk diffusion method, antifungal activity was found only in chloroform extracts, with inhibition zones of 9 and 11 mm. On the other hand, by microdilution method was detected activity in an aqueous extract of strain *Arthrospira* 1, with a MIC value of 17.1 mg mL^{-1}. The results showed that tested *Arthrospira* strains produce antifungal compounds.

Keywords: antifungal activity, *Arthrospira* (*Spirulina*), *Candida*, cyanobacteria.

Acknowledgments

The authors gratefully acknowledge the financial support of the Ministry of Science, Technological Development and Innovation of the Republic of Serbia (Grants No. 451-03-66/2024-03/200125 & 451-03-65/2024-03/200125).

THE IMPACT OF RED LIGHT ON THE BIOMASS PRODUCTION IN SELECTED CYANOBACTERIA STRAINS

Dajana Blagojević, Petar Davidović, Jovana Panajotović, Jelica Simeunović

University of Novi Sad, Faculty of Sciences, Trg Dositeja Obradovića 2, 21 000 Novi Sad, Serbia, dajana.blagojevic@dbe.uns.ac.rs

ABSTRACT

Cyanobacteria (blue-green algae) are a group of photosynthetic procaryotes investigated as an exceptional source of novel and bioactive compounds, while some species are used in aquaculture, agriculture, food and feed, etc. Recently, these microorganisms have been intensively studied to develop biocrusts, with the aim of stabilizing the soil and rehabilitation of degraded land surfaces (biocarpet engineering). Considering low biomass production in cyanobacteria is one of the main reasons limiting their wider commercial use, this study aimed to investigate the possibility of increased biomass production in four cyanobacteria strains from genera *Arthrospira* (*Spirulina*) and *Nostoc* by using red light, with illumination periods of 5 h and 10 h. During 35-day cultivation, the biomass production was determined spectrophotometrically, by measuring the chlorophyll *a* concentration. The results showed that red light inhibited the growth in tested *Arthrospira* strains, whereby the inhibition was more pronounced at longer exposure to red light. On the other hand, biomass production was increased approximately 2-fold in tested *Nostoc* strains, reaching 1.2 mg/mL and 1.8 mg/mL, respectively. Such results indicate the possibility of increasing the production of biomass or specific compounds in *Nostoc* strains by manipulation of cultivation conditions such as light quality.

Keywords: *Arthrospira* (*Spirulina*), biomass production, cyanobacteria, *Nostoc*, red light.

Acknowledgments

The authors gratefully acknowledge the financial support of the Ministry of Science, Technological Development and Innovation of the Republic of Serbia

(Grants No. 451-03-66/2024-03/200125 & 451-03-65/2024-03/200125). This research was also supported by the Science Fund of the Republic of Serbia (Grant No. 7726976), Integrated Strategy for Rehabilitation of Disturbed Land Surfaces and Control of Air Pollution–RECAP.

NATURE CONSERVATION CHALLENGES: INVASIVE FLORA OF THE "VLASINA" PROTECTED AREA

Filip Grbović , Snežana Branković, Nevena Petrović

University of Kragujevac, Faculty of Science, Department of biology and ecology, Radoja Domanovića 12, 34 000 Kragujevac, Serbia, nevena.n.petrovic@pmf.kg.ac.rs

ABSTRACT

Invasive plant species pose a significant global biodiversity challenge due to their rapid spread and competition with native species, necessitating effective conservation strategies to mitigate their impact. A floristic survey in the "Vlasina" protected area (An Area of Outstanding Natural Beauty in Serbia) identified six highly invasive plant species in the autumn of 2023: *Robinia pseudoacacia* L., *Reynoutria japonica* Houtt., *Erigeron annuus* (L.) Pers., *Erigeron canadensis* L., *Lupinus polyphyllus* Lindl., and *Bidens frondosa* L. The purpose of this study was to assess their population dynamics, habitat types, and ecological impacts, with an emphasis on the implications for monitoring and management. The results show that invasive plants thrive in seminatural and ruderal habitats: *R. pseudoacacia* and *R. japonica* have been identified as the dominant invasive species along roadsides and in residential areas, while *E. annuus* and *E. canadensis*, as well as *L. polyphyllus* and *B. frondosa*, were identified in harsh conditions and on moist urban surfaces. These findings suggest that invasive plants thrive in a wide range of habitat conditions within the "Vlasina" and may alter biodiversity and ecosystem structure. Continued research is needed to develop effective control measures for sustainable solutions, including biomass production from invasive plants and phytoremediation.

Keywords: Invasive Species, Ecology, Biodiversity Loss, Habitat Disruption, Ecological Restoration.

COMPOSTING – TECHNOLOGY OF BIOLOGICAL WASTE TREATMENT

Ivan Stojković[1], Milica Karanac[2], Vladimir Pavićević[3]

[1]Innovation Center of Faculty of Technology and Metallurgy, Karnegijeva 4, 11 120 Belgrade, Serbia, istojkovic@tmf.bg.ac.rs
[2]Agence Francaise de Develompent Serbie, 11, Zmaj Jovina 11 000 Belgrade, Serbia, karanacmilica@gmail.com
[3]University Belgrade, Faculty of Technology and Metallurgy, Karnegijeva 4, 11 120 Belgrade, Serbia, vpavicevic@tmf.bg.ac.rs

ABSTRACT

Composting is defined as the decomposition of wet, solid organic matter using aerobic microorganisms under controlled conditions. As a product, a useful material is obtained, similar to humus, which does not have an unpleasant smell and can be used as a soil conditioning agent or as a fertilizer. The main goals of composting different organic ingredients are: decomposition of the organic fraction of waste subject to rotting into a stable product, rich in nutrients, which can be used for soil conditioning, growing plants, covering landfills or for some other purposes; destruction of pathogens and reduction of the amount of biodegradable waste disposed of in landfills. The quality of the produced compost and the composting time depend on the composition of the initial raw material. There are six basic types of raw materials for composting: food processing residues; manure and agricultural by-products; residues from forestry and the wood industry; biowaste or waste sludge created by biological treatment of municipal and industrial waste water; plant residues as waste from yards, gardens and parks and separated organic waste containing sorted compostable fractions of municipal waste. Compost is stabilized solid matter dark brown to black which brings numerous benefits for both plant growth and soil quality. Compost quality is defined by several parameters: presence of pathogens, content of heavy metals, particle size, maturity, influence on plant growth and content of inert components. The composting process can be divided into four phases according to the change in temperature from the beginning to the end of the process: mesophilic (initial), thermophile, cooling and maturation phase.

Keywords: composting, aerobic biological treatment, biowaste.

LIFE CYCLE ASSEMENT OF BIODIESEL PRODUCTION AND USE

Ivan J. Stojković,[1*] Miljana Krstić,[2] Ana Veličković,[2] Jelena Avramović,[2] Vlada Veljković[3]

[1] Innovation Center of Faculty of Technology and Metallurgy, 11 000 Belgrade, Karnegijeva 4, Serbia
[2] University of Priština in Kosovska Mitrovica, Faculty of Technical Sciences, Department of Technological Engineering, Knjaza Miloša 7, 38 220 Kosovska Mitrovica, Serbia
[3] Serbian Academy of Sciences and Arts, SASA Branch of Niš, 11 000 Belgrade, Kneza Mihaila 35, Serbia, istojkovic@tmf.bg.ac.rs

ABSTRACT

This scientific work aims to evaluate the life cycle of biodiesel, using the method of environmental impact and sustainability analysis. Biodiesel is a biofuel obtained by processing vegetable oils or animal fats, which can be used as a substitute for conventional diesel, due to its renewable nature and lower impact on greenhouse gas emissions. However, biodiesel production can also have certain negative impacts on the environment and society, such as land use, water consumption and emissions of other gases. Understanding the environmental impacts associated with this specific feedstock is essential to assess the overall viability and sustainability of biodiesel production from vegetable oils and waste animal fats. This paper uses a life cycle assessment (LCA) methodology to analyze biodiesel. LCA is a systematic approach that enables the quantification and assessment of environmental impacts during all phases of the life cycle, including production of raw materials, processing, distribution, use and disposal. In this research, LCA will be applied to identify and assess the impacts of biodiesel on several key categories, such as greenhouse gas emissions, energy consumption, water use and land use. The results of this study are expected to provide deeper insight into the overall environmental and sustainability impact of biodiesel. Based on the LCA analysis, it will be possible to identify key points in the life cycle of biodiesel where improvements can be implemented and negative impacts on the environment can be reduced. Life cycle assessment of

biodiesel production from these feedstocks will provide valuable insight to policy makers, researchers and stakeholders involved in the renewable energy and waste management sectors.

Keywords: waste edible oils, biodiesel, LCA, environmental protection.

DEVELOPMENT OF RENEWABLE ENERGY SYSTEMS IN OGUN STATE, NIGERIA: A HYBRIDIZATION MODEL

Israel Dunmade

Department of Earth & Environmental Sciences, Mount Royal University, Calgary, Canada,
idunmade@mtroyal.ca

ABSTRACT

The global trend is towards increasing the fraction of energy supply from renewable sources. Governments, corporate organizations and international agencies all over the world are collaborating towards achieving affordable and sustainable energy supply. Using observation method and secondary data from literature, this study explored the feasibility of energy supply from renewable sources in Ogun State, Nigeria. Results of the study showed availability of abundant sunshine for solar power, sizable rivers with suitable topography for mini hydro, and large amounts of biomass from forest industry wastes, agricultural wastes and household wastes that are utilizable for the production of biofuels and other bio-based commodities. To eliminate the risk of reliance on a single source of energy, a hybridization model was proposed for the integration of bioenergy, mini-hydro, solar and wind energy at a municipal scale. This study would be found useful by energy producers, investors and governmental agencies that are intending to diversify their energy mix as it serves as a good foundation for more comprehensive studies of possible combinations of renewable energy sources for specific localities. Development of municipal scale integrated renewable energy systems would alleviate climate change problem and facilitate supply of affordable sustainable energy.

Keywords: bioenergy, hybrid energy systems, solar energy, wind energy.

A SUSTAINABLE APPROACH TO WASTEWATER TREATMENT IN THE PRODUCTION OF MILK AND DAIRY PRODUCTS

Ljiljana Tanasić, Suzana Knežević, Milena Milojević, Maja Došenović Marinković, Biljana Delić Vujanović

The Academy of Applied Studies Šabac, Department of Agricultural and Business Studies and Tourism Vojvode Putnika 56, 15 000 Šabac, lj.tanasic@akademijasabac.edu.rs

ABSTRACT

The dairy industry produces wastewater at all stages of the production process, from primary processing and separation of milk to production, packaging, and distribution of final products. Depending on the type of product, the stage of production, and the size of the production, the resulting wastewater mainly consists of residues of milk, milk fat, proteins, lactose and carbohydrates, detergents, and chemical reagents. In general, the dairy industry produces a lot of wastewater, almost 0.2–10 l per 1 l of processed milk. Since the dairy industry produces a variety of products, the characteristics of the dairy industry effluents also vary significantly depending on the operating techniques used in the process. Milk wastewater is characterized by varying pH values; high levels of biological oxygen consumption; varying chemical consumption of oxygen and content of fat, total phosphorus, and total nitrogen.

Emission limit values for certain groups or categories of polluting substances for technological waste water before their discharge into the recipient are defined by the Regulation on emission limit values of pollutants in water and deadlines for their achievement (Official Gazette of the RS 67/2011, Official Gazette of the RS 48/2012, Official Gazette of RS 1/2016).

To meet emission limitation requirements and protect the environment, dairies should use appropriate wastewater treatments. This paper will present techniques that are efficient, environmentally friendly, and economically available.

Keywords: Dairy industry, wastewater, limit values.

USE OF SLAUGHTERHOUSE WASTE FOR ENERGY PURPOSES IN THE REPUBLIC OF SERBIA

Suzana Knežević, Milena Milojević, Maja Došenović Marinković, Ljiljana Tanasić

Academy of Applied Studies Šabac, Unit for Agricultural and Business Studies and Tourism, Vojvode Putnika 56, Šabac, Serbia, sdknez@gmail.com

ABSTRACT

In the Republic of Serbia, large quantities of animal waste are generated that are not managed adequately. A particular category of this waste is slaughterhouse waste, which has significant potential to be used for energy purposes. Most slaughterhouses and private farms are forced to independently resolve the issue of disposing of slaughterhouse waste, which often ends up in illegal dumps, endangering human health and the environment. The aim of this paper is to highlight the possibilities of transforming slaughterhouse waste into a useful resource for generating thermal and electrical energy in the process of biogas production. Existing biogas plants that use or will use slaughterhouse waste as a substrate have been analyzed. The main energy effect of plants that use slaughterhouse waste is 'green' sustainable megawatts of electrical energy. According to expert estimates, approximately two megawatts of electrical energy can be produced from 100 tons of slaughterhouse waste. The ecological benefits of using slaughterhouse waste for energy purposes include protecting human health, watercourses, and groundwater.

Keywords: slaughterhouse waste, energy purposes, Republic of Serbia.

THE SUPPORT TO RURAL AND SUSTAINABLE DEVELOPMENT THROUGH UNCONVENTIONAL LIVESTOCK PRODUCTION

Milena Milojević, Suzana Knežević, Maja Došenović Marinković, Goran Stanišić

[1]Academy of Applied Studies Šabac, Unit for Agricultural and Business Studies and Tourism, Vojvode Putnika 56, Šabac, Serbia, sdknez@gmail.com

ABSTRACT

Everyone knows that agriculture is vital for feeding and clothing people and supplying raw materials for industry, and its importance will remain. However, intensifying agriculture leads to issues like pollution, residues, and animal welfare problems. These issues are why unconventional livestock production is becoming more common.

For instance, small family farms focusing on rabbit breeding are emerging as a good example. They highlight excellent breeding abilities, easy care, and nutritious meat essential for convalescent nutrition.

Following the European Union's advice, small farms have a chance to earn extra income by raising rabbits or other animals unconventionally. This supports small farms, boosts rural development, sustains local communities, and helps the environment.

It's widely acknowledged that agriculture is crucial for providing food, clothing, and raw materials, and its importance will persist. But intensified agriculture brings challenges like pollution and animal welfare issues, pushing for alternative livestock practices.

Keywords: unconventional livestock production, sustainable development, rural development, rabbits.

NITRATE CONCENTRATION IN DRINKING WATER IN SCHOOLS FROM RURAL AREAS OF THE MAČVA DISTRICT (SERBIA)

Bojan Damnjanović[1*], Marijana Srećković[1,2,3], Milica Živković[4,5], Ana Vasić[1], Gordana Jovanović[1], Ljiljana Tanasić[6]

[1] Academy of Professional Studies Šabac, Department of Medical and Business-Technological Studies, Hajduk Veljkova 10, 15000 Šabac, Serbia, bdamnjanovic@live.com
[2] Serbia Public Health Institute Šabac, Jovana Cvijića 1, 15000 Šabac, Serbia
[3] Faculty of Medicine, University of Novi Sad, Hajduk Veljkova 3, 21000 Novi Sad, Serbia
[4] Faculty of Science, Department for Biology and Ecology, University of Novi Sad, Trg Dosuteja Obradovića 3, 21000 Novi Sad, Serbia
[5] Faculty of Economics and Engineering Management in Novi Sad, Cvećarska 2, 21107 Novi Sad, Serbia
[6] Academy of Professional Studies Šabac, Department of Agricultural and Business Studies and Tourism, Vojvode Putnika 56, 15000 Šabac, Serbia

ABSTRACT

The schools with their own water supply sources, such as wells, had higher nitrate concentrations compared to those connected to public water supply systems.

The retrospective ten-year analysis of nitrate concentrations trend in water samples from private water supply systems (wells) in rural schools of the Mačva district using database of the Institute for Public Health Šabac, were carried out in this study.

Data on nitrate concentrations were processed through a retrospective analysis of 3,970 water samples. The average ten-year nitrate concentration was 24.4 mg/l. In 235 samples were detected high nitrate concentrations, with the average ten-year value of 113.2 mg/l. The linear trend model suggests that the nitrate concentration was decreasing by 0.9 ml/l per year. The reason of such trend is probably the increase in the implementation of appropriate water treatment methods used to reduce nitrate concentration (reverse osmosis).

According the results it is important to provide regular monitoring and management of nitrate concentrations in drinking water in schools to ensure the health and safety of students. Also, there is a need for the implementation of

preventive measures to reduce nitrate pollution, such as promoting sustainable agricultural practices, proper waste management, and investing in advanced water treatment technologies.

Keywords: nitrate trend, drinking water, wells, school, denitrification.

THE FIRST RECORD OF EURYALE *FEROX* SALISB. IN FRESHWATERS OF EUROPE

Milica Živković[1,2], Ranko Perić[3], Dragan Obradov[2], Bojan Damnjanović[4], Šandor Šipoš[2], Boris Novaković[5]

[1]University Business Academy, Faculty of Economics and Engineering Management, Cvećarska 2, 21 000 Novi Sad, Serbia
[2]University of Novi Sad, Faculty of Sciences, Department of Biology and Ecology, Trg Dositeja Obradovića 3, 21 000, Novi Sad, Serbia
[3]Institute for Nature Conservation of Vojvodina Province, Radnička 20a, 21 000 Novi Sad, Serbia
[4]Academy of Professional Studies Šabac, Department for Medical and BusinessTechnological Studies, Hajduk Veljkova 10, 15 000 Šabac, Serbia
[5]Sector of National laboratory, The Serbian Environmental Protection Agency, Ministry of Environmental Protection, Žabljačka 10a, 11 160 Belgrade, Serbia, milica.zivkovic.edu@gmail.com

ABSTRACT

An aquatic plant, *Euryale ferox* Salisb, is the only species of the genus Euryale native to eastern Asia and has been found from India to Korea and Japan. *E. ferox* is ecologically classified as floating leaf emergent macrophyte or as a rooted floating macrophyte - aerohydatophyte. *E. ferox* is regarded as an extinct Tertiary aquatic plant of Europe. Also *E. ferox* seeds were found in the Pleistocene of Poland. The present study aimed to provide data on the first finding of *E. ferox* in freshwaters of Europe, at the site of the Main drainage canal system near the Plavna village (South Bačka District: the Vojvodina Province, Serbia). This record can be regarded as the first species finding in natural habitat of Europe, out of its current distribution range. *E. ferox* was recorded at this site on September 25, and then on November 02, 2022. Otherwise, there are 9 confirmed species records in botanical gardens and parks of Europe. The Main drainage canal system in Plavna village is 10 km long lowland artifical waterbody. We assumed that this non-indigenous aquatic plant in Serbia could be dispersed into the drainage canal via endo-/epizoochory; it is most likely the species' seeds were accidentally dispersed by migratory bird species. Voucher specimens (herbarium material and ethanol samples) have been deposited in the Herbarium Collection of the Institute for Nature Conservation of the Vojvodina province (PZZP). Nomenclature is given according to the World Flora Online (2023).

Keywords: *Euryale ferox*, first record, freshwaters, Serbia, Europe.

THE INFLUENCE OF HYDROMORPHOLOGICAL VARIABLES ON THE SPREAD OF INVASIVE ALIEN PLANTS ALONG THE RIVERS IN SERBIA

Živković Milica[1,2], Anđelković Ana[3], Popović Slađana[4], Bojan Damnjanović[5], Branko Miljanović[2]

[1]University Business Academy, Faculty of Economics and Engineering Management, Cvećarska 2, 21 000 Novi Sad, Serbia
[2]University of Novi Sad, Faculty of Sciences, Department of Biology and Ecology, Trg Dositeja Obradovića 3, 21 000 Novi Sad, Serbia,
[3] Institute for Plant Protection and Environment, Teodora Drajzera 9, 11 040 Belgrade, Serbia
[4] University of Belgrade, Scientific Institution, Institute of Chemistry, Technology and Metallurgy, National Institute, Center for Ecology and Technoeconomics, Njegoševa 12, 11 000 Belgrade, Serbia
[5] Academy of Professional Studies Šabac, Department for Medical and BusinessTechnological Studies, Hajduk Veljkova 10, 15 000 Šabac, Serbia, milica.zivkovic.edu@gmail.com

ABSTRACT

Riparian and aquatic habitats being especially under threat, as these habitats represent important corridors for the spread of invasive speciesThe rapid spread of invasive alien plants worldwide has occurred as a consequence of intensive anthropogenic movement. Field research was conducted in riparian areas of 35 rivers in Serbia, following the River Habitat Survey (RHS) methodology. The presence of 26 alien invasive species in riparian zones was documented, with the most dominant invasive species being: *Robinia pseudoacacia, Amorpha fruticosa* and *Xanthium strumarium*. One of the aims in this study was also to determine the relevant HMS (Habitat Modification Score) and HQA (Habitat Quality Assessment Score) subscores (obtained as part of the RHS methodology) and to show their importance relative to the invasive species in riparian zones. Canonical correspondence analysis (CCA) analysis was used, and based on this analysis three HMS and HQA subscores (out of 18 in total) were determined to have a statistically significant effect: In-stream channel vegetation sub-score, Flow type sub-score and Land-use within 50m sub-score, while the strongest positive correlation with the first axes was evident for the Flow type HQA sub-score.

Keywords: invasive alien plants, RHS, HMS, HQA, rivers in Serbia.

ECO DESIGN AS DRIVER OF INNOVATION - CHALLENGES AND TRENDS

Nevena Vukić[1*], Dejan Kojić[2], Ljubica Janjetović[2]

[1] University of Kragujevac, Faculty of Technical Sciences, Svetog Save 65, 32 000 Čačak, Serbia, nevena.vukic@ftn.kg.ac.rs
[2]University PIM Banja Luka, Technical Faculty, Despota Stefana Lazarevića bb, 78 000 Banja Luka, Bosnia and Herzegovina, dejan.kojic@univerzitetpim.com, ljubicajanjetovic@gmail.com

ABSTRACT

Eco design involves creating products with minimal environmental impact throughout their entire life cycle. This approach integrates sustainability principles into the design, production, and disposal processes. By integrating of eco design principles, companies can significantly reduce its environmental footprint, promote sustainability, and contribute to a circular economy. This study focuses on identifying current challenges and trends within eco-innovative packaging design as a relatively new concept. The aim was to investigate the consumer motivation to accept eco-design and to find out if they expect to see eco design as a natural feature of all quality products and their packaging. The data collection was performed using the checklists and interviews. The obtained results indicated that eco design concept is not limited only to “green” target groups, but is more widely accepted by a wide range of consumers.

Keywords: eco design, packaging, sustainability, life cycle, circular economy.

ECONOMY AND MANAGEMENT
EKONOMIJA I MENADŽMENT

APPLICATION OF DEEP REINFORCEMENT LEARNING IN PORTFOLIO MANAGEMENT

Fengchen Gu

School of AI and Advanced Computing, XJTLU Entrepreneur College (Taicang), Xi'an Jiaotong-Liverpool University, Taicang Road, Taicang, Suzhou, 215400, Jiangsu, China
University of Liverpool, Department of Electrical Engineering and Electronics, Brownlow Hill, Liverpool, L69 7ZX, Merseyside, United Kingdom, Fengchen.Gu19@student.xjtlu.edu.cn

ABSTRACT

Financial portfolio management aims to allocate resources for optimal returns while mitigating risk. Traditional methods based on assumptions like normal return distributions and simplistic risk measures have limitations. Deep reinforcement learning (DRL) combines deep learning for feature representation and reinforcement learning for optimal decision-making. It offers advantages like reduced assumptions, handling complex environments, automated feature learning, improved sample efficiency, online learning, and scenario simulation. However, DRL for portfolio management faces challenges regarding financial risk management, overfitting, data quality, reward design, and generalizing to unseen scenarios. Potential improvements include enhanced algorithms and neural architectures, richer state/action spaces, multi-objective reward functions, regularization, and incorporating real-world constraints. Other goals are improving generalization through sufficient representative data, managing training anomalies, and bridging gaps between simulated and live environments. Verifying state-of-the-art performance lacks established benchmarks. Common metrics used are cumulative returns, risk-adjusted returns like Sharpe/Sortino/Omega ratios, and comparisons to prior work reproduced in-house. Isolating the impact of individual model components through theoretical analysis, ablation studies, module replacement, and intermediate validation is difficult. Improving interpretability by integrating traditional financial principles and extracting trading logics is important for investor acceptance. Despite the challenges, DRL shows promise for enhanced portfolio management

Keywords: Portfolio management, Financial Markets, Deep reinforcement learning.

THE SIGNIFICANCE OF TIME MANAGEMENT SKILLS IN HEALTHCARE ORGANIZATIONS: PERCEPTIONS OF HEALTHCARE WORKERS

Milica Stanković[1], Marko Slavković[2*]

[1]General Hospital "Sveti Luka" Smederevo, Knez Mihailova 51, 11300, Smederevo, Serbia
[2]University of Kragujevac Faculty of Economics, Liceja Kneževine Srbije 3, 34 000 Kragujevac, Serbia, mslavkovic@kg.ac.rs

ABSTRACT

Time management skill is increasingly becoming a significant indicator of healthcare workers' productivity in achieving the mission of providing quality healthcare services. In addition to the knowledge and skills they possess, healthcare organizations require their employees to develop successful time management skills, which involve goal setting, planning, setting priorities, time estimation, and performance monitoring. The aim of this study is to examine the perception of employees about time management during work in healthcare organizations in the Republic of Serbia. An empirical research was conducted to achieve this aim. The results showed that healthcare workers are aware that time is the most important resource, yet they do not keep track of their time spent at work, which is a crucial component. Based on the results, it can be concluded that healthcare workers need education to improve their time management skills.

Keywords: time management, healthcare organizations, healthcare workers.

LEADERSHIP IN STARTUPS: PIONEERING PATHS TO SUCCESS

Ayman Sadik Al Najjar

University of Pecs, Faculty of Business and Economics, Rákóczi street 80., H-7622 Pécs, Hungary,
ayman.alnajjar@pte.hu

ABSTRACT

Leadership is important to startup success, yet it is often underestimated. Startups, which are defined by fast growth, limited resources, working in an environment of high risk and uncertainty and have a desire for innovation, rely mainly on the leadership of its founders or CEOs. This paper aims to study three leadership theories and its impact on a startup, ranging from trait and transformational to transactional leadership. Each theory provides a unique perspective on leadership approach, emphasizing human characteristics, behavioral interactions, and situational flexibility. The paper reviews existing literature about leadership and startups and makes intersection between those two domains. The findings show that trait leadership theory provides insights into the personality qualities of founders, which influence venture survival and direction in the early stage of establishment. While transformational leadership is a good in inspiring creativity and promoting shared goals in transient phase of startup growth. On other hand, transactional leadership gives stability and clarity in larger startups with established structure and bigger staff. As businesses progress through the stages of development, their leadership styles need to evolve to suit shifting demands. From the pursuit of smoothing challenges, networking and funding in the early phases to the formation of defined goals and performance management systems in the long run. This leads to emerging entrepreneurial leadership which is considered as adaptive leadership that is flexible and adapts leadership styles based on the status and situation of the startup firm.

Keywords: startups, trait leadership, transactional leadership, transformational leadership, entrepreneurial leadership.

OPEN INNOVATIONS FOR THE IMPROVEMENT OF LEADERSHIP

Milan Resimić

University of Belgrade, Faculty of Organizational Sciences, Jove Ilića 154, 11 000 Belgrade, Serbia,
apostolcentar@yahoo.com

ABSTRACT

Open innovations are of particular importance for the quality of organizational leadership. Support for open innovation at the level of a company leader implies the development of a culture of change and support, as well as an organizational climate in the spirit of creativity and openness. On the other hand, as management has the ability and power to suppress innovation or influence subordinates to suppress the development of innovation, the need for a strong value system is more pronounced. The goal of the paper is to point out the importance of open innovation for the improvement of leadership from different aspects. In order to raise the overall quality of leadership at different levels and in different types of organizations, one of the key ways is to encourage the development of open innovations and their application. It is of particular importance to increase the capacity for using open innovation in order to increase the probability of achieving organizational leadership goals.

Keywords: open innovation, development, leadership, behavior, competitiveness.

HUMAN CAPITAL DEVELOPMENT, CAPABILITIES AND ECONOMIC GROWTH IN NIGERIA

Awe Isaac Tope

Bamidele Olumilua University of Education, Science and Technology, Department of Economics, School of Social and Management Science, Ikere –Ekiti, P.M.B. 250, Ekiti State, Nigeria,
awe.isaac@bouesti.edu.ng

ABSTRACT

Human capital development has been identified by various authors as part of the economic growth determinant. It is impossible to achieve sustainable growth without matching the relationship between human capital and economic growth with appropriate capabilities. This study sought to examine the relationship among human capital development, capabilities, and economic growth in Nigeria using time series data spanning from 1984 to 2021. Autoregressive Distributed Lag (ARDL) cointegration estimation technique was employed to analyse the relationship among human capital development, capabilities, and economic growth as confirmed by pre-test results [Phillip Peron (PP) and Augmented Dickey-Fuller (ADF)] to test for stationarity. The finding reveals that total factor productivity (proxy for innovation capability), Gross capital formation and financial deepening (financial capability) were the capability variables that significantly influenced economic growth. Therefore, the study concludes that human capital development without adequate capabilities, Nigeria will not be able to sustainably grow. Consequently, the government should focus its efforts on devising policies that will revolutionize Nigeria's education system in a manner that will stimulate the economy.

Keywords: Human Capital Development, Total Factor Productivity, Trade Openness, Life Expectancy and Financial Deepening.

HUMAN POTENTIAL MANAGEMENT AND EMPLOYEE MOTIVATION

Slađana Lolić

University of Business Studies, Jovana Dučić 23a, 78 000 Banja Luka, Bosnia and Herzegovina
University of Banja Luka, Faculty of Philosophy**,** Bulevar vojvode Petra Bojovića 1A**, 78 000** Banja Luka**,** Bosnia and Herzegovina, lolics537@gmail.com

ABSTRACT

Human potential plays a significant role in the company. The basis of the business of every company is the quality of human potential, their abilities, skills, motivation... Motivation is one of the main factors that affects the work and productivity of employees. Greater employee motivation creates a greater motive for work, which contributes to better company results. The aim of this paper is to show that different factors influence the motivation and work of employees, but also how human resources are managed in the organization.

Keywords: human potential, employee motivation, training and development.

ORGANIZATIONAL MODEL 7S IN THE CONTEXT OF ORTHODOX AND ETHICAL BUSINESS LEADERSHIP

Milan Resimić

University of Belgrade, Faculty of Organizational Sciences, Jove Ilića 154, 11 000 Belgrade, Serbia,
apostolcentar@yahoo.com

ABSTRACT

The growing trend of interest in Christian ethics and spirituality influenced organizational models and behavior. Spirituality gives meaning to every activity, including organizational leadership, and it provides a framework for using organizational models. The aim of the work is to connect the selected elements of the famous McKinsey model 7S through the categories of Orthodox leadership. Ethical and spiritual leadership are developing as separate disciplines today. There is a strong correlation of elements of spiritual and ethical business leadership with the 7S organizational model. The development of spiritual and ethical leadership based on Christian morality in the organization can be achieved through justifying values, opening the structure, refining skills, raising the level of motivation, differentiating style and skills, as well as more effective control. From the perspective of the emerging Orthodox leadership theory, it is impossible to completely separate and connect the categories of leadership with the elements of the 7S model without overlapping.

Keywords: Organization, Model 7S, Behavior, Ethics, Spirituality, Leadership.

THE DEVELOPMENT, SITUATION AND MANAGEMENT OF TOURIST THEMATIC ROUTES IN HUNGARY AND GERMANY

Mónika Pentz, Tibor Gonda

University of Pécs, Department of Marketing and Tourism, Faculty of Economics, Rákóczi út 80, 7622 Pécs, Hungary, gonda.tibor@ktk.pte.hu

ABSTRACT

The tourist themed routes go back almost 100 years. First of all, they are of great importance within the field of tourism, and even today they are effective tools for tourism development and rural development. In the 1990s, the first thematic tourist routes were created in Central and Eastern European countries. Their creation, operation and qualification are not regulated, and mostly they are not stable, with management who knows how to organize, so they usually cease to exist after a short period of operation. According to a recent representative research, the fact that there are thematic tourist routes is generally known in Hungary. The most famous of these are the wine routes. There would be a significant demand for tourist routes along various interesting themes, but their maintenance and operation would only be realistic if a management organization with adequate financial resources and professional competence existed. The authors formulate their proposals based on the analysis of good practice in Germany and the results of a questionnaire survey in Hungary in order to improve it.

Keywords: theme routes, heritage, local products, tourism management.

MANAGEMENT OF AMORTIZATION CALCULATION ON THE BASIS OF FINANCIAL STATEMENTS IN PROFIT PROJECTION

Ognjen Bakmaz[1], Darko Martinov[2], Dragan Vukasović[1]

[1]The College of Service Business East Sarajevo - Sokolac, Cara Lazara bb, 71 350, Sokolac - East Sarajevo, Bosnia and Herzegovina, ognjen@vub.edu.ba
[2]Independent University of Banja Luka, Braće Podgornika 8, 78 000 Banja Luka, Bosnia and Herzegovina

ABSTRACT

The modern economic understanding equates company in terms of ownership, the owner of the alliance, and in this regard arises variable combination of the priority objectives in which priority is given to the objectives defined by the majority shareholders. The company is a complex organization that operates in terms of external and internal uncertainty, with insufficient rationality of individual parts, which are often conflicting or even contrary to higher goals. In such circumstances, preferably in management by objectives that allows the realization of benefits from the participation of subordinates. Management usually imposes target profit as the primary objective of the whole and within that encourages lower-level management structures to define their individual goals and reconcile them with the primary. Thus, through primary objective gets more accepted imposed objectives with more complete authority, responsibility and control.

Keywords: costing, services, amortization, target profits.

ANALYSES OF THE MOST INFLUENTIAL UTILISING HOFSTEDE'S CULTURAL DIMENSIONS FOR PREDICTING CROSS-CULTURAL MANAGEMENT OUTCOMES THROUGH ADAPTIVE NEURO-FUZZY METHOD

Milovančević Miloš[1], Srđan Stojičić[1], Mirjana Miljanović[2], Nikola Simonović[3]

[1]University of Niš, Faculty of Mechanical Engineering, Aleksandra Medvedeva 14, 18 000 Niš, Serbia, milos.milovancevic@masfak.ni.ac.rs
[2]University of East Sarajevo, Faculty of Production and Management, Vojvode Stepe Stepanovića bb, 89 101 Trebinje, Bosnia and Herzegovina
[3]University MB, Faculty of Business and Law, Teodora Drajzera 27, 11 000 Beolgrade, Serbia

ABSTRACT

Cultural differences have significantly influenced business management during the past twenty years. Internationally, cross-cultural management is currently a prominent topic in modern business. Hofstede's model consists of six variables that are utilised to evaluate cross-cultural implications and cultural aspects: power distance, uncertainty avoidance, individuality versus collectivism, masculinity against femininity, long-term orientation, and indulgence versus restraint. The main goal was to study the influence of Hofstede's six-dimensional model on predicting cross-cultural management outcomes. An ANFIS (adaptive neuro fuzzy inference system) was utilised on the data to determine the most crucial factors for predicting case fatality. The ANFIS method was used for variable selection to determine the key factors affecting the prediction of cross-cultural management.

Keywords: ANFIS, forecasting, cross-cultural management.

ANALYSE THE MOST SIGNIFICANT COMPONENTS FOR FORECASTING THE HERFINDAHL-HIRSCHMAN INDEX USING AN ADAPTIVE NEURO-FUZZY TECHNIQUE

Srđan Stojičić[1], Milovančević Miloš[1], Mirjana Miljanović[2], Nikola Simonović[3]

[1]University of Niš, Faculty of Mechanical Engineering, Aleksandra Medvedeva 14, 18 000 Niš, Serbia, milos.milovancevic@masfak.ni.ac.rs
[2]University of East Sarajevo, Faculty of Production and Management, Vojvode Stepe Stepanovića bb, 89 101 Trebinje, Bosnia and Herzegovina
[3]University MB, Faculty of Business and Law, Teodora Drajzera 27, 11 000 Beolgrade, Serbia

ABSTRACT

There is a complex relationship between competition in the product market and investment in business. On one hand, the relationship may be positive, while on the other hand, it might be negative. Various methodologies have been proposed to assess market power for the purpose of developing steps to mitigate or eliminate it. Commonly utilised methods rely on indices such as the Hirschman-Herfindahl Index (HHI). The main goal of this article was to assess how different economic and business variables affect forecasts of the Herfindahl-Hirschman Index (HHI), a very sensitive measure. An ANFIS (adaptive neuro fuzzy inference system) was employed to analyse the data and determine the most crucial factors for predicting HHI. The research indicates that the number of employees has the most significant influence on HHI predictions.

Keywords: ANFIS, forecasting, Herfindahl-Hirschman, business.

BLUE OCEAN STRATEGY & SUSTAINABLE GROWTH: HOW TO PLAY AND WIN

Tatjana Mamula Nikolić[1], Svetlana Kralj[2], Mirjana Milovanović[3]

[1]Metropolitan University, Tadeuša Košćuška 63, 11 158 Belgrade, Serbia,
tatjana.mamula@metropolitan.ac.rs
[2]Independent researcher, Podgorica, Montenegro, lana@connection-s.com
[3]Banja Luka College, Miloša Obilića 30, 78 000 Banja Luka, Bosna i Hercegovina,
mirjana.milovanovic@blc.edu.ba

ABSTRACT

In today's volatile business environment, the Blue Ocean Strategy (BOS) has proved as a prominent framework for creating an uncontested market space for achieving sustainable growth. Applying this strategy also achieves a new way of adding value for consumers, clients, stakeholders, and consequently, the local community. This paper examines how contemporary issues and trends affect the implementation and effectiveness of the Blue Ocean Strategy. The focus of the research will be on examples of companies that have successfully used the principles of BOS in facing the challenges of the new age, such as rapid technological progress, the rise of the sharing economy and competition. The examples show the implementation of the Blue Ocean Strategy both in large companies and in SMEs, whether the BOS is applied in B2B, B2C, or B2B2C business models, both on a global scale and in the region. Our aim is to illustrate effective strategies and highlight the importance of creative thinking needed to design sustainable business approaches in today's permacrisis. As a part of research, BOS case study would be described on the local enterprise.

Keywords: blue ocean strategy, disruptive innovation, non-disruptive innovation, sustainable growth, sharing economy.

THE ECONOMIC AND SOCIAL DETERMINANTS OF VACCINE HESITANCY IN ROMANIA DURING THE COVID-19 PANDEMIC

Balázs Boga

Babes-Bolyai University, Faculty of Economics and Business Administration, Department of Economics and Business Administration in Hungarian Language, Strada Teodor Mihali 58-60, Cluj-Napoca 400591, Romania, bogabazsi@gmail.com

ABSTRACT

The COVID-19 pandemic affected all countries both in social and economic dimensions. Currently, vaccination is considered to be one of the most efficient solutions which can stop the further spread of the virus. Therefore, the paper aims to understand the factors that determined the social approval of the COVID-19 vaccines in Romania. To get a detailed picture on the situation, we looked not only at economic variables, but also at social and demographic components. Accordingly, the findings of the analysis list the variables that significantly influence the vaccination rate nationwide. The social approval (or the refusal) of these shots is a complex issue, thus it is essential that policymakers make decisions based on scientific evidence. The practical relevance of the paper lies in the two policy implications suggested (i.e., transparent and predictable policymaking and adjustments on the level of the education system in the long run for similar situations), which also highlight the importance of evidence-based decision-making processes in public health. Our analysis method consists of multivariate cross-sectional OLS regressions.

Keywords: vaccination, vaccine hesitancy, COVID-19, pandemic, Romania.

IMPACT OF THE PANDEMIC CAUSED BY CORONAVIRUS (COVID-19) ON INTERNATIONAL MARKETING AND THE CONSUMER BEHAVIOR IN INTERNET SHOPPING

Miljenko Strnad, Biljana Rađenović Kozić

University of Business Studies, Jovana Dučić 23a, 78 000 Banja Luka, Bosnia and Herzegovina, miljenko.strnad@gmail.com, biljanarkozic@gmail.com

ABSTRACT

The pandemic caused by the coronavirus (COVID-19) has had a significant impact on the global economy and in a very short period of time it changed society as a whole, the daily social activities of people, as well as the business activities of economic entities. "New Reality" has had an effect on international marketers, and accordingly on Internet trade, as an integral part of the international marketing system. This work aims to give us an insight into the real changes that occurred during and after the pandemic caused by the coronavirus (COVID-19) in international marketing, as well as in the customers behavior and habits who are users of online stores. The work is primarily based on research conducted in Croatia, as well as partially in Bosnia and Herzegovina, Serbia and Slovenia. The aim of the primary research was to obtain results to what extent consumers of this region were ready to accept online shopping as the only way of shopping that is possible with partial and even complete restriction of movement, as well as to what extent they are ready to change their behavior and habits related to internet store. In addition to the primary research carried out, this paper is based on theoretical analysis, as well as on comparative analysis of the experiences of developed countries. The end result aims to reach conclusions that would provide useful indicators related to real changes in the behavior and habits of consumers, as well as the adjustment of marketing strategies and concepts of economic entities within the framework of new circumstances.

Keywords: internet trade, international marketing, consumer behavior, COVID-19.

POSITION OF THE BRAND IN ON LINE SHOPPING

Miljenko Strnad, Biljana Rađenović Kozić

University of Business Studies, Jovana Dučić 23a, 78 000 Banja Luka, Bosnia and Herzegovina,
miljenko.strnad@gmail.com, biljanarkozic@gmail.com

ABSTRACT

The position of the brand in the market of the 21st century is a very important question of the theory and practice of marketing. Brands rule the markets. Consumers feel more confident buying brands. Pandemics, wars, economic crises and the appearance of a large number of producers contribute to the fact that consumers feel insecure and that one of the basic parameters for deciding to buy a product is the certainty of what the product provides. For a product to be a brand, it is determined by standardization and safety. From this, it is clear why consumers choose brands in most cases. With the appearance of the online store, the sales area has opened up for a large number of brands, but also for those products that we often did not have the opportunity to see before the appearance of this type of store. Therefore, the competition becomes more pronounced in one place. Everyone meets in the online world, which is very easy for the consumer to access. The goal of the research presented in this paper is precisely to determine whether online shopping has contributed to or threatened the competitive position of brands? Did it enable previously unknown products to position themselves more quickly and efficiently in the minds of consumers? Finally, has there been any change in building a brand compared to a traditional store and how much online sales and communication systems contribute to building an image. Everything will be presented on the basis of a comparative analysis of the literature in this field, cases from practice, and primary research conducted on the market of Croatia, Bosnia and Herzegovina and Serbia, in order to observe possible changes and impacts.

Keywords: online shopping, brand, changes in communication.

INSTAGRAM AND TRIPADVOSOR.COM: COMPARATIVE CONTENT ANALYSIS AND ONLINE REVIEW

Dragana Gašević, Marija Vranješ, Dragana Tomašević

Novi Sad School of Business, Vladimira Perića - Valtera 4, 21 000 Novi Sad, Serbia,
dragana.gasevic@vps.ns.ac.rs, marija.vranjes@vps.ns.ac.rs, dragana.tomasevic@vps.ns.ac.rs

ABSTRACT

Social networks play an important role in various fields of companies' businesses. Numerous studies deal with analyzing the content shared with followers through these modern communication channels. What is shown through social networks are promises that are created and presented to followers to make a sale and build an emotional connection with them. On the other hand, followers (buyers, consumers, tourists, visitors) during and after buying a product or using a specific service compare what they were promised with what they got. They often share their experiences with others through word of mouth and electronic communication media (online reviews). The research subject is a comparative analysis of the content published on the Instagram profiles of four hotels from the Republic of Serbia with reviews available on the Tripadvisor.com portal. That is, the goal is to determine whether and to what extent visitors comment on the elements promoted through the Instagram profile when reviewing. This research analyzed 452 posts and 27 reviews identified over one year. By comparing the available secondary data, the offer elements were identified as fully meeting and exceeding the visitors' expectations. Also, the factors rated by visitors with the lowest ratings and that caused disappointment were identified. These indicators are practical contributions to the work and can help managers create marketing strategies to minimize hotel functioning problems. The paper's theoretical contribution is reflected in the expansion of theoretical knowledge about the importance of social networks and the monitoring of user reviews.

Keywords: social networks, Instagram, hotel industry, online reviews.

EXAMINING AGE DIFFERENCES IN CONSUMER ATTITUDES TOWARD SOCIAL MEDIA INFLUENCERS

Marija Vranješ, Dragana Gašević, Dragana Tomašević

Novi Sad School of Business, Vladimira Perića - Valtera 4, 21 000 Novi Sad, Serbia,
dragana.gasevic@vps.ns.ac.rs, marija.vranjes@vps.ns.ac.rs, dragana.tomasevic@vps.ns.ac.rs

ABSTRACT

Traditional media are losing their attractiveness in the modern business environment, particularly among the younger population. At the same time, more and more people are shifting towards social media and relying on influencer endorsements. In these circumstances, it becomes evident that integrating influencers into the company's marketing strategy is imperative. This study aimed to identify statistically significant differences in consumer attitudes toward social media influencers across various age segments. To achieve this, we analyzed variables related to influencer characteristics (similarity, attractiveness, expertise, and reliability) as well as influencer-generated content (informative and entertaining value). Employing a one-factor analysis of variance, we examined different age segments. Analysis of primary data collected from 340 respondents revealed statistically significant differences only in the attractiveness variable. Specifically, younger consumers (under 20 years old) rated their preferred influencers' attractiveness more positively than older consumers (aged 30 to 39). However, no statistically significant differences were observed for the remaining variables among consumers of different age groups. The theoretical implications of this study pertain to enhancing understanding of contemporary consumer attitudes towards influencers. Furthermore, the obtained scientific results guide management in formulating marketing strategies on social networks, particularly concerning selecting appropriate influencers.

Keywords: influencer characteristics, influencer-generated content, age differences.

METHODOLOGY FOR EVALUATION OF SUCCESS OF PRODUCT MARKETING

Vučelja Lekić, Mladen Janjić, Nada Damljanović

University of Kragujevac, Faculty of Technical Sciences Čačak, Svetog Save 65, 32 000 Čačak, Serbia, vucelja.lekic@ftn.kg.ac.rs, mladen.janjic@ftn.kg.ac.rs, nada.damljanovic@ftn.kg.ac.rs

ABSTRACT

Calculation and measurement of the impact of achieved business results with the contribution of marketing and product branding is a continuous process in every business environment. This type of evaluation is necessary so that management can determine the validity of various marketing concepts focusing on planning adequate marketing strategy in the future. Techniques of fuzzy natural logic and approximate reasoning is used to show methodology for evaluation of product marketing success. Evaluation is based on the analysis of relationship between several business parameters and performance indicators, including product quality, marketing attractiveness, overall sales, etc., by applying a special reasoning method (called perception-based logical deduction), which effectively utilize expert knowledge to evaluate relation between product and marketing and make a decision.

Keywords: Marketing, business, evaluation, fuzzy natural logic, approximate reasoning.

AN INFLUENCE OF INTERNET MARKETING ON A CONSUMER BEHAVIOUR

Mladen Milić[1], Jelena Lutovac[2]

[1]University PIM, Faculty of Economics, Despota Stefana Lazarevića bb, 78 000 Banja Luka, Bosnia and Herzegovina, mladen.milic@fondpiors.org
[2]Megatrend University, Faculty of Business Studies Belgrade, Bulevar Mihajla Pupina 117, 11 000 Belgrade, Serbia, jelena.vitomir1@gmail.com

ABSTRACT

Internet marketing is a very important tool in the hands of management, which they use more and more recently in order to manage the company more easily and better, and as a result achieve the best possible business results. Good results achieved in this way will inevitably position the company in a desirable place on the market and thus give it a certain importance and advantage compared to the competition.

Managing a company by applying internet marketing in business processes successfully builds relationships between the company on the one hand and consumers on the other, in an efficient, economical and effective way for everyone. In a very short time in Republika Srpska and Bosnia and Herzegovina, as well as around the world, internet marketing has become a successful and irreplaceable business model that is widely applied by the company's management in everyday business. Company managements who understood the role and importance of Internet marketing in time in its positioning on the market and the influence on consumer behavior year after year achieve more and more noticeable results in business and in the fight with the competition, which is clearly visible from the positive trends in the movement of key indicators.

Keywords: internet, marketing, website, company, company management, consumer.

THE ROLE OF THE PLANNER IN THE SUPPLY CHAIN

Nikola Vojvodić[1], Milja Šteković[2], Darko Vaselić[1]

University PIM, Faculty of Economics, Despota Stefana Lazarevića bb, 78 000 Banja Luka, Bosnia and Herzegovina, profnikolavojvodic@gmail.com
Lactalis Holländischer Käse GmbH, Werner-von-Siemens-Ring 12, 85 630 Grasbrunn, Njemačka

ABSTRACT

In today's fast-paced, highly competitive and innovative environment, satisfying consumer needs is a major challenge for companies. In modern times, companies that operate as a whole that uses all their available resources survive successfully. In order to be able to use all its resources, it is necessary to connect all parts of the company in a common process that points out problems and interruptions. The supply chain, by definition, includes the movement of goods and services outside and inside the organization, and its part that manages the reduction of uncertainty brought by the future is planning. The introduction of an S&Op process, which aligns planning with other parts of the organization, has led many companies to incredible success compared to the competition. Resilience and speed of the supply chain, along with innovation, cost reduction, efficiency are the new goals that need to be achieved. In order for this to be possible, it is necessary to employ experts who will connect processes and use new technologies in order to improve and speed the response of each organization to market demands.

Keywords: supply chain, planning, S&Op, resilience, agile, cost control, efficiency.

RESEARCH OF THE BEHAVIOR OF ECOLOGICAL CONSUMERS IN THE BUYING PROCESS

Simonida Vilić[1], Dujaković Tatjana[2]

[1] University PIM, Faculty of Economics, Despota Stefana Lazarevića bb, 78 000 Banja Luka, Bosnia and Herzegovina, svilic26@yahoo.com
[2] Republic Administration for Inspection Affairs, Trg Republike Srpske 8, 78 000 Banja Luka, Bosnia and Herzegovina

ABSTRACT

Ecologically responsible producers now have the opportunity to realize a key competitive advantage in the market, because ecological awareness is gradually integrated into all aspects of social, business, political and ethical thinking and action. The fact that there is an environmentally responsible consumer segment on the market has become unquestionable. However, with the entry of an increasing number of bidders into that ecological market, it is no longer enough to be aware of that fact, but complex strategies of segmentation, targeting and positioning are also required. As in the case of any other market segment, there is a need to identify these target consumers in order to effectively approach them and meet their needs through specially designed marketing programs. The research goal of this work is aimed at determining the perception of ecological consumers about ecological products/services and looking at the way in which consumers react in the purchase process. The scientific-research character of this work is based on the analysis of relevant scientific literature and modern sources using the examination method, the analysis method, the comparison method, the description method and the deduction method. The results of the empirical research showed that in the modern conditions of dynamic and intense competition, researching the attitudes, preferences and behavior of ecological consumers in the purchase process becomes imperative for the successful operation of the company and achieving a competitive advantage, as well as that the ecological image of the company and ecological advertising has a direct impact on decision-making on purchasing ecological products/services.

Keywords: ecological consumer behavior, ecological products/services.

SOLUTION TO CIRCULAR ECONOMY PRACTICES' ADOPTION CHALLENGES IN THE NIGERIAN MANUFACTURING SECTOR: A FOCUS ON OTA REGION

Israel Dunmade[1,2], Joshua Osaro[2]

[1]Mount Royal University, Department of Earth & Environmental Sciences, 4825 Mount Royal Gate SW Calgary, Alberta, Canada
[2] Covenant University, Mechanical Engineering Department, 10 Idiroko Road, Canaan Land, Ota, Ogun State, Nigeria, idunmade@mtroyal.ca

ABSTRACT

Our economic activities thrive on resource exploitation, material processing, manufacturing, utilization and disposal. The linearity of our economic activities has caused enormous environmental problems such as resource depletion, loss of biodiversity, soil contamination, air and water pollution, and climate change. However, circular economy has been found to be a pragmatic approach to addressing these problems and to incorporating sustainability into our economic activities. Scholars, professionals and policy makers in many countries and corporate organizations, especially in developed countries, have been taking steps to introduce circularity into various sectors of our economy. Unfortunately, many developing countries are yet to buy into it. Using a survey approach, this study attempted to identify challenges to circular economy practices' adoption in Nigeria and tried to proffer solutions to the challenges. Results of the study showed non-awareness of circular economy practices, unsupportive government policy, institutional issues, and infrastructure deficit as the main challenges. Public awareness education, circularity education incorporation into schools/college curricula, circular economy research funding, circular infrastructure/market structure development, and government support are the proposed solutions to the aforementioned challenges. The government support could be in the form of tax rebates, subsidies, supportive policies as well as circularity innovation demonstration centers' establishment. Taking those steps would foster public awareness and widespread adoption of circular economy practices. Consequently, this would eliminate the aforementioned environmental

problems and enhance our progression towards achieving sustainable development goals.

Keywords: circular systems, industrial sustainability, resource use optimization, sustainable systems, waste management.

THE SIGNIFICANCE OF SUPPORT PROGRAMS FOR THE SMALL AND MEDIUM ENTERPRISES SECTOR IN THE REPUBLIKA SRPSKA

Jelena Jovović, Milica Lakić, Darko Vaselić

University PIM Banja Luka, Faculty of Economics, despota Stefana Lazarevića bb, 78 000 Banja Luka, Bosnia and Herzegovina, jelena.univerzitet.pim@gmail.com, mlclakic@gmail.com

ABSTRACT

Small and medium-sized enterprises (SMEs) represent a significant development factor in all transitional countries. It could be argued that the development of SMEs represents one of the greatest development opportunities for Bosnia and Herzegovina, including Republika Srpska. Therefore, it is important to highlight their position.

Why focus on the SMEs sector? Firstly, because these enterprises are the engine of economic development, i.e., the driving force of the economy. In this sense, their role is particularly significant in transition countries, including Bosnia and Herzegovina with Republika Srpska. They are considered the backbone of the growth and development of national economies. Looking at them individually, it can be said that these companies make the biggest contribution to increasing employment, gross added value and turnover. They have a comparative advantage in being able to adapt quickly to changes and meet market demands. Furthermore, these enterprises promote private ownership and entrepreneurial skills.

It is also evident that SMEs in Bosnia and Herzegovina operate under conditions of high unemployment rate, low levels of economic activity, lack of investment and insufficient competitiveness. These conditions are further characterized by instability and unpredictability, expensive loans, problems with debt collection, investment issues, outdated technology, as well as high levels of corruption, bureaucracy, and political instability.

The study analyzed the attitudes of different levels of management, responsible for the SMEs conduct of business. The research aimed to determine the respondents'

perception of the key success factors of SMEs in Republika Srpska, particularly regarding support programs for the SMEs sector.

The main method of data collection in this study was a survey conducted by filling out a questionnaire in May 2022. The survey was anonymous and conducted with 100 respondents (100 SMEs) from Republika Srpska via e-mail.

Subsequently, through correlation analysis, more concrete results were obtained, indicating the greatest importance of the support programs from the Development Agency of Republika Srpska and favorable loans for development and innovation activities, pointing towards the direction in which Republika Srpska institutions should intensify efforts to improve the position of SMEs.

Also, the highest percentage of respondents identified expert and consultancy support and support from the Council for the Development of SMEs and Entrepreneurship as the least significant. These data emphasize the importance of more rigorous competency checks and more adequate selection of personnel in institutions dealing with SME issues, so that professional development and counseling gain significance and effectiveness.

Keywords: SMEs, support programs, subsidies, Development Agency of the Republika Srpska, loans, expert and consultancy support.

THE IMPORTANCE OF ANALYSIS OF FINANCIAL STATEMENTS ON THE EXAMPLE OF THE PODRAVKA COMPANY

Marko Milić[1], Slađana Vujičić[2]

[1]Independent University of Banja Luka, Braće Podgornika 8, 78 000 Banja Luka, Bosnia and Herzegovina, milicmarko.milic@gmail.com
[2]College of Business Economics and Entrepreneurship, Mitropolita Petra 8 street, 11 000 Belgrade, Serbia, slađanakonto@gmail.com

ABSTRACT

Financial reports are published on the official websites of business entities, on stock exchanges (if the company is listed on the stock exchange), as well as in other ways so that they are fully accessible to the public. So, as a rule, these are documents that do not represent a business secret, but the goal is to familiarize all interested stakeholders with the financial performance of the company, and all in the function of more successful and long-term business.

It is very important to adequately and fundamentally analyze the financial reports that the company publishes for the half-year period as well as for the whole year, and in this way determine the success of the business and the financial position of the company.

The work methods that will be used in this work are: analysis method, deduction method, description method and comparison method.

The aim of this work is to show how, on the example of the Podravka company, an effective analysis of financial statements can be performed and financial stability can be seen. There is a special emphasis on showing how the company's dividend policy can affect the company's development. Adequate analysis of financial performances enables the management of Podravka to detect deviations from expected values and to undertake corrective actions.

Keywords: importance, analysis, financial reports, Podravka.

IMPORTANCE OF FINANCIAL ANALYSIS IN MODERN BUSINESS CONDITIONS

Marko Milošević, Marko Milić, Ognjen Bakmaz

The College of Service Business East Sarajevo - Sokolac, Cara Lazara bb, 71 350, Sokolac - East Sarajevo, Bosnia and Herzegovina, marko@vub.edu.ba

ABSTRACT

Financial analysis is the process of assessing a company's financial performance, health and sustainability by examining its financial statements, indicators, trends and other relevant financial data. It involves interpreting numbers to assess various aspects of a company's financial position and performance. Financial analysis is crucial to decision-making by investors, creditors, managers and other stakeholders. Today's business environment is shaped by digital transformation, globalization, technological innovation, data-driven decision making, agility, evolving workforce dynamics, sustainability imperatives, customer centricity, regulatory complexity and cybersecurity challenges. Such conditions define how companies operate, compete and adapt to changes in the global economy, while simultaneously addressing regulatory requirements and effectively mitigating risks. This reflects the importance of financial analysis, which is necessary in modern business conditions because it provides valuable critical insights, facilitates and directs decision-making based on information, mitigates and manages risks, improves performance and resilience and encourages sustainable growth and success of companies.

Keywords: financial analysis, ratio analysis, business, financial management.

THE IMPACT OF FISCAL AND MONETARY POLICY ON THE MINING SECTOR OUTPUT IN NIGERIA

Mary Bosede Olufayo

Bamidele Olumilua University of Education, Science and Technology, Department of Economics, School of Social and Management Science, Ikere –Ekiti, P.M.B. 250, Ekiti State, Nigeria,
maryolufayo@gmail.com

ABSRACT

It has been the worries of the economist and policy makers getting the economy into the desired growth trajectory investment in solid minerals has been one of the identified growth drivers in economic literature. The study examined the impact of fiscal and monetary policy on the mining sector output in Nigeria via time- series data between 1981 and 2021. The unit root test was conducted adopting Philip-pereon , while the Autoregressive Distribution Lag (ARDL) method was employed. The study concluded that the performance of mining sector has been unimpressive during the period. Only the interactive impact of fiscal policy and monetary policy (proxy money supply) significantly influenced mining sector output in Nigeria. The study recommended that there is a need to increase the budgetary allocation to the mining sector both at the federal and state levels to boost the growth of the mining sector. Also, the government should advance more credit through special directives from the Central Bank of Nigeria to commercial banks to grant more loans to the mining sector.

Keywords: Investment, Growth, Mining, Autoregressive Distributed Lag and Economy.

COMPARATIVE ANALYSIS OF THE MICROCREDIT SECTOR IN SELECTED COUNTRIES OF THE REGION

Milica Lakić[1], Jelena Jovović[1], Ružica Đervida[2], Zoran Đuričić[2]

[1]University PIM, Faculty of Economics, Despota Stefana Lazarevića bb, 78 000 Banja Luka, Bosnia and Herzegovina, mlclakic@gmail.com, jelena.univerzitet.pim@gmail.com,
[2]Independent University of Banja Luka, Faculty of Economics, Veljka Mlađenovica 12e, 78 000 Banja Luka, ruzica.djervida@nubl.org, zoran.djuricic@nubl.org

ABSTRACT

The development of a country's finacial szstem is reflected in the diversity of financial institutions that make up it, and the structure of the financial system of selected countries is of a bankocentric type, characterized by traditional banking. The subject of this paper is a comparative analysis of the business of the microcredit sector in the Republic of Srpska, the Federation of Bosnia and Herzegovina, Montenegro and Serbia. The fact is that the microfinance sector is not engaged in the business of receiving deposits, but exclusively by granting loans at extremely high interest rates. Transaction costs are significantly higher in the microfinance sector, compared to the business policies of banks. The paper compares and critically analyzes the components of the microcredit sector of selected countries based on total assets, capital adequacy, interest rate, loans placed by maturity and structure, then based on legislation, transparency and possible directions in microfinance. Data for the microcredit sector were collected for the period from 2020 to 2023, from the reports of the competent institutions for supervision and control of the microcredit sector, reports and publications of the National Bank of Serbia, as well as an additional source of statistics of central banks of selected countries. The aim of this research is an objective and reliable presentation of data along with these methods of work.

Keywords: microcredit sector, financing, capital adequacy, loans.

FINANCING MODELS OF HEALTHCARE INSTITUTIONS FROM THE OBLIGATORY HEALTH INSURANCE IN THE REPUBLIC OF SRPSKA

Jelena Jovović[1], Mladen Ivić[1], Željko Grublješić[1], Miloš Tubić[2]

[1] University PIM, Faculty of Economics, Despota Stefana Lazarevića bb, 78 000 Banja Luka, Bosnia and Herzegovina, jelena.univerzitet.pim@gmail.com, ivic.mm81@gmail.com, zeljko@directbox.com
[2] Health Insurance Fund of Republika Srpska Prijedor, Oslobodilaca 6, 79 101 Prijedor, Bosnia and Herzegovina, milos.tubic@zdravstvo-srpske.org

ABSTRACT

The existence of an efficient system of public health care in the social community is a characteristic for a quality social entity and a measuring element of the life quality in a population. Like any other sub-system in the state, it is necessary to finance the sustainable development of the public health system.

The paper contains an analysis of several payments models from the funds of the obligatory health insurance to the health system and health service providers, with a presentation of the existing systems and models of covering costs. For this purpose, research was conducted by comparing historical data on health care costs and analyzing their trends.

The aim of the paper is to research and select adequate financing models for provided health services, which is the job of managers in health care, in order to choose between several models developed for this purpose. The manner in which health care costs are settled in the Republic of Srpska, as well as the amounts in the observed period, is also shown. Conclusions on trends confirmed, that the costs of medical treatments, for which the state allocates money for the health care system, are increasing.

At the same time, it was observed that the number of insured persons is decreasing, and that despite the relatively high average allocation for treatment per capita, considerable amounts of direct personal payment for services and medicines are still high, which are either not available from obligatory health insurance, or are difficult to access through regular procedures.

Keywords: health care, health insurance, medical costs, financing models.

SPECIFICITY OF BUDGETING OF "STARČEVICA" SKI CLUB

Srećko Stanišić[1], Dejan Crnomat[1], Srboljub Vuković[2]

[1]University of East Sarajevo, Faculty of Physical Education and Sports, Vuka Karadžića 30, 71 126 Lukavica, East Sarajevo, sreckostanisic@gmail.com
[2]University of Banja Luka, Faculty of Physical Education and Sports, Bulevar vojvode Petra Bojovića 1A, 78 000 Banja Luka, Bosnia and Herzegovina

ABSTRACT

This paper investigates the budgeting process in sports organizations, with special emphasis on the example of the organization of a ski camp. The goal of the research is to analyze this process using the organization of a ski camp as a concrete example, identifying the key elements of the budget and investigating the impact of financial management on the success and sustainability of the camp. The methodology includes a detailed analysis of financial data, income, and expenses related to the organization of ski camps, to gain insight into the process of making financial decisions. The research results indicate the importance of effective financial management for the success of sports organizations, especially in the context of specific sports activities such as skiing. This paper provides useful guidelines for improving financial management in sports organizations in the future.

Keywords: ski camp, financial management, budget.

THE APPLICATION OF THE ANALYTIC HIERARCHY PROCESS (AHP) METHOD USING EXPERT CHOICE SOFTWARE

Jasmina Ćurčić[1], Milan Vesković[1], Siniša Macan[2], Sandra Milunović[1], Neda Nikolić[1]

[1]University of Kragujevac, Faculty of technical sciences Čačak, Svetog Save 65, 32 000 Čačak, Serbia, Serbia
[2]Republic of Srpska, Ministry of Interior, 78 000 Banja Luka, Bosnia and Herzegovina,
milan.veskovic@ftn.kg.ac.rs

ABSTRACT

This research will address the "selection of the optimal computer from the set of offers received by the company JUGOPLAST from Guča". The procedure for applying the PROMETHEE method and the Analytic Hierarchy Process (AHP) method will be presented. The practical application of the AHP method will be demonstrated using Expert Choice 2000 software. It is essential to specify the criteria and alternatives for procuring laptop computers in the observed company. This paper will demonstrate the application of the AHP method in a specific decision-making example. A decision needs to be made when selecting the optimal computer or laptop from the set of offers for the company JUGOPLAST from Guča.

JUGOPLAST finds itself in a situation where it needs to replace outdated computers used by its employees or engineers to somewhat facilitate their existing work. The advantages of using software are numerous, primarily allowing for automation of calculations, which somewhat eases the manager's job, but it cannot entirely solve it because the manager makes the final decision.

Keywords: method, criterion, alternative.

THE ROLE OF GENERATION Z IN CREATING NEW BUSINESS MODELS

Nikša Grgurević

Adriatic University, Faculty of Management, Zemunska 143, Meljine, Herceg Novi, Montenegro
University PIM Banja Luka, Faculty of Economics-Study Center Trebinje, 89 000 Trebinje, Bosnia and Herzegovina, niksagrgurevic@t-com.me

ABSTRACT

Generation Z (better known as "zoomers") is influencing changes in traditional business models through the creation of innovations fueled by digitization and artificial intelligence. Thanks to a better understanding of digitization, this generation is a step ahead of other generations in the world of changes in the business sense. The subject of research in this paper is the role of generation Z in creating new business models, as well as shaping existing ones. The aim of the research is to prove how generation Z influences the creation of an innovative business environment compared to baby boomers, generation X and millennials. It is important to understand the business strategies that the zoomer generation uses, especially in light of their growing influence over previous generations.

Keywords: generation Z, innovation, digitization, artificial intelligence, baby boomers, generation X, millennials.

OIL PRICES AND HEADLINE AND CORE INFLATION DYNAMICS IN SAUDI ARABIA

Rami Hijazine

University of Pécs, Faculty of Business and Economics, Pécs, Rákóczi út 80, 7622 Mađarska, Hungary, ramihijazine@yahoo.com

ABSTRACT

The study examines the relationship between oil prices and headline and core inflation in Saudi Arabia from 2001 to 2022. To examine short- and long-run dynamic effects, the study employs Johansen cointegration and Vector Error Correction Model (VECM) approach.

Our findings indicate the presence of long run equilibrium relationship only in the core inflation model, characterized by a significant and negative error correction vector. Short run effects are not significant. While in the long run, oil prices, M2 and imports have a positive effect on the dependent variables, whereas GDP has a negative effect. Granger causality results indicate a bidirectional causality between Imports and core inflation at 10% level, in addition to a unidirectional causality running from Imports towards money supply at 5% significance level.

Variance decomposition results show that GDP, oil prices, imports and M2 coefficients explain 13.69, 0.622, 4.52 and 1.73 percent of the variability, respectively, emphasizing the primary influence of international oil prices and its effect on the imports to Saudi Arabia, in addition to the domestic economic conditions on core inflation.

Although core inflation is less susceptible to external shocks, oil prices still play a significant role in the basket of goods and services. Developing strategic industrial policies not related to the fossil fuel sector is recommended to stimulate export-led value-added growth and target core inflation.

Keywords: energy economics, monetary economics, oil prices, headline inflation, core inflation**.**

SIMILARITY OF BI-VARIANT TIME SERIES

Vučelja Lekić, Nada Damljanović, Mladen Janjić

University of Kragujevac, Faculty of Technical Sciences Čačak, Svetog Save 65, 32 000 Čačak Serbia,
vucelja.lekic@ftn.kg.ac.rs, mladen.janjic@ftn.kg.ac.rs, nada.damljanovic@ftn.kg.ac.rs

ABSTRACT

This paper presents one algorithm for choosing optimal solution from a bi-variant time series database. The presented algorithm uses a similarity measure to compare each object in the database to a specific suitable object. The proposed method is useful when dealing with multidimensional time series data, e.g., bi-variant time series, where calculation of distances between all elements can be time-consuming for certain applications, e.g., in situations where real-time data analysis is of critical importance.

Keywords: Time series, Bi-variant time series, Similarity measure, Distance measure.

MEASURING THE EFFICIENCY OF CEREAL PRODUCTION OF EUROPEAN COUNTRIES THROUGH DATA DISCLOSURE ANALYSIS

Žarko Rosić, Igor Šabić

University PIM, Faculty of Economics, Despota Stefana Lazarevića bb, 78 000 Banja Luka, Bosnia and Herzegovina, corsairdoo1@gmail.com, igorr_90@hotmail.com

ABSTRACT

In this paper, the Enveloped Data Analysis (DEA) method was used, which is used to measure the efficiency of business systems in the production of cereals in European countries. Due to the increase in population on earth, there is a need for more food and more efficient production. The DEA method enables the analysis of the efficiency of the observed units taking into account combinations of different input and output variables. It should be noted that the input and output data do not have to be the same. In this paper, an output-oriented model was used, the goal of which is to maximize output at a given level of input. In other words, we get information on how much room there is to increase the yield in order to have an efficient grain production.

Keywords: measure, efficiency, DEA method.

LAW AND SECURITY SECTION
PRAVO I BEZBJEDNOST

THE CRIME OF GENOCIDE ACCORDING TO SOURCES OF INTERNATIONAL CRIMINAL LAW, WITH A SPECIAL EMPHASIS ON SELECTED JUDGMENTS OF INTERNATIONAL COURTS

Aleksandra Milošević

University of Belgrade, Faculty of Law, Bulevar kralja Aleksandra 67, 11 000 Belgrade, Serbia
alexandramilosevic77@gmail.com

ABSTRACT

The crime of genocide, as defined by international criminal law, represents one of the gravest violations of human rights and a threat to international peace and security. This paper examines the legal framework governing the crime of genocide, focusing on its definition, elements, and prosecution under key international instruments such as the Genocide Convention, the Rome Statute of the International Criminal Court (ICC), and relevant case law from international courts. Special attention is given to landmark judgments from the International Criminal Tribunal for the former Yugoslavia (ICTY), the International Criminal Tribunal for Rwanda (ICTR), and the International Court of Justice (ICJ), analyzing their contributions to the development and interpretation of genocide law. Through a comprehensive review of these sources, the paper aims to elucidate the complexities involved in proving the intent to commit genocide, the challenges faced by prosecutors, and the evolving jurisprudence that shapes the accountability for this heinous crime. By examining selected cases, the study provides insights into the judicial processes and the standards of evidence required to establish genocide, thereby contributing to a deeper understanding of international efforts to prevent and punish genocide.

Keywords: Genocide, International Criminal Law, International Courts, Genocide Convention, Rome Statute.

THE INSTITUTE OF NECESSARY DEFENSE AS STIPULATED BY THE CRIMINAL CODE OF THE REPUBLIC OF SERBIA IN THE CONTEXT OF PROTECTING CONSTITUTIONAL RIGHTS AND FREEDOMS

Aleksandra Milošević

University of Belgrade, Faculty of Law, Bulevar kralja Aleksandra 67, 11 000 Belgrade, Serbia
alexandramilosevic77@gmail.com

ABSTRACT

The institute of necessary defense, as stipulated by the Criminal Code of the Republic of Serbia, is a key mechanism for the protection of constitutional rights and freedoms of citizens. Necessary defense allows individuals to take measures necessary to avert imminent danger to life, body, or property without incurring criminal liability. This institute is detailed in Articles 19 and 20 of the Criminal Code, which define the conditions under which necessary defense can be applied and the boundaries that must not be exceeded to avoid excessive reaction.

The application of the institute of necessary defense is directly related to the protection of fundamental constitutional rights such as the right to life, physical integrity, freedom, and property. It provides citizens with a legal framework within which they can protect their basic rights when those rights are threatened. However, in practice, there are often dilemmas and challenges related to assessing the proportionality and necessity of the defensive measures taken, which can lead to legal disputes and varying interpretations. Through an analysis of case law and legislative solutions, this paper aims to provide insights into the effectiveness and fairness of the application of the institute of necessary defense in the Republic of Serbia, with a particular focus on its role in protecting the constitutional rights and freedoms of citizens.

Keywords: Necessary Defense, Criminal Code, Constitutional Rights, Republic of Serbia, Legal Framework.

CONTRACT KILLERS PROFILING - CRIMINAL JUSTICE AND CRIMINOLOGY ASPECT

Farah Fazlagić- Gezgel, Almir Pustahija

University of Travnik, Faculty of Law, Azapovići 439, 71 254 Kiseljak, Bosnia and Herzegovina, almir.pustahija@pfk.edu.ba

ABSTRACT

Contract murder is set in within the segment of qualified types of murder where one subject hires another subject to kill a targeted person or a group of people. In that process, the employer or instigator hires a person who charges the services with money or with other value. The phenomenology of contract murder in a civilised society arouses a great public interest and a significant degree of concern in the context of general security, while the courts put the contract murder into the category of most severe cases. This paper deals with and analyses the typology of contract murders on the basis of motivational samples, the types of hitmen with the reference to their characteristics and the segments of special investigations when contract murder is concerned. With such approach, the aim is to give a scientific and expert contribution to a complex investigation on contract murder, which will help in future research about this issue.

Keywords: contract murder, instigator, qualified type, expressed concern, investigation.

ECONOMIC CRIME

Darko Dimovski

University of Niš, Faculty of Law, Trg kralja Aleksandra 11, 18 105 Niš, Serbia,
darko@prafak.ni.ac.rs

ABSTRACT

At the beginning of the paper, the author gives a definition of economic crime, while underlining the existence of doubts about its definition. In the next part of the paper, he highlights certain characteristics of economic crime, clearly separating the special modality of committing criminal acts, the special status of the perpetrator and the occurrence of large-scale damage as its characteristics. The typology of economic crime developed by Muamer Nicević and Aleksandar Ivanović are the subject of the author's interest, along with adequate examples from practice. The last part is devoted to the analysis of the connection between economic crime and organized crime.

Keywords: economic crime, phenomenology, typology.

CRIMINOGENICITY LABOR AND FINANCIAL BUSINESS IN CONNECTION WITH EMPLOYEE RIGHTS

Mile Matijević

University of Business Studies, Jovana Dučić 23a, 78 000 Banja Luka, Bosnia and Herzegovina, matijevicdrmile@gmail.com

ABSTRACT

Labor and financial legislation regulated all aspects of employment, work of workers, as well as financial business procedures related to the employment relationship. The provisions that regulate the rights and obligations of employees, as well as the responsibility and obligations of the employer in connection with the employment relationship, are particularly significant. In the financial sense, the legality of the payment of salaries, contributions, and taxes is particularly important in order to exercise the rights of workers.

Current practice indicates that in many areas of labor and financial legislation, "intentional/unintentional" errors and omissions are made, to the detriment of employees. Thus, "unofficial work", "envelope pay" and other criminogenic deviations, which essentially give an illegal advantage/profit to the entrepreneur, to the detriment of the employee, are already "traditionally" known.

The paper will analyze the legal provisions in the subject area, through a certain prism of comparability with neighboring countries. In addition, current practice will give examples, practice that is contrary to labor and financial legislation in connection with the employment relationship.

The field of labor and financial legislation has direct negative implications for the status position of employees, workers, both during the employment relationship, especially in relation to retirement, which is why it is necessary to strengthen the legal and other responsibility of employers in the subject area.

Keywords: work, labor law, finance, financial law, taxes, contributions, pension.

CYBERCRIME

Suzana Malešić[1], Duška Zorić[1], Amir Hadžimujić[2]

[1]Independent University of Banja Luka, Faculty of Security and Protection, Braće Podgornika 8, 78 000 Banja Luka, Bosnia and Herzegovina, suzanamalesic@gmail.com, zoricduska@yahoo.com
[2]Law office-Džavid Slamnik, Filipa Višnjića 72, 74 000 Doboj, Bosnia and Herzegovina, Hadžimujicamir@gmail.com

ABSTRACT

Cybercrime as a specific type of crime has lately experienced expansion, so the attacks on countries, institutions as well as individuals are more frequent. The Republic of Srpska has not been left out either, considering the latest attacks on the Integrated Health Information System of the Republic of Srpska. Information technology development and the tendency towards greater digitalization have led to new ways of committing cybercrime acts. In the paper, the authors analyze the methods of execution, phenomenology and typology of the offenders of the criminal acts of computer crime / cybercrime with a special reflection on protection measures, that is, the prevention of both, natural and legal persons. In the paper, a special emphasis is placed on the need of the education of business subjects about the types and manners of recognizing and the consequences of cyber attacks.

Keywords: cybercrime, prevention.

THE ABUSE OF OFFICIAL POSITION OR AUTHORITY AS A FORM OF CORRUPTION

Suzana Malešić, Duška Zorić

[1]Independent University of Banja Luka, Faculty of Security and Protection, Braće Podgornika 8, 78 000 Banja Luka, Bosnia and Herzegovina, suzanamalesic@gmail.com, zoricduska@yahoo.com

ABSTRACT

The abuse of official position or authority as the main criminal act against official position causes various doubts and problems in practice regarding the features of offenders of that very action of execution, using official position, which is not clearly and concisely defined, and which is contrary to the principle of legality as the main postulate of Criminal law. In the paper, the authors analyze the elements of a criminal act, the act of execution, the offender, and the form of offence by providing examples from court practice with a critical review of a small number of those convicted of this criminal act of corruption. In the second part of the paper, a special attention is paid to the comparison of legal solutions of this criminal act in the neighboring countries.

Keywords: abuse, criminal act, the Republic of Srpska.

INFORMATION TECHNOLOGY
INFORMACIONE TEHNOLOGIJE

LEARNING WITH DIGITIZED CULTURAL HERITAGE - A VIRTUAL JOURNEY THROUGH NOVI SAD

Ivana Vasiljević, Aleksandra Bobić*, Milan Miščević, Miloš Obradović, Anica Draganić, Marija Silađi, Nnenad Kuzmanović, Ratko Obradović

University of Novi Sad, Faculty of Technical Sciences, Trg Dositeja Obradovića 6, 21 102 Novi Sad, Serbia, ivanav@uns.ac.rs, aleksandrabobic@uns.ac.rs, mmiscevic@uns.ac.rs, milos_obradovic@uns.ac.rs, draganic@uns.ac.rs, maria_siladji@uns.ac.rs, nenadkuzmanovic@uns.ac.rs, obrad_r@uns.ac.rs

ABSTRACT

Research into applying digital technology for educational purposes supports raising interest in cultural heritage. That approach, which involves user interaction with content through modern technology, is an engaged learning experience. Digitized cultural heritage attracts new audiences and motivates different social groups, especially young people familiar with digital technologies, to find greater interest in heritage, create new educational opportunities, and raise awareness of the values of cultural heritage. The paper presents the results of the project A virtual journey through Novi Sad implemented by the research team of the Faculty of Technical Sciences in Novi Sad. Digitization is recognized as an opportunity to improve accessibility and the more active use of knowledge about cultural heritage. The project is focused on developing an innovative technological and methodological approach to digitizing cultural heritage, through multidisciplinary cooperation between scientific research institutions, cultural institutions, city administration, and civil society. The importance of the project is reflected in its scientific contribution to the field of heritage studies, with an emphasis on the application of digital technologies in the presentation and preservation of cultural heritage. In addition, the project output had a concrete application within the Novi Sad European Capital of Culture 2022 program.

Keywords: digitization, cultural heritage, modern technologies, education, animation**.**

INNOVATIVE USE OF 3D ANIMATION IN PATIENT EDUCATION ON MINIMAL INVASIVE CARDIOTHORACIC SURGERY

Milan Miščević[1,*], Aleksandra Bobić[1*], Lazar Velicki[2], Ratko Obradović[1], Ivana Vasiljević[1]

University of Novi Sad, Faculty of Technical Sciences, Trg Dositeja Obradovića 6, 21 102 Novi Sad, Serbia, mmiscevic@uns.ac.rs, aleksandrabobic@uns.ac.rs, obrad_r@uns.ac.rs, ivanav@uns.ac.rs
[2]University of Novi Sad, Faculty of Medicine, Hajduk Veljkova 3, 21 137 Novi Sad, Serbia
lvelicki@gmail.com

ABSTRACT

Visualization in medicine represents one of the innovative ways of patient education where, through the use of 3D animations, surgical procedures are visually represented based on detailed data about anatomy, surgical protocols, and expert opinions in the field. In this study, the process of creating and implementing 3D animation in patient education on minimally invasive cardiothoracic surgery is analyzed. Through this research, it was explored how animation can effectively empower patients to better understand the complexity and benefits of this medical procedure. The goal was to create an educative–3D animation that intricately illustrates each stage of the operation, including preparation, the procedure itself, and the advantages associated with this type of intervention. Through this approach, patients will have the opportunity to visualize their future experiences and better prepare themselves emotionally and mentally. Particularly, ways in which animation can demonstrate the advantages of the minimally invasive method compared to traditional approaches were investigated, which can contribute to increased acceptance of the procedure among patients. Additionally, it was considered how this technology can assist medical staff in effectively communicating with patients and enhancing their experience throughout the entire treatment process.

Keywords: 3D Educational Animation, Education in Cardiology.

WAVELET TRANSFORMATION WITH EXAMPLES

Alen Kamiš[1], Aleksandar Zakić[2], Saša Kukolj[3], Nemanja Deretić[4]

[1]The College of Service Business East Sarajevo - Sokolac, Cara Lazara bb, 71 350, Sokolac - East Sarajevo, Bosnia and Herzegovina, alen@vub.edu.ba
[2]Alfa BK University, Bulevar maršala Tolbuhina 8, 11 070, Belgrade, Serbia, aleksandar.zakic@alfa.edu.rs
[3]Faculty of management, Njegoševa 1a, 21205 Sremski Karlovci, Serbia, sasa.kukolj@famns.edu.rs
[4]Belgrade Business and Arts Academy of Applied Studies, Kraljice Marije 73,11 000 Belgrade, Serbia, nemanja.deretic@bpa.edu.rs

ABSTRACT

This paper presents Wavelet transformation in image and signal processing. Wavelet (small wave) is used as a principle by which various programming and engineering tasks are solved with the main goal of improving the shortcomings of the Fourier transformation in terms of data compression, image processing, computer graphics, signals and other areas.

In this document, the theoretical part will be covered and a couple of examples that can be used for the Wavelet transformation will be shown.

Keywords: Wavelet transform, CWT, DWT, practical examples.

DISPLAY OF SPINAL DEFORMITIES IN AN AR ENVIRONMENT

Dijana Stojić[1], Saša Ćuković[2], Vanja Luković[1], Dejan Vujičić[1]

[1]University of Kragujevac, Faculty of Technical Sciences Čačak, Svetog Save 65, 32 000 Čačak Serbia, dijana.stojic@ftn.kg.ac.rs, vanja.lukovic@ftn.kg.ac.rs, dejan.vujicic@ftn.kg.ac.rs
[2]ETH Zurich, Institute for Biomechanics, Laboratory for Movement Biomechanics, Gloriastrasse 39, 8006 Zurich, Switzerland, sasa.cukovic@hest.ethz.ch

ABSTRACT

In this paper, it is shown how a 3D model of the spinal column in patients with adolescent scoliosis can be visualized in augmented reality, through the use of various software tools. This process is based on analysing the surface of the back and identifying key anatomical markers. The application of developed 3D models can have a significant impact on improving the process of non-invasive diagnostics and monitoring of scoliosis. These advanced models enable more precise visualization and analysis of spinal deformities, providing detailed insight into anatomical structure and changes over time.

Keywords: adolescent idiopathic scoliosis; augmented reality; biomedicine; mixed reality; spinal deformities.

LEARN MORE ABOUT PARALLEL PROGRAMMING TECHNIQUES BY IMPLEMENTING A HISTOGRAM ON GPU

Dushan Bikov[1], Limonka Koceva Lazarova[1], Zoran Panov[2]

[1]Goce Delcev University, Faculty of Computer Science, „Крсте Мисирков“ 10-А, 2000 Shtip, North Macedonia, dusan.bikov@ugd.edu.mk, limonka.lazarova@ugd.edu.mk
[2]Goce Delcev University, Faculty of Natural and Technical Sciences, „Гоце Делчев“ 89, 2000 Shtip, North Macedonia, zoran.panov@ugd.edu.mk

ABSTRACT

A histogram is a graphical representation of the distribution of data, commonly used as an analysis tool in statistics to visualize the frequency distribution of a dataset. Our focus of interest lies in the Frequency Histogram, a special graph that employs vertical columns to illustrate the frequency of occurrence of each data element.

Here, we will present a parallel SIMT (Single Instruction Multiple Threads) Histogram algorithm. This algorithm is composed of basic parallel primitives like sorting and parallel compact. Implementing in this manner for educational endeavors allows students to delve into the details, learn, and enhance their understanding of the CUDA parallel programming model. The presented algorithm utilizes a sparse representation of the vector to store results, distinguishing it from well-known standard parallel Histogram algorithms. Besides delving into the details of implementing parallel primitives, we will also discuss how to perform an efficiency evaluation of the parallel program.

Keywords: Histogram, Parallel primitives, Parallel programing, CUDA, GPU.

DESIGN AND IMPLEMENTATION OF A SEISMIC DATA ACQUISITION PROTOTYPE SYSTEM INTENDED FOR VARIOUS APPLICATIONS

Dushan Bikov[1], Zoran Panov[2], Risto Popovski[1]

[1]Goce Delcev University, Faculty of Computer Science, „Крсте Мисирков“ 10-А, 2000 Shtip, North Macedonia, dusan.bikov@ugd.edu.mk
[2]Goce Delcev University, Faculty of Natural and Technical Sciences, „Гоце Делчев“ 89, 2000 Shtip, North Macedonia, zoran.panov@ugd.edu.mk

ABSTRACT

In this work, we present a prototype of a high-precision and high-resolution seismic data acquisition system (DAQ). This system is designed for real-time monitoring, data acquisition, and visualization of seismic activity, tailored specifically for local and micro-location applications, but not limited to them. The system has various applications, including mathematical modeling of different scenarios based on collected data. These applications are relevant to geophysical research, structural health monitoring, traffic monitoring, industrial safety, household safety, and more. This prototype system acquires seismic data from the geophone or ranger seismometer connected to an analog-to-digital converter, which then transfers the data to single-board computers (SBCs). Because these SBCs possess all the capabilities of a standard PC, they ensure remote access, real-time monitoring, data acquisition, preprocessing of seismic data, and transfer of data from remote stations to the base station or server for future processing, among other functionalities. In practice, these data acquisition systems can function as standalone systems. Here, the structural components, functionality, and characteristics of this prototype system will be presented.

Keywords: Analog-to-Digital converters, Single-Board Computers, Seismology, geophone.

POSSIBILITIES OF USING ARTIFICAL INTELLIGENCE TOOLS IN MATHEMATICS EDUCATION

Limonka Koceva Lazarova, Natasha Stojkovik, Vasko Kokalanov

[1]Goce Delcev University, Faculty of Computer Science, „Крсте Мисирков“ 10-А, 2000 Shtip, North Macedonia, limonka.lazarova@ugd.edu.mk, vasko.kokalanov @ugd.edu.mk

ABSTRACT

The paper explores the potential integration of artificial intelligence (AI) tools in mathematics education. It delves into the transformative impact AI could have on teaching and learning processes within the realm of mathematics. By leveraging AI technologies such as machine learning algorithms and natural language processing, educators can personalize learning experiences, provide targeted feedback, and offer adaptive tutoring systems. These AI tools can assist students in grasping complex mathematical concepts, fostering deeper understanding, and promoting engagement. Furthermore, the paper discusses challenges and considerations in implementing AI in mathematics education, including ethical concerns and the need for effective teacher training. Overall, it highlights the promising opportunities AI presents for enhancing mathematics education and shaping the future of learning.

Keywords: mathematics education, AI tools, teacher, student.

WORDPRESS – AN ESSENTIAL TOOL FOR DIGITAL MARKETING

Mirjana Kocaleva Vitanova, Biljana Zlatanovska, Marija Miteva

Goce Delcev University, Faculty of Computer Science, „Крсте Мисирков“ 10-А, 2000 Shtip, North Macedonia, mirjana.kocaleva@ugd.edu.mk, biljana.zlatanovska@ugd.edu.mk, marija.miteva@ugd.edu.mk

ABSTRACT

E-commerce is the process of selling goods and services over the Internet. Customers come to the website or online marketplace and buy products using electronic payments. After receiving the money, the merchant ships the goods or provides the service.

Digital marketing offers the perfect way to meet and connect with our audience. We can test offers and messages and get insight into the peak times they visit our website. If we have a social media strategy—and we really should—we can build relationships with them faster and easier. Adapt to our audience and we'll build credibility that can set us apart from the competition. With digital marketing, we can be fast, fluid in our approach.

The website is the hub of all digital marketing activities. It is a very powerful channel, but it is also a medium required to execute various online marketing campaigns. The website should represent the brand, product, and service in a clear and memorable way. It should be fast, mobile friendly and easy to use.

Keywords: E-commerce, digital marketing, website, social media strategy.

USING CHATGPT IN SOLVING DEFINITE INTEGRALS

Biljana Zlatanovska, Marija Miteva, Mirjana Kocaleva Vitanova

Goce Delcev University, Faculty of Computer Science, „Крсте Мисирков“ 10-А, 2000 Shtip, North Macedonia, biljana.zlatanovska@ugd.edu.mk, marija.miteva@ugd.edu.mk, mirjana.kocaleva@ugd.edu.mk

ABSTRACT

Artificial intelligence has an inevitable scientific and societal development nowadays. It is increasingly involved in human everyday life with the simple purpose of making it easier. Therefore, in this work, we will explore the possibilities of ChatGPT as an artificial intelligence tool in the application of definite integrals. The application of definite integrals is reviewed in calculating the length of a curve, the area of a figure, the volume, and the surface area of a rotating body generated by rotation around the X or Y axis. In this paper, the following questions will be answered: How effective is the solution to the task given to ChatGPT? To what extent does this solution correspond to the solution of the same task solved by a human? Are mathematicians satisfied with this tool for solving this type of math problem? What improvements should be made for ChatGPT so that the solution of such types of tasks meets mathematical standards?

Keywords: ChatGPT, Artificial intelligence, definite integral, application of definite integral in geometry.

DESIGNING A NUMERICAL MODEL OF TOOTH FROM CT WITH VOLUMETRIC MESH

Vasko Kokalanov, Verica Toneva Stojmenova, Natasha Stojkovik

Goce Delcev University, Faculty of Computer Science, „Крсте Мисирков“ 10-А, 2000 Shtip, North Macedonia, vasko.kokalanov@ugd.edu.mk

ABSTRACT

Today’s dental praxis is strongly based on assumptions and experience; hence it often leads to unwanted complications and failure in the therapy. Complex dental treatments, such as crowns, bridges, prostheses, implant constructions, can cost a lot of time, money and effort to be created. In order to decrease the number of failures, the dentistry is striving for digital solutions capable to plan and predict treatments.

The content of this paper highlights step by step procedure of building numerical model of intact and endodontic treated tooth. A model of this kind can help in performing analysis for accurate calculation of the load on the teeth (one, more or all teeth), prediction of the outcome of the implant and/or implant-prosthetic dental treatment. The proposed procedure can be applied for designing a numerical model of whole jaw which can be used to find answers of whether the complex dental construction will withstand the chewing forces and hance can help by proposing a precise solution if the predicted outcome is unfavourable.

Keywords: volumetric mesh, numerical model, tooth, dental solution.

APPLICATION OF AUDIO RECORDERS FOR REGISTERING SEISMIC SIGNALS FROM INDUCED SEISMICITY PRODUCED BY BLASTING IN OPEN PIT MINES

Zoran Panov[1], Dushan Bikov[2]

[1]Faculty of Natural and Technical Sciences, Goce Delcev University, Shtip, North Macedonia,
[2]Faculty of Computer Science, Goce Delcev University, Shtip, North Macedonia,
dusan.bikov@ugd.edu.mk, zoran.panov@ugd.edu.mk

ABSTRACT

Seismic events induced by blasting operations in open pit mines pose significant challenges for monitoring and mitigation. This paper presents an innovative approach utilizing audio field recorders to capture seismic signals from both vertical and horizontal geophones deployed in mining environments. Field experiments were conducted at a mining site, where a network of geophones coupled with audio recorders was strategically deployed to comprehensively monitor induced seismicity. The integration of audio field recorders with geophone arrays enabled the accurate detection and analysis of seismic activity, providing valuable insights into the spatial distribution and characteristics of induced seismic events. Our findings underscore the efficacy of audio field recorders in recording high-fidelity seismic data, showcasing their versatility as essential tools for seismic monitoring in challenging mining environments. Furthermore, this research contributes to enhancing safety protocols and risk management strategies in the mining industry by leveraging innovative technologies for improved seismic monitoring and mitigation efforts.

Keywords: Mining, Seismic, Blasting, Audio Recorders, Analog-to-Digital converters.

EXPERTISE JUSTIFICATION AND PROPOSAL OF INTRODUCING ARTIFICIAL INTELLIGENCE INTO MEDICATION PROCUREMENT SYSTEMS

Vladimir Milićević, Igor Franc

University of Kragujevac, Faculty of Mechanical and Civil Engineering in Kraljevo, Dositejeva 19, Kraljevo, Serbia, milicevic.v@mfkv.kg.ac.rs, franc.i@mfkv.kg.ac.rs

ABSTRACT

This paper explores the justification and proposes a model for the introduction of artificial intelligence (AI) into medication procurement systems. By analyzing the current state of medication procurement, we identify key areas where AI could enhance efficiency, accuracy, and reliability of the process. The implementation of AI is suggested for automating ordering, predicting demands, optimizing inventory, and analyzing supply chain risks. Through testing and evaluating selected AI models, their ability to enhance medication procurement processes can be revealed. Implementation of these models, along with continuous monitoring and optimization, enables medication procurement systems to more efficiently manage inventory, reduce the risk of shortages, and achieve long-term financial savings. This study provides a framework for a systematic approach to introducing AI into medication procurement systems to improve performance and process optimization.

Keywords: artificial intelligence, process optimization, model, expertise, medication procurement systems.

SIMULATION AND MODELING OF MEDICAL SCENARIOS WITH THE APPLICATION OF ARTIFICIAL INTELLIGENCE

Vladan Čolić[1], Marija Mosilović[1], Enes Sukić[2]

[1]Academy of Applied Studies Sumadija, College in Trstenik, Radoja Krstića 19
37 240 Trstenik, Serbia, vcolic@asss.edu.rs
[2] University Union - Nikola Tesla, Faculty of Information technology and engineering - FITI, Jurija Gagarina 149a, 11 070 Belgrade, Serbia

ABSTRACT

The processes of simulation and modeling in medicine are not new. The popularization of modern technologies, primarily Artificial Intelligence (AI), has significantly impacted this segment of medical practice. This primarily refers to the development of predictive models and the creation of intelligent simulators based on these technologies. These systems are built on concepts of Artificial Intelligence such as Machine Learning and Deep Learning. They enable diagnostics, outcome prediction, data analysis, and patient privacy protection. Simulations and models based on AI have significant applications in medical education for both current and future medical professionals.The application of AI in medical simulation and modeling brings challenges and limitations, including technical, ethical, and legal aspects. Technical issues include choosing the appropriate topology of neural networks and a lack of data for system training. Ethical and legal questions involve the lack of regulation and accountability in case of errors. Future directions for the development of these technologies in this field include integrating human and artificial capabilities to achieve better patient outcomes. A multimodal approach to artificial intelligence and the development of large-scale language models promise to enhance the performance of AI systems, positively impacting the segments of medical practice where they are applied.

Keywords: simulation, modeling, Artificial Inteligence (AI), medical systems, medical education.

APPLICATION OF GDPR RULES IN MEDICAL INFORMATION SYSTEMS

Vesna Simikić

PHI Hospital 'Sveti Vracevi', Srpske vojske 53, 76 300 Bijeljina, Republic of Srpska, Bosnia and Herzegovina, simikic.vesna.85@gmail.com

ABSTRACT

The data represent facts that gain meaning through processing. Processed sales are called information and as such represent very significant resources today. A special category is represented by sensitive or private data. The need to protect this data initiated the development of legal regulations and guidelines that define the rules of personal data protection. The adoption of the General Regulation of the European Union on the Protection of Personal Data (GDPR) introduced significant changes in the work with private data and prompted changes in the legal regulations at the local level. Medical data belong to the confidential category of data. Bearing in mind the fact that their collection and processing are performed through medical information systems, it is necessary to highlight the importance of their protection in the field of application of information technologies. The widespread use of modern information and communication achievements in business introduces a large number of risks into the process of processing medical data.The aim of this paper is to point out the importance of private data protection in medical information systems, with an emphasis on the need for conscientious participation of all system users and compliance with the rules defined by the guidelines and legal regulations for the protection of private data both at the global and local level.

Keywords: private data, GDPR, security measures, medical information systems.

Note: This paper was derived from my master's thesis 'Protection of personal data in health information systems' defended in October 2023 at the Faculty of Political Sciences in Sarajevo, Department of Security and Peace Studies.

ENGINEERING, TECHNOLOGY AND MATERIALS
INŽENJERSTVO, TEHNOLOGIJE I MATERIJALI

ENHANCEMENT OF PHOTODETECTION PARAMETERS USING FLUORINE AND SILVER CO-DOPING IN ZNO

Aminu Muhammad[1,2], Sabah M. Mohammad[1], Suvindraj Rajamanickam[1], Ibrahim Garba Shitu[2]

[1] University Sains Malaysia, Institute of Nano Optoelectronics Research and Technology (INOR), 11 800 USM, Penang, Malaysia
[2] University Kafin-Hausa, Department of Physics, Sule Lamido, ahun-Kano Road, Kafin Hausa, Jigawa State, Nigeria, aminumuhammad1427@gmail.com

ABSTRACT

This study aims to dope silver (Ag) and fluorine (F) in zinc oxide (ZnO) for the improvement of photoresponse properties in ZnO since previous reports confirmed improvement of these properties using individual doping of F and Ag. The F-doped ZnO (FZO) and F and Ag co-doped ZnO (FAZO) nanorods were synthesized using a modified hydrothermal method and characterized with the Field emission scanning electron microscopy, X-ray photoelectron spectroscopy, photoluminescence analysis and Ultraviolet (UV)-Visible analysis. Two photodetectors (PD)` based on FZO and FAZO were fabricated. The FAZO PD outperformed the FZO PD in terms of photoresponse characteristics at even lower bias voltages, when irradiated at the UV-light of 365 nm, which might be related to better crystal quality in the FAZO PD. The sensitivity, responsivity, quantum efficiency, detectivity, rise and fall times at zero bias for the FAZO PD are 24463%, 8.24 mA/W, 6.47×10^8 Jones, 2.8%, 70 ms, and 80 ms, respectively, and 9418%, 0.2 mA/W, 6.25×10^7 Jones, 0.1%, 80 ms, and 80 ms for the FZO PD. Hence, F and Ag co-doping in ZnO have shown promising results for enhancing PD parameters characteristics.

Keywords: ZnO, Fluorine, Silver, co-doping, and enhanced photoresponse parameters.

CHROMIUM (VI) REMOVAL FROM WASTEWATER BY ELECTROCOAGULATION IN A BATCH AND CONTINUOUS MODE

Borislav N. Malinović, Olja Petrušić, Sanda Pilipović, Draženko Bjelić, Tijana Đuričić

Faculty of Technology, University of Banja Luka, Stepe Stepanovica 73, 78 000 Banja Luka, Bosnia and Herzegovina, borislav.malinovic@tf.unibl.org

ABSTRACT

The toxicity of hexavalent chromium (Cr(VI)) is well recognized, and its use is highly regulated in EU countries, including restrictions under frameworks like the REACH regulation in the EU. In Republika Srpska, the use of Cr(VI) is also limited by current legal regulations, ensuring strict control over its use and discharge. Under REACH, hexavalent chromium (chromium trioxide) is classified as a Substance of Very High Concern (SVHC) and is subject to authorization and restriction lists. Despite these measures, it is still primarily used in the electroplating, metal processing, steel, paint and varnish, and leather industries, particularly outside the EU. In this paper electrocoagulation treatment were used for removing of hexavalent chromium from synthetic wastewater. The concentration of Cr(VI) before and after treatment was determined spectrophotometrically. Experiments were performed in an electrocoagulation reactor with a capacity of 1L, which can operate in batch and continuous mode. The reactor is made of acrylic, in which 6 electrodes of dimensions (100x100x30mm) are placed. The impact of electrode material, current density, supporting electrolyte, pH, as well as reactor operation mode and flow rate in continuous mode on Cr(VI) removal efficiency was tested and the high efficiency of this type of electrocoagulation reactor was proven.

Keywords: hexavalent chromium, wastewater treatment, removal efficiency.

A SUSTAINABLE RECYCLING OF POLYETHENE TEREPHTHALATE OTTLES BY ELECTROSPINNING

Sanja Rackov, Branka Pilić

University of Novi Sad, Faculty of Tehnology Novi Sad, Boulevard cara Lazara 1, 21 101 Novi Sad, Serbia, sanja.rackov@uns.ac.rs

ABSTRACT

Since the rapid industrial development results in extensive production and use of conventional plastic materials, their inadequate disposal and accumulation led to a major environmental concern due to the global climate and environmental impact. The traditional methods of plastic waste treatment including disposal to landfills, plastic recycling and even incineration are often inefficient, expensive, limited or cause additional emmisions to the environment. There is a large gap in the area of materials which can fully substitute traditional plastic with regard to their features as low cost production, easy processability, good mechanical and thermal stability - therefore scientific effort is directed towards novel cost-effective recycling technologies. Electrospinning as a versatile and unique technique in obtaining fibers at the micro and nano-scale represents a modern and superior recycling approach for utilizing plastic waste and their conversion into value-added products. Polyethylene terephtalate (PET) is a semi-crystalline thermoplastic with reasonable thermal, mechanical stability and good chemical resistance thus its consumption is still increasing and accordingly the main constituent of the plastic waste. In this light, this study tend to present the recycling of PET bottles by electrospinning in fabricating fibrous non-woven filtration media. The structure of the obtained nanofibrous membranes was confirmed by FTIR, while DSC is used to evaluate their thermal behaviour. The insight into fiber diameter distribution and morphology is provided by SEM analysis.

Keywords: nanomaterials, electrospinning, filtration.

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DEVELOPMENT OF POLYHYDROXYALKANOATE BASED BLENDS AS GREEN SOLUTIONS FOR DIFFERENT PURPOSE

Tamara Erceg, Sanja Rackov, Branka Pilić

University of Novi Sad, Faculty of Tehnology Novi Sad, Boulevard cara Lazara 1, 21 101 Novi Sad, Serbia, tamara.erceg@uns.ac.rs

ABSTRACT

The modern society is facing environmental concerns about the exploitation and use of petroleum-based polymers in terms of their degadation rate and subsequent solid waste issues. As traditional treatment technologies cannot response to the appropriate extent, scientific effort has been focused towards novel recycling technologies as well as development of potential substitutes for conventional plastic. In these sense, polyhydroxyalkanoates (PHA) presenting biobased and biodegradable polyesters produced by microbial fermentation has been extensively studied as a promising replacement. With regards to their practical interest and potential contribution in various fields of biomedicine, packaging, electronic devices, the demand for specific mechanical and thermal requirements is expanding. The aim of this study is related to overcome the main constrictions of polyhydroxyalkanoates - their high brittleness and narrow thermal processing window. Poly(3-hydroxybutyrate-co-3-hydroxyvalerate) and poly(caprolactone diol) blends were prepared via practical and cost-effective solution casting method. Thermal, structural mechanical and surface properties of the obtained thin films were thoroughly evaluated by FTIR, DSC, SEM and by investigating their tensile properties together with wettability.

Keywords: poly(3-hydroxybutyrate-co-3-hydroxyvalerate) (PHBV), poly(caprolactone diol) (PCL-diol), biopolymers, film-forming ability.

Acknowledgment: This research was funded by the Provincial Secretariat for Higher Education and Scientific Research, Autonomous Province of Vojvodina, Republic of Serbia.

REMOVAL OF ACRIDINE RED DYE FROM AQUEOUS SOLUTION USING PHYSICOCHEMICALLY ACTIVATED HYDROCHAR OF SPENT MUSHROOM SUBSTRATE

Marija Milenković, Tamara Lazarević-Pašti, Slavica Porobić-Katnić, Vedran Milanković, Tamara Tasić, Milena Marinović-Cincović

University of Belgrade, Institute of Nuclear Science Vinča, Mike Petrovića Alasa 12-14, 11 000 Belgrade, Serbia, milena@vin.bg.ac.rs

ABSTRACT

Sustainable solutions for environmental restoration are crucial due to the increasing release of toxic substances in the ecosystem. The adsorption capacity to remove acridine red from an aqueous solution was investigated using the hydrochar of the spent mushroom substrate, which was obtained by the process of hydrothermal carbonization at a moderate temperature. To improve the adsorption capacity, hydrochar was subjected to chemical activation with 20% $CaCl_2 \cdot 5H_20$, and then physical activation of the pyrolysis was performed at 500 °C, whereby Ca-pyro-hydrochar (Ca-PHC) was synthesized. The adsorption performance of Ca-PHC was analyzed at 22 °C and the obtained results were applied to four different isotherm models: Langmuire, Freundlich, Temkin, and Dubinin–Radushkevich. The calculated data suggest that the Langmire and Freundlich model best describes the investigated removal process and that the maximum sorption capacity of acridine red was 31.8 mg g^{-1}. Based on the SEM analysis, the appearance of microspheres was observed, which was caused by the degradation of cellulose during the pyrolysis of the spent mushroom substrate. The number of pores of the examined material increased, which contributed to its increase in adsorption capacity. These findings indicate that the used biosorbent is effective for the remediation of textile wastewater.

Keywords: Spent mushroom substrate, Hydrochar, Physicochemically activation, Acridine red, Adsorption.

THE INFLUENCE RECYCLED RUBBER ON THE MECHANICAL AND THERMAL PROPERTIES OF ELASTOMERIC COMPOSITES

Slaviša Jovanović[1, 2], Vojislav Jovanović[2], Gordana Marković[3], Suzana Samaržija-Jovanović[2], Marija Milenković[4], Milena Marinović-Cincović*[4]

[1]Deoflor East d.o.o., Banovačka 68, 22 300 Stara Pazova, Serbia
[2]University of Priština, Faculty of Natural Science and Mathematics, Lole Ribara 29, 38 220 Kosovska Mitrovica, Serbia
[3]Tigar a.d., Nikole Pašića 213, 18 300 Pirot, Serbia
[4]University of Belgrade, Institute of Nuclear Science Vinča, Mike Petrovića Alasa 12-14, 11 000 Belgrade, Serbia, milena@vin.bg.ac.rs

ABSTRACT

Recycled rubber powder (PRR) is used as a filler and modifier for various elastomeric materials. Recycled rubbers include reclaimed rubber, ground rubber, or reprocessed synthetic rubber, by means any rubber waste that has been converted to an economically useful form.

Composites based on elastomers and recycled rubber powder is a serious challenge for the environment. The main goal of this paper was to study the effect of rubber powder on the mechanical and thermal properties of elastomeric composites based on three precursors of the network. Triple blends were prepared using non-polar natural rubber (NR), polyisoprene rubber (BR) and styrene butadiene rubber (SBR) (mass ratio 40/40/20). In all rubber compounds the CB/PRR ratio is constant (60). Samples were prepared using two roll mill.

In the present work, the effect of the different ratio of powdered recycled rubber (PRR) on curing characteristics, mechanical properties before and after aging and thermal stability of NR/BR/SBR/CB/PRR rubber blends were investigated.

Mechanical properties of elastomeric composites based on NR/BR/SBR/CB//PRR three network precursors after thermal aging at 100°C during 168h are significantly altered with an increase of the amount of powdered recycled rubber (PRR). The thermal degradation temperature shifts to a higher temperature up to 5 phr of PRR in NR/BR/SBR/CB rubber blend.

Keywords: Powder recycled Rubber, composites, Ternary rubber blend, Mechanical properties, Thermal stability.

APPLICATION OF NUCLEAR METHODS TO DETERMINE THE DEGREE OF CONTAMINATION OF THE ŠAR MOUNTAINS AQUATORIUM DOE TO THE USE OF DEPLETED URANIUM AMMUNITION

Nenad Stanojević[1*] , Jelena Đokić[1], Dušan Nikezić[2], Živče Šarkoćević[1], Uroš Kovačević[3]

[1]University of Priština in Kosovska Mitrovica, Faculty of Technical Sciences, Knjaza Miloša 7, 38 220 Kosovska Mitrovica, Serbia, neskobrez@gmail.com
[2]University of Belgrade, Institute of Nuclear Science Vinča, Mike Petrovića Alasa 12-14, 11 000 Belgrade, Serbia
[3] University of Belgrade, Faculty of Mechanical Engineering, Kraljice Marije 16, 11 120 Belgrade, Serbia

ABSTRACT

The study represents the research of the origin and connection of waters of the Šar Mountains aquatorium using natural isotopes of water, tritium and oxygen ^{18}O. The waters of two lakes and two creeks that dominate this aquatorium have been analyzed.

Monitoring of the seasonal maximum, taking into account the obtained tritium profile of the soil and the temperature on the day of collection (and around it), unequivocally showed that all the water in the Šar Mountains aquatorium is of atmospheric origin and, as such, unsuitable for any major transformation for commercial purposes. In addition, the study presents the results of the examination of the Šar Mountains aquatorium for contamination with depleted uranium. Doubts about the possibility of such contamination are justified because during the spring of 1999, a conflict took place on the territory of the Western Balkans in which ammunition with depleted uranium was used.

Based on the obtained results, it was concluded that there was no contamination of the Šar Mountains aquatorium with depleted uranium. The expanded measurement uncertainty was less than 5%.

Keywords: depleted uranium; tritiated water; oxygen 18O; radiation survey; Šar Mountains aquatorium.

USING BIOMASS AS A BUILDING MATERIAL TO SHAPE A SUSTAINABLE AND ENVIRONMENTALLY FRIENDLY FUTURE

Milica Mladenović, Biljana Vučićević, Predrag Škobalj

University of Belgrade, Institute of Nuclear Science Vinča, Mike Petrovića Alasa 12-14, 11 000 Belgrade, Serbia, mica@vin.bg.ac.rs, bee@vin.bg.ac.rs, p.skobalj@vin.bg.ac.rs,

ABSTRACT

Green building, or the sustainable use of biomass in construction, is a concept for the design and construction of buildings with a lower environmental impact and higher resource efficiency. In recent years, the construction sector has recognized that the introduction of more environmentally friendly methods is crucial to halting global warming and protecting natural resources. The use of biomass as a bio-based material from naturally occurring, renewable resources is a key component of green building. These materials have the potential to completely change the way buildings are designed and constructed, while offering a more environmentally friendly alternative to traditional building materials.

The paper gives a brief overview of the benefits of using these materials in construction. At the same time, there are challenges and limitations to the application of biomaterials, so the scientific community is continuously investing in research to overcome these obstacles. With this in mind, the paper also gives a brief overview of the literature in this field, focusing on lignocellulosic materials and by-products of agricultural production. The physical-mechanical, economic and ecological properties of concrete produced by incorporating lignocellulosic/agricultural waste into the cement matrix were the subject of these research, which led to some very intriguing results.

Keywords: Eco-materials; lightweight concrete; agricultural waste; straw.

EXTRACTION OF RESIDUAL OIL FROM FODDER RADISH SEED PRESS CAKE

Vesna S. Zlatković[1], Nada L. Grahovac[2], Ivana B. Banković Ilić[1], Petar M. Mitrović[2], Zoran B. Todorović[1], Ana M. Marjanović Jeromela[2], Vlada Veljković[3]

[1]University of Niš, Faculty of Technology, Bulevar oslobođenja 124, 16 000 Leskovac, Serbia
[2]Institute of Field and Vegetable Crops, Novi Sad, Maksima Gorkog 30, 21 101 Novi Sad, Serbia
[3]Serbian Academy of Sciences and Arts, SASA Branch of Niš, Kneza Mihaila 35, 11 000 Belgrade, Serbia, vlada.veljkovic@sanu.ac.rs

ABSTRACT

The residual oil extracted from a press cake, a by-product of fodder radish seed screw pressing, underwent extraction using n-hexane as an extracting solvent. The influence of various process parameters (solvent/press cake ratio: 3–10 mL/g, temperature: 20–70 °C, and processing time: 1–5 min) on the residual fodder radish oil yield. The response surface methodology alongside a 33 full factorial design with replication was used to optimize oil extraction. The second-order polynomial model was used to describe the statistical relationship between fodder radish residual oil yield and process variables, facilitating process optimization. Assessment by analysis of variance was employed to evaluate the impact of process variables on residual fodder radish oil yield. The developed model displayed high coefficients of determination (R2 = 0.938, Radj2 = 0.925, and Rpred2 = 0.907) and minimal mean relative percent deviation (≈±0.6% across 54 data points), affirming its reliability. This model predicted a maximum fodder radish oil yield of 23.8%, attainable across the following optimal process factors: temperatures of 70 °C, solvent/press cake ratios of 10 mL/g, and processing times of 5 min. The experimental residual fodder radish oil yield under these process conditions was 23.6%.

Keywords: fodder radish. modeling, press cake. response surface methodology.

Acknowledgment

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THE EFFECT OF DIFFERENT SALTS ON THE CHEMICAL COMPOSITION OF LAVENDER ESSENTIAL OIL

Aleksandra B. Perović,[1,2] Ivana T. Karabegović,[2] Miljana S. Krstić,[3] Ana V. Veličković,[3]Jelena M. Avramović,[3] Stojan S. Mančić,[2] Bojana R. Danilović,[2] Vlada B. Veljković[4]

[1]DCP Hemigal, Tekstilna 97, 16 000 Leskovac, Serbia
[2] University of Niš, Faculty of Technology, 16000 Leskovac, Bulevar oslobođenja 124, Serbia
[3] University of Priština in Kosovska Mitrovica, Faculty of Technical Sciences, Department of Technological Engineering, Knjaza Miloša 7, 38 220 Kosovska Mitrovica, Serbia
[4] Serbian Academy of Scineces and Arts, Sasa Branch in Niš, Kneza Mihaila 35, 11 000 Belgrade, Serbia, vlada.veljkovic@sanu.ac.rs

ABSTRACT

Lavender essential oil (LEO) is widely utilized in aromatherapy, cosmetics, pharmaceuticals, and the food industry due to its biological properties and appealing fragrances. This study examines the influence of two concentrations (5% and 10%) of NaCl and KCl on the chemical composition of LEO. Hydrodistillation was conducted with a 1:10 hydromodule ratio using a Clevenger-type apparatus for 120 minutes. Gas chromatography-mass spectrometry (GC-MS) was employed to analyze the chemical composition of LEO. A total of 54 compounds were identified, with linalool (26.2-27.1%), linalyl acetate (16.4-18.1%), and lavandulyl acetate (5.9-6.4%) being the predominant compounds. Regardless of the added salts and their concentrations, no significant impact on the quality and composition of LEO was observed. However, comparative analysis revealed a slight increase in 1-octen-3-yl acetate and myrtenal, while linalool, linalyl acetate, 1,8-cineole, (E)-caryophyllene, (Z)-β-ocimene, and (E)-β-ocimene were reduced by up to 5% in the oils obtained with the salt presence. Although salts are known to enhance the recovery of certain volatile constituents, the magnitude of this effect varies depending on the type and concentration of the salt applied. Therefore, further research in this field is necessary

to explore alternative lavender pretreatment methods and identify more efficient extraction techniques.

Keywords: lavender essential oil, hydrodistillation, salts, GC/MS.

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A COMPARISON OF CONVENTIONAL AND NOVEL CASTOR OIL RECOVERY METHODS

Miljana Krstić,[1] Dragana Rajković,[2] Ana Veličković,[1] Jelena Avramović,[1] Ana M. Marjanović Jeromela,[2] Ivan J. Stojković,[3] Vlada Veljković[4*]

[1]University of Priština in Kosovska Mitrovica, Faculty of Technical Sciences, Department of Technological Engineering, Knjaza Miloša 7, 38 220 Kosovska Mitrovica, Serbia
[2]Institute of Field and Vegetable Crops, Novi Sad, Maksima Gorkog 30, 21 101 Novi Sad, Serbia
[3]University of Belgrade, Innovation Center of the Faculty of Technology and Metallurgy, Karnegijeva 4, 11 000 Belgrade, Serbia
[4]Serbian Academy of Sciences and Arts, SASA Branch of Niš, Kneza Mihaila 35, 11 000 Belgrade, Serbia, vlada.veljkovic@sanu.ac.rs

ABSTRACT

Castor (*Ricinus communis* L.) is cultivated as a non-edible oilseed crop across tropical, sub-tropical, and temperate regions, often in areas with marginal soils. The castor oil recovery process usually involves primary seed preparation, oil recovery, and refining, with variations in the order of operations. The recovery methods include conventional methods, such as mechanical pressing, solvent extraction, or combining both methods, and novel methods, such as aqueous enzymatic, ultrasound-assisted, microwave-assisted, and supercritical CO_2 extraction. The present paper compares conventional and novel castor oil recovery methods regarding oil yield and quality (composition and properties). Ultrasound-assisted extraction provided about 70% in 9 min, while conventional method yielded 66% in 15 min. The microwave-assisted extraction gave higher oil yield for a shorter time (37%/20 min) compared to the conventional method (17.4%/150 min), while supercritical CO_2 extraction showed no positive effect on yield. The hybrid ultrasound-microwave-assisted extraction provided the highest oil yield (98.37%/30 min). Aqueous enzymatic extraction provided higher oil yields (80%/4h) compared to conventional (56.6%/8h). Novel techniques present more economically viable, sustainable, and environmentally friendly alternatives for oil extraction, mitigating the drawbacks and excessive energy consumption associated with conventional methods.

Keywords: Castor (*Ricinus communis* L.), castor oil yield, recovery methods, sustainable development, castor plant use.

EXAMINATION OF THE QUALITY OF GOAT CHEESE IN A SACK

Savanović Danica[1], Velemir Ana[1], Savanović Jovo[2], Mandić Snježana[1], Savić Aleksandar[1], Kučinar Jovana[1]

[1]University of Banja Luka, Faculty of Technology, Vojvode Stepe Stepanovića 73, 78 000 Banja Luka, Bosnia and Herzegovina, danica.savanovic@tf.unibl.org
[2] Higher school "Banja Luka College", Miloša Obilića 30, 78 000 Banja Luka, Bosnia and Herzegovina

ABSTRACT

Goat cheese in a sack is a traditional Herzegovinian product of extreme specificity, both in production technology and in the properties of the final product. The main characteristic of cheese in a sack is anaerobic ripening inside a bag made of lamb skin (mixture), which is how the cheese got its name. The aim of this work is to examine the physico-chemical (content of moisture, ash, protein, fat, acidity, pH, a_w, color and texture), antioxidant (content of total phenols, flavonoids, non-flavonoids, FRAP, DPPH and ABTS test) and sensory characteristics of goat milk, and goat cheese in a sack, as a finished product. Analyzing the results of physico-chemical tests of goat milk and goat cheese in a sack, it was established that the chemical composition and physical properties are in accordance with the relevant legal regulations. Also, by analyzing the results of the antioxidant test, a high antioxidant activity of goat milk and goat cheese in a sack was established. Descriptive sensory analysis confirmed that goat milk and goat cheese in a sack meet the basic quality parameters that are characteristic of them, i.e. appearance, smell, taste, consistency, color, and the overall impression of the samples corresponds to high quality.

Keywords: quality, goat milk, cheese.

SENSORY PROPERTIES OF FERMENTED SAUSAGES WITH CASINGS TREATED WITH PLANT EXTRACTS

Ana Velemir*[1], Snježana Mandić[1], Danica Savanović[1], Jovo Savanović[2]

[1]University of Banja Luka, Faculty of Technology, Vojvode Stepe Stepanovića 73, 78000 Banja Luka, Bosnia and Herzegovina, ana.velemir@tf.unibl.org
[2] Higher school "Banja Luka College", Miloša Obilića 30, 78 000 Banja Luka, Bosnia and Herzegovina

ABSTRACT

Natural plant extracts are a good alternative to improve the quality and safety of dry fermented sausages. Different factors during processing have an impact on the quality characteristics of the final product, but the sensory properties influence overall quality and consumers' product acceptance. This study aimed to examine the effect of the incorporation of the plant extracts in a natural casing on the sensory properties of fermented sausages, "sucuk" type. The sausages were produced in industrial conditions, stuffed into the pretreated natural casings, vacuum packaged, and stored at 4°C for six months. Five groups of sausages were tested, C1 (natural casing without treatment), C2 (treated with 6% (v/v) ethanol), C3 (treated with ascorbic acid), A (treated with ethanol extract of *Aronia melanocarpa*), and D (treated with ethanol extract of *Cornus mas*).

The sensory analysis was performed by a team of 10 trained evaluators, by ranking samples according to acceptability and using a 5-point scoring system. The external appearance and condition of the casing, cross-sectional appearance, color of the cross-section, smell, taste, and aroma, as well as the consistency of the examined groups of sausages after ripening (0) and during storage (3 and 6 months) were examined.

The major changes occurred in the smell, taste, and aroma. Bitterness occurred in sample C1, and a sour taste in samples C3, DEE, and AEE. Based on the obtained results, it can be concluded that the incorporation of the plant extracts in a natural casing has a statistically significant effect ($p<0.05$) on the sensory properties of the

tested sausages. The overall sensory quality of all samples was quite high during the entire testing period, evaluated from 85.5 to 100% of the maximum possible quality.

Keywords: fermented sausages, plant extracts, natural casing, sensory properties.

BIOACTIVITY, NUTRITIVE AND SENSORY QUALITY OF NEW PRODUCT - CORNELIAN CHERRY TOPPING

Božana Odžaković[1*], Vanja Ćupina[2], Slavica Grujić[1], Staniša Latinović[1], Zoran Kukrić[1]

[1]University of Banja Luka, Faculty of Technology, Bulevar vojvode Stepe Stepanovića 73, 78 000 Banja Luka, Bosnia and Herzegovina, bozana.odzakovic@tf.unibl.org
[2]Center of secondary schools in Trebinje, Vožda Karađorđa 1 Trebinje, Republic of Srpska, Bosnia and Herzegovina

ABSTRACT

The main aim of this paper was the development of a new product, cornelian cherry topping, with a defined viscosity suitable for use in the confectionary industry. In addition, the quality of the fruit pulp and selected sample, phenolic composition and antioxidant activity were determined. Pectin was used to achieve the appropriate viscosity. Descriptive sensory analysis was used to evaluate viscosity and other sensory characteristics of samples. In order to obtain a new product, a suitable recipe was developed and the parameters of the production process and product quality were defined. Basic chemical composition, the content of total phenols, flavonoids, flavonols and flavan-3-ol, monomeric and total anthocyanins and antioxidant activity (DPPH and ABTS tests) of cornelian cherry pulp and selected topping were analyzed. The results showed that sensory characteristics of fruit topping can be improved by increasing the pectin content (1%) and reducing the sugar content (33.75%) without modification of cornelian cherry content. Although the antioxidant activity of cornelian cherry pulp was about three times higher compared to the selected topping sample, the antioxidant potential of this product is significant. The selected sample showed a higher antioxidant activity against DPPH radical (1472.33 µg TE/g) than ABTS radical (1348.37 µg TE/g).

Keywords: cornelian cherry, pectin, viscosity, quality, antioxidant activity.

COMPOSITION AND ANTIFUNGAL ACTIVITY OF *CARUM CARVI* ESSENTIAL OIL

Dragana Plavšić[1*], Ljubiša Šarić,[1] Ana Varga, [1] Ivana Čabarkapa,[1]Jasmina Lazarević,[1]Olja Todorić,[1] Dragan Psodorov [2]

[1]University of Novi Sad, Institute of Food Technology Novi Sad, Bulevar cara Lazara 1, 21 000 Novi Sad, Serbia, dragana.plavsic@fins.uns.ac.rs
[2]College of Professional Studies – ICEPS - International Centre of Professional Studies, Cvećarska 2, 21 000 Novi Sad, Serbia

ABSTRACT

The modern trends in nutrition suggest the limitation of synthetic food additives or the subtitution with natural ones. Therefore, a huge interest for the application of various natural agents exists in order to protect food from a microbiological damage and extend product sustainability. The aim of this study was to determine antifungal activity of *Carum carvi* essential oil on selected isolates of mold. Eleven laboratory origin isolates of mold were selected for antifungal researches, such as: *Alternaria alternata, Aspegillus flavus, A. fumigatus, A. niger, A. versicolor, Cladosporium cladosporioides, Fusarium proliferatum, F. sporotrichioides, Penicillium aurantiogriseum, P. expansum* and *P. oxalicum*. Mold species are isolated from wheat, corn and buckwheat and flour of these cereals. The antifungal activity was determined using broth microdilution method.

By the application of GC/MS analysis of essential caraway oil, 12 components was identified. The major components of the caraway essential oil were carvone (72.67%), limonene (22.93%), dihydrocarveol (1.09%) and *cis*-hydrocarvon (1.05%). Essential oil of *Carum carvi* showed antifungal activity on all tested isolates in the MIC range of 0.2–1.7 µl/ml and MFC range of 0.4–28.4 µl/ml. The lowest MFC value was obtained for *C. cladosporioides* (0.4 µl/ml). The highest MFC value was obtained for *P. oxalicum* (28.4 µl/ml). Obtained results of the caraway essential oil antifungal activities could be of significant value in the improvement of antifungal protection–the damage reduction caused by molds activities in food and in the

replacement of synthetic preservatives and fungicides in the products of natural origin.

Keywords: essential oil, caraway, antifungal activity, molds.

Acknowledgments

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ELECTRONIC, STRUCTURAL STABILITIES AND OPTICAL PROPERTIES OF BA_2SIO_4 SPINEL FOR OPTOELECTRONIC DEVICES: A FIRST PRINCIPLE STUDY

Idris Muhammad Chiromawa[1,2], Amirruddin Shaari[2], Razif Razali[2], Abdullahi Lawal[3], Abdullahi Mikailu[1], Muhammad Tajuddeen Garba[1]

[1]University Kafin-Hausa, Department of Physics, Sule Lamido, ahun-Kano Road, Kafin Hausa, Jigawa State, Nigeria, idrismc@su.edu.ng
[2]Universiti Teknologi Malaysia, T02, Level 2, 81 310 Skudai Johor Bahru, Malaysia
[3]Federal University Dutse, Faculty of Science, Department of Physics, Gida sitin, Dutse 720101, Jigawa State, Nigeria

ABSTRACT

This paper investigates new alternative spinel materials as transparent conducting oxides (TCOs). The physical properties of spinel-type materials make them well suited for many industrial applications. Besides, it opens the door for new technological applications including the possibility of transparent flexible electronics. The structural properties of Ba_2SiO_4 are studied by first-principles calculations within the density functional theory (DFT) framework. Many-body perturbation theory (MBPT) based on a random phase approximation (G_0W_0 + RPA) approach was used to compute the optical properties. The bare DFT calculations showed that the energy bandgap of Ba_2SiO_4 using GGA-PBEsol and LDA-PZ was found to be 4.89 eV and 4.02 eV respectively. These results confirm that Ba_2SiO_4 is a wide bandgap material which is one of the fundamental properties of transparent conducting materials. The results on the optical properties of Ba_2SiO_4 with the inclusion of electron-hole interaction (G_0W_0 + RPA) showed that the conductivity for Ba_2SiO_4 is 4.28 x 10^4 Ωcm^{-1} at a photon energy of 9.56 eV and 74.69 x 10^4 Ωcm^{-1} at a photon energy of 15.69 eV respectively. Finally, the results reveal the suitability of Ba_2SiO_4 spinel for many optoelectronic and transparent conducting devices.

Keywords: TCOs; Ba_2SiO_4 spinel; Random phase approximation; DFT.

POTENTIAL UTILIZATION OF THE MEAT OF INVASIVE CRAYFISH *FAXONIUS LIMOSUS* FROM THE DANUBE RIVER

Jasmina Lazarević[1*], Ivana Čabarkapa[1], Slađana Rakita[1], Jovana Delić[1], Miloš Županjac[1], Zorica Tomičić[1], Tatjana Peulić[1]

[1]University of Novi Sad, Institute of Food Technology Novi Sad, Bulevar cara Lazara 1, 21 000 Novi Sad, Serbia, jasmina.lazarevic@fins.uns.ac.rs

ABSTRACT

Preserving the balance of the aquatic ecosystem requires minimizing the impact of invasive species, such as the spiny-cheek crayfish *Faxonius limosus* from the Danube River. Valorizing the meat of spiny-cheek crayfish through the concept of zero waste not only helps in reducing its negative impact on biodiversity but also presents an opportunity for culinary innovation. The integration of crayfish meat into gastronomy products offers a viable approach to management and sustainable exploitation. To develop new products formulated from crayfish meat, we investigated various aspects including safety parameters, technological quality, nutritional value and sensory properties. Consequently, this study aimed to provide fresh evidence of the nutritional value and economic potential of invasive crayfish from the Danube River, paving the way for optimal utilization and sustainable exploitation of these resources.

Keywords: invasive spiny-cheek crayfish, meat, optimal utilization.

Acknowledgments

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EXTRACTION AND CHARACTERIZATION OF GARLIC PENNYCRESS (*THLASPI ALLIACEUM* L.) SEEDS OIL

Milan D. Kostić, Biljana S. Đorđević, Marija R. Miladinović, Olivera S. Stamenković

University of Niš, Faculty of Technology, Bulevar Oslobodjenja 124, 16 000 Leskovac, Serbia, milankostic285@yahoo.com, djbiljana89@gmail.com, marijamiladi@gmail.com, oliverastam@yahoo.com

ABSTRACT

Considering diverse applications of oils, there is increasing interest in identifying and exploring potential new oilseed crops. One such promising crop is *Thlaspi alliaceum* L. (garlic pennycress) from the Brassicaceae family. The present paper deals with the yield, physicochemical properties, and fatty acid composition of garlic pennycress seed oil (GPSO) obtained by maceration (70°C, *n*-hexane:seed ratio 10:1 mL/g, 10 min), Soxhlet extraction (*n*-hexane:seed ratio 10:1 mL/g, 6 h), and cold pressing (8 mm nozzles) of the seeds. The highest GPSO yield was achieved by Soxhlet extraction (18.43±0.21 g/100g), followed by cold pressing (13.23±0.56 g/100g) and maceration (13.09±0.08 g/100g). The physicochemical properties of the obtained GPSOs were not influenced by the extraction technique. All obtained GPSOs are characterized by low iodine, peroxide, and acid values, refractive indexes, and high viscosities. The most abundant fatty acids in the oils are oleic and linoleic acid with similar content in all GPSOs (30-32%), followed by behenic acid (13.6-15.5%). The oils rich in behenic acid are valuable feedstocks for the food, pharmaceutical, and cosmetic industries. The significant content of behenic acid in GPSO indicates its high potential for broad applications.

Keywords: behenic acid; garlic pennycress; seed oil.

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THE STATISTICAL ANALYSIS OF THE OIL EXTRACTION FROM GARLIC PENNYCRESS (THLASPI ALLIACEUM L.) SEEDS

Milan D. Kostić, Biljana S. Đorđević, Marija R. Miladinović, Olivera S. Stamenković

University of Niš, Faculty of Technology, Bulevar Oslobodjenja 124, 16 000 Leskovac, Serbia, milankostic285@yahoo.com, djbiljana89@gmail.com, marijamiladi@gmail.com, oliverastam@yahoo.com

ABSTRACT

Garlic pennycress (Thlaspi alliaceum L.) is weedy, annual plant that grows in Europe, Asia, and North America. It can be cultivated on marginal land with no or minimal agricultural requirements. Garlic pennycress seeds are rich in oil, which can be a valuable feedstock for industrial application. This study investigates the oil recovery from garlic pennycress seed by maceration using n-hexane. The aim of the paper is statistical analysis and modeling the oil yield obtained under various extraction conditions: temperature (20-70 ^{o}C), solvent:seed ratio (3-10 mL/g), and time (5-15 min) according to the 3^3 full factorial design. According to the analysis of variance, a statistically significant effect ($p<0.05$) on the garlic pennycress seed oil yield had all individual process factors, the interaction between temperature and time, and the quadratic term of the temperature. Other interaction and quadratic terms did not show statistically significant effects. The influence of the maceration conditions decreased in the following order: maceration temperature>solvent:seed ratio>maceration time. The oil yield was modeled as a function of the maceration temperature, solvent:seed ratio and maceration time using a quadratic model. The reliability of the model was confirmed by good agreement between experimental and calculated values of oil yield (MRPD=±1.62%, 27 data).

Keywords: garlic pennycress; maceration; oil yield; statistical analysis.

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FRACTIONATION OF JUNIPER BERRY ESSENTIAL OILS OBTAINED BY CLASSICAL AND MICROWAVE-ASSISTED HYDRODISTILLATION

Miljana Krstić,[1] Nevenka Bošković Vragolović, [2]Ana Veličković,[1] Svetomir Milojević,[1] Jelena Avramović,[1] Ivan J. Stojković,[3] Vlada Veljković[4*]

[1]University of Priština in Kosovska Mitrovica, Faculty of Technical Sciences, Department of Technological Engineering, Knjaza Miloša 7, 38 220 Kosovska Mitrovica, Serbia
[2]University of Belgrade, Faculty of Technology and Metallurgy, Karnegijeva 4, 11 000 Belgrade, Serbia
[3]University of Belgrade, Innovation Center of the Faculty of Technology and Metallurgy, Karnegijeva 4, 11 000 Belgrade, Serbia
[4] Serbian Academy of Sciences and Arts, SASA Branch of Niš, Kneza Mihaila 35, 11000 Belgrade, Serbia , vlada.veljkovic@sanu.ac.rs

ABSTRACT

The composition of the essential oil of juniper (*Juniperus communis* L.) depends on plant age, geographical origin, fruit maturity, etc. Nevertheless, juniper essential oil mainly consists of terpene hydrocarbons: monoterpenes (up to 85%) and sesquiterpenes (up to 27%), along with their oxygenated derivatives (up to 4%). Consequently, researchers look for the most effective methods for separating juniper essential oils into pure components or their fractions. This research is focused on isolating essential oil fractions and analyzing their composition during hydrodistillation (HD) and microwave-assisted hydrodistillation (MAHD) processes. It was observed that the composition of the juniper essential oils undergoes significant changes during the process. The concentration of easily volatile components was the highest in the early fractions, while less volatile components dominated the final fraction. Comparing the fractionation techniques, it can be concluded that a similar percentage of components are separated within 10 minutes using HD compared to 9 minutes with MAHD. Furthermore, when using juniper fruits that were pre-swollen for 24 hours, the HD for 10 minutes gave better results than the MAHD for 9.5 minutes.

Keywords: *Juniperus communis* L., essential oil, hydrodistillation, microwave-assisted hydrodistillation, fractionation.

ADVANCING PLANT METABOLIZAM ANALYSIS: A REAL – TIME OPTICAL APPROACH

Miloš S. Mošić[1], Sara V. Ristić[1], Marija M. Petković Benazzouz[1], Stefan Lekić[2], Katarina M. Miletić[1]

[1]University of Belgrade, Faculty of Physics, Studentski trg 12-16, 11 001 Belgrade, Serbia
[2]University of Belgrade, Institute of Chemistry, Technology and Metallurgy, Njegoševa 12, 11 000 Belgrade, Serbia, milos.mosic@ff.bg.ac.rs, sara.ristic.f@gmail.com, marijapetkovic@ff.bg.ac.rs, stefan.lekic@ihtm.bg.ac.rs, katarinamiletic@ff.bg.ac.rs

ABSTRACT

Optical detection of plant stress in real-time is crucial as it enables timely interventions to mitigate potential damage. This study presents a detailed evaluation of a system that detects changes in plant metabolism in real-time by distributing optical signals across the leaf. The methodology facilitates continuous monitoring of changes in the optical properties of plant leaves through measurements of optical transmission coefficients using a 665 nm LED light signal, thereby recording the circadian rhythm over time. Given that the photosynthetic processes within the leaves are closely linked to the plant's overall health, this system can detect stress caused by various factors and identify metabolic changes by analysing the circadian rhythm patterns of the observed plants.

For inducing metabolic changes, the plant *Vriesea carinata*, a verified representative of dual metabolism, was subjected to various stress types: water deficit and high light intensity. To validate the method, the collected results were compared with data obtained through chemical methods to establish a correlation between the traditional, destructive method and the non-destructive, optical method.

The findings successfully identify circadian rhythms as parameters for recognizing changes in plant metabolism, demonstrating the significance of the proposed method in researching plant physiology through the optical identification of biological processes.

Keywords: Plant metabolism, Circadian rhythm, Non-destructive method, Real-time optical approach, Stress detection.

SPECTROSCOPIC METHOD FOR DETERMINATION OF THE TWO-DIMENSIONAL PROFILE OF A FLAME IN VIS-NIR WAVELENGTH REGION

Miloš S. Mošić*, Sara V. Ristić, Marija M. Petković Benazzouz, Katarina M. Miletić

University of Belgrade, Faculty of Physics, Studentski trg 12-16, 11001 Belgrade, Serbia,
sara.ristic.f@gmail.com, marijapetkovic@ff.bg.ac.rs, katarinamiletic@ff.bg.ac.rs,
milos.mosic@ff.bg.ac.rs

ABSTRACT

This study introduces a novel, non-contact optical technique for solving a two-dimensional, ill-posed problem in temperature tomography inside the firebox of a commercial coal power plant. For determining the 2D temperature distribution and attenuation coefficients, we utilized four optical probes positioned at the corners of the combustion chamber, coupled to identical spectrometers via optical fiber cables. Spectral radiances between 780 nm and 900 nm were measured using Aurora 4000 spectrometers for the simulation.

The measurement and reconstruction setup are based on a spectroscopic approach, assuming gray body radiation from the medium. This method was validated using experimental data from a 1D case within the same commercial coal power plant.

This new approach offers a simpler measurement process, where the lower spatial resolution is offset by enhanced spectral resolution, providing a simpler alternative to methods involving laser absorption spectroscopy and expensive multispectral or hyperspectral CCD cameras.

Keywords: Temperature tomography, Non-contact optical technique, VIS-NIR spectroscopy, Ill-posed problem, Attenuation coefficient.

STRATEGIES FOR ENHANCING METFORMIN PALATABILITY WITH ARTIFICIAL SWEETENERS

Andrija Vukov, Milan Vraneš, Jovana Panić, Snežana Papović, Teona Teodora Borović, Nikolett Cako Bagány, Sanja Belić, Slobodan Gadžurić

University of Novi Sad, Faculty of Sciences, Department of Chemistry, Biochemistry and Environmental Protection, Trg Dositeja Obradovića 3, 21 000 Novi Sad, Serbia,
andrija.vukov@dh.uns.ac.rs

ABSTRACT

Metformin, a key drug for type 2 diabetes mellitus, is often hindered by its bitter taste, affecting patient compliance. This study takes a unique approach by proposing the combination of Metformin with artificial sweeteners like sodium saccharin and acesulfame potassium to improve its taste. The research focuses on how these sweeteners alter the hydration properties of Metformin in aqueous solutions, a novel angle in taste modification.

To measure the interactions between Metformin and the sweeteners, the study employed density, sound velocity, and viscosity measurements. These were conducted across a range of temperatures and concentrations. The data was then analyzed, considering solute-solute and solute-solvent interactions, and calculations were made for the apparent molar volume, Hepler coefficient, and other related properties.

The findings indicate that artificial sweeteners can enhance the palatability of Metformin, potentially improving patient compliance in clinical settings by altering its taste-related physical properties. The study highlights the importance of sensory properties in medication adherence and the potential of sweeteners to address this challenge.

Keywords: metformin, taste modification, hydration properties.

Acknowledgement

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NEXT-GENERATION HYDRAULIC FLUIDS: THE ROLE AND PERSPECTIVES OF IONIC LIQUIDS

Milan Vraneš[1], Saša Laloš[2], Jovana Panić[1], Snežana Papović[1], Teona Teodora Borović[1], Nikolett Cako Bagány[1], Andrija Vukov[1], Slobodan Gadžurić[1], Siniša Bikić[3]

[1]University of Novi Sad, Faculty of Sciences, Department of Chemistry, Biochemistry and Environmental Protection, Trg Dositeja Obradovića 3, 21 000 Novi Sad, Serbia, milan.vranes@dh.uns.ac.rs
[2]University of Banja Luka, Faculty of Mechanical Engineering, Ulica Vojvode Stepe Stepanovića 71, 78 000 Banja Luka, Bosnia and Herzegovina
[3]University of Novi Sad, Faculty of Agriculture, Trg Dositeja Obradovića 8, 21 000 Novi Sad, Serbia,

ABSTRACT

Ionic liquids are revolutionary fluids and solvents in modern science and engineering, remaining liquid below 100°C. Their unique properties, such as non-flammability, high thermal stability, and the ability to dissolve various compounds, enable innovative applications across multiple industrial sectors. They are ideal for safety-critical and long-lasting applications due to their negligible vapor pressure and exceptional chemical stability.

In hydraulic systems, ionic liquids surpass conventional petroleum-based fluids, offering high viscosity and lubricant properties that reduce wear, enhance system efficiency, and cut operational costs. Their low compressibility improves control and precision, crucial for high-performance sectors like aviation and robotics. Additionally, their biodegradability and non-toxicity offer a sustainable alternative to traditional fluids.

Selecting suitable cations and anions allows ionic liquids to be customized for specific uses, including extreme conditions. However, their widespread adoption is hampered by high production costs and compatibility concerns with hydraulic system materials. Ongoing research aims to develop cost-effective production methods and

resolve material interactions, promising a sustainable future for ionic liquids in hydraulic applications.

Keywords: ionic liquids, hydraulic fluids, green solvents.

Acknowledgement

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ANALYSIS OF MARINE FUEL OIL PURIFIER EFFICIENCY, CHEMICAL ELEMENTS AND COMPOUNDS FOUND IN THEM

Miroslav Vukičević[1], Zdravko Ikica[2], Boris Hrnić[3], Vladan Vuković[2]

[1]University of Montenegro, Faculty of Maritime Studies Kotor, Put I Bokeljske brigade 44, 85 330 Kotor, Montenegro, vukicevic.miroslav@gmail.com
[2]University of Montenegro, Institute of Marine Biology, Put I bokeljske brigade 68, 85 330 Kotor, Montenegro
[3]University of Montenegro, Faculty of Mechanical Engineering, Džordža Vašingtona bb, 81 000 Podgorica, Montenegro

ABSTRACT

Ensuring the proper operation of a ship's propulsion system necessitates the use of high-quality fuels. Several factors contribute to fuel quality, including the source of origin crude oil, refining methods, blending processes, and the quality of storage and distribution. Marine fuels must adhere to international standards such as ISO standards to be suitable for consumption on ships.

This article presents an analysis of over 6000 fuel samples obtained from two sample points within a purification system, conducted by independent laboratories. While all samples must meet the ISO 8217:2017 Standard for marine residual fuel before bunkering, this analysis focuses on elements with potentially harmful effects on marine engine systems. A comprehensive examination will be conducted, employing an inductive method to draw general conclusions about the current levels of abrasive impurities and other detrimental elements in fuels post-purification.

Specific attention will be given to elements like aluminium, silicon, vanadium, calcium, magnesium, lead, nickel, potassium, sodium, zinc, and phosphorus present in residual fuel oils. These elements, in certain forms or concentrations, pose challenges to marine engines. Testing conducted according to the IP 501 standard, utilizing inductively coupled plasma emission spectrometry, is essential to ensuring smooth engine operation and mitigating damages and associated costs caused by abrasive fines in the fuel oil.

Keywords: fuel treatment, fuel quality, abrasive fines, ISO standard.

MODELING A PURIFICATION SYSTEM FOR EFFICIENT REMOVAL OF ABRASIVE IMPURITIES

Miroslav Vukičević[1*], Zdravko Ikica[2], Boris Hrnić[3], Vladan Vuković[2]

[1]University of Montenegro, Faculty of Maritime Studies Kotor, Put I Bokeljske brigade 44, 85 330 Kotor, Montenegro, vukicevic.miroslav@gmail.com
[2]University of Montenegro, Institute of Marine Biology, Put I bokeljske brigade 68, 85 330 Kotor, Montenegro
[3]University of Montenegro, Faculty of Mechanical Engineering, Džordža Vašingtona bb, 81 000 Podgorica, Montenegro

ABSTRACT

Aluminium and silicon particles in fuel known as “cat fines” are catalytic residues from the refinery process. They can cause mechanical damage to fuel pumps, injectors, piston rings and cylinder liners. They are very hard and highly abrasive, thus causing abrasive wear to main engine components. These impurities in marine fuel must therefore be reduced to the recommended value. One of the main tasks of the fuel treatment plant on a ship is to separate solids and water from the fuel. Onboard ships, there are fuel purifiers which rotate at a high speed (more than 6,000 rev/min) producing centrifugal force and providing good separating effect even for small solid particles (Al+Si). Proper settling and regular drainage from the tanks with adequate filtration are not sufficient for proper fuel preparation. The quality of purifier operation varies over years because it is affected by a large number of factors. For the purpose of this paper, over twelve thousand fuel samples will be analyzed to determine the current efficiency of the purifiers and whether they can meet the stringent requirements of marine engine manufacturers. The data will be taken from a tanker ship, taking into account different operational scenarios. These scenarios are linked with maximum possible fuel consumption on the ship during exploitation. Using the Simulink program for the system simulation, it is possible to do optimization in the operation of fuel purifier. This optimization refers to the required amount of fuel and quality of separation, which also regards the removal of abrasive impurities.

Keywords: Abrasive wear, Cat fines, Purifier optimization, Ship automation & simulation.

ANALYSIS OF THE MAIN ADVANTAGES OF USING GASES OR OTHER LOW-FLASHPOINT FUELS FOR SHIP PROPULSION

Miroslav Vukičević, Balša Drašković, Petar Mustur

University of Montenegro, Faculty of Maritime Studies Kotor, Put I Bokeljske brigade 44, 85 330 Kotor, Montenegro, vukicevic.miroslav@gmail.com, draskovicbalsa@gmail.com, musturpetar1@gmail.com

ABSTRACT

Ships that are using gases or other low-flashpoint fuels for propulsion are covered by The International Code of Safety for Ships using Gases or other Low-flashpoint Fuels (IGF Code), which provides basic rules and regulations that must be followed during the construction and use of these propulsion systems. Taking into account that the largest numbers of ships use heavy fuel oil (HFO), which is extremely bad considering the harmful exhaust gases it produces, LNG as a propellant comes with a number of advantages, especially when it comes to the regulations prescribed by Annex VI of MARPOL Convention. An additional mitigating factor is the fact that LNG fuel is globally available and experiences greater expansion from year to year. Also, ships that would use the mentioned propellant would directly meet the necessary requirements and be able to sail in Sulphur Emission Control Areas (SECA Zones). The use of alternative fuels is an obligation and a process that will have to be implemented worldwide in the future. That is exactly why use of gases or other low-flashpoint fuels for propulsion is one of the most effective solutions that can be applied in the near future on a large number of vessels.

Keywords: IGF code, low-flashpoint fuels, alternative fuels, LNG fuel.

XRF ANALYSIS OF THE "SEVEN-COLOURED EARTH" SOIL OF MAURTITIUS

Perica Bošković, Martina Gudelj, Mile Dželalija

Univesity of Split, Faculty of Science, Ruđera Boškovića 33, 21 000 Split, Croatia,
pboskovic@pmfst.hr

ABSTRACT

In south-western Mauritius besides the small village of Chamarel (Mauritius), you can find this uniqu land with colouring soil. The soil found here reflects seven different colours like red, blue, green, brown, violet, yellow and purple. The analysis of the soil was taken by x-ray fluorescence spectroscopy. The research show that this natural phenomenon is due to decomposed basalt gullies. The hot and humid climate helps in the decomposition of the basalt into clay. As a result of total hydrolysis (chemical breakdown of minerals by water), the soluble elements such as silicic acid and cations are washed, leaving a large composition of iron and aluminium which constitute a ferralitic soil. The iron sesquioxides (Fe_2O_3) have a red and anthracite colour, whereas the aluminium sesquioxides (Al_2O_3) have a blue or purplish colour.

Keywords: X-ray flourescence spectroscopy, seven-coloured earth, elemental analysis.

SUSTAINABILITY ASSESSMENT OF THE ENERGY SYSTEM OPTIONS OF A POWER PLANT THROUGH MULTI-CRITERIA ANALYSIS

Predrag Škobalj, Valentina Turanjanin, Biljana Vučićević, Dragoslav Mrđa, Milica Mladenović

University of Belgrade, Institute of Nuclear Science Vinča, Mike Petrovića Alasa 12-14, 11 000 Belgrade, Serbia, p.skobalj@vin.bg.ac.rs, valentin@vin.bg.ac.rs, bee@vin.bg.ac.rs, dmrdja@vin.bg.ac.rs, mica@vin.bg.ac.rs, valentin@vin.bg.ac.rs

ABSTRACT

Most of the electricity generated in the Republic of Serbia is produced in thermal power plants that burn lignite. The strategy for the development of the energy system is: construction of new power plants based on lignite and natural gas with higher energy efficiency, rehabilitation and modernization of existing plants and accelerated use of renewable energy sources as part of the green transition. Thermal power plant "Kolubara A" is the subject of analysis in this paper, with five thermal units total installed capacity of 270 MW. This paper analyzes potential options for thermal power plant units: existing option with coal (lignite) combustion and options with renewable energy sources, such as waste materials, solar energy, and renewable solid fuels. The paper proposes four energy system options for the thermal unit status, each defined with appropriate sustainability indicators: economical, ecological, social and resource. The Analysis and Synthesis of Parameters under Information Deficiency (ASPID) method of multi-criteria assessment was used to calculate a general index of sustainability and ranking the options. The purpose of this article is to identify viable options for evaluating the sustainability of renewable and non-renewable thermal power plant units.

Keywords: renewable energy system options, sustainability, energy indicators.

THE POTENTIAL FOR USING SOYBEAN STRAW IN THE CREATION OF BUILDING MATERIALS

Biljana Vučićević, Dragoslav Mrđa, Valentina Turanjanin, Milica Mladenović, Predrag Škobalj

University of Belgrade, Institute of Nuclear Science Vinča, Mike Petrovića Alasa 12-14, 11 000 Belgrade, Serbia, bee@vin.bg.ac.rs, dmrdja@vin.bg.ac.rs, valentin@vin.bg.ac.rs, mica@vin.bg.ac.rs, p.skobalj@vin.bg.ac.rs

ABSTRACT

Many countries around the world focus on environmental preservation and reducing industry's impact on climate change. Considering that the construction industry accounts for around 40% of global pollution, the majority of which is caused by energy use and more than a quarter by the materials themselves, the building sector offers huge potential for energy saving and greenhouse gas emission reduction.

Agricultural residues, on the other hand, are widely distributed worldwide. The kinds of crops that are accessible differ according to the climate. In Serbia, the production of soybeans is quite common. Very little soybean straw is distributed to animals or used as a source of energy. It is quite bulky and usually removed from the fields by uncontrolled open burning, which releases toxic gasses into the atmosphere.

This research reports on an experimental study of a building material made of concrete and soy straw. Measured density, thermal conductivity, and thermal capacity were used to simulate the thermal behaviour of a chosen object and results of a comparison of a brick building and a building composed of a mixture of soy straw and concrete was done using a mathematical model made in Transient System Simulation Tool.

Keywords: building, materials, soybean straw, simulation, TRNSYS.

STRATEGIES OF CRIME PREVENTION THROUGH ENVIRONMENT DESIGN

Tanja Stupar[1*], Davor Stupar [2]

[1]University of Banja Luka, Faculty of Architecture, Civil Engineering and Geodesy, Bulevar vojvode Stepe Stepanovića 77/3, 78 000 Banja Luka, Bosnia and Herzegovina, tanja.stupar@aggf.unibl.org
[2]Ministry of Internal Affairs of Republic of Srpska, Kralja Petra I Karađorđevića 5, 78 000 Banja Luka, Bosnia and Herzegovina, davortnt@yahoo.com, tanja.stupar@aggf.unibl.org

ABSTRACT

We are witnessing rapid changes and unpredictable challenges face by cities and their residents - from environmental and natural challenges and disasters to security issues. Protecting and improving safety of people and communities is one of the biggest security challenges and it is in the focus of crime prevention. Numerous examples have shown that urban design can prevent criminal behavior and that the physical environment influences to people's behavior as much as the social environment. The model of crime prevention through environmental design (CPTED) is well-known in the world. The aim of this paper is to point out the importance of CPTED for the improvement of urban safety and quality of life in the city, shaping the public urban space by applying CPTED strategies. It is important to design safe public spaces, as well as achieve a balance between improving urban security and preserving the openness of public spaces (their pleasant and free use).

The contribution of the paper is in the presented strategies for the proper implementation of CPTED. Thus, the approach to the analysis of urban security is more complete. CPTED strategies should be an integral part of policies and strategies of state, and planning policies because only in this way urban space will achieve a higher level of convenience for quality community life. Since this model is still new and little researched in the territory of the Republic of Srpska, the formed theoretical research base is important for further research at institutes and faculties, as well as for the preparation of planning and project documentation.

Keywords: urban safety, urban design, crime prevention, CPTED, CPTED strategies.

CRIME PREVENTION IN THE CONCEPTUAL DESIGN OF THE ARCHITECTURAL AND URBAN SOLUTION OF THE PATRIARCH PAVLE SQUARE IN BROD

Tanja Stupar

University of Banja Luka, Faculty of Architecture, Civil Engineering and Geodesy, Bulevar vojvode Stepe Stepanovića 77/3, 78 000 Banja Luka, Bosnia and Herzegovina, tanja.stupar@aggf.unibl.org

ABSTRACT

According to the 2019 public competition for the selection of a conceptual architectural and urban planning solution for the arrangement of Patriarch Pavle Square in Brod (Republic of Srpska - Bosnia and Herzegovina), the main goal of the conceptual project was to improve the quality of spatial, functional and communication processes and to create a pleasant and aesthetically acceptable image of the city, which meets the demands of citizens and visitors. The call for competition does not directly mention 'urban security', but in order for a public space to be pleasant for its users, it must be safe first of all. People's safety is one of the biggest security challenges and it is in the focus of crime prevention. Urban design can prevent criminal behavior, and this is confirmed by the world-famous model of crime prevention through environmental design (CPTED). The aim of this paper is to point out the importance of strategies for the proper implementation of CPTED, with the aim of a more complete approach to the analysis of urban security. Strategies were not used in the creation of the first-prized conceptual solution, and the author's team wanted to respond to the stated objectives of the call for competition. Therefore, I now want to examine how well-designed public urban space is first of all safe and attractive for citizens. Since the CPTED model is new and mostly unknown in the territory of the Republic of Srpska, the author's team was not even aware of its importance for crime prevention at the time. That is why it is necessary to check the quality of the conceptual solution in the security context and to define guidelines for the improvement of urban security during the implementation of this project.

Keywords: public competition, urban design, public space, CPTED strategies, Brod (RS-BH).

DIAGNOSTIC AND TESTING OF WAGON AXLES (AXLE ASSEMBLIES), WITH THE GOAL OF DETERMINING THE BOUNDARY CONDITIONS FOR EXPENDITURE

Veljko Vuković[1], Zoran Stjepanović[2], Halid Žigić[3], Novak Damjanović[1]

[1]University PIM Banja Luka, Technical Faculty, Despota Stefana Lazarevića bb, 78 000 Banja Luka, Bosnia and Herzegovina, v.velja@gmail.com
[2] European University, Techincal Faculty, Bijeljinska cesta 72/74, 76 100 Brčko, Bosnia and Herzegovina, stjepanovicz@hotmail.com
[3] European University "Kallos" Tuzla, XVIII hrvatske brigade 8, 75 000 Tuzla, Bosnia and Herzegovina, halid_zigic@hotmail.com

ABSTRACT

This scientific work includes technological procedures and methods of control and testing of wagon axles (axle assemblies) that can be applied in determining their condition and the possibility of further use in exploitation. Technological procedures and methods enable controllers and operators to detect failures, i.e. defects, damage and irregularities on axles (axle assemblies). The life expectancy of the use of the axles or their eventual scrapping depends to a significant extent on the technological procedures and methods of control and testing of the axles (axle assemblies).

Keywords: Shaft, reliability, diagnostics, testing, exploitation.

PSYHOLOGY
PSIHOLOGIJA

INFLUENCE OF EDUCATIONAL STYLES OF PARENTS ON AGGRESSIVENESS OF ADOLESCENTS

Andea Uzelac[1], Snežana Samardžić[2]

[1]PIM University, Faculty of Phylosophy, Despota Stefana Lazarevića bb, 78 000 Banja Luka, Bosnia and Herzegovina
[2]JZU Special hospital for psychiatry Sokolac, Podromanija bb, 71 350 Sokolac, Bosnia and Herzegovina, nenasok@yahoo.com

ABSTRACT

The aim of the research was to examine the relationship between the parenting styles of parents and the appearance of aggression in adolescents in the final grades of secondary schools. The sample consisted of 204 respondents, of whom 107 were male and 97 female, with an average age of 17 years. Among the instruments, we used a structured questionnaire for sociodemographic data and family characteristics (constructed for the purposes of this research), the BPAG aggression scale and the VS-scale for the assessment of parenting styles. It was found that there is a statistically significant difference between subjects of different genders in the intensity and structure of aggressiveness. Boys in the sample show a significantly higher level of overall aggressiveness compared to girls (p=.01). Boys resort to physical and verbal aggressiveness significantly more often than girls (p=.00; p=.03). On the subscales of anger and hostility, no statistically significant differences were found in relation to gender.Research has shown that the level of aggressiveness also depends on the parenting style of both mother and father. Subjects with mothers who had cold parenting styles (cold-restrictive and cold-permissive) and fathers with a cold-restrictive parenting style significantly more often showed a higher level of aggression (p<.001) compared to subjects whose parents had warm parenting styles.

Keywords*:* educational style, parenting, aggressiveness, adolescents.

PERCEPTION OF FAMILY RELATIONSHIPS AND YOUNG PEOPLE'S ATTITUDES ON GAMBLING

Danijela Jokanovic[1], Barbara Stankovic[2]

[1]PIM University, Faculty of Phylosophy, Despota Stefana Lazarevića bb, 78 000 Banja Luka Bosnia and Herzegovina, djokanovic404@gmail.com
[2]Dr Lazar Vrkatic Faculty of Law and Business Studies, Bulevar oslobođenja 76, 21 102 Novi Sad, Serbia, barbara.stankovic1@gmail.com

ABSTRACT

Today's youth live in a society where gambling is considered as socially acceptable behaviour and its negative consequences are often overlooked. The availability of gambling content and the frequent advertising of gambling services as a way to make money quickly and efficiently also contribute to this.

Pathological gambling is a disorder of impulse control, characterised by persistent repetitive gambling actions with serious harmful psychological, financial and social consequences for the individual.

The family is a very important factor in preventing the occurrence of gambling addiction. A risky family could be called the one that, by its shape, structure or internal relationships of its members and its attitude towards children, produces an emotional climate that adversely affects the children's development. It, thus, prevents healthy development in childhood and affects unhealthy forms of development in adolescence and adulthood, and with certain genetic predispositions, can influence the reinforcement of certain undesirable behaviours.

The aim of this research was to examine the correlation between the percepton of family relationships and attitudes about gambling as well as the frequency of gambling among the third and fourth grade high shool students.

The survey involved 462 respondents, high school students from the territory of Banja Luka. In addition to filling out the socio-demographic data questionnaire, the respondents expressed their perception of family relationships through the degree of agreement with the statements on the Family Relationship Scale created for the purposes of this survey. The attitudes towards gambling were assessed using the

Gambling Attitudes Scale, which consists of 20 statements. The respondents were able to rate their degree of agreement with the stated statements on a five- point scale (from 'not at all accurate' to 'completely accurate'). Two additional particles (questions) were created to examine the types of gambling that the respondents who gamble prefer as well as the way in whch they engage in gambling (live, online, both ways).

The data processing was performed in the statistical software SPPS. The results showed the statistically significant difference in the prevalence of gambling between young men and girls. Young men are more likely to engage in gambling. The perception of family relationships dominated by bad and low-quality communication, frequent arguments, insufficient conversations, in which a young person feels like a stranger in the family, is statistically significantly related to the attitudes towards gambling as well as the prevalence of gambling among young people.

Keywords: risky behavior, family relationship, gambling, attitudes about gambling.

THE RELATIONSHIP OF SCRIPT PROHIBITIONS AND PATTERNS OF AFFECTIVE ATTACHMENT IN HEALTHY MEN

Snežana Samardžić[1], Darjana Sredić[2]

[1] JZU Special hospital for psychiatry Sokolac, Podromanija bb, 71 350 Sokolac, Bosnia and Herzegovina, nenasok@yahoo.com
[2]PIM University, Faculty of Phylosophy, Despota Stefana Lazarevića bb, 78 000 Banja Luka, Bosnia and Herzegovina

ABSTRACT

Both Affective Attachment Theory and Transactional Analysis emphasize the importance of early developmental experiences and relationships that a child enters into with close people, primarily parents. In this context, the messages he receives from them are also very important, because they shape his life script. The paper aims to determine whether there are significant differences in healthy individuals with different patterns of family affective attachment in relation to exposure to parental scripted prohibitions.

The survey was conducted on a sample of 100 male subjects. In examining adopted patterns of family affective attachment (PAV), a modified Brennan questionnaire for assessing PAV (1995) was used, while the degree and character of script prohibitions were assessed using the Script Prohibition Scale, authored by Gavrilov-Jerković et al. (2009). The results of the research confirmed the expected presence of four patterns of affective attachment in our sample. The obtained mean values of the entire sample for each investigated script prohibition are averaged, but respondents with different prohibitions are distributed differently in PAV patterns. The average exposure to all prohibitions was found in respondents with a secure attachment style. Respondents with an occupied PAV pattern were, during their upbringing, exposed above average to the parental injunction "Don't exist", while fearfully attached respondents were exposed to the highest number of prohibitions, with high malignancy: Don't exist, Don't be important and Don't be healthy.

Keywords: script prohibitions, affective attachment, healthy people.

RESULTS OF THE RESEARCH OF THE APPLICATION OF ADDENBROOKE'S REVISED COGNITIVE ASSESSMENT TEST AND A CASE REPORT ON A HEALTHY RESPONDENT AND A RESPONDENT WITH A DIAGNOSIS

Tanja Todorovic

University of Business Engineering and Management, Banja Luka, Faculty of Philosophy, Despota Stefana Lazarević bb, Banja Luka, Bosnia and Herzegovina, tanjatodorovic446@gmail.com

ABSTRACT

ACE-R is a widely accepted instrument in clinical practice, the revision of which has overcome certain weaknesses. The aim of this paper was to present the results of the ACE-R test research, and to analyze and compare the results obtained in the work with a healthy subject and a subject with a clinical diagnosis. The respondents are of similar characteristics, as well as of the same gender. From the clinical population, a subject with a diagnosis of depression after a stroke, which is the most common complication of it, was selected. The results obtained in this work confirmed the results of previous research. In the case of the healthy subject, as expected, there were no major problems during testing, which was not the case when it came to the subject with the diagnosis.

Keywords: ACE-R, stroke, depression, healthy subject, diagnosed subject.

PERSONALITY CHARACTERISTICS AS A PREDICTOR OF ACCIDENTS

Sanja Ilić, Elvir Ibeljić

University PIM Banja Luka, Faculty of Philosophy, Despota Stefana Lazarević bb, Banja Luka, Bosnia and Herzegovina, sanjailic@yahoo.com, elvir_ib@yahoo.com

ABSTRACT

Despite the lack of faith in the concept of accident proneness, there is a body of empirical work that links some personality traits with accident involvement. An early literature review by Keehn (1961) concluded that extraversion, possibly accompanied by neurosis, is associated with higher accident liability. Many studies that examine the relationship between personality and accident involvement have focused upon road traffic accidents.

One of the difficulties with personality studies is that they have lacked a coherent taxonomy, resulting in a wide variety of personality traits being measured, using a mixture of different types of methodology. Older studies, until the 1970s, used questionnaires (e.g. Katz adjustment scales), projective tests (e.g. TAT, Rorschach) and clinical interviews, while more recent studies favor personality inventories, such as 16PF. The personality traits measured include extraversion, neuroticism, social maladjustment, aggression, impulsivity, locus of control, sensation-seeking and, more recently, positive affectivity/negative affectivity and Type A behavior.

To clarify the existing literature, Robertson and Clarke (2002) conducted a meta-analysis of personality and occupational accidents, using the “big five” taxonomy to categorize personality traits. The results revealed criterion-related validity (uncorrected) for four of the big five factors: (low) agreeableness, openness, neuroticism and (low) conscientiousness (with uncorrected mean validities of 0.32, 0.29, 0.19 and 0.15 respectively). These indicated that individuals high in openness and neuroticism, and low in agreeableness and conscientiousness, are more liable to be accident involved.

Keywords: personality, accidents, type A, extraversion, neuroticism.

SUICIDE - A TRAGIC DIMENSION OF TIME, SPACE AND SOCIETY

Mirela Fazlić[1], Almir Pustahija[2]

[1]Psihološko savjetovanje- privatna psihološka praksa, 71 000 Sarajevo, Bosnia and Herzegovina, mirelafazlic1204@gmail.com
[2]Pravni fakultet Univerziteta u Travniku, Azapovići 439, 71 250, Kiseljak, Bosnia and Herzegovina, almir.pustahija@pfk.edu.ba

ABSTRACT

Suicide is a deeply complex phenomenon that requires a comprehensive approach to understanding as well as prevention. At its core, suicide is permeated by numerous psychological aspects, including depression, anxiety, feelings of hopelessness, and social isolation. Understanding these psychological factors is crucial for identifying risk groups and developing effective prevention strategies. The analysis of statistical parameters on the methods of committing suicide provides significant insight into trends and patterns of behavior. Various factors, such as age, gender, socioeconomic status and the availability of certain resources, can influence the way suicide is committed. In the fight against suicide, prevention plays a key role. In addition to recognizing early warning signs and providing support, prevention also involves promoting open conversations about mental health and reducing the stigma around seeking help. Educating the public about mental health, the availability of quality psychological help and the development of a support network are essential parts of prevention efforts.

In conclusion, a systemic approach to suicide prevention requires cooperation between health organizations, educational institutions, government agencies and civil society. Continued research, awareness and support are key to reducing suicide rates and ensuring better treatment and support for those struggling with mental health.

Keywords: Suicide, influencing factors and warning signs, appeal for help, prevention strategies, cooperation of institutions.

MEDICAL SCIENCES AND BIOTECHNOLOGY
MEDICINSKE NAUKE I BIOTEHNOLOGIJA

PROTEIN AND DNA BINDING PROPERTIES OF IRON(III)-PYRIDOXAL-S-METHYL-ISO-THIOSEMICARBAZONE (FE(III)-PLITSC) COMPLEX

Aleksandra A. Rakić[1*], Luka Golubović[1], Violeta Jevtović[2], Dušan Dimić[1]

[1]University of Belgrade, Faculty of Physical Chemistry, Studentski trg 12-16, 11 000 Belgrade, Serbia, saska@ffh.bg.ac.rs
[2]University of Ha'il, College of Science, Department of Chemistry, Ha'il 81451, Saudi Arabia

ABSTRACT

The antimicrobial activity and cytotoxicity of semicarbazone-metal complexes was described in the literature. The interactions between transport proteins/DNA and newly synthesized Fe(III)-pyridoxal-S-methyl-isothiosemicarbazone (Fe-PLITSC) complex were examined by experimental and theoretical methods, as a way to access the possible distribution and cytotoxicity of complex. The backbone of research is based on spectrofluorimetric titration and molecular docking calculations in AutoDock 4.2. Experiments, conducted at 300 K, have indicated that the Fe-PLITSC complex binds to the human serum albumin (HSA), bovine serum albumin (BSA), and DNA, with binding energies of -33.0, -31.0 and -26.7 kJ mol^{-1}, respectively. Theoretical calculations gave similar energy values and revealed the most favorable binding sites. The Fe-PLITSC complex prefers binding near TRP213 in HSA and TRP134 in the BSA molecule, which corresponds well with the fluorescence quenching. Comparing calculated and experimentally obtained binding energies the most probable binding mode of the complex to B-DNA form is from the minor groove side. The intercalation or binding to Z-DNA form is also possible. Fe-PLITSC complex is capable of interacting with DNA molecules and can be transported by serum albumins in the circulatory system throughout the body.

Keywords: Molecular docking; Spectrofluorimetry; Fe-PLITSC; bioactivity.

SYNTHESIS AND STRUCTURE OF PYRIDOXAL-S-METHYL-ISO-THIOSEMICARBAZONE-IRON(III) (PLITSC-FE(III)) COMPLEX

Aleksandra A. Rakić[1], Luka Golubović[1], Violeta Jevtović[2], Dušan Dimić[1]

[1]University of Belgrade, Faculty of Physical Chemistry, Studentski trg 12-16, 11 000 Belgrade, Serbia, saska@ffh.bg.ac.rs
[2]University of Ha'il, College of Science, Department of Chemistry, Ha'il 81451, Saudi Arabia

ABSTRACT

Isothiosemicarbazone molecules are an important part of a thiosemicarbazone family due to their coordination capacity and antiviral, antibacterial, antimalarial, and antitumor bioactivities, especially when coordinated with a metal ion. A new complex of Fe(III) with ligand Pyridoxal-S-methyl-isothiosemicarbazone (PLITSC) is synthesized. The synthesized crystal structure was analyzed by X-ray crystallography and theoretically characterized using DFT calculations at the B3LYP/6–311++G (d,p) (for all atoms except the Fe atom) + def-TZVP (for Fe) level of theory. The applicability of quantum-chemical calculations was assessed by comparison with the crystallographic structure. One neutral and one negatively charged form of tridentate PLITSC ligand coordinate to the Fe^{3+} ion via electron-donor phenolic oxygen, hydrazine nitrogen, and amide nitrogen creating the bis-ligand octahedral iron structure, $[Fe(L\text{-}H_2)(L\text{-}H)][SO_4]\cdot 2.5H_2O$. The coordination of the sulfur atom to the Fe^{3+} ion was blocked by the substituted methyl group. Comparison between the calculated and crystallographic bond lengths and angles confirmed that the quantum chemical treatment of the synthesized Fe(III) complex with PLITSC ligands was at the adequate level of theory.

Keywords: Pyridoxal-S-methyl-isothiosemicarbazone; PLITSC; DFT calculations; X-ray crystallography; tridentate coordination.

NEEDS FOR EDUCATIONAL REFORM IN PHARMACY

Zahida Binakaj[1*], Svetlana Stojkov[2], Tanja Stevanović- Pavlović[1], Hatidža Karić[1], Amela Škapur[1], Enisa Halilović[1], Emina Suljagić[3]

[1]HI Pharmacy „Violapharm“, Bukva bb, 74 260 Tešanj, Bosnia and Herzegovina, apotekaviolaa@hotmail.com
[2]University Business Academy, Faculty of Pharmacy, Trg mladenaca 5, 21 101 Novi Sad, Serbia, svetlanastojkov22@gmail.com
[3]Public Health Institution University Clinical Center Tuzla, Trnovac bb, 75000 Tuzla, Bosnia and Herzegovina, emina.binakaj@gmail.com, hida_b123@hotmail.com

ABSTRACT

Introduction: The needs within the health system and society as a whole require an urgent change in the education of masters of pharmacy, both in terms of health specializations and academic ones. New pathologies, new drugs and a completely changed way of life of citizens set an imperative in accepting a new way of education for a master of pharmacy.

Goal: Showing the role and importance of the master of pharmacy as a member of the interdisciplinary team within the health system.

Material and methods: About ten years ago, Pharmacies "Violapharm" started advising patients with mental difficulties in terms of proper therapy intake, advising on the therapeutic effect, and monitoring interactions with other medications. In addition to this, a consultation center for oncology patients and for patients with diabetes was launched.

Results: With this approach and communication with family doctors and competent specialists as a benefit for the patient, we had better compliance and better adherence, which resulted in better treatment outcomes. In the first year of the counseling center, we had 60 registered patients. After five years, the number increased to 249. During the Covid virus pandemic, we had 513 registered patients.

Conclusion: The role of a master of pharmacy is no longer primarily about supplying medications, but in accordance with the needs of the healthcare system and society as a whole, it requires additional education and reform to adequately treat target groups such as those with: diabetes mellitus, malignant diseases, mental health

issues, and others. as: diabetes mellitus, malignant diseases, mental difficulties and others.

Keywords: masters of pharmacy, educational reform, interdisciplinary team.

ASSESSMENT OF ANTIMICROBIAL AND ANTIOXIDANT ACTIVITY OF THE ACETONIC EXTRACT OF *ARMILLARIA GALLICA* BASIDIOCARPS AND ANALYSIS OF THE PRESENCE OF METALS

Nevena Petrović[1*], Zoran Simić[2], Marijana Kosanić[1]

[1]University of Kragujevac, Faculty of Science, Department of Biology and Ecology, Radoja Domanovića 12, 34 000 Kragujevac, Serbia, nevena.n.petrovic@pmf.kg.ac.rs, zoran.simic@pmf.kg.ac.rs
[2]University of Kragujevac, Faculty of Science, Department of Chemistry, Radoja Domanovića 12, 34 000 Kragujevac, Serbia, marijana.kosanic@pmf.kg.ac.rs

ABSTRACT

Armillaria gallica Marxm. & Romagn., commonly known as bulbous honey fungus, is a species of mushroom that is conditionally edible, typically appearing during autumn. The objective of this study was to assess the antimicrobial and antioxidant activity of the acetonic extract of *A. gallica* and to analyze the presence of metals in its dry basidiocarps. Antimicrobial activity was evaluated using the microdilution method, while antioxidant activity was determined through the DPPH and reducing power assays. The total phenolic content was estimated as gallic acid equivalent. Additionally, the metal content in dry basidiocarps was examined using atomic absorption spectrometry. The minimal inhibitory concentrations ranged from 5 to 20 mg/ml. The half-maximal inhibitory concentration in the DPPH assay was 944.52 μg/ml, and the absorbances in the reducing power assay ranged from 0.117 to 0.032. The total phenolic content was determined to be 6.85 mg GAE/g. The most abundant metal was iron with a concentration of 5492 mg/kg. *Armillaria gallica* is a widely distributed species of conditionally edible mushroom, exhibiting relatively pronounced antimicrobial and antioxidant properties. However, caution is advised when consuming this mushroom due to its tendency to accumulate metals in its basidiocarps.

Keywords: bioactivity, edible, heavy metals, medicinal, mushroom.

EDUCATION
OBRAZOVANJE

STUDENTS EXPECTATIONS TOWARD UNIVERSITY CAREER FAIRS: A CASE STUDY OF ENGINEERING FACULTY STUDENTS IN HUNEDOARA

Mihaela Popa[1], Ljubica Janjetovic[2] Adrian Eugen Cioablă[3]

[1]Politehnica University Timisoara, Engineering Faculty Hunedoara, mihaela.popa@upt.ro
[2] University PIM Banja Luka, ljubica.janjetovic@univerzitetpim.com
[3]Politehnica University Timisoara, Mechanical Engineering Faculty, adrian.cioabla@upt.ro

ABSTRACT

The purpose of this study is to identify the reasons why individuals attend university career fairs and the expectations they hold toward these events. Additionally, the article seeks to understand the students views on the usefulness of these events and assesses the strongest points of the fair. The event chosen for the study is the Career Fair organized in Timisoara in 2023 (in April and October). The event is dedicated to students and graduates interested in identifying opportunities offered by companies for professional information, internships, part-time, or full-time jobs. After participating in the 22nd and 23rd editions of the event, 77 of the participating students from Faculty of Engineering in Hunedoara completed a feedback questionnaire. The questionnaire administered in the study included 2 identification questions, 2 open questions, and 9 closed questions, structured into 13 items evaluating the opinion or satisfaction about certain aspects of the event. Items are answered on a 5-point Likert scale. Data interpretation with the help of graphic and tabular methods allowed the creation of a relevant image of the studied aspects and the relationships between them. In this context, students opinions about the Career Fair event can provide a benchmark for improving substantive aspects of such events. Considering the impact on decision-making for a future professional career, the subject of the study is considered topical. The study can contribute to the professionalization of information by delimiting the factors that define its purpose and structure.

Keywords: career fair, students, work marketplace, decision, feed-back.

POSSIBILITIES OF USING SOFTWARE TOOL IN THE EDUCATIONAL PROCESS IN THE FIELD OF SURFACE FINISHING AND HEAT TREATMENT

Ján Duplák, Darina Dupláková, Maryna Yeromina*, Samuel Mikuláško, Róbert Pyteľ

Technical University of Kosice, Faculty of Manufacturing Technologies with a seat in Presov, Institute of Advanced Technologies, Bayerova 1, 08001 Presov, Slovakia, maryna.yeromina@tuke.sk

ABSTRACT

Software support may have an important role in the educational process in the field of surface treatment and thermal processing. With the rise of digitalization, software tools have become invaluable means for teaching and learning complex concepts and procedures. These tools enable students to better understand aspects of surface treatment and thermal processing through various simulations. The use of software support in the educational process contributes to improving the quality of teaching in key areas of technical practice. This article provides a broad overview and subsequent comparison of two simulation software programs focused on surface treatments and thermal processing. The article extensively examines the simulation software Thermo-Calc and Nascam. Thermo-Calc and Nascam are software support products for thermodynamic calculations and microstructure simulations in the field of surface treatment and thermal processing. Their high precision, flexibility, and above-average performance make them indispensable tools for enhancing the educational process with potential industrial applications. Thermo-Calc is sophisticated software designed for thermodynamic and phase diagram calculations in materials engineering and materials science. Nascam is software designed for simulations of material microstructures and mechanical properties. The result of this publication was to compare two simulation software programs and determine which one is more suitable for implementation in the educational process.

Keywords: surface treatment, heat treatment, Thermo-Calc, Nascam, educational process.

THE SYNERGY OF DIGITAL TOOLS FOR CREATING AND ASSESSING A WORKING ENVIRONMENT IN THE ERGONOMIC EDUCATIONAL PROCESS

Darina Dupláková[1], Ján Duplák[1], Dejan Kojic[2], Enes Sukic[3], Patrik Sloboda[1]

[1]Technical University of Kosice, Faculty of Manufacturing Technologies with a seat in Presov, Institute of Advanced Technologies, Bayerova 1, 08001 Presov, Slovakia, darina.duplakova@tuke.sk
[2]University PIM Banja Luka, Technical Faculty, Despota Stefana Lazarevića bb, 78 000 Banja Luka, Bosnia and Herzegovina
[3]University Union - Nikola Tesla, Faculty of Information technology and engineering - FITI, Jurija Gagarina 149a, 11 070 Belgrade, Serbia

ABSTRACT

The creation and evaluation process of the working environment is considered a demanding activity that requires extensive knowledge across a broad spectrum of specialized fields. Proper creation of the working environment ensures suitable working conditions, which impact the overall productivity and efficiency of manufacturing processes. Ensuring the creation of an appropriate working environment necessitates a multidisciplinary nature of the project, where logistics, production, and ergonomics synergistically interact. The creation of an ergonomically suitable working environment results from knowledge in the area of ergonomic load, as well as all factors of the working environment, which need to be implemented early in the education of future industrial managers and ergonomists. In line with current digital trends and educational opportunities, the presented article is also conceived, providing information about the possibilities of cooperating with various digital tools and ensuring the integration of expert knowledge among students in creating ergonomic working environments for industrial production. The introduction of the article is dedicated to the description of the ergonomic work environment and the possibilities of implementing digital tools in its assembly. The main part of the article highlights the synergy of integrating these tools for creating working environments with opportunities for inclusion within the educational process. The conclusion of the article provides a summary of the achieved results with recommendations for the educational process in the field of ergonomics.

Keywords: digital tools, work environment, ergonomics, education process.

MICRO:BIT AS A NEW TECHNOLOGY IN EDUCATION IN SCHOOLS IN SERBIA

Milan Veskovic[1*], Vasilija Simovic[2], Srđan Nogo[3], Olga Dukic[4], Ana Vulovic[4]

[1]University of Kragujevac, Faculty of Technical Sciences Čačak, Department of Computer Engineering, Svetog Save 65, 32 000 Čačak, Serbia, milan.veskovic@ftn.kg.ac.rs
[2]Active informatics, mathematics and tie BS Sava Šumanović, Zemun, 11 000 Belgrade, Serbia, simovic.vas@gmail.com
[3]University of East Sarajevo, Faculty Electrical Engineering, Vuka Karadžića 30, 71 123 Lukavica, Bosnia and Hercegovina, srdjan.nogo@etf.ues.rs.ba
[4]Active informatics, mathematics and tie Technical school Čačak, Cara Dušana, Čačak, Serbia olgadukic@tehnickacacak.edu.rs, anavulovic@tehnickacacak.edu.rs

ABSTRACT

The gap between abstract and often inconceivable frontal studies and the new wave of practical teaching, which forces the individualization and independence of students in education, is overcome by the introduction of new technologies, one of which is Micro:bit. By teaching students digital-technical literacy in a fun way, the interest and will of the students for the subject increases at the same time. The benefits of this device are not only aimed at students but also at teachers and the entire school system. Modernization and the introduction of new approaches pave the way for the schools of the future both in Serbia and around the world. The work is divided into two parts, the first theoretical part is about the basics of the micro:bit, the appearance of the device, its specifications, and the programming languages in which it is implemented, as well as the practical part, which is reflected in the survey of the current attitudes of teachers from Serbia.

Keywords: Micro:bit; digital literacy; block programming; Informatics; education.

INNOVATIONS AND TEACHING SYSTEMS IN THE TEACHING OF NATURE AND SOCIETY

Dragana Aleksić

Independent University of Banja Luka, Faculty of Education, Veljka Mlađenovića 12e, 78 000 Banja Luka, Bosnia and Herzegovina

ABSTRACT

The specificity of innovations and innovative ways of working in teaching dates back to the previous years of the educational system, but it always requires upgrading and improvement, especially use and application in practice. There has been a lot of talk about potential teaching systems, but there has always been a problem regarding application in the practical implementation of teaching and its process. As the teaching itself is very specific and requires good preparation and planning, innovative ways of working also require good preparation and planning. There are special types of learning that can only be applied in certain activities and with certain classes. The teaching of nature and society also requires special preparations in accordance with the teaching units in which new teaching models of work can be applied. It is very important to emphasize the importance of teaching nature and society, because in this way students not only get to know the environment around them, but they also prepare to learn through various experiments through innovative ways of working, which is the goal of this work. The research problem relates to the transformation of established ways of working into innovative ones that can be applied in practice and supplemented in further education. Students should be particularly interested in order to be active in this type of work and advancement. It is also necessary to further educate teachers in order to be able to apply innovative ways of working and to understand their importance in today's lifelong education system. It is of particular importance that educators are able to measure the difficulty of tasks according to the individual capabilities of each student individually, and accordingly plan teaching and its innovative work systems.

Keywords: Teaching, innovations, electronic learning, teaching systems, nature and society teaching.

RELIGIOUS TOURISM IN UNIVERSITY EDUCATION PROGRAMS IN HUNGARY

Elek Bartha

University of Debrecen, Faculty of Humanities, Department of Ethnography, Egyetem tér 1. 4032 Debrecen, Hungary, bartha.elek@unideb.hu

ABSTRACT

Religious tourism has been a dynamically growing social and economic phenomenon in our world for the past fifty years. Its roots can be traced back to thousands of years in a variety of religions. Nowadays, the number of religiously motivated trips worldwide is estimated to be at hundreds of millions every year. However, several times that number is accounted for by the amount of sacred destinations and similar program elements in other tour packages.

All of the features described above constitute a spectacular element of the life of faith and religiosity. Its economic significance is continuously increasing, and the individual churches are recognizing this while seeking to satisfy the practical needs of religious tourism. In Hungary, Christian pilgrimages go back a thousand years and, by today, the Protestant churches as well as the Jewish community have established the infrastructure for sacred travel purposes alongside those available in the Catholic and Orthodox churches. Courses on religious tourism are offered at several universities in Hungary either as a stand-alone major or as part of various programs.

This presentation intends to provide an analytical overview of the practice of this growing tourism sector in Hungary and its emergence in higher education.

Keywords: religious tourism, pilgrimage, university programs.

AUTHENTIC MATERIALS IN ESP TEACHING AT THE UNIVERSITY OF BANJA LUKA

Jelena Pažin[1], Sanja Maglov[2]

[1]University of Banja Luka, Faculty of Architecture, Civil Engineering and Geodesy, Bulevar vojvode Stepe Stepanovića 77/3, 78 000 Banja Luka, Bosnia and Herzegovina jelena.pazin@aggf.unibl.org
[2]University of Banja Luka, Faculty of Mechanical Engineering, Vojvode Stepe Stepanovića 71, 78 000 Banja Luka, Bosnia and Herzegovina, sanja.maglov@mf.unibl.org

ABSTRACT

This research paper investigates the utilization of authentic materials in English for Specific Purposes (ESP) teaching at the University of Banja Luka. It aims to explore the practices and perceptions of ESP lecturers regarding the integration of authentic materials into their teaching methodologies.

The study employs a comprehensive questionnaire distributed among ESP lecturers to gather data about the use of authentic materials. This questionnaire focuses on ESP textbook selection, integration of authentic materials, teaching challenges, and strategies for enhancing student engagement.

Initial findings from the survey indicate a deliberate emphasis among ESP lecturers on the importance of relevance, authenticity, and student involvement in their teaching methodologies. Teachers adapt materials to meet students' needs, actively strive to sustain interest in the subject matter, and value collaborative efforts with specialists and students to enhance the effectiveness of ESP instruction.

The paper provides valuable insights into the rationale behind the incorporation of authentic materials, effective integration strategies, and the potential benefits they offer to ESP learners. It highlights pedagogical implications and challenges associated with the use of authentic materials, emphasizing the importance of tailored approaches and collaborative efforts in ESP teaching. The paper concludes with recommendations for future research and practice, underlining the ongoing need for exploration and innovation in the integration of authentic materials in ESP instruction.

Keywords: ESP instruction, authentic teaching materials, authenticity, textbooks, materials selection and adaptation.

CHATGPT IN EVERYDAY TEACHING

Mitar Miki Tepić[1], Branka Tepić[2]

[1]PI SSC „Mihajlo Pupin“, Svetog Save 1A, 74 400 Derventa, Bosnia and Herzegovina, mitarmikitepic@gmail.com
[2]PI BS „Liješće“, Liješće bb, 74 450 Brod, Bosnia and Herzegovina

ABSTRACT

This research paper explores the role and potential of ChatGPT, a generative artificial intelligence model, in everyday teaching. With the increasing integration of technology into the educational system, ChatGPT offers innovative possibilities for personalized learning, support for students and teachers, and the development of critical thinking. Using a mixed-methodology approach, including quantitative surveys and qualitative interviews with teachers and students, the paper assesses how ChatGPT can enhance learning and teaching. Our findings indicate significant benefits of using ChatGPT in education, including increased student engagement, provision of individualized learning support, and facilitation of administrative tasks for teachers. However, the research also identifies challenges, such as ethical issues and the need for the development of digital literacy. The paper concludes with recommendations for the effective integration of ChatGPT into teaching processes and guidelines for future research.

Keywords: ChatGPT, AI in education, Personalized learning, Technology-assisted learning, Digital literacy.

FROM DESK TO TABLET: HOW MODERN TECHNOLOGIES SHAPE STUDENT MOTIVATION

Branka Tepić[1]*, Mitar Miki Tepić[2]

[1]PI BS „Lješće“, Lješće bb, 74 450 Brod, Bosnia and Herzegovina, brankamtepic@gmail.com
[2]PI SSC „Mihajlo Pupin“, Svetog Save 1A, 74 400 Derventa, Bosnia and Herzegovina

ABSTRACT

In the contemporary educational context, technology plays a pivotal role in shaping pedagogical approaches and students' learning experiences. This paper explores the impact of modern technologies, including digital tools and online platforms, on student motivation for learning. Utilizing a mixed-methods research strategy that encompasses quantitative surveys and qualitative interviews with elementary and secondary school students, the study aims to identify key factors that encourage or demotivate students in a digital educational environment. Preliminary findings suggest that access to personalized learning through technological tools can significantly increase student motivation, provided that challenges such as digital literacy and resource availability are adequately addressed. By analyzing data collected from various educational contexts, the paper presents a comprehensive overview of how technology can serve as a catalyst for student engagement and learning improvement. In conclusion, the paper underscores the importance of integrating technological innovations into educational strategies in a manner that respects individual student needs and promotes an inclusive and motivating classroom environment.

Keywords: Modern technologies, Learning motivation, Digital education, Personalized learning, Digital literacy.

GAMIFICATION IN DAILY GERMAN LANGUAGE TEACHING

Branka Tepić

[1]PI BS „Lješće“, Lješće bb, 74 450 Brod, Bosnia and Herzegovina, brankamtepic@gmail.com

ABSTRACT

This paper explores the potentials and impacts of gamification in the process of learning German in everyday teaching. Defined as the use of game elements in non-game contexts, gamification provides a novel approach to student motivation and engagement. The study builds on theoretical frameworks that support the application of gamification in education, including an analysis of specific examples and methodologies applicable in teaching German. Based on empirical data collected from various educational institutions, the effects of gamification on language learning were analyzed, including skills in speaking, writing, reading, and listening. The results indicate positive implications of gamification, thus encouraging further integration of this method into teaching curricula. The paper also proposes guidelines for implementing gamification strategies in everyday teaching, emphasizing the importance of tailoring games to specific educational goals and contexts.

Keywords: Gamification, German language instruction, Student motivation, Interactive learning, educational strategies.

OTHER TOPICS
OSTALE TEME

FLUID DYNAMICS

Srećko Stanišić[1], Srboljub Vuković[2], Sara Lučić[1]

[1]University of East Sarajevo, Faculty of Physical Education and Sports, Stambulčić, 71 420 Pale, Bosnia and Herzegovina, sreckostanisic@gmail.com
[2]University of Banja Luka, Faculty of Physical Education and Sports, Bulevar vojvode Petra Bojovića 1A, 78 000 Banja Luka, Bosnia and Herzegovina

ABSTRACT

Objective: This review aims to analyze and synthesize the current literature related to fluid dynamics in biomechanics, particularly focusing on studies investigating hydrodynamic effects on various biomechanical systems.

Method: A systematic literature review was conducted using databases such as PubMed and Google Scholar. Studies were selected based on their relevance to fluid dynamics, biomechanical systems, and key parameters examined.

Results: Fluid dynamics has applications in various biomechanical systems, including swimming strokes, hand and forearm movements, body positioning, and the influence of fluid parameters on performance.

Conclusion: Fluid dynamics contributes to performance optimization in various activities.

Keywords: fluid, biomechanics, sport biomechanics, CFD.

MAINTAINING MENTAL HEALTH THROUGH REGULAR EXERCISE

Éva Judit Szalánczi-Bartha, Zoltán Szalánczi

University of Debrecen, Faculty of Economics and Business, Institute of Sport Economics and Management, Böszörményi út 138, 4032 Debrecen, Hungary, bartha.eva.judit@econ.unideb.hu

ABSTRACT

There are numerous studies available confirming the prominent role of sport in the maintenance of mental health, in particular their contribution to stress management or to the prevention of depression (Meyer et al., 2020; Bartha, 2018; Haugen et al.,2016). Recreational sport is an excellent tool to prevent the development of health problems caused by stress. The chief objectives of my research have been to explore how often people use physical exercise as a stress management tool in their everyday life and where sport fits in the strategies for coping with stress. My specific aim has been to see if there is a difference in the effect of sport on mental health depending on the branch of sports pursued, the location for doing sports chosen and the company of other practitioners included in the activity. I have conducted a survey based on a questionnaire, which was completed by 241 respondents. Overall, my results reflect that, although a lot of people are aware of the role of sport in health, they do not consciously use it as a coping strategy. Sport has a positive impact on mental health in general, but there are specific forms of sport that are highly supportive of mental well-being. By consciously choosing the conditions or circumstances in which we work out, we can use sport to support multiple dimensions of mental health.

Keywords: mental health, stress management, leisure sport, sport psychology.

PARENTAL MOTIVATIONS RELATED TO YOUTH SPORTS

Zoltán Szalánczi, Éva Judit Szalánczi-Bartha

University of Debrecen, Faculty of Economics and Business, Institute of Sport Economics and Management, Böszörményi út 138, 4032 Debrecen, Hungary, szalanczi.zoltan@econ.unideb.hu

ABSTARCT

In my research, I am looking for the answer to what future benefits parents hope for in connection with their child's sports, and I also want to analyze the family background of young athletes. For children to fall in love with sports and thereby create the basis for a healthy adult life, it is important that their parents also support exercise in the initial steps. My goal is to find the basis of the motivation received from the family background, and thus to be able to determine which are the factors that most influence parents in guiding their children towards an athletic career. In my research, I am also looking for the answers to what are the opportunities and benefits available through sports, which motivate parents the most in encouraging their children to play sports, and what are the key areas that can be used to influence them the most. The main goal of my research is to be able to determine the areas considered most important for parents among the benefits of their child's sports activities and to assess what kind of help they need from the clubs. I conducted my research using an online questionnaire method, to which 727 responses were received from several regions of the country and clubs at different levels. The investigation enabled me to determine the most important factors and measures that affect parents and provide them with assistance. Based on my research, I received a clear answer that parents have a definite idea of what future benefits they can gain from their child's sports, be it social, financial, or factors affecting the child's later well-being. The positive effects were typically highlighted by the parents, where a kind of strengthening of the emotional bond with their child and the related positive feelings can be experienced. Such is the pride, or the provision of the experience, the center of which is the child. It is also clear from the results of the research that the support of parents by sports associations can be mainly divided into three groups.

Keywords: youth sport, family background, parents, soccer.

ANALYSIS OF PLASMA DYNAMICS IN AIR TRIGGERED BY NANOSECOND LASER PULSES: AN ANALYTICAL AND NUMERICAL APPROACH

Hristina Delibašić Marković[1], Violeta Petrović[1], Konstantinos Kaleris[2,3], Ivan Petrović[4]

[1]University of Kragujevac, Faculty of Science, Radoja Domanovića 12, 34000 Kragujevac, Serbia
[2]Hellenic Mediterranean University, Institute of Plasma Physics and Lasers, Tria Monastiria, 74 100 Rethymo, Greece
[3]Hellenic Mediterranean University, Physical Acoustics and Optoacoustics Laboratory, Music Technology and Acoustics Dept., 74 100 Rethymno, Greece
[4]Academy of Professional Studies Šumadija, Department in Kragujevac, Kosovska 8, 34 000 Kragujevac, Serbia, hristina.delibasic@pmf.kg.ac.rs

ABSTRACT

The study investigates the laser-induced breakdown (LIB) in gases, essential for plasma creation and rapid increase of free electron populations, highlighting its significance in scientific and technological areas like energy deposition and radiative emissions. It explores electron dynamics during LIB, emphasizing the need for precise free electron density analysis for modeling and controlling breakdown and secondary processes. The interaction between free electrons and heavy particles in a partially ionized medium is examined, necessitating a thorough understanding and control. A detailed analytical and numerical investigation into a free electron rate model for air plasmas triggered by nanosecond laser pulses is presented. This model, incorporating multiphoton and cascade ionization, electron diffusion, recombination, and attachment, provides a closed-form expression validated by experimental simulations. It accurately predicts electron density evolution under varying laser intensities and focal sizes and explores plasma response to different laser parameters. This work offers insights into plasma characteristics' dependency on laser settings, aiding in complex models for electron and ion temperature evolution, thermoelastic expansion, and shock-wave phenomena post-LIB. This integrated approach enhances understanding of plasma dynamics induced by nanosecond laser pulses, benefiting scientific and technological applications involving LIB.

Keywords: analytical solution, numerical simulations, laser-induced breakdown, nanosecond laser gas ionization.

QUANTITATIVE INSIGHTS INTO PLASMA GENERATION IN SKIN TISSUES BY NANOSECOND LASER PULSES: A NUMERICAL STUDY

Hristina Delibašić Marković[1], Violeta Petrović[1], Carlos Molpeceres[2], Ivan Petrović[3]

[1]University of Kragujevac, Faculty of Science, Radoja Domanovića 12, 34000 Kragujevac, Serbia, hristina.delibasic@pmf.kg.ac.rs
[2]Universidad Politecnica de Madrid, Centro Laser, C/ Alan Turing, 1, 28 031 Madrid, Spain
[3]Academy of Professional Studies Šumadija, Department in Kragujevac, Kosovska 8, 34 000 Kragujevac, Serbia,

ABSTRACT

This research focuses on the dynamics of electron behavior during the laser-induced breakdown (LIB) in skin tissues, pivotal for plasma generation in biomedical contexts. Through a numerical analysis centered on high-intensity Nd:YAG laser pulses within the 500–1000 nm wavelength range and a 10 ns pulse duration, we explore the balance of electron gains and losses. This understanding is crucial for manipulating LIB processes, which play a significant role in innovating medical treatments and diagnostics. Employing a numerical model, our study simulates the evolution of free electron density in skin tissues, considering various ionization mechanisms like multiphoton, cascade, and chromophore ionization, as well as electron diffusion and recombination. The investigation enriches the theoretical base for LIB and offers practical guidance for fine-tuning laser parameters to enhance medical applications. It underscores the contribution of numerical simulations to the advancement of laser technologies in medicine, paving the way for the development of targeted and more efficacious therapeutic interventions.

Keywords: numerical simulations, laser-induced breakdown, nanosecond laser tissue ionization.

FREQUENCY OF FOREST FIRES DEPENDING ON ALTITUDE IN THE TERRITORY OF BOSNIA AND HERZEGOVINA

Sasa Ljubojevic[1], Branko Latinovic[2]

[1]Public Forest Enterprise "Forests of Republic of Srpska", Trg Republike Srpske No. 8/11, 78000 Banja Luka, Bosnia and Herzegovina, sasa.ljubojevic@sumers.org
[2]Pan-European University APEIRON, Pere Krece 13,78 000 Banja Luka, Bosnia and Herzegovina, branko.b.latinovic@apeiron-uni.eu

ABSTRACT

The result of this work is the analysis of the occurrence of forest fires detected by satellite and their distribution depending on the altitude. The detected fires were analyzed using GIS in relation to the digital terrain model of Bosnia and Herzegovina. Based on the obtained data, a digital map of the threat of forest and forest land from forest fires was created in relation to altitude. The analysis performed in this paper represents the basis for future research on the threat of forests and forest land in the territory of Bosnia and Herzegovina. In addition to the created GIS background and analysis, the paper also provides guidelines on how to use the obtained data.

Keywords: forest fire, analysis, GIS, Bosnia and Herzegovina.

THEORETICAL FRAMEWORKS OF THE INFLUENCE OF SOCIAL MEDIA ON THE ATTITUDES AND BEHAVIOR OF USERS

Jelena Krstić, Ljubomir Zuber

[1]Institute of Economics in Belgrade, Kralja Milana 16, 11 000 Belgrade, Serbia, jelenacvijovic85@gmail.com
[2]University PIM Banja Luka, despota Stefana Lazarevića bb, 78 000 Banja Luka, Bosnia and Herzegovina, ljubomir.zuber@univerzitetpim.com

ABSTRACT

Various theories available in the international literature provide frameworks for understanding how social media platforms are integrated into the daily lives of individuals and how users' reliance on these platforms shapes their interactions, perceptions, and behavior patterns in the digital age. Media Dependence Theory, Uses and Gratifications Theory, Social Identity Theory and Cultivation Theory are prominent theoretical frameworks used in communication studies to better understand the relationship between media and individuals, and more recently they are dominantly applied in the context of social media. In this context, the objective of this paper is to provide an insight into the complex dynamics of the influence of social media on users and society in general, based on a review of research results that had the aforementioned theories as a conceptual basis.

Keywords: communication theories, social networks, promotion, user behavior.

THE ROLE OF THE MASS MEDIA IN CREATING THE POLITICAL ATTITUDE OF THE POPULATION

Sandra Đukanović

Vendom d.o.o, Veliko Blaško bb, 78250 Laktaši, Bosnia and Herzegovina,
sandra.djukanovic@vendomdoo.com

ABSTRACT

Mass media play a central role in informing the public about what is happening, both locally and globally, especially in those areas about wich consumers of media content do not have direct knowledge or experience. Recent researches have shown that the mass media do have undeniable role in creating public opinion, influencing the thoughts, attitudes and value system, as well as the lifestyle and behavior of the average user of media services.

Mass media influence our perception of realyti even when they are not the only source of that reality. The aid of this work is to determine in what way the mass media influence the creation of the political atitude of the population, especially in Republic of Srpska, Bosnia and Herzegovina. The role of the mass media in creating the political attitude of the population is multiple. Apart from choosing only a few from the multitude of events to "expose" to the public's attention, the media also influence the way we understand specific events. In the language of theory, they frame or interpret events and thus highlight or ignore some parts of reality. This "framing" occurs with the multitude of pressures (economic, personal, ideological and especially political) that every journalist or media is under when reporting on events, wich also influence what and how the event will ultimately be presented.

Keywords: mass media, political attitude, public opinion, framing, interpretation of events.

RTRS AND BNRTV - MASS MEDIA THAT SHAPE REALITY OR INFORM THE PUBLIC

Sandra Đukanović

Vendom d.o.o, Veliko Blaško bb, 78250 Laktaši, Bosnia and Herzegovina,
sandra.djukanovic@vendomdoo.com

ABSTRACT

According to multiple consecutive studies made by TV station viewership measurement agencies, BNRTV (Radio Television BN) and RTRS **(**Radio Television of Republika Srpska**)** represent the most watched and influential mass media in Republic of Srpska.

The aim of the research conducted within this study is to demonstrate, through comparative analysis (particularly focusing on the media's informative functions), how the two most watched television stations in Republic of Srpska deliver information and news to the public.

Special attention is devoted to agenda-setting and the concept of framing in media, which involves selecting which part of the information will be considered more prominent. Based on the research (tracking of the main news programs of both television stations in past four years with an emphasis on 7 days in may ,2024), the conclusion was drawn that there is a significant influence of agenda-setting and media framing in the media reporting of RTRS and BNRTV. It is evident in the agenda-setting of both television stations that bias in reporting (visibility bias) as well as bias in filtering (selective bias or bias in selection) are easily observable.

The research also revealed that both television stations have their own regularities in setting the agenda, leading to very little overlap in the agenda, especially when it comes to emphasizing the importance of certain news items.

Keywords: RTRS, BNRTV, information, agenda-setting, bias.

ADDITIONAL PAPERS
DODATNI RADOVI

CHALLENGES OF TURNING THE WESTERN BALKANS INTO CIRCULAR ECONOMY

Jelena Dimovski

Public International Business College Mitrovica, Faculty of International Business Management, Bislim Bajgora nn, 40000 Mitrovica, Kosovo, j.stanojevic@ibcmitrovica.eu

ABSTRACT

Transition of the Western Balkans (WB) to the more sustainable economy is foreseen in the Green Agenda, an aspiring initiative jointly developed by the WB countries and European Union. Following the initiative, the Western Balkans tend to create a prosperous and equitable society with dynamic and resource efficient circular economy. This can be reached by minimizing greenhouse effects, stimulating the economic growth based on resource use that will further lead to economic benefits such as job creation in the new green and digital sectors. Moving to circular economy, as one of the main goals of the Green Agenda, encourages WB countries to initiate circularity in business models, increase resource productivity, produce and consume goods more efficiently and in more innovative manner, enhance waste management and use waste as a resource. The aim of the research is to examine the importance and necessity of green transition for the Western Balkans, as well as the key preconditions for its implementations. Insight into the regulatory and institutional requirements, need to redesign a sustainable economic development model towards green transition and development opportunities created by such a model serve to respond to the research goal and build a foundation for further researches.

Keywords: Western Balkans, circular economy, sustainable economic growth.

THE IMPACT OF DIGITAL MARKETING ON MODERN BUSINESS AND ADVERTISING

Isidora Milošević[1], Milica Grbić[2], Biljana Bjelica[3]

[1]Visoka škola za uslužni biznis Istočno Sarajevo – Sokolac, Cara Lazara 73, 71350, Sokolac – Istočno Sarajevo, Bosna i Hercegovina, isidora@vub.edu.ba
[2]Visoka tehnička škola strukovnih studija u Novom Sadu, Školska 1, 21000, Novi Sad, Srbija, grbic@vtsns.edu.rs
[3]Visoka škola za uslužni biznis Istočno Sarajevo – Sokolac, Cara Lazara 73, 71350, Sokolac – Istočno Sarajevo, Bosna i Hercegovina, biljana@vub.edu.ba

ABSTRACT

In today's world, alongside increased market globalization and economic regionalization, business success relies on the utilization of modern information technology. The emergence and development of the Internet and the networking of businesses and public administrations, driven by digital marketing strategies, have led to significant changes in how business systems operate and their efficiency. It has facilitated easy and fast communication, almost instant transmission of large amounts of data over long distances, simple publishing and updating of multimedia documents and their continuous global availability, digital delivery of goods and services, direct online payments, creation of virtual organizations, etc. All of these represent elements of a new form of business. Electronic commerce is a broad concept encompassing all business transactions or information exchanges conducted using information and communication technology between: businesses, businesses and their customers, or businesses and public administrations.

Keywords: globalization, information technology, internet, communication, electronic commerce.