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INTERNATIONAL CONFERENCE ON ADVANCES IN SCIENCE AND TECHNOLOGY

III INTERNATIONAL CONFERENCE ON
ADVANCES IN SCIENCE AND TECHNOLOGY

BOOK OF ABSTRACTS

FACULTY OF MANAGEMENT HERCEG NOVI

HERCEG NOVI, MONTENEGRO

29 MAY - 01 JUNE 2024

Faculty OF MANAGEMENT HERCEG NOVI

FAKULTET ZA MENADŽMENT HERCEG NOVI

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ADVANCES IN SCIENCE AND TECHNOLOGY

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HERCEG NOVI, 29 MAY - 01 JUNE 2024

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Grgurević Nikša, PhD **(MNE)**, Faculty of Management, Herceg Novi; Grigorieva Natalia Olegovna, PhD **(RUS)**, ICLINIC Medical Center, St. Petersburg; Holzner Johannes, PhD **(DEU)**, Department of Agriculture, Food and Nutrition, University of Applied Sciences Weihenstephan-Triesdorf, Weidenbach, Iskakov Irlan Zhangazyevich, PhD **(RUS)**, University at the Inter-Parliamentary Assembly EurAsEC, St. Petersburg; Jaganjac Jamila, PhD **(BIH)**, Faculty of Business Economics, University Vitez, Travnik; Jovanović Jovana, PhD **(MNE)**, Faculty of Management, Herceg Novi; Jovanović Mihailo, PhD **(MNE)**, Faculty of Management, Herceg Novi, Jovanović Djordje, PhD **(MNE)**, Faculty of Management, Herceg Novi; Jovanović Olivera **(MNE)**, Faculty of Mechanical Engineering, University of Montenegro, Podgorica; Jovković Ljiljana, PhD **(SRB)**, MB University, Belgrade; Jurakić Marko, PhD **(HRV)**, Vimal Academy for Human Resources Development, Zagreb; Karabegović Edina, PhD **(BIH)**, Technical Faculty of the University of Bihać; Karabegović Isak, PhD **(BIH)** Academician of Academy of Sciences and Arts of BIH; Kartseva Aleksandra, PhD **(RUS)**, University at the Inter-Parliamentary Assembly EurAsEC, St. Petersburg; Kartoshkin Alexandr Petrovich, PhD **(RUS)**, Saint-Petersburg State Agrarian University; Kirkorova Lyudmila, PhD **(RUS)**, Yaroslav-the-Wise Novgorod State University, Veliky Novgorod; Kirovska Zanina, PhD **(MKD)**, Integrated Business Institute, Skopje; Kirsanova Natalia Pavlovna, PhD **(RUS)**, University at the Eurasec Interparliamentary Assembly, St. Petersburg; Klarić Dragan, PhD **(MNE)**, Faculty of Management, Herceg Novi; Kuzminykh Olga Borisovna, PhD **(RUS)**, University at the Inter-Parliamentary Assembly EurAsEC, St. Petersburg; Koščak Marko, PhD (SVN), Faculty of Tourism, University of Maribor; Kostić Vasilije, PhD **(MNE)**, Faculty of Management, Herceg Novi; Koprivica Suzana, PhD **(SRB)**, University "Union - Nikola Tesla", Belgrade; Liehuang Zhu, PhD **(CHN)**, Beijing Institute of Technology, Beijing; Lučić Milo, PhD **(MNE)**, Faculty of Management, Herceg Novi; Lukić Nikolić Jelena, PhD **(SRB)**, Modern Business School, Belgrade, Serbia; Maksimović Sekulić Nina, PhD **(SRB)**, Modern Business School, Belgrade, Serbia; Markuz Ana, PhD **(HRV)**, Libertas International University, Zagreb, Croatia; Martinović Srdja, PhD **(MNE)**, Faculty of Law, University of Montenegro, Podgorica; Mašović Azemina, PhD **(MKD)**, Integrated Business Faculty, Skopje; Mihajlović Milan, PhD **(SRB)**, Modern Business School, Belgrade, Serbia; Milošević Danijela, PhD **(SRB)**, Faculty of Technical Sciences Čačak, University of Kragujevac; Mirović Dejan, PhD **(MNE)**, Faculty of Business Economics and Law, Bar; Moskvicheva Yelena Vladimirovna, PhD **(RUS)**, Peter the Great St. Petersburg Polytechnic University; Novićević Rajko, PhD **(MNE)**, Faculty of Business Economics and Law, Bar; Omarova Natalia Yurievna, PhD **(RUS)**, Department of Economics, Yaroslav-the-Wise

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PLENARY LECTURES

AGRICULTURE IN THE NEXUS OF CLIMATE CHANGE, SUSTAINABILITY, ANIMAL WELFARE AND DIGITALIZATION

Johannes Holzner[1], Dragan Brkovic[1], Carsten Hümmer[1]
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ABSTRACT:
Our society and the Agricultural production systems worldwide are more and more defined by the influence of climate change. Sustainability systems either for the industry and agriculture face huge challenges to feed the people. Moreover, there is a gap in the demands of the country side and megacities.
In many countries, society demands simultaneous advancements in sustainability of production systems and animal welfare. One of the aspects of possible pathways to solutions is the continuation of the process of digitalization than is currently already taking place in agriculture. To initiate and enable discussion on the possibilities of international cooperation in this field, this work aims to both give an overview of the current trends in Germany and examine key factors in detail.

Keywords: *agriculture, climate change, country side, animal welfare, digitalisation, sustainability*

SME DEVELOPMENT IN EU AND TRANSITION COUNTRIES

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ABSTRACT:
Small and medium-sized enterprises (SMEs) in the EU and transition states faced in 2022 and 2023, not only the consequences of the global recession from 2020, due to the COVID-19 pandemic, but also with new economic uncertainty and global turbulence (energy crisis, inflation, tightened monetary policy), which significantly worsened their business conditions. The conditions for the development of entrepreneurship have significantly worsened due to the energy transition, intense climate changes and the reduction of biodiversity and the growth of poverty. Fear of entrepreneurial failure has increased in all countries, expectations of new entrepreneurs have fallen during the recession. Key challenges and risks for SMEs relate to: the large productivity gap between SMEs and large enterprises, inflationary pressures, slow establishment of new firms and start-ups, disruptions in the supply chain and turbulence in the financial sector. The research in the paper is focused on the analysis of the structural performance of SMEs in transitional and EU countries, with a special emphasis on the development of SMEs in Serbia. The methodological instrumentation is based on the structural, dynamic and comparative analysis of SMEs, as well as the results of relevant international research (Global Entrepreneurship Monitor, Small Business Act, etc.).

Keywords: *small and medium enterprises (SMEs), development and structural performance, key challenges and risks of SMEs.*

ENGINEERING, TECHNOLOGY AND MATERIALS

BIOTECHNOLOGICAL PRODUCTION OF TRICHODERMA BIOFUNGICIDE ON STARCH-RICH WASTEWATER

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ABSTRACT:
In order to reduce the use of pesticides and protect plants with as little risk as possible, it is necessary to introduce biopesticide preparations. Usually, for the biotechnological production of microbial biofungicides, synthetic or semi-synthetic medium are mostly used. However, the price of the cultivation medium can significantly affect the cost of production so, it is necessary to find alternative medium. Accordingly, the goal of this research was to investigate the possibility of using starch-rich wastewater in the production of Trichoderma biofungicide. Wastewater obtained from the potato processing industry was used as a cultivation medium in this research. Different concentrations of wastewater were used as a medium for the cultivation of Trichoderma harzianum K179. Cultivation was carried out in Erlenmeyer flasks on a shaker at 170 rpm for 5 days. After 5 days of cultivation, the cultivation broth was tested in vitro against two phytopathogenic isolates, Fusarium graminearum and Aspergillus flavus, both isolated from infected maize cobs. The statistical analysis of the obtained in vitro results of the inhibition zones diameter showed that undiluted wastewater has the greatest potential as a medium for the production of Trichoderma biofungicide. After validation experiment in Woulff bottle on the undiluted wastewater media, the success of the bioprocess was confirmed. The maximum mean values of the inhibition zone diameter formed against isolates of F. graminearum and A. flavus were 54.33 mm and 31.33 mm, respectively. The obtained results are the basis for the continuation of research and further development and scale-up of this bioprocess.

Keywords: *Trichoderma harzianum, biotechnological production, wastewater utilization, biocontrol, maize disease*

Acknowledgements*: This work was supported by the Ministry of Education, Science, and Technological Development of the Republic of Serbia (project number: 451-03-47/2023-01/200134).*

ASSESSMENT ECOTOXICITY OF THE HEAVY METALS IN THE WATER OF THE BREGAVA RIVER AND THEIR IMPACT ON HUMAN HEALTH

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ABSTRACT:
Ecotoxic metals are metals that in their dissolved phase are "poisonous" to living word. The toxicity of heavy metals can reduce energy levels and damage the functioning of the brain, lungs, kidneys, liver, blood composition and other important organs. Long-term exposure can lead to gradual progression of physical, muscular and neurological degenerative processes that cause diseases like multiple sclerosis, Parkinson's disease, Alzheimer's disease and muscular dystrophy. Repeated and long-term exposure to some metals and their compounds can even cause cancer. Even if they do not have any biological function, the toxic effects of these metals remain in some other forms that are harmful to the human body and its proper functioning.
In this paper analyzed the concentrations of ecotoxic metals in the water of the Bregava River in the city of Stolac, in four different seasons when the water level is different. The obtained results were compared with the MDK values and appropriate conclusions were reached.

Keywords: *ecotoxic, poison, disease, concentration, health*

CHALLENGES IN XANTHAN PRODUCTION FROM BIOFUELS INDUSTRY EFFLUENTS

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ABSTRACT:
Xanthan or xanthan gum, commercially the most important biopolymer of microbial origin, holds a significant position in the global bioproducts market. Industrially, it is produced by aerobic submerged cultivation of bacteria from the genus Xanthomonas on appropriate formulated media, in batch stirred tank bioreactors and under optimal conditions. The total cost of industrial xanthan production can be reduced by using the media based on alternative substrates that are less expensive than usually used glucose and sucrose containing media. Numerous agro-industrial effluents are considered for that purpose. Among them, effluents generated during production of biodiesel and bioethanol, environmentally attractive alternatives to fossil fuels, are ranked as highly promising due to their quality and quantity that will be enlarged as a result of expansion of biofuels industry. In this review, crude glycerol and distillation stillage are analyzed because they remained in the largest amount after biodiesel and bioethanol production, respectively. The data from available literature related to characterization of these effluents as raw materials for xanthan production are summarized, and the criteria for their biotechnological utilization are given. In addition, the success of xanthan biosynthesis on media prepared with crude glycerol and distillation stillage are compared. The systematization of collected data will contribute to a better understanding of the challenges related to the xanthan production on biofuels industry effluents.

Keywords: *Biotechnological production, xanthan, crude glycerol, distillation stillage, waste utilization*

Acknowledgements*: This article is part of the projects (451-03-47/2023-01/200134 and 337-00-110/2023-05/25) funded by the Ministry of Science, Technological Development and Innovation of the Republic of Serbia and short-term project (142-451-3166/2023-01/01) funded by the Provincial Secretariat for Science and Technological Development of Vojvodina.*

THE SIGNIFICANCE OF VISUAL INSPECTION WITHIN THE QUALITY VERIFICATION OF LOW-VOLTAGE ELECTRICAL INSTALLATIONS – PART 1 – PREVENTIVE FIRE PROTECTION

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ABSTRACT:
The paper explains the importance of a well-executed visual inspection of low-voltage electrical installations conducted within the periodic verification of the quality of electrical installations. Depending on the type of hazard, identified irregularities observed by visual inspection can be classified into two categories: irregularities that may cause a fire and irregularities that may lead to an electric shock. The paper outlines the most common irregularities that may cause a fire encountered by the team of experts from the Faculty of Electrical Engineering, University of Belgrade, during the periodic quality verification of low-voltage electrical installations in public, commercial and industrial facilities in the period 2012–2023. Additionally, the paper presents checklist that can be used for preventive visual inspections to timely identify hazards from irregularities that may cause a fire.

Keywords: *low-voltage electrical installations, quality verification, visual inspection, fire*

THE SIGNIFICANCE OF VISUAL INSPECTION WITHIN THE QUALITY VERIFICATION OF LOW-VOLTAGE ELECTRICAL INSTALLATIONS – PART 2 –PREVENTIVE PROTECTION AGAINST ELECTRIC SHOCK

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ABSTRACT:
The paper explains the importance of a well-executed visual inspection of low-voltage electrical installations, focusing on irregularities that could lead to an electric shock. It outlines the most common irregularities encountered during visual inspections of low-voltage electrical installations in public, commercial, and industrial facilities, conducted by the team of experts from the Faculty of Electrical Engineering, University of Belgrade, in the period 2012–2023. The paper introduces a checklist, derived from the experience of quality verification of low-voltage electrical installations, which can be used within the visual inspection for timely identification of hazards that may cause an electric shock.

Keywords: *low-voltage electrical installations, quality verification, visual inspection, electric shock*

INFLUENTIAL FACTORS ON THE RESPONSE OF A BODY EXPOSED TO MULTIAXIAL VIBRATIONS

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ABSTRACT:
Whole-body vibrations represent one of the causes of spinal disorders in humans. Prolonged exposure to multiaxial vibrations can lead to harmful consequences for the musculoskeletal system, while repetitive occurrences may result in the development of pathological changes in the spinal column. The biodynamic responses of seated passengers exposed to whole-body vibrations have been extensively studied in terms of the apparent mass or seat-head transfer functions across a wide frequency range of vibrations. In this work, the subjects were exposed to multiaxial vibrations. Seat-head transfer functions were determined in order to evaluate the biodynamic response of the body and influencing factors on the frequency response.

Keywords: *biodynamic responses, multiaxial vibrations, musculoskeletal system, transfer function*

A REVIEW OF FRICTION WELDING: TYPES AND MACHINING PARAMETERS FOR ALUMINUM ALLOYS

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ABSTRACT: *This paper provides a comprehensive review of crucial aspects of the concepts and types of Friction Welding (FW). Recognized as one of the most economical and highly productive methods for joining both similar and dissimilar metals, FW has garnered significant attention in various industries. Its widespread application includes the joining of challenging alloys such as steel, titanium, and aluminum, where conventional welding processes face limitations. The joint quality achieved in FW is paramount, and its enhancement is closely tied to the manipulation of machining parameters, with axial force, rotational speed, and traverse speed playing pivotal roles. These parameters significantly impact the efficiency and effectiveness of the FW process. In this review, particular emphasis is placed on the detailed analysis of these parameters concerning the friction welding of aluminum and its alloys. Understanding the intricate relationship between axial force, rotational speed, and traverse speed during the friction welding of aluminum is crucial for optimizing the process and achieving superior joint quality.*

Keywords: *Friction Welding, Machining Parameters, Aluminum Alloys*

HYBRID ENERGY SYSTEMS

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ABSTRACT:

A hybrid energy system combines energy production and/or storage by using two or more energy sources to run a generator. Their application enables an easier transition from fossil fuels to alternative energy sources. This is manifested through the research of new technologies that integrate renewable energy sources. By implementing hybrid energy systems using the existing energy infrastructure, the costs of building new plants, the impact on the environment and system disruptions are reduced.
The planning of the hybrid power system, in addition to the needs of technological development, is also focused on the needs of the market. The priority is to configure a combination of energy technologies, which will be sufficient and reliable for the needs of end users. It should be emphasized that at least one renewable fuel source is used in hybrid systems. The system is designed for the needs of increasing the reliability and utilization of renewable energy sources by ensuring continuous energy production. Therefore, it is necessary to ensure the storage of electricity produced from renewable sources due to their volatility.
With the implementation of hybrid energy systems, the goal is to use renewable energy sources for electricity production, primarily from the ecological aspect of reducing the negative impact on the environment.

Keywords: *hybrid systems, renewable sources, electric power system, ecology*

ANALYSIS OF THE CORRUGATED STRUCTURE OF THE APATURA ILIA BUTTERFLY AS A BIOMIMETIC MODEL FOR THE POTENTIAL DESIGN OF NEW NANOSTRUCTURED MATERIALS

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ABSTRACT:
The structure of an Apatura ilia butterfly wing was examined. The corrugation of the structure provides a suitable surface for detection system materials. It was discovered that this is a partial ordering structure, and randomness in the recognized pattern was noticed. The key analysis parameter was particle density. The results demonstrated that the observed structure is perfectly consistent with the order of transparent materials. The surface density demonstrates the pattern's repeatability, which is vital for stimuli transfer because it functions as a type of actuator in its whole. When examined, the Apatura butterfly wing structure serves as a representative model for nanomaterials that could be used in many forms of sensing, medicinal, and military applications.

Keywords: *Apatura ilia butterfly, corrugated materials, structure analisys*

TRANSITION OF HEATING PLANT FROM COAL TO NATURAL GAS – CASE STUDY OF KRAGUJEVAC, REPUBLIC OF SERBIA

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ABSTRACT:
Kragujevac is one of the biggest industrial and educational centers in the Republic of Serbia with more than 150,000 citizens. For many years this city has struggled with intensive air pollution caused by particle matter (PM), consequently influencing the environment, citizens' health, and life quality. One of the biggest sources of pollution in this city is the heating plant which was powered by coal until season 2023/2024, from heating season 2023/2024 it operated only using natural gas. This study analyses the consequences of this transition on air pollution in the city of Kragujevac. The analysis includes the monthly concentration comparisons for analyzed seasons and the comparison of the seasonal average concentrations of $PM_{2.5}$.

Keywords: *air pollution, environment, human health, life quality*

NATURAL BLUE SPIRULINA (*SPIRULINA PLATENSIS*) IN A NEW FRUIT JUICE DESIGN

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ABSTRACT:
One of the more popular fruit juices is cherry juice loved for its characteristic sweet-sour taste. Also, the use of blue spirulina, obtained by extraction from blue-green algae, is increasingly popular because of the less present characteristic smell and taste of algae. This research aimed to investigate the effect of added natural blue algae Spirulina platensis in concentrations (8% and 16%) on the nutritional and sensory properties of sour cherry fruit juice. Compared to control cloudy cherry juice, formulated fruit juices with blue algae have higher protein, fat, ash, carbohydrate contents, as well as minerals, especially potassium and sodium. The results of the sensory analysis through the hedonic scale showed that the formulation of cherry juice with 16% added spirulina has the highest overall acceptability rating, similar to the control juice. In addition, the 16% spirulina juice formulation has the potential to become a newly designed product for consumers who prefer a balanced healthy diet.

Keywords: *blue spirulina, fruit juice, nutritional composition, sensory properties*

Acknowledgments: *This research was financially supported by Provincial Secretariat for Higher Education and Scientific Research AP Vojvodina (Project no. No. 142-451-3144/2023-01/01), as well as by Ministry of Science, Technological Development and Innovation, Republic of Serbia, Institute of Food Technology in Novi Sad (No. 451-03-47/2023-01/200222).*

BEYOND SCREENS: ANALYZING SMARTPHONE USE AND LEARNING EFFECTIVENESS IN PROGRAMMING DISCIPLINES

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ABSTRACT:
Young people are increasingly using smartphones and less frequently computers. Modern education attempts to keep up with this trend through educational mobile applications and content adapted for use on phones. On the other hand, smartphones, with their limited display and input methods, cannot fully replace computers in acquiring software development skills. The question arises as to how habits of intensive use of mobile devices affect the learning performance of computer science students in disciplines involving programming. The habits and attitudes of computer science and information technology students at the Faculty of Technical Sciences in Čačak, as well as the teaching staff instructing programming, were analyzed. Quantitative methods (a questionnaire for students) and qualitative methods (interviews with teachers) were employed. The obtained results can be valuable for further research and immediate application in educational environments.

Keywords: *smartphones, higher education, computer science, programming*

EFFECTS OF AGING IN SERBIAN OAK *(QUERCUS PETRAEA)* BARRELS ON THE POLYPHENOL COMPOSITION AND ANTIOXIDANT ACTIVITY OF RED WINE

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ABSTRACT:
After the vinification process, red wines are usually characterized by an aging period in wooden barrels which play an important role by influencing the color, smell, taste and persistency of the wine. The type of wood, degree of toasting and contact time between wine and wood significantly impact the composition of extracted compounds. The aim of this work was to identify individual phenolic acids and flavonoids and to define the antioxidant activity of Merlot wine samples after 30 days of aging in five different oak (Quercus petraea) barrels from Serbia. The composition of polyphenolic compounds in the wine samples was determined by the HPLC method, while the antioxidant activity was determined using spectrophotometric DPPH (2,2-diphenyl-1-picrylhydrazyl), ABTS and reducing power (RP) assays. Throughout this study, it was observed an increase in the content of total phenolic acids in wines aged in oak barrels compared to the content of total phenolic acids in the control wine. What's more, HPLC analysis revealed that among phenolic acids, gallic acid had the highest concentration in all tested samples. Secondly, the most abundant flavonol was myricetin. Kaempferol and quercetin were present in significantly smaller amounts. All wine samples showed the ability to neutralize $DPPH^{\bullet}$*,* $ABTS^{\bullet+}$ *radicals and a high reducing power. The wine sample that was in contact with oak originating from the Batot forests showed the highest antioxidant activity through all three tests.*

Keywords: ***r****ed wine, polyphenols, oak barrels, antioxidant activity, chemical characterization*

SIMULATED ANNEALING FOR SOLVING THE UNRELATED PARALLEL MACHINE SCHEDULING PROBLEM WITH PROCESSING TIMES AND SETUP TIMES

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ABSTRACT:
This paper deals with the problem of job planning in the parallel connection of machines with the processing times of jobs on the machines and the times required for tool preparation when performing the next operation within one job. Job scheduling is a key area within resource planning and scheduling, especially in the design of large, flexible production management and optimization systems. The main goal of this research is to present a parallel job scheduling and scheduling model to minimize the total time of the objective function Cmax and improve production efficiency. In the introductory part of the paper, a comprehensive analysis of the relevant literature is presented, and the research methodology is described, as well as the application of the metaheuristic algorithm for the optimization of the problem of planning and job scheduling. The next part shows the optimization results and the efficiency of the proposed algorithm, based on the parallel planning model. The input parameters for the optimization were derived from the authors' previous work, which investigated a similar problem using a Genetic Algorithm (GA). In addition, this paper conducts a detailed analysis and comparison between SA and GA as two different approaches to solving the same problem. These findings contribute to a deeper understanding of the algorithms used and the introduction of additional constraints when solving future problems in the context of parallel deployment of machines. The results of this research provide a valuable contribution to the development of effective resource optimization strategies in industrial environments.

Keywords: *planning and scheduling, metaheuristics, processing times, machine setup times.*

NUMERICAL ANALYSIS OF THE TOWER HEIGHT IMPACT ON STRUCTURAL LOADING CAUSED BY WIND PRESSURE

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ABSTRACT: *Wind can significantly influence structural constructions. To investigate the wind's effect on building structures, data is collected on wind impacts at specific locations, and mathematical models describing wind effects are developed and enhanced. Based on new insights, guidelines are formulated for determining characteristic wind load values, which become part of the corresponding standards. This paper presents the procedure for applying wind loads to a tower following Eurocode 1: Actions on structures – Part 1-4: General actions – Wind actions. The wind loading is applied using a Visual Basic script, which accesses the model through the FEMAP Application Programming Interface (API) and imposes wind pressure. Using Finite Element Method (FEM) calculations, an analysis is performed on the tower's height impact on wind loading and stresses within the structure.*

Keywords: *Wind Effects, FEM Analysis, FEMAP Application Programming Interface*

THE INFLUENCE OF THE SPENT COFFEE GROUNDS EXTRACT ON WALNUT PASTE SHELF LIFE AND COMPOSITION

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ABSTRACT:

Walnuts are rich in nutrients, including omega-3 fatty acids, antioxidants, vitamins (such as vitamin E), and minerals (like magnesium and phosphorus). Walnuts are commonly commercialized as shelled or unshelled (as whole or ground kernels), but they also can be processed to obtain ingredients such as walnut oil, flour, and paste. This study aimed to investigate the effect of the spent coffee grounds (SCG) extracts on walnut paste shelf life. SCG extracts were prepared by solid–liquid extraction (K_1) and by ultrasound extraction (K_2). Antioxidant activity has been determined and the color, texture, and sensorial attributes were evaluated. Accelerated Shelf life analysis of walnut paste was conducted on OXI TEST. The addition of K_1 extract led to an increase in the antioxidant capacity measured by the DPPH test up to 142%, while K_2 increased the antioxidant capacity up to 170% compared to the control walnut paste sample. Similar results were obtained by other tests such as FRAP (K_1 194%; K_2 184%), ABTS (K_1 163%; K_2 224%), while the content of total polyphenols increased up to 110% and 123%, for K_1 and K2, respectively. The instrumentally determined change in the color of the walnut paste after the addition of the K_2 extract is higher than the K_1 extract. The analysis on the OXI TEST showed that the estimated shelf life of the walnut paste (at a temperature of 20°C is 219 days, with the addition of K_1 shelf life was extended to 287 days, and with K_2 is extended to 489 days.

Keywords: walnut, spent coffee grounds, shelf life

Acknowledgments: *This research was financially supported by Provincial Secretariat for Higher Education and Scientific Research AP Vojvodina (Project No. 142-451-376/2023-01/2), as well as by Ministry of Education, Science and Technological Development, Republic of Serbia, Institute of Food Technology in Novi Sad (Grant Number: 451-03-47/2023-01/200222).*

THERMAL ANALYSIS OF SOLAR WALL AIR HEATING SYSTEM

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ABSTRACT:
This study presents a thermal analysis of an air heating solar wall system featuring a modified Trombe wall design. The analyzed system comprises double glass glazing and a massive wall with an opening and central channel. The study aims to analyze the temperature distribution within the system to gain insights into its performance under varying constructive and operational parameters. Numerical simulations are used to assess dynamic temperature profiles within the system. The obtained results are analyzed to predict the effects of environmental parameter, such as solar radiation, ambient temperature, and wind velocity, on the temperatures of the solar wall. The proposed thermal analysis is important for determining the design parameters and operational conditions of the solar wall air system, thus advancing the development of sustainable and efficient passive solar heating solutions.

Keywords: *solar wall, air heating, modified Trombe wall, temperature distribution*

BIOETHANOL PRODUCTION FROM SUGAR BEET MOLASSES REMAINED AFTER THE OSMOTIC DEHYDRATION OF RED CABBAGE

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ABSTRACT:
Osmotic dehydration (OD) is a method to partially reduce the water content of fruits and vegetables, aiming to increase the shelf life of different food products. OD is usually a pre-treatment applied before the drying phase in food production. It is based on soaking fresh fruits or vegetables in a hypertonic solution, usually sucrose syrup. Recent investigations showed that sugar beet molasses is an excellent and low-cost hypertonic medium for OD of different foods. However, the main drawback of molasses application in industrial OD processes is the impossibility of regenerating diluted molasses remaining after OD, in difference to conventionally used sucrose syrup. This work investigated the potential of applying sugar beet molasses that remained after the osmotic dehydration of red cabbage as feedstock for bioethanol production. Batch alcoholic fermentations of media with different initial sugar concentrations of 100-200 g/L using Saccharomyces cerevisiae were investigated. The highest ethanol yield of 71,17 g/L was obtained by fermentation of media with an initial sugar concentration of 150 g/L. According to the results, molasses remaining after OD of red cabbage can be used as a convenient substrate for bioethanol production offering savings in process water and energy for mixing. Hence, efficient utilization of sugar beet molasses as a low-cost substrate for the osmotic dehydration of red cabbage with further application as feedstock for bioethanol production is feasible.

Keywords: *bioethanol, fermentation, molasses, osmotic dehydration, red cabbage*

PHYSICO-CHEMICAL PROPERTIES OF HOTEL'S SWIMMING POOLS WATER IN COASTAL AREA OF MONTENGRO

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ABSTRACT:
The swimming pools are very popular during the summer touristic seasone in Montenegro, but also they are identified as a potential source of human health risk for users, due to either chemical or microbiological contamination. Thus, the aim of this paper was monitoring of physical and chemical characteristic of swimming pools water, indoor and outdoor, in a coastal area of Montenegro during the summer season. The results of investigation generally indicated very good quality of swimming pools water. Conductivity, pH, turbidity, temperature and oxidability complied with the Montenegrin standards. Only residual clorine content in indoor swimming pools water was slightly above the maximum allowed concentrations, while this parameter for outdoor swimming pools water complied with prescribed value.

Keywords: *swimming pools water, outdoor pools, indoor pools, physico-chemical parameter*

A MECHATRONIC ARM AS AN AID FOR THE DEVELOPMENT OF CHILDREN'S COGNITIVE ABILITIES

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ABSTRACT:
In this paper a mechatronic arm, which enables different ways of material handling by using medical injectors, was developed. One of the examples is the removal of plastic cups from a vertically placed gravity storage. It was analyzed separately in the paper. The basic idea for the development of such a system stemmed from the need to help in children's cognitive abilities, that is, to enable children to understand spatial orientation as easily and simply as possible, and then learn the basic principles of robots operation. The mentioned mechatronic arm is realized in such a way that has five degrees of freedom. It is made up of three basic segments with associated rotational joints (as in the case of Articulated Robots) and two additional segments that make up a gripper, with associated rotational and linear joints. The functionality of the developed mehatronic arm was confirmed by testing in real working conditions. All the advantages and disadvantages of the developed solution were observed.

Keywords: *mechatronic arm, Articulated Robots, gripper, medical injectors, mechatronics for kids*

DISPLACEMENT OF GRAVITY RETAINING WALLS UNDER THE EFFECT OF SEISMIC LOADING

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ABSTRACT:
Understanding the behavior of support structures due to seismic influences is one of the oldest problems in geotechnical engineering. The devastating effects of earthquakes make this problem extremely important. The subject of this paper is the comparison of analytical (Richard-Elms method, Whitman-Lio method) and numerical (HS model, PLAXIS 2D) methods of calculating the seismic pressure on the retaining wall. Specifically, the permanent deformations-displacement of gravity retaining walls under the action of an earthquake will be analysed. From current point of view, it is interesting to evaluate the accuracy and justification of the application of simple approximate methods and compare them with more accurate numerical nonlinear analyses.
As the most significant conclusion is that analytical methods generally give higher displacement values compared to numerical methods. Specially, it should be noted that the Richard-Elms method, which is based on the active force calculated according to the Mononobe-Okabe method, gives displacement values that are several times higher than the displacements obtained by the calculation of the FE model, while the Whitman-Lio method provides displacement values that are much closer to the displacements obtained by the calculation of the FE model.

Keywords: *gravity retaining walls, seismic influences, Richard-Elms method, Whitman-Lio method, PLAXIS 2D*

APPLICATION OF 3D TECHNOLOGY IN THE EDUCATION OF STUDENTS IN FIELD OF MACHINE ELEMENTS

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ABSTRACT:
In order to improve teaching in the field of machine elements, the Faculty of Mechanical Engineering of the University of Montenegro introduced the application of innovative methods in the form of 3D technologies that were implemented in the practical part of the teaching. The use of 3D technologies, in the form of 3D modeling and printing of machine parts, allows students to gain a deeper understanding of machine elements through an interactive and visual experience. In addition to enabling students to create realistic models of machine elements in this way, 3D technologies also provide the possibility of simulating different working conditions and testing constructive solutions of machine elements in a virtual environment. This is particularly useful because students can combine different materials, shapes and dimensions of machine elements, and then perform experiments and investigate their influence on the behavior of machine elements in different working conditions. Also, this interactive learning method encourages creativity, teamwork, and problem-solving skills, which prepares students for the complex projects and challenges they will meet in their future careers.

Keywords: *3D model, 3D printing, machine elements*

THE INFLUENCE OF THE LASER BEAM ON THE QUALITY OF THE SURFACE WHEN THE PARAMETERS ARE CHANGED

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ABSTRACT:
Laser cutting and engraving machines are widely used in various industrial, commercial and creative contexts. This process is used for precision carving as well as creating detailed engravings or reliefs on a variety of materials, including metal, plastic, wood, glass and textiles. Laser cutting of materials has emerged as a key technology in modern manufacturing processes due to its precision, efficiency and versatility. The advantages of laser cutting include a precise result, a reduction of the thermally affected zone, a regular cut profile, edges that are smooth and straight, minimal or almost no deformation of the processed material, the ability to work at high speeds. One of the leading problems is the quality of the cut, which can depend on the manufacturing parameters, the quality of the material, the thickness of the material, and the focal length. This paper presents an analysis of the quality of the cut in relation to the change in manufacturing parameters and materials.

Keywords: *laser, cutting, parameters, material*

INVESTIGATION OF THE STABILITY OF *SILYBUM MARIANUM* PLANT EXTRACTS DEPENDING ON THE STORAGE AND PRESERVATION CONDITIONS

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ABSTRACT:
Silybum marianum contains secondary metabolites such as phenols and flavonoids, and other active substances that show antioxidant activity. In addition, it shows other significant properties such as antimicrobial, anti-inflammatory, hepatoprotective, antidiabetic and cardio protective properties, and therefore their extracts are used as herbal medicines.
In order for the extract to retain the herbal medicine properties with preserved biologically active substances as well as their activity, it is important to investigate their stability, which will remain throughout the product's shelf life. Biologically active substances can be thermolabile or volatile, abd therefore subjected to changes under the influence of environmental factors such as temperature, humidity, light, oxygen, and others. Testing the stability of herbal products is complicated, because the whole plant is considered an active substance, so it is possible to monitor stability through selected individual components and/or changes in the capacity of extracts biological activity. In this direction, changes in the content of total polyphenols and antioxidant activity were investigated depending on the exposure time, the effect of light and the storage temperature regime. Three temperature regimes were chosen: +4°C (refridgerated), 25°C (room temperature), and 40°C (extreme conditions). The samples were kept in light and dark bottles. Changes in the content of total phenols, flavonoids, and antioxidative activity with time of exposure were monitored. The effects of certain environmental parameters on the stability of plant extracts were determined and quantified. The research results can serve as an important tool in studies of the plant extracts stability and storage conditions.

Keywords: *Silybum marianum, stability, antioxidant activity, polyphenol*

APPLICATION OF FDM TECHNOLOGY IN PRODUCT DEVELOPMENT PROCESS: AN EXAMPLE OF CENTRIFUGAL FAN CARRIER FOR NESPI 4 CASE

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ABSTRACT:
This paper presents design and manufacturing process of the centrifugal fan carrier for the NESPI 4 CASE. Two centrifugal fans were selected as heat removal devices for the case. During the design process of the fan carrier, an analysis of the possibility of using the space of the case was performed, with certain limitations, and then 3D models of all the components of the device were created. Then, the design of the fan carrier was carried out, considering the given limitations. The carrier was manufactured using FDM 3D printing technology. During and after the assembly process, an operating and functionality check was performed, which showed that there is no inconsistency between the carrier and the other components of the device. Furthermore, functional test showed decreasing of computers' operating temperature, while noise level was in allowed range for human health.

Keywords: *product development, 3D model, FDM technology, fan, heat*

MEASURING INSTRUMENT AND FAULT DIAGNOSIS SYSTEM

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ABSTRACT:
With the advancement of information and microprocessor technologies, vibration analysis has become one of the more reliable and important methods of technical diagnostics. The paper presents the development of a new device for vibrodiagnostics of machine plants. Experimental results demonstrate that studying and analyzing vibrations of machines using LabVIEW programming is simpler, more effective, and visually comprehensible compared to other text-based languages. Additionally, this vibration testing system not only enables real-time data acquisition of multiple channels but also offers excellent expandability and high speed. Data analysis is conducted on the records collected with high-sensitivity piezoelectric sensors. Furthermore, the paper showcases measurement results obtained with the developed Micro Mon Rotech device in industrial environments.

Keywords: *Data Acquisition System, Vibro-diagnostics, Condition Monitoring, LabVIEW.*

TOPOLOGICAL AND GEOMETRIC DESRIPTORS USED FOR CLASSIFYING DIGITAL OBJECTS

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ABSTRACT:
The desription and classification of object shapes is a classical problem stemming from various problems in industry, medicine and applied sciences. We combining approaches from digital image processing, topology and machine learning to address such problems. After initially preprocessing the images (to decrease the contrast and the illumination differences), we binarize the images using increasing threshold values. We form the corresponding filtration and compute its persistent diagram, from which we derive several topological object descriptors, which we use for classifying digital objects. We also calculate some geometric classifiers, mostly related to area, perimeter and elongation. For each value, topological and geometric, we discuss its applicability, and compare new and existing classifiers.

Keywords: *classification, shape analysis, image processing*

CHOQUET-TYPE PSEUDO-INTEGRALS FOR FACE RECOGNITION

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ABSTRACT:
Pseudo-integrals are integrals based on fuzzy measures. Choquet and Sugeno integrals are among the most famous. The Choquet integral and its generalizations based on the Sugeno measure are especially interesting for applications. In the paper, one such integral is defined, but based on the so-called c-credibility measure. The construction of that measure on the final set based on singletons is given. . Facial recognition plays an important role, for example, in border control and verification of personal documents (passports, identity cards, driver's licenses, etc.), and can be solved, for example, by using different local descriptors. Each part of the face shown in the digital image can be compared with the corresponding part of another image, and from all these comparisons a conclusion should be drawn about the coincidence-overlapping of the two faces. Aggregation functions play an important role, especially Choquet-type integrals, which is also presented in this paper.

Keywords: *aggregation function, face recognition, fuzzy measure, pseudo-integral*

APPLICATION OF FUZZY METRIC SPACES IN IMAGE PROCESSING AND FIXED POINT RESULTS

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ABSTRACT:
The study of fixed point theory in metric spaces and its generalizations plays a crucial role in nonlinear analysis. This paper focuses on fixed point theory in the context of fuzzy metric spaces, introducing a novel class of contractive mappings and establishing a fixed point theorem for this class. An illustrative example is presented to validate the theoretical results, with implications for image processing using appropriate fuzzy metrics.

Keywords: *fixed point, contractive mapping, Cauchy sequence, image processing.*

PRECISION TECHNOLOGY FOR SUSTAINABLE OLIVE CULTIVATION FOR INNOVATIONS IN OLIVE OIL PRODUCTION VALUE CHAIN

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ABSTRACT:
Paper is based on pilot project implemented in Bar Municipality (Montenegro) that focuses on precision technology for sustainable olive cultivation implemented by Business Start Center in Bar and Barska uljara with support of PhD researchers. In particular, project focuses on using UAV (Unmanned Aerial Vehicle or drone) and sensor-stations to monitor cultivation of autochthonous olives type "žutica". Autochthonous olive trees of Montenegro are prone to alternate bearing, the quantity of raw material (olive fruit) is uncertain each year. Olive farmers therefore experience economically unstable business. The goal of the project is to propose precision technology that will modernize olive cultivation and create competitive value chain for sustainable and resilient autochthonous olive cultivation. Olive oil maid from this olive type creates unique value proposition of Montenegro and therefore the olive industry sector needs to undergo value chain analysis with goal of economic valorisation and commercialization. Precision technology is used to monitor the complete annual process of olive cultivation, during all the stages of both vegetative and reproductive organs growth and development. Olive pruning, for example, is labour intensive costly practice with important implications for crop harvest and nutrition. Pruning also affects soil protection and irrigation strategies. Currently in Montenegro it is conducted in traditional manner which involves on-ground measurements of the primary canopy dimensions, which also might generate inconsistent results due to the irregular geometry of the trees, especially old and millennial olive trees, characteristic for Montenegrin olive growing. This requires very intensive field work that is very costly and time consuming. Alternatives of this practice are researched in many olive growing countries, particularly in Italy, Spain and Greece. Based on these researches and published studies, we decided to implement pilot project that is based on UAV technology or more familiar name for this is drone technology is used for three-dimensional (3D) monitoring of hundreds of olive trees. Drone imagery in combination of sensor-stations are used just to monitor canopy characteristics from the pruning point of view, to monitor information about olive tree plantation mechanism, harvesting methods,

overall health status of the three – providing inputs for nutrient deficiencies. Four pilot areas are selected and we have set in place soil sensors which collect real time data. UAVs and the sensors provide high-resolution imagery and real-time data about crop health, pests and irrigation requirements. Gathering information about olive plantations will lead to optimization of inputs and to real time response to changes in climate conditions or other type of risks.

Keywords: *smart agriculture, precision agriculture, value chain, economic valorisation*

COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

IMPLEMENTATION OF INFORMATION SYSTEM DEVELOPMENT AND PRODUCTION MONITORING IN THE MANUFACTURING COMPANY „JUGOPLAST“

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ABSTRACT:

In the chapters of this scientific research paper, there will be discussion about the application of information systems in a company, organization, the types of information systems represented in the company, the functional areas where these types of information systems are present, with a special focus on the CASE tool MS Access and its application in the manufacturing company Jugoplast. Additionally, there will be mention of an innovation that will significantly simplify the monitoring of the production process. Considering that serial (mass) production often faces the problem of recording the number of shipments (semi-finished or finished products resulting from the work of a machine), it is necessary to implement a system that will automatically record the number of pieces produced at the machine's output (horizontal and vertical presses for extraction, forming, cutting, etc.). The system would involve a sensor that electronically sends data to a PLC, from which the worker reads the result and records it in a form.

Keywords: *information system, application of information system, production, production volume, database.*

FIXED POINT THEORY IN FUZZY METRIC SPACES WITH APPLICATION TO IMAGE PROCESSING

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ABSTRACT:
Fixed point theory in metric spaces as well as in spaces that represent the generalization of metric spaces is one of the most important areas of nonlinear analysis. There are numerous applications of this theory, such as: solving wide classes of differentials equation, optimization problems, theory of equilibrium, image processing and many other disciplines. In this paper we deal with fixed point theory in the frame of fuzzy metric spaces, where a new class of contractive mappings is introduced and the fixed point theorem for that class of mappings is proved. An example confirming the validity of the results is shown. Appropriate fuzzy metrics are applied to image processing.

Keywords: *fixed point, contractive mapping,Cauchy sequence, image processing.*

DETERMINING THE OPTIMAL NUMBER OF CHARACTERISTIC VECTORS IN MEDICAL IMAGES

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ABSTRACT:
Determining sets of feature vectors in image processing is crucial. Feature vectors represent essential characteristics or features extracted from the images. They serve as a concise and informative representation of the image content. Images often contain a large number of pixels, and processing them directly can be computationally expensive and inefficient. Feature vectors help in recognizing patterns and structures within the images. These patterns can be important for tasks such as object detection, classification, and segmentation. The goal of this research is to use mathematical modeling to arrive at the set that would be the best for the problem of detecting changes in the liver.

Keywords: *copy/move forgeri detection, image analysis, metaheuristic, clustering*

THE AUTOMATED APPROACH FOR MINIMIZING RISKS TO OARS WITH FOTELP-VOX TRANSPORT SIMULATIONS

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ABSTRACT:

This study introduces an evolutionary approach for minimizing risks to organs-at-risk during tumor therapy, utilizing the FOTELP-VOX program in voxel-based transport simulations (author R.Ilić). The use of voxels in the FOTELP program requires spatial constraints within a parallelepiped for targeted irradiation with a particle source. Particle interactions with the initial voxel are identified based on voxel density. The technique continues until the particle's fate is complete, verifying interactions on that path and modeling these processes. To simulate particle delivery, it uses Monte Carlo techniques. When particles are carried from an external source through the human body, the absorbed dose has a 3-D distribution. The CT data is used to characterize the anatomy of the patient.

The current methodology is based on a manuel trial-and-error approach. In order to expedite the discovery of an optimized solution, we explored various optimization strategies, such as random search, Bayesian optimization (BO), and genetic algorithm (GA), within the framework of FOTELP-VOX. By evaluating these approaches, our research seeks to identify the most effective strategy for minimizing risks to organs-at-risk during radiation exposure. Two novel methodologies, namely FOTELP-VOX-BO and FOTELP-VOX-GA, are proposed.

The introduction of FOTELP-VOX-BO and FOTELP-VOX-GA methodologies further expands the research's potential applications and relevance within the domain of Monte Carlo transport simulations.

Keywords: *Tumor therapy, voxel-based simulations, evolutionary optimization, Monte Carlo techniques.*

MODELING OF NATURAL HAZARDS INDICATORS IN THE R PROGRAMMING LANGUAGE

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ABSTRACT:
Modeling and simulation in the risk management of natural catastrophic events is, like the modeling of geographic processes, primarily a complex mathematical process based on a series of large amounts of data. The choice of locations for data collection, types of sensors, acquisition and validation of such series is a complex activity. However, the choice of an adequate mathematical model with the possibility of comparing results and executing several models represents a special challenge. One of the good ways is to execute the existing models contained in the R programming language library. The mentioned approach is implemented in the courses Modeling and simulation in risk management, Faculty of Technical Sciences and Fundamentals of modeling geographic processes, Faculty of Sciences in Novi Sad. By using SPEI and similar libraries containing the R programming language and data from eight experimental, climatological stations in the vicinity of Novi Sad, students and researchers are able to implement existing models, to perform their graphical representation and to predict possible trends in the future.

Key words: *programming language R, SPEI, modeling and simulation, risk management, hazard, risk, exposure, vulnerability.*

TRACKING AND FORECASTING STUDENTS' PROGRESS USING PROMETHEE II AND MLP METHODS

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ABSTRACT:
The paper focuses on a significant issue in higher education related to students' progress and performance in exams. During the semester, students would benefit from knowing whether their work on the course is sufficient to achieve the desired result on the final exam. If a student is informed at the right moment that success in the subject is unlikely, it could encourage them to work harder for the rest of the semester and achieve their goal. However, if a bad result is expected for most students, a change in the teaching method should be considered. To give students timely advice, it's necessary to assess their level of knowledge and then predict their expected exam results. Therefore, the research aims to determine whether a particular student or more will complete the course. In the solution proposed in this paper, the student's knowledge is assessed using the MCDM method - PROMETHEE II, which considers four criteria (attendance, activity, homework, and tests), and the teacher's preferences in five time moments (t2,...,t6). This helps to obtain a progress function for the student, which shows how they are progressing toward their goal. Based on the values of the progress function in milestones t2-t6, student achievement is categorized through grades. The Multilayer Perceptron Algorithm is used for grade classification. The findings clearly justify that PROMETHEE II and MLP models are appropriate for tracking, classifying, and forecasting student achievement.

Keywords: *MCDM, PROMETHEE II, MLP, student’s achievement tracking, student’s achievement forecasting*

MODELING MOBILITY PERFORMANCE WITHIN SMART CITY INFRASTRUCTURE USING URN DIAGRAMS

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ABSTRACT:
The implementation of "smart city" projects can undoubtedly benefit from a reliable information system to monitor autonomous electric car charging stations. Developing such a system is indeed a complex process that requires careful planning and consideration of various operating scenarios. It's crucial to ensure that all aspects of the system are well-designed and implemented to meet the needs of the users and the community. In this paper, one such scenario through the User Requirements Notation (URN) as modeling language used to model and analyze requirements is developed. The centrepiece of this system is jUCM-Nav, an open modelling, analysis, and transformation tool for URN that operates on the Eclipse platform. Stored information on autonomous electric car charging stations includes the maximum energy capacity, current energy state, unit energy price, distribution cost, and identifier. The car database stores the owner's name and surname, the current energy state and capacity, and the account balance. The information system should simulate charging and record the receipts generated after charging.

Keywords*: User Requirements Notation (URN), Information System, charging stations, Eclipse platform*

BUSINESS ANALYTICS

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ABSTRACT:
Business reporting represents a key phase for managerial decision-making, so the quality, readability, accuracy, and up-to-date features of data have become a priority. With an increasing volume of data and the ability for mass access to data in today's business environment, business analytics tools have become crucial for decision-making.
MS Power BI, an advanced tool for graphical visualisation and data analysis, becomes essential for organizations that prefer to have useful insights into their data and share them with relevant stakeholders. Due to its simplicity in data access and graphical presentation of processed data, the primary objectives of this paper refer to its use and basic goals.

Keywords: *business analytics database, MS Power BI*

EVOLUTIONARY DEVELOPMENT OF ARTIFICIAL INTELLIGENCE IN EDUCATION: ANALYSIS OF RECENT TRENDS AND FUTURE DIRECTIONS

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ABSTRACT:
This review paper explores the dynamic development of Artificial Intelligence (AI) in education, along with analyzing recent trends and future directions in this field. We begin by examining various aspects of AI application in education, investigating how this technology is transforming the methods of learning and teaching. We focus on key research trends that encompass personalized learning, automated assessments, and advanced data analytics. We delve into the implications of these technological innovations for the future of education, exploring how AI will shape school systems and teaching strategies in the coming years. Through this paper, we investigate how the increasing influence of AI on education will alter the ways in which students acquire knowledge and how educators adapt their teaching methods.

Keywords: *artificial intelligence (ai), education, ethics, machine learning (ml)*

"THE IMPACT OF INFORMATION SYSTEMS ON COMPANY DEVELOPMENT"

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ABSTRACT:

This paper explores the impact of information systems on business development based on the author's experiences gained through the development of project and conceptual solutions in the field of enterprise development with the application of information systems. In today's era of globalization, information systems are an indispensable segment of every social activity. The analysis covers a wide range of topics, starting from introductory concepts to the integration of information systems into key business functions of the enterprise: management, marketing, production, logistics, as well as the cohesion of these functions with the purpose of enterprise development and improving market performance. Within the business functions, decision-making processes, management of business processes, analysis of the company's market position in line with product and service placement in the market are defined. Special attention is paid to financial analysis in order to maintain financial stability and profitability of the company. Through concluding considerations, the importance of efficient and effective enterprise development is emphasized both from the current position and in the context of strategy and goals. This paper provides a deeper insight into the complex interaction between information systems and enterprise development, and provides guidelines for further research and implementation in practice.

Keywords: *Information systems; Business development; Globalization; Decision-making processes; Financial analysis*

BUSINESS PROCESSES MODELLING FROM ASPECT OF PROJECTING FUTURE USER INTERFACE OF INFORMATION SYSTEM

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ABSTRACT:
In order to increase the comprehensibility of business processes and to ensure the projecting logic and potential changes of the information systems or to support the analysis of the modelling system it is very useful to introduce graphic visualisation of the aforementioned processes. Modelling processes enable the usage of the corresponding software tools in order to define business processes graphically. This paper presents the process of control and investigation by using Microsoft Viso and BPwin modelling tools. The aim of the paper is to show the flow chart of the control and investigation processes as well as their comparative analysis from the perspective of planning and projecting the future user interface of the information system.

Key words*: model processes, information systems*

DESIGN OF A HUNTING DOG STIMULATION SYSTEM

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ABSTRACT:
Electronic dog tracking systems are very useful during hunting. At any moment the hunter can see where the dog is and which way it is moving, allowing for a worry-free hunting experience. Some of the most popular manufacturers of dog tracking systems are Garmin, DogTrace, and Dogtra. The main disadvantage of these systems is their external antenna, which can disturb or even injure dog when moving through bushes and vegetation. A big competitor of the previously mentioned systems is the Canandi system, developed in Serbia. The Canandi system consists of 3 units, a dog collar, a hunter unit and a mobile aplication. The dog collar uses a GPS, in order to find the coordinates of the dog's location and then sends those coordinates via radio link to the hunter unit, which then forwards them to the hunter's mobile phone through Bluetooth. In this way, the hunter can track his dog's movements in real-time without the need for his phone to be within a range of a mobile network or connected to the Internet. With one hunter unit it is possible to track up to 20 dogs within a range of 20 km in line of sight. Compared to the competition, the Canandi system introduces several important innovations. In this paper, the Canandi dog collar system will be described. We will discuss the bark detection system, the system for detecting dog movement speed and we will also explore the system for sound and vibration stimulation.

Keywords: *GPS, LoRa, bark detection, movement detection, stimulus*

PROPOSING AN APPROACH FOR ADDRESSING CHALLENGES OF SMART EDUCATION IMPLEMENTATION: A SYSTEMATIC FRAMEWORK

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ABSTRACT:
All spheres of society are affected by digital transformation. One of the spheres is education. The application of information technologies in traditional education influenced the development of electronic education, and further integration and application influenced the emergence of smart education. Apart from the advantages of smart education, numerous challenges also arise during the implementation process. The primary aim of this scientific paper is to propose a comprehensive framework for effectively addressing the challenges of smart education implementation. The proposed framework includes various aspects of approaching the challenges. Following the outlined framework, future directions for the development of the framework are given.

Keywords: *smart education, smart technology, smart learning, education challenges, framework*

SHAPE OF THE MAGNETIC FIELD UNDER A POLE OF INDUCTION MACHINE WITH CONVENTIONAL AND SINUSOIDAL WINDING CONFIGURATION

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ABSTRACT:
A conventionally wounded alternating current machine produces a magnetic field that is not simply periodic. Higher harmonics arise from the machine's uniformly distributed windings, which causes the resulting magnetomotive force to have a more trapezoidal like profile under the pole. However, the combination of the effects of all three phases results in a magnetomotive force that is roughly periodic and forms a circular rotating magnetic field. Nowadays, optimized machines have a variety of winding distributions, including sinusoidal, depending on the application and working regime. This study compares the distribution of magnetic fields under the stator pole of an alternating current machine with a conventional and sinusoidal winding distribution. A three-axis Hall sensor was used to measure the magnetic field, and the findings are presented and discussed.

Keywords: *induction machine, winding configuration, magnetic field, Hall sensor*

COMPARATIVE ANALYSIS OF THE RELATIONAL DATABASE MODEL WITH ITS EQUIVALENT GRAPH DATABASE MODEL

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ABSTRACT:
In today's digital age, databases underpin various applications, ranging from mobile applications to intricate business systems. Selecting an appropriate database model is paramount to facilitate efficient data management and enable swift, reliable analysis. The relational model, characterized by its tabular structure and well-defined schemas, has long been the standard in the database realm. It offers effective data organization and furnishes robust data integrity and security management mechanisms. However, as applications evolve and become increasingly complex, a need arises for a more flexible approach to data modeling to capture the inherent relationships between entities better. In such cases, NoSQL databases may often be a superior solution for modern applications. This paper outlines the process of migrating a relational model to its corresponding graph database counterpart, specifically focusing on Neo4j, a leading graph database. It then presents a comparative analysis of the relational and graph database models, discussing the advantages and disadvantages of both approaches. A case study is also employed to illustrate scenarios where each approach is demonstrably better suited.

Keywords: *relational model, NoSQL, graph databases, Neo4J, data migration*

BIOLOGY, PHYSICS, CHEMISTRY, MATEMATICS

ON SUMMABILITY IN R^2

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ABSTRACT: *In this paper, we explicitly prove that a necessary and sufficient condition for the residue function* $\mathfrak{R}_{\langle L-F\rangle}$*, where* L *is the charge over* $\mathbf{P}(I)$*, such that its limit value* dL *is the total differential on the compact interval* I *in* $\mathbf{R}^2$*,* $F = \langle f\mu\rangle$*,* f *is a point function on* I *and* μ *is a* ***Lebesgue*** *measure, would be basically summable on the interval* I*, is that there is a charge* K *over* $\mathbf{P}(I)$*, such that its differential form* dK *is the total differential on* I *and the chrge* $\langle L-K\rangle$ *is the* (***BS***) *antiderivative on* I *of the function* f*.*

Keywords: *residue function, summability*

SYNTHESIS, CHARACTERIZATION AND HSA INTERACTIONS OF NEW [PDL_2CL_2] COMPLEX

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ABSTRACT:
In this report, we have synthesized a new palladium(II) complex, [PdL_2Cl_2], where L = 5-(methylamino)-3-morpholine-4-ylisothiazole-4-carbonitrile. In water solution (15 mL) of $K_2[PdCl_4]$ (0.1632 g, 0.50 mmol) was added 15 mL of a methanolic ligand solution (0.2243 g, 1 mmol). The resulting mixture was stirred for 1 hour at room temperature until the reagents had completely dissolved. The solution then was filtered off under vacuum and washed with diethyl ether, yielding an orange powdery residue. The characterization of the synthesized complex [PdL_2Cl_2] was carried out by elemental microanalysis, IR spectroscopy and determination of the melting point. The interaction of the new complex with human serum albumin (HSA) was investigated by fluorescence spectroscopy. The high value of the binding constant, K_b, and the Stern-Volmer quenching constant, K_{SV}, are the result of good binding of the complex to HSA.

Keywords: *palladium(II), metal complex, isothizalole ligand, HSA interaction.*

ORGANIC MODIFIED MONTMORILLONITES AS ADSORBENTS OF DIFFERENT POLLUTANTS FROM DIFFERENT ENVIRONMENTS: FORMALDEHYDE FROM POLYMER MATRICES AND ACID RED 183 DYE FROM WATER

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ABSTRACT: *In this research, composites based on montmorillonite K10 (MMT), modified with Hexadecyltrimethylammonium bromide (HDTMABR) and Tetraphenylphosphonium bromide (TPPBR), were synthesized, which we called HMMT and TMMT. This research aims to demonstrate the bifunctionality of HMMT and TMMT composites in the removal of pollutants from two completely different systems: the formaldehyde (FA) from a synthesized cross-linked urea-formaldehyde (UF) resin and the anionic dye Acid Red 183 (AR183) from an aqueous medium. The disulfite method was used to determine free and liberated formaldehyde (FA) from synthesized urea-formaldehyde/montmorillonite composites (UF/HMMT and UF/TMMT). Also, the ion exchange capacity (CEC) and specific surface area (SSA) of the modified montmorillonites were determined. Adsorption studies show that TMMT (0.5 g TMMT/50 cm^3 aqueous dye solution, c=20 $mgdm^{-3}$) was able to remove 87.29% of AR183 dye (dye pH=7), while HMMT removed 85.95% dye under the same conditions. The calculated values of free and liberated FA from UF resins indicate that UF/HMMT (free FA = 0.12%, liberated FA = 0.96%) is a better scavenger than UF/TMMT (free FA = 0.6%, liberated FA = 2.52%).*

Keywords*: urea-formaldehyde resins, montmorillonite, Acid Red 183, free and liberated FA*

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UTILIZATION OF IMMOBILIZED HORSERADISH PEROXIDASE AS BIO-CATALYST FOR PESTICIDES REMOVAL FROM WATER

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ABSTRACT:
Anthropogenic activities and industrial production lead to increased levels of organic pollutants, such as pesticides, which appear in natural waters. Pesticides in natural waters represent a significant risk to health and the environment due to their high stability and solubility in water, toxicity, bioaccumulation, and low biodegradability. Processes that have attracted considerable attention in removing pesticides from water are enzyme-catalyzed transformation reactions, as a potential alternative to classical chemical methods. In this work, the potential application of immobilized peroxidase on a magnetite-biochar solid support as a biocatalyst for the removal of pesticides from water was examined. A mixture of 8 pesticides in deionized water was used for the investigation. The utilization of immobilized peroxidase in the concentration of 0.5 U/mL in the presence of hydrogen peroxide achieves high pesticide removal efficiency (43-100%). A removal efficiency above 80% compared to the initial concentration after one hour of reaction was recorded at acetamiprid, melathion, and propiconazole.

Keywords: *pesticides, bio-catalyst, peroxidase, water treatment*

Acknowledgments: This study is conducted under the project TwiNSol-CECs which has received funding from the Horizon Europe program under grant agreement No.101059867.

DIVERSITY OF PHOTOTROPHIC MICROBIAL ORGANISMS IN GORNJA TREPČA SPA, SERBIA

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ABSTRACT:
The main objective of this research is to document the floristic characteristics of cyanobacteria and algae in Gornja Trepča Spa, Serbia. Gornja Trepča Spa is located in the central part of Serbia, surrounded by the Vujan and Bukovik mountains, at an altitude of 460 m.a.s.l. The water is characterized by low mineralization, with a temperature ranging around 29°C, and a pH of 7.4, signifying neutral to slightly alkaline conditions. It is characteristic for the complete absence of iron and hydrogen sulfide. Literature sources indicate that the water has low radioactivity, with an emission of 29.6 Bq/L. Algological samples were collected in May and July 2023. Phytobenthos samples were collected by brushing stones and using a pipette from the surface of the bottom deposits. All collected samples were promptly fixed with formaldehyde to a final concentration of approximately 4%. All non-diatom algae were examined by preparing temporary slides, while permanent slides were made for diatoms. Light microscope observations and micrographs were conducted using a Zeiss AxioImagerM.1 microscope equipped with DIC optics and AxioVision 4.9 software. On the basis of relevant literature 72 taxa from 4 phyla (Cyanobacteria, Chlorophyta, Charophyta, and Heterokontophyta) were identified. Cyanobacteria and diatom taxa were the most diverse.

Keywords: *algae, cyanobacteria, Gornja Trepča, Serbia*

DIVERSITY OF FOULING ORGANISMS ON A CARGO SHIP SAILING THE SAVA RIVER, SERBIA

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ABSTRACT:

The study investigates the constituents of biofilm formed on a hull of a cargo ship in the Sava River, Serbia. Thickness of biofilm play main role in energy efficiency of ship during exploitation. A biofilm sample was collected from the ship's surface on March 2023 from the site of the "Vahali" Shipyard in Mačvanska Mitrovica using a brushing method. For mycological analysis a 100 µL aliquot made from the biofilm sample was inoculated onto a standard PDA medium under aseptic conditions. The average bacterial count in the sample was 315.33 CFU per Petri dish/100 µL of the sample, while the average fungal count was 11 CFU per Petri dish/100 µL of the sample. Based on colony characteristics and microscopic features of reproductive structures, filamentous fungi Cladosporium cladosporioides, Mucor megalocarpus and Penicillium spp. were identified. Additionally, yeast Candida sp. was observed alongside filamentous fungi. Microscopic analysis of the ship's biofilm revealed densely interwoven, branched hyphae predominantly enveloping threads of green algae from the Cladophora genus. Besides mycelia, the presence of micro- and macroconidia, as well as chlamydospores of Fusarium species, was noted in the biofilm.
Light microscope observations of algal material was made using a Zeiss AxioImagerM.1 microscope. Seven algal species from four divisions were identified through microscopic analysis: Aphanothece sp., Audouinella chalybea, Cladophora glomerata, Cocconeis pediculus, Gomphonema parvulum, Navicula sp., and Rhoicosphaenia abbreviata. Quantitatively, the most dominant biofilm species was Cladophora glometara, completely covered with diatoms Cocconeis pediculus and Rhoicosphaenia abbreviata.

Keywords: *biofilm, ship, energy efficiency, microalgae, microfungi*

POTENTIAL ANTI-INFLAMMATORY EFFECT OF NEWLY SYNTHESIZED 3-(1-((4-HYDROXY BUTYLAMINO)ETHYLIDENE)CHROMAN-2,4-DIONE

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ABSTRACT:
In this work, we have reported synthesis of new coumarin derivative, 3-(1-((4-hydroxy butylamino)ethylidene)cromane-2,4-dione. A mixture of 3-acetyl 4-hydroxy coumarine (0.500 g, 0.002 mol) and 4-aminobutanol (0.183 g, 0.002 mol) in methanol (50 ml) was refluxed for 2 h. The progress of the reaction was monitored by TLC (toluene:acetone = 8:2). After the completion of the reaction the solvent was evaporated to half of its volume. Upon the addition of 5 ml of water, the obtained white precipitate was filtered, dried, and washed from 96% ethanol. The characterization of the synthesized coumarin derivative was carried out by elemental microanalysis, IR and NMR spectroscopy. The molecular docking study was used to investigate the potential anti-inflammatory effect of newly synthesized compound on the enzyme lipoxygenases.

Keywords: *coumarin derivative,characterization, molecular docking study*

ANTIMICROBIAL AND ANTIOXIDANT ACTIVITY OF THE LICHENS CLADONIA RANGIFERINA AND LOBARIA PULMONARIA

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ABSTRACT:
Lichens are symbiotic organisms composed of at least one fungal and one algal species. The chemical composition of lichens primarily stems from fungal metabolic processes and the generation of various secondary metabolites with biological properties. These substances have garnered growing interest in the pharmaceutical sector. The aim of this study is to investigate the antimicrobial and antioxidant activity of methanol extracts of the lichens Lobaria pulmonaria and Cladonia rangiferina. The antimicrobial activity was determined by the microdilution method against four species of bacteria and four species of fungi. Results of this method exhibited moderate antimicrobial activity of tested lichen species with MIC values ranging from 0.39 to 50 mg/mL. The lowest MIC value (0.39 mg/mL) showed the extract of Cladonia rangiferina against Staphylococcus aureus. In comparison to the standard antibiotics as positive controls, the antimicrobial activity of studied extracts was less expressed. Antioxidant activity of the extracts of the tested lichens has been screened in vitro by using DPPH radical scavenging method. The tested lichen species showed weak antioxidant activity, although it should be emphasized that the extract of Lobaria pulmonaria showed a slightly stronger antioxidant effect compared to the extract of Cladonia rangiferina. The results suggest that the tested lichen species represent potential antimicrobial agents that can be used for pharmaceutical purposes in treating various diseases.

***Keywords**: lichens, antimicrobial activity, antioxidant activity*

CHARACTERIZATION OF CHITOSAN EXTRACTED FROM DANUBE RIVER CRAYFISH SHELLS USING DIFFERENT EXTRACTION METHODS

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ABSTRACT:
The biopolymer chitin and its derivative chitosan have sparked particular scientific, industrial, and commercial interest in the last decade of the 20th century. This interest stems from their natural origin and excellent functional properties, leading to a potentially wide range of diverse applications, including the production of biopolymeric films. Crustaceans, such as crabs, shrimps, lobsters, as well as mollusks and squids, are predominantly utilized as commercial sources of chitin.
The subject of this paper is the characterization of chitosan, including the determination of the viscosity-average molecular weight and the degree of deacetylation of chitosan obtained through various extraction methods from the shells of the American crayfish that has appeared and proliferated in rivers in Serbia.
The most commonly used methods for obtaining biopolymeric chitosan films involve a significant number of steps, the use of various chemicals, and consume considerable time and energy. Modification of these methods has resulted in savings without a significant impact on the final product. The methods employed in this study included three different chitosan extraction pathways, along with two distinct deacetylation temperatures.
Based on the obtained results, it can be concluded that by employing modified procedures, which are resource-efficient in terms of chemicals and energy, a similar or higher chitosan yield can be retained. This is achieved while obtaining chitosan with desired characteristics comparable to those obtained through conventional chemical extraction methods.

Keywords: *chitosan, extraction methods, characterization, crayfish shells*

COMPARATIVE ANALYSIS OF TURBULENCE INTENSITY AND NUSSELT NUMBER PREDICTION IN INTERNAL FLOWS: EVALUATING ALGEBARIC MODEL AGAINST COMMERCIAL CFD SIMULATIONS

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ABSTRACT:
This research delves into the determination of turbulence intensity and Nusselt number within internal flows using Prandtl's mixing-length model. The study employs heat transfer and pressure drop analogies to predict these parameters, with a particular emphasis on comparing the obtained results with those from commercial Computational Fluid Dynamics (CFD) software for water and air flows. The accuracy of turbulence predictions is pivotal in various engineering applications, motivating the examination of Prandtl's model and its comparison with advanced CFD simulations. The investigation aims to validate the empirical findings against established CFD results, providing insights into the model's applicability and accuracy for internal flow analyses.

Keywords: *CFD, flow, model, turbulece*

TANACETUM BALSAMITA ESSENTIAL OIL FROM FLOWER EXERTS ANTITUMOR EFFECTS BY DOWNREGULATING NRF-2 AND MMP-9 EXPRESSION IN HUMAN BREAST CANCER CELLS

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ABSTRACT:
One of the most common women's malignancies worldwide is the breast cancer. Nrf-2 is one of the main regulators of redox homeostasis and its up-regulation is indicated in the growth and progression of breast cancer cells, and represents one of the major novel therapeutic targets in cancer treatments. MMP-9 is an important protease associated with cancer progression, including invasion and metastasis. The aim of this study was to investigate an antitumor capacity of flower Tanacetum balsamita essential oil (FEO) by measuring apoptosis rate, MMP-9 concetration and Nrf-2 expression level in human breast cancer cell lines MDA-MB-468 and MDA-MB-231. The cells were treated with two different concentrations of FEO (1 µg/mL and 10 µg/mL) during 24 h and 72 h. The tested essential oil expressed proapoptotic effects. The investigated oil significantly inhibited the MMP-9 concentration and downregulated the expression level of Nrf-2. The obtained data suggest that the tested FEO exert considerable antitumor activity, decreasing oxidative resistanse, elevating apoptosis level and inhibiting the migration capacity of tested breast cancer cell lines. The reduced levels of Nrf-2 expression suggest decreased defense potential for oxidative disturbances, which could be the major antitumor mechanism detected in the study. Targeting apoptotic pathways is an efficient strategy for identifying candidate from natural products to improve chemoterapeutic treatment of breast cancer. The obtained results suggest that the investigated essential oil poses the capacity to be potential promising novel chemotherapeutic agents against breast cancer progression and metastasis.

Keywords: *Tanacetum essential oil of flower, breast cancer cells, Nrf-2, MMP-9, apoptosis ratio.*

BIODIVERSITY IN AN URBAN CONTEXT: PRELIMINARY STUDY OF ECOSYSTEMS AND HABITATS IN THE MEMORIAL PARK "KRAGUJEVAČKI OKTOBAR"

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ABSTRACT:
This study aims to assess ecosystem diversity, invasive plant species, and fungi in the Memorial Park "Kragujevački Oktobar" (Kragujevac, Serbia), a protected cultural asset that commemorates the suffering and death of thousands of innocent civilians in World War II. Aside from its historical, national, and cultural significance, this area has exceptional natural values. Field research was carried out from 2016 to 2023, covering various vegetation periods. The factors such as anthropogenic impact and invasive plant species were investigated to determine their potential negative impact on the biodiversity of this area. A detailed analysis of the land cover using the CORINE Land Cover database revealed the presence of seven land cover categories: urban green areas, meadows, agricultural areas with a significant portion of natural vegetation, deciduous forests, and water bodies. Using pan-European data (The High Resolution Tree Cover Density), various levels of density were identified, and a significant area of the park with a density of woody vegetation over 30% was observed, indicating relatively well-preserved forest ecosystems. The presence of nine highly invasive plant species with well-established populations has been identified as a threat to autochthonous biodiversity, natural ecosystem functioning, the economy, and human health. Furthermore, 125 fungi species have been identified, including one strictly protected and three protected species. These findings help to deepen our understanding of the park's ecosystem and habitat structure, emphasizing the importance of preserving them. The collected data can be used to help preserve biodiversity and manage this unique area in a sustainable manner.

Keywords: *ecosystems, fungi, habitats, invasive species, nature conservation.*

THE SIGNIFICANCE AND APPLICATION OF PHOTOCATALYSIS FOR REMOVING MOULDS AND MYCOTOXINS IN WATER

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ABSTRACT:
Moulds are widely distributed heterotrophic organisms present in aquatic ecosystems, including oceans, freshwater, and drinking water. Over the past 30 years, an increased presence of mouldsls has been documented in European waters, which can have adverse effects on human health and water quality. Water analyses often show the presence of moulds, including Penicillium, Cladosporium, Aspergillus, and other species, which can cause blockages in water pipes, alter the taste of water, and trigger allergic reactions. Moulds, such as Aspergillus spp., have even been found in hospital water systems, raising concerns about possible fungal infections. Mycotoxins, as secondary metabolites of moulds, lead to a range of health effects and thus pose an additional problem if found in the aquatic environment. Photocatalysis have shown great potential in removing moulds and mycotoxins from the aquatic environment. With the use of materials such as TiO_2 and other nanoparticles, a large number of moulds and their secondary products can be effectively removed. Additionally, studies have shown that a combination of UV radiation and hydrogen peroxide can be effective for this purpose. Different combinations of catalysts and light sources show varying effectiveness in degrading mycotoxins. This paper provides an overview of methods and evaluates the effectiveness of photocatalytic treatments to improve water quality for the protection of human health.

Keywords: moulds, mycotoxins, photolysis, photocatalysis, advanced oxidation processes

GREEN, MICROWAVE-ASSISTED SYNTHESIS OF A-RING FUSED PYRIDINE DERIVATIVES OF SELECTED BILE ACIDS

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ABSTRACT:
Natural products of steroid structure, including bile acids, regulate numerous physiological and biochemical processes, and therefore have therapeutic uses. Chemical modifications achieved by introducing heteroatoms, heterocycles or replacing atoms in the steroid moiety often lead to changes in biological properties, increase in selectivity and/or reduction in side effects of novel compounds. With this aim, we performed green, microwave-assisted syntheses of [3,4-b] fused pyridine derivatives of lithocholic and deoxycholic acid, by condensing the corresponding 3-oxo-4-ene derivatives with propargylamine, in the presence of $Cu(NO_3)_2 \times 3H_2O$ as catalyst. All synthetic precursors of the novel A-fused pyridine analogs were obtained in a closed microwave reactor system, in high yields and for short reaction times as well.
Over the past few decades organic synthesis has been directed towards the development of environmentally acceptable processes that form the basis of green chemistry, so the synthetic steps in this work were microwaves-induced, in solvent-free conditions, where the solely reactants were used. In this way, a reduction in the use of organic solvents was achieved in the reaction environments themselves, and in certain cases also during isolating the reaction products. At the same time, these synthetic methods have significant advantages from an economic point of view, due to simpler processing of reaction mixtures and isolation of products, improvement of product yield, shortening of reaction time, etc.

Keywords: *lithocholic acid, deoxycholic acid, [3,4-b] fused pyridine derivatives of bile acid, solvent-free, neat conditions*

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THE MACROINVERTEBRATE COMMUNITY COMPOSITION IN SOME WATER ECOSYSTEMS IN STARA PLANINA MOUNTAINS (SOUTHEAST SERBIA)

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ABSTRACT:

Due to its geographical location and paleogeographic history, the Stara Planina Mountains are one of the six biodiversity hotspots in Europe. This study aims to depict the composition of the aquatic macroinvertebrates situated on the Serbian side of the Stara Planina Mountains. Aquatic macroinvertebrates were collected at six sites: Jelovičko Spring, Dojkinačka, Visočica, Temštica, and Rakitska rivers, and the spring of Bigar Stream. We recorded 1974 specimens within 98 taxa and ten systematic groups. Insects dominated the macroinvertebrate community, comprising 83.1% of the total density. Specifically, Diptera (23.5%), Ephemeroptera (19.8%), and Trichoptera (19.3%) were the most abundant. Trichoptera was the most diverse group, represented by 27 taxa, followed by Diptera (25 taxa) and Ephemeroptera (15 taxa). The diversity of macroinvertebrate communities, expressed as the Shannon index of general diversity, varied spatially from 3.17 (Dojkinačka River) to 1.72 (spring of Bigar Stream), while Simpson's Diversity Index ranged from 0.73 (spring of Bigar Stream) to 0.95 (Rakitska River). This study contributes to filling knowledge gaps about benthic communities in rivers and streams in the Stara Planina Mountains, which is essential for evaluating the vulnerability of freshwater ecosystems.

Keywords: *macroinvertebrate diversity, sensitive taxa, rivers, springs*

A METAHEURISTIC APPROACH TO SOLVING ONE VARIANT OF THE P-HUB MAXIMAL COVERING PROBLEM

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ABSTRACT:
This paper deals with the uncapacitated single allocation p-hub maximal covering problem (USApHMCP) with binary coverage criterion. This problem consists of choosing p hub locations from a set of nodes so as to maximize the total demand covered while satisfying the single allocation strategy. The applied binary coverage criterion ensures that the distance between any origin-destination pair through located hubs should be shorter than a predetermined distance. A mixed integer linear programming model for USApHMCP is introduced. Due to the limitation of exact methods in finding optimal or feasible solutions only for instances of small problem dimensions, a General Variable Neighborhood Search (GVNS) heuristic is proposed as a solution method to USApHMCP. Constructive components and parameters of GVNS method are adapted to the characteristics of the considered problem. The results of testing the proposed GVNS metaheuristic on problem instances with up to 200 nodes indicate its efficiency with respect to both computation time and solution quality.

Keywords: *p-hub maximal covering problem, binary coverage, variable neighborhood search*

COMPARATIVE VALIDATION OF THE GROUNDWATER LEVEL DETERMINATION METHOD

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ABSTRACT:
In this paper, a comparative validation of the method of determining the level of underground water was performed, using a tape level meter and a level meter with a sensor electrode, whose performance is in accordance with the criteria from AOAC (Association of Official Analytical Chemists) and Eurachem. Piezometer at Nikola Tesla Airport Belgrade Serbia and the piezometer at the location of the Sunoko sugar factory in Pećinci Serbia were chosen as measuring points for the validation of the method and the assessment of the measurement uncertainty of the groundwater level measurement. Based on the elements of validation such as repeatability, reproducibility, the contribution of the error of the measuring equipment, the accuracy of the calibrated scale, it was determined that the tape level meter has a measurement uncertainty of 3.36 %, while the sensor electrode level meter has a measurement uncertainty of 2.93%.

Keywords: *method validation, measurement uncertainty, groundwater level, level meter, field measurement*

EMPIRICAL FORMULAS FOR DETERMINING THERMOPHYSICAL PROPERTIES OF PARAFFIN: A COMPARATIVE STUDY WITH EXPERIMENTAL DATA

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ABSTRACT:
This study delves into the empirical determination of thermophysical properties of paraffin, specifically focusing on its significance in latent heat energy storage applications. Inspired by similar methodologies employed in fuel oil studies, the research emphasizes the vital role of physical and chemical characteristics in engineering applications, impacting processes such as equipment design and material balances. Petroleum properties, particularly those of its fractions, are conventionally classified into two groups: those independent of temperature and those temperature-dependent, encompassing critical parameters like density, characteristic temperatures, and vapor pressure. Paraffin, derived from crude oil through extensive processing, stands out among these fractions due to its application in various industrial sectors, including energy, heating, and transportation. In this work, we present uncomplicated methodologies for calculating fundamental properties of unspecified petroleum fractions, with a focus on paraffin, a complex mixture primarily composed of hydrocarbons. The properties under consideration include molar mass, density, heat capacity, thermal conductivity, critical parameters, and boiling point. These calculations leverage easily measurable or commonly known parameters, such as standard density and normal boiling temperature, often expressed in terms of API density and Watson's characterization factor. Given the growing importance of paraffins in latent heat energy storage, this study aims to contribute significantly by 1) comparing empirical expressions for determining their thermophysical properties with experimental and literature data and 2) developing thermodynamic tables for paraffins based on selected expressions and data. The accurate knowledge of these properties is imperative for optimal functioning in production facilities within the petroleum industry, and this research aims to provide practical and efficient methods to enhance the engineering analysis and design of processes involving paraffins.

Keywords: *energy storage, paraffin, thermal properties*

MEDICAL, BIOMEDICAL AND PHARMACEUTICAL SCIENCES

INTERACTION OF DINUCLEAR PLATINUM(II) COMPLEXES WITH PHENANTHROLINE AS A BRIDGING LIGANDS WITH HUMAN SERUM ALBUMINE

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ABSTRACT:

Mononuclear platinum(II) complexes used in medicine as antitumor agents showed a number of different problems in the application such as toxic effect, the appearance of resistance and a limited spectrum of action. Because of that, polynuclear platinum(II) complexes are under current investigation as a new class of antitumor agents with potential clinical applications. Two dinuclear Pt(II) complexes with 1,7-phenanthroline (1,7-phen) and 4,7-phenanthroline (4,7-phen) as the bridging ligands and ethylenediamine (en) as bidentate coordinated diamine ligand, $[\{Pt(en)Cl\}_2(\mu\text{-}1,7\text{-}phen)]^{2+}$ and $[\{Pt(en)Cl\}_2(\mu\text{-}4,7\text{-}phen)]^{2+}$, were synthesized and theirs in vitro cytotoxic activity were tested [1]. Results of investigation of cytotoxic activity against two tumor cell lines (human breast carcinoma (MDA-MB-231) and mouse breast carcinoma (4T1) cells), and one healthy cell line (human fibroblasts cells (MRC-5)) showed that platinum(II) complexes had good cytotoxic activity. Complex $[\{Pt(en)Cl\}_2(\mu\text{-}1,7\text{-}phen)]^{2+}$ had stronger selectivity toward MDA-MB-231 and 4T1 breast carcinoma cells in comparison to cisplatin [1]. Further, in this paper interactions of $[\{Pt(en)Cl\}_2(\mu\text{-}1,7\text{-}phen)]^{2+}$ and $[\{Pt(en)Cl\}_2(\mu\text{-}4,7\text{-}phen)]^{2+}$ complexes with human serum albumin (HSA) were investigated by UV-Vis spectrophotometry and fluorescence spectroscopy. Results indicate that investigated platinum(II) complexes bind to HSA through dynamic process. Also, competitive interactions between platinum(II) complexes and site markers ibuprofen (IB) and eosin Y were performed.

[1] N. Marković, M. Zarić, M.D. Živković, S. Rajković, I. Jovanović, N. Arsenijević, P. Čanović, S. Ninković, *ChemistrySelect.*, 2019, **4** (44), 12971–12977.

Keywords: *platinum(II) complexes, phenanthroline, HSA, ibuprofen, eosin Y*

INVESTIGATION OF THE INHIBITORY ACTIVITY OF FURANOCOUMARIN DERIVATIVES IN KAMPO EXTRACT MEDICINES ON THE ENZYME VITAMIN K EPOXIDE REDUCTASE RESPONSIBLE FOR ANTICOAGULANT EFFECT

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ABSTRACT:
The present study aimed to evaluate the inhibitory effect of natural furanocoumarin coumarin derivatives, namely isoimperatorin (IsoIMP), oxypeucedanin (OXY), oxypeucedanin hydrate (OXYh), imperatorin (IMP), heraclenin (HERn) and heraclenol (HERl) which were isolated from Kampo Extract Medicines, on human enzyme Vitamin K epoxide reductase (VKOR) through molecular docking simulation. VKOR is a crucial enzyme located in the endoplasmic reticulum (ER) membrane. It plays a vital role in the carboxylation process of blood coagulation enzymes, which is dependent on vitamin K. Warfarin (WF) is a commonly used oral anticoagulant that belongs to the category of vitamin K antagonists (VKA). Based on the values of Gibbs binding energies (ΔG_{bind}, kcal mol^{-1}), the inhibitory potential against the VKOR enzyme decreases in the following order: isoIMP (-8.61) > HERn (-8.46) > OXY (-8.43) > IMP (-8.33) > OXYh (-8.24) > HERol (-7.18). All investigated compounds exhibit almost identical, although slightly lower, inhibitory effects towards the VKOR enzyme in comparison to WF (-9.71). Upon comparing the characteristics of the ADMET (Absorption, Distribution, Metabolism, Excretion, and Toxicity) analysis, it is evident that the compound isoIMP, which exhibited the most potent inhibitory effect against VKOR enzyme, possesses a superior pharmacological profile in comparison to WF. In summary, the examined compounds exhibit a strong inhibitory activity to the VKOR enzyme, low levels of toxicity, and have a structural similarity to commercial anticoagulants. These characteristics make them suitable for further research and potential use as commercial anticoagulants.

Keywords: *anticaogulant, furanocoumarins, ADMET, molecular docking, Kampo Medicines*

COMPARATIVE ANALYSIS OF THE CHEMICAL COMPOSITION OF POTENTILLA REPTANS L. AERIAL PART AND RHIZOME

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ABSTRACT:
Potentilla reptans L. belongs to the Rosaceae family, genus Potentilla, and is a native species of Eurasia. The most common compound found in the rhizome is catechin, while the aerial parts contain chinic acid, caffeic acid and 5-O-caffeocholic acid, along with other constituents that contribute to its unique composition. Potentilla species have been traditionally used for the treating purulent facial eczema and buccal ulcerations. They are applied topically for mouth ulcers, throat inflammation and wound-healing, and are also used internally for jaundice and dysentery. In traditional medicine Potentilla species have been employed for the treatment of hepatitis, rheumatism, scabies, diarrhea, viral infections and as a remedy for detoxification in cases of purulent facial eczema and buccal ulcerations.
The aim of this study was to compare the chemical compositions of aqueous extracts from the rhizome and aerial part of P. reptans collected during the summer in central Serbia. We determined the content of several major groups of components in both herbal samples, including total flavonoids, phenols, and total procyanidins. The levels of total phenols and procyanidins were found to be higher in the rhizome compared to the aerial part. These findings suggest that the characterization of aqueous extracts from different parts of P. reptans confirms that traditional medicinal uses of this plant which h should not be disregarded.

Keywords: *Potentilla reptans L, flavonoids, phenols, procyanidins*

REPRESENTATION OF BACTERIAL INFECTIONS IN THE HUMAN POPULATION OF MACVA DISTRICT

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ABSTRACT:
The aim of this study was to determine the most common of bacterial infections in the human population on the territory of the Mačva district and to examine the existence of antibiotic resistance among them. Due to their frequency, the necessary use of antibiotics and the increased costs of treatment, bacterial infections represent a current and one of the most prevalent problems in modern medicine. According to microbiological analyzes conducted in the Health Laboratory in Sabac, during 2022, various causative agents of human infections were registered. The presence of bacteria was determined in different types of materials, using standard microbiological methods. A total of 107700 samples were analyzed, of which 60.92% of the isolates were from population of Mačva district.
In 67.24% of punctate samples, were present coagulase negative staphylococci, Enterococcus spp. (20.69%) and Naisseria spp. (12.07%). Staphylococcus aureus had dominant participation in infections of the throat (56.06%), skin (37.96%), nose (36.32%), wounds (24.43%), sputum (21.66%) and tongue (19.92%). A high rate also has a Klebsiella spp. which were recorded in sputum (34.47%), oral swabs (73.33%) and wound swabs (14.15%). In addition, Streptococcus pneumoniae, Haemophilus spp., Escherichia coli and beta hemolytic streptococci were also important causes of bacterial infections in the human population.
The results of the disc diffusion antibiogram method showed resistance to ampicillin, penicillin G and amoxicillin in the range of 19.8% - 33.2%, in Staphylococcus aureus isolates.

Keywords: *antibiotics, bacteria, infection, resistance.*

STUDYING THE ANATOMY OF THE HUMAN BODY THROUGH THE PRISM OF VIRTUAL REALITY (VR)

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ABSTRACT:
Although systems that rely on robotics and artificial intelligence are widely present in various spheres of the economy, the implementation of much less complicated virtual applications in education, especially in developing countries, is only in its humble beginnings. Biology, as an interdisciplinary science, includes various fields within which various aspects of the structure, function and influence of living systems are studied. One of the subjects studied in biology is the anatomy of the human body. Given the fact that these contents are complex, and that (with the exception of medical faculties) it is generally not possible to directly observe body parts on dissected organs, pupils and students often have difficulties in mastering these contents. With the advancement of technology, resources such as virtual 3D models and virtual laboratories are becoming more and more available, and their potential for application in education and science is great. Visualization in biology teaching is very important, and a virtual environment based on VR technology enables exactly that. Apps that offer the experience of learning the anatomy of the human body are diverse, some of them are: My Anatomy (VR), Human Body, Anatomy Learning - 3D Anatomy, and many others that can be downloaded for free from the Android Play Store. This paper presents the capabilities of the Human Body virtual application. Virtual applications are diverse and very accessible, and there are no obstacles to their more massive use in teaching. This would encourage researchers to examine in more detail the effects of using virtual applications in the education of pupils and students.

Keywords: *teaching of biology, anatomy of human body, android 3D apps, virtual reality.*

MECHANISMS OF RESISTANCE DEVELOPMENT TO 5-FLUOROURACIL IN HT-29 COLORECTAL CANCER CELLS

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ABSTRACT:
Colorectal cancer is the second deadliest and third most common cancer in the world, making it a serious health problem. The main therapy for this type of cancer is 5-fluorouracil (5-FU) based chemotherapy. However, the effectiveness of chemotherapy is limited by the development of 5-FU resistance in colorectal cancer cells. Thus, the aim of this study was to establish 5-FU resistance in HT-29 colorectal cancer cells and then to underline the molecular mechanisms that contribute to its development. The 5-FU resistance in HT-29 cells was induced by continuous exposure to stepwise increasing concentrations of 5-FU over a period of 6 months. After confirmation of 5-FU resistance in newly established HT-29-5FUR cells (resistance factor above 15), we analyzed the mRNA (qPCR) and protein (immunocytochemistry) expression of molecules related to drug resistance development. Our results show that upregulated expression of TYMS, CYP1A1, CYP1B1, MRP-1, MRP-5, Bcl-2, and Bcl-xL, as well as downregulated expression of UMPS, hMLH-1, and Bax in HT-29-5FUR cells compared to parental HT-29 cells contributed to the development of 5-FU resistance. Furthermore, we investigated the role of reduced glutathione and glutathione synthetase (involved in de novo glutathione synthesis) in the development of resistance to 5-FU using the colorimetric method and immunocytochemistry, respectively. The obtained results show that these molecules, which participate in the first line of cell antioxidant protection, did not contribute to this process. In conclusion, targeting examined molecules could be crucial in future investigations to prevent and overcome the development of 5-FU resistance in colorectal cancer cells.

Keywords: *5-fluorouracil, colorectal cancer, drug resistance, resistant cancer cell line*

Acknowledgements:
This study was supported by the Ministry of Science, Technological Development and Innovation of the Republic of Serbia (Agreement no. 451-03-57/2023-03/2936; no. 451-03-66/2024-03/200122; and no. 451-03-65/2024-03/200122), and the Project "Identification and modulation of biomarkers related to resistance of colorectal cancer cells on 5-fluorouracil – IDBioResist" financed by the funds of the Center for Scientific Research of the Serbian Academy of Sciences and Arts and the University of Kragujevac.

FLOW CYTOMETRY ANALYSIS OF BREAST CANCER CELLS TREATED WITH NITROGEN-CONTAINING STEROID COMPOUNDS

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ABSTRACT:
Breast cancer (BC) is among the most widespread diseases with a fatal outcome. Estrogen receptor positive (ER+) BC could be treated by both hormonal and cytostatic therapies. Triple negative BCs (TNBC) are very aggressive subgroup of BCs, resistant to hormonal therapy. Consequently, TNBC are managed with standard treatment, including cytotoxic agents, which has a lot of side effects, often followed by local and systemic relapse. These facts, as well as the fact that some steroidal compounds are known for their anticancer properties, prompted us to test novel modified steroids for their anticancer activity in order to find new therapeutics with low side effects. Nitrogen-containing steroids which inhibited growth of ER+ MCF-7 or TNBC MDA-MB-231 BC cells were tested for the mechanism underlying this antiproliferative effect. After the treatment with equitoxic concentrations of steroids, specific dyes were added and cells were analyzed by flow cytometry, detecting and counting cells which underwent some specific change, caused by treatment with steroids. Some of the 17-substituted androstane derivatives induced apoptosis, some changed mitochondrial membrane potential (MMP) or induced production of reactive oxygen species (ROS) in treated MCF-7 cells. Steroidal heterocycles did not induce apoptosis or necrosis in significant extent in MDA-MB-231 cells, or change MMP. The highest impact on both treated cancer cell lines steroidal compounds exerted via inducing production of ROS, while cell cycle of treated cells was not influenced highly. Since no clear evidence about type of cell death, further search for a mechanism of cell growth inhibition is needed.

Keywords: *Apoptosis, cell cycle, mitochondrial membrane potential, reactive oxygen species, cytotoxicity*
Acknowledgements: Financial support for this study was provided by the Ministry of Science, Technological Development and Innovation of the Republic of Serbia (SRO 200125).

ANTIMICROBIAL EFFECT OF TEA TREE (*MELALEUCA ALTERNIFOLIA*) ESSENTIAL OIL IN PREGNANT WOMEN

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ABSTRACT:
Genital tract infections during pregnancy pose significant medical challenges, often resulting in adverse outcomes such as premature births, miscarriages, fetal growth restriction, and anomalies. Antibiotic therapy during pregnancy, especially in the initial trimester, is restricted, which adds complexity to patient care. Tea tree essential oil (Melaleuca alternifolia) from alternative medicine presents a promising avenue due to its natural antimicrobial properties.
The research aimed to assess the antimicrobial efficacy and toxicity of tea tree essential oil on Artemia salina shrimp eggs. Standard CLSI dilution methods were employed to determine the minimum inhibitory concentration (MIC) and minimum bactericidal/fungicidal concentration (MBC/MFC) of the oil and to identify microorganisms with heightened sensitivity.
The study involved screening tea tree essential oil against bacterial (Staphylococcus aureus, Proteus vulgaris) and fungal (Candida albicans) isolates from pregnant women with vaginal infection symptoms.
Results revealed significant antimicrobial activity of tea tree essential oil, particularly against C. albicans, with MIC and MFC recorded at 5.68 µl/ml. For P. vulgaris and S. aureus, MIC/MBC values were 6.25/11.36 µl/ml and 22.72 µl/ml, respectively. LC_{50} values at 24 and 48 hours were 0.16 µl/ml and 0.1 µl/ml.
In conclusion, tea tree essential oil exhibits potent antimicrobial effects, suggesting its potential therapeutic use for vaginal infections during pregnancy. Nonetheless, further research is imperative to elucidate its spectrum of activity, potential adverse effects, and toxicity before recommending its usage in pregnant women.

Keywords: *vaginal infection, pregnancy, Melaleuca alternifolia, essential oil*

EXPRESSION OF THE HEAT STRESS PROTEIN HSP101 IN DIFFERENT CEREAL VARIETIES DURING A THREE-YEAR STUDY

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ABSTRACT:
In order for plant cells to survive under stress conditions, it is important for proteins to remain in their functional conformation. In stressful conditions, the role of heat stress proteins is very important because they prevent thermal aggregation of proteins damaged by stress. Imunoblot analysis was used to investigate expression of HSP101 in flag leaf of five different cereal varieties in experimental tests during three years of research. In all three seasons, a high increase in the expression of HSP101 was observed in the Zvezdana wheat variety under conditions of heat stress compared to the other analyzed cereal varieties. The variety that was also characterized by a high level of HSP101 was the Hystar wheat variety. The Jadar oat variety was characterized by a lower expression and level of HSP101 under heat stress conditions compared to the other analyzed cereal varieties. Immunoblot analysis of HSP101 showed that there is a significant increase in the expression of this protein under conditions of heat stress in the leaf of cereal varieties. It was also shown that there is a significant difference in the accumulation of HSP101 between the analyzed cereal varieties. The expression of HSP101 was more significant in cereal variety, which showed greater resistance to heat stress. The results of this research suggest that the analyzed cereal varieties differ significantly in their ability to respond to heat stress, which could be useful for the development of varieties in cereal breeding programs, in order to obtain varieties more resistant to high temperatures.

Keywords: *proteins, wheat, oat, heat stress, HSP101*

ECONOMY, MANAGEMENT, TOURISM AND HOSPITALITY

HERCEG NOVI: ANALYSIS OF ECONOMIC AND COMMUNICATION ASPECTS OF CULTURAL HERITAGE FROM THE PERSPECTIVE OF CITIZENS' ATTITUDES

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ABSTRACT:
Herceg Novi, with its rich culture built over centuries, represents one of the most important tourist destinations in southern Europe. The goal of the work is to look at the potential of the city's cultural heritage as well as the possibility of connecting it with economic and media aspects. We start the research method by studying the scientific and media public of countries whose peoples left their mark in the formation of the culture of Boka Kotorska. We analyze how those countries promote their own cultural values. The attitudes of the citizens of Herceg Novi towards the realization of the cultural heritage festival and the ways of its presentation were also examined. Combined research methods were used in the form of surveys, interviews, as well as analysis of media content from the fields of culture and economic policy. The results of the research show that new strategies are needed in the development of local culture and the strengthening of the tourist potential of the city.

Keywords: *Herceg Novi, cultural heritage, promotion*

DOES THE ACCOUNTING DEPARTMENT PROVIDE TAX COMPLIANCE OF COMPANIES?

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ABSTRACT:
In general, company owners and its legal representatives are responsible for tax payments of the company and possible tax evasion. On the other hand, tax compliance usually depends on the bookkeeping records made by the accounting department. In some situations, accountants are asked to solely decide on the tax treatment of certain transaction, while in others they have a help from the legal department of the company. In addition, tax treatment of certain transactions is decided after the consultations with external tax consultants, which employ both accountants and lawyers. Case studies from the transition country presented in the paper show that accounting departments are mostly responsible for deciding on tax treatments of transactions, while legal departments in companies are usually responsible for drafting the contracts, cooperation with attorneys and preparation for court proceedings. Such findings imply that accountants should have a wide knowledge on various types of taxes in order to provide tax compliance of the companies. While professional accounting organizations have already included tax modules in their education programs, most faculties in transition countries dealing with accounting issues are yet to implement it. Therefore, higher education institutions should strive to fill this gap in order to harmonize their education programs with the requirements of the labor market.

Keywords: *accounting, law, tax, tax compliance, tax evasion, education*

TECHNOLOGICAL DEVELOPMENT AND INNOVATION AS THE FOUNDATION OF SERBIA'S ECONOMIC PROGRESS

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ABSTRACT:
The contemporary world is characterized by constant changes, in which the key to economic success lies in the ability to understand them and optimally adapt to the newly emerging business environment. Changes are happening at such a speed and intensity that it is very difficult to keep track of them. One of the basic principles for growth and development of countries, as well as for the overall socio-economic progress, is the development of science and technology.

Contemporary economic trends in the world economy, especially the trends in technological development, are becoming more and more dynamic. In today's world, only those countries that are capable to invest in research and development can hope for economic progress, advancement and prosperity.

Continuous technological changes also affect the boost in the dynamics of business conditions, making them uncertain and unpredictable. Modernization of technology, growth and development within that sector, has a direct impact on the growth of the economy. The general orientation of companies in the direction of development has resulted in ever increasing innovation. The aim of this study is to indicate the significance and complexity of the impact of technological development on modern business conditions and to demonstrate that the strategic pathway for Serbia is investing in the development of science and technology, as well as encouraging the development of business operations in that direction.

Keywords: *technological development, innovation, socio-economic progress, Serbia*

THE ROLE OF DISRUPTIVE AND NON-DISRUPTIVE INNOVATION IN THE BUSINESS ECOSYSTEM

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ABSTRACT:
The paper presents examples of different digital business models and the role of disruptive and non-disruptive innovations in modern business. Today we are witnessing the transforming effects of cloud technology, machine learning, mobile devices, social media, which are unstoppably and galloping changing the business environment. Desk research has shown that organizations planning to create and introduce innovations must be curious and open to the challenges in permacrisis. In addition to the art of anticipating and designing changes, they also need to know how to implement them. Digital disruption indicates the continuation of a technological and economic paradigm that requires the re-creation of markets, strategies and value itself. On the one hand, digitalization coupled with digital transformation creates new value and new opportunities for organizations to make an impact and innovate. On the other hand, established norms are in danger due to the inapplicability of traditional industrial definitions and the formation of new ecosystems. To prepare for a radically different tomorrow, those striving to thrive under digital disruption should continually redefine strategy in terms of how best to open up to external influences, connect with new ecosystems and partners, how they can manage change and drive digital transformation through organization. The question is, what can organizations start doing today to prepare for a completely different business environment? Is it necessary and obligatory for innovation to be disruptive? As a concept, non-disruptive innovation represents the continuous creation of new industries and new jobs without destroying existing ones, in order to achieve productivity, economic growth and sustainability. Disruptive and non-disruptive innovations have different roles and consequences for stakeholders and ecosystems.

Keywords: *innovation, disruptive, non-disruptive, digital transformation, digital business models*

FUZZY AHP ASSESSMENT OF BALKAN WINERIES FROM A TOURIST ATTRACTION PERSPECTIVE

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ABSTRACT:
In many modern tourist destinations, wineries represent increasingly popular public facilities attracting many visitors. Although wine production areas have been potential places for people to gather since ancient times, since the end of the 20th century, with the transformation from primarily production facilities to facilities that integrate the concepts of production and tourism, wineries have become significant strongholds of wine culture. The development of wineries in the Balkans experienced expansion at the beginning of the 21st century, along with the end of the transition process. In the last ten years, visiting wineries has become an indispensable activity of wine tourism. Many factors determine the attractiveness of a winery among potential visitors. This paper aims to evaluate selected wineries from the Balkans, built after 2000, based on defined indicators that influence the attractiveness of wineries by applying multi-criteria analysis. Ten modern wineries from Serbia, Montenegro, North Macedonia, Croatia, Bulgaria, Bosnia, and Herzegovina were selected for the research. The indicators were ranked by importance using the fuzzy AHP approach, and then the selected wineries. The obtained results point to the most critical factors determining contemporary wineries' attractiveness. The results may impact the future processes of building wineries in the Balkan region.)

Keywords: *multi-criteria decision making, fuzzy AHP approach, evaluation, contemporary wineries, tourism, Balkan region*

IMPORTANCE OF DUE DILIGENCE IN MERGERS AND ACQUISITIONS PROCESSES

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ABSTRACT:
Mergers and acquisitions (M&A) represent complex transactions that require detailed preparation in order to increase the success rate in the post-acquisition period. One of the most important preparatory phases is the process of due diligence, i.e. detailed research of the target company from various aspects in order to identify potential risks, but also to consider potential synergies which can be obtain after the realization M&A. The due diligence process involves a comprehensive analysis and assessment undertaken by acquirers to scrutinize the financial, legal, operational and strategic aspects of a potential target company before engaging in an M&A transaction. The aim of the paper is to analyze the due diligence process and point out the key reasons why due diligence is one of the key factors of M&A success. The paper indicates that due diligence contributes to identifying and mitigating risks associated with M&A transactions, improves post-acquisition integration, enables more effective negotiation of transaction terms, ensuring a fair and equitable outcome for all involved parties.

Keywords: *mergers and acquisitions, due diligence, post-acquisition integration, value creation*

DESIGNING DEVELOPMENT STRATEGIES: AN OVERVIEW OF THE DIGITAL ENTREPRENEURIAL ECOSYSTEM FOCUSING ON ONE OF THE KEY PILLARS

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ABSTRACT:
The paper deals with the analysis of the digital entrepreneurial ecosystem in Serbia, using the EIDES (The European Index of Digital Entrepreneurship System) methodology. The goal of the research is to provide insight into the specifics of one of the eight pillars of the digital entrepreneurial ecosystem, in order to identify key issues and challenges. Focusing on the calculation of parameters for the year 2023 enables an overview of the current situation and the recognition of potential bottlenecks in this domain. Based on the collected data, the author is able to identify the key factors that contribute to or limit the growth of the digital entrepreneurial ecosystem in Serbia. This work has significant implications for decision makers, entrepreneurs and stakeholders in the innovation ecosystem. Analyzing one of the eight pillars enables a more precise targeting of resources and support, in order to overcome obstacles and improve the overall efficiency of the digital entrepreneurial ecosystem in the country. The discovery of bottlenecks for the year 2023 provides the basis for development strategies that will encourage innovation and strengthen Serbia's competitive advantages in digital entrepreneurship.

Keywords: *digital entrepreneurial ecosystem, EIDES methodology, innovation, entrepreneurship, entrepreneurial system*

THE ROLE AND SIGNIFICANCE OF BRANDING FOR THE TOURIST DESTINATION OF HERCEG NOVI

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ABSTRACT:
In order for a destination to be successfully branded on the tourism market, it is necessary to harmonize a large number of factors. It is very important to include in branding all groups that have an interest in the way the destination will be branded. These interest groups are: people living in the destination, visitors, local and regional authorities, local, regional and national tourism organizations, as well as all those other organizations that are associated with a particular destination.
Since March 2019. Montenegro has promoted as an attractive tourist destination, through a continuous campaign by the organizers, one of the most influential travel magazines, in the UK market National Geographic Traveler. Which means that it is high time to seriously address the strategic planning of Montenegro as a tourist destination and thus Herceg Novi.
When we know what our tourist product is, then we can easily define the target group that should consume it.

Keywords*: brand, destinations, tourism, organizations*

THREATS TO ECONOMIC SECURITY IN THE VIRTUAL MARKET AND THE ROLE OF MARKETING TECHNOLOGIES IN COUNTERING THEM

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ABSTRACT:
The article considers the classification of threats to economic security, which was preceded by a study of the causes of threats and their consequences through the prism of theories of disasters, conflicts, and risks. Attention is focused on the fact that the modern hierarchy of consumer needs, with an emphasis on the development of the Internet space, makes changes to the established behavioral aspects of functioning in the format of trade relations, in connection with which there is an urgent need to study the reaction of consumers to the use of marketing technologies in the context of the development of virtual markets. The purpose of the article is achieved through the consistent application of the following research methods: observation, generalization, comparison - to analyze and substantiate threats to the economic security of entrepreneurial activity; abstract logical analysis - to identify the causes and consequences of threats to economic security; modeling - to justify marketing technologies in the virtual market.

Keywords: *economic security; entrepreneurial activity; challenges of economic security; threats to economic security; indicators of economic security; signals of threats to economic security.*

LGBT TOURIST MARKET OF MONTENEGRO

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ABSTRACT:
LGBT tourism, as a rapidly growing tourist niche, is increasingly interesting, both in the market and as a socio-cultural phenomenon whose existence and development depends, among other things, on the degree of liberalization of society and the sense of security of the gay population in the destination. The goal of the work is to gain insight into the state and perspective of the LGBTQ+ tourist market in relation to the possibilities of the tourist destination of Montenegro. The paper presents the basic characteristics of this type of tourism, the general state of the tourism market in Montenegro and the possibilities of the ***LGBTQ+*** *market sub-segment from a forward-looking standpoint.*

Keywords: *LGBTQ+ tourism, tourist market, tourist destination Montenegro,*

MARKETING MANAGEMENT AS A GENERATOR OF ORGANIZATION'S SUSTAINABILITY IN CONDITIONS OF CHAOS

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ABSTRACT:
The paper analyzes the impact of crisis periods on traditional business models and how market chaos manifests itself on the sustainable development of companies and the ability to achieve stable business income. The necessity of market orientation and adaptive strategies in the context of modern business operations is analyzed. Special emphasis of the paper is placed on the role of the marketing function, digital transformation of business processes and the role of public policies in creating a more resilient economic environment. The work deepens the understanding of the complexity of the contemporary global market environment and provides frameworks for a better understanding of the challenges faced by companies, and indicates the need to take advantage of the opportunities arising from these challenges, with the aim of stimulating their prosperity and growth. The focus is on strategic thinking, innovation and adaptability of companies, with reference to the need for effective management of marketing strategies and the use of market opportunities in order to achieve sustainable development in a continuously unpredictable global economy.

Keywords: *marketing strategy, transformation of business processes, adaptability*

INNOVATION IN SMES IN BOSNIA AND HERZEGOVINA: THE ROLE OF GREEN ENTREPRENEURIAL ORIENTATION

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ABSTRACT:
This study investigates the relationship between green entrepreneurial orientation (GEO) and different types of innovation (i.e., product, process, and marketing) within small and medium-sized enterprises (SMEs) in Bosnia and Herzegovina. A cross-sectional survey method was used to collect data from a diverse sample of SMEs. The data collection is still ongoing, and the current sample is 140 SMEs. Structural equation modeling was used to test the hypotheses. The results show that GEO plays an important part in different types of innovation. The findings of this research contribute to the existing literature on sustainable business and innovation within the unique context of Bosnia and Herzegovina by not only contributing to the academic discourse on green entrepreneurship but also providing practical insights for SMEs seeking to improve their competitive advantage by integrating green practices and innovations in Bosnia and Herzegovina.

Keywords: *Innovation, Green entrepreneurial orientation, SMEs, Bosnia and Herzegovina*

NATIONAL CULTURE DIMENSIONS AND CONSUMER DECISION MAKING: TESTING THE MODERATING EFFECTS OF LIFESTYLE

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ABSTRACT:
The aim of the paper is to test the effects of Serbian national culture dimensions on consumer behavior in the purchase decision-making process. Additionally, the paper examines the presence of moderating effects of lifestyle when observing the relationship between national culture dimensions and consumer purchasing behavior. Relationships between national culture dimensions and consumer behavior in the purchase decision-making process were tested using the structural equation model. The results of the study show that uncertainty avoidance is the strongest predictor of consumer purchasing behavior, while power distance is the weakest. Collectivism did not exhibit statistically significant effects on the observed dependent variable. Furthermore, moderation analysis indicates that the effects of collectivism, uncertainty avoidance, and power distance on consumer purchasing behavior change with the change in consumers' lifestyles, whereas the moderating effect was not confirmed for femininity. The scientific contribution of the study is based on the originality of the research model. Additionally, significant practical implications of the work, namely its results, for the formulation of optimal business strategies, both generally for the target consumer groups and depending on their psychographic characteristics, can also be distinguished.

Keywords: *national culture dimensions, lifestyle, consumer behavior, purchase decision-making process*

CHALLENGES OF MANUFACTURERS OF PRODUCTS WITH PROTECTED GEOGRAPHICAL INDICATION

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ABSTRACT:
In the European Union the protected indication of geographical origin is one of the indications used to protect the name of agricultural and food products. Such products have several advantages for producers, consumers and the whole society of which the quality and authenticity of the product, preservation of tradition and local culture, tourist attraction and economic development of rural areas stand out the most.
Today, 24 agricultural and food products in Croatia are protected by the designation of geographical origin and around eighty producers have the exclusive right to use the protected name on their products. Therefore, the paper investigates the number of producers involved in the production of products with a protected geographical indication by county in Croatia and examines, with the interview method, challenges the producers are faced with in order to highlight the advantages, disadvantages, dangers and opportunities in their further business development.

Keywords: *protected geographical indication (PGI), products with PGI in Croatia, producers of product with PGI in Croatia*

IMPACT OF INTERNATIONAL MIGRATION ON INCOME INEQUALITY IN EUROPEAN TRANSITION COUNTRIES

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ABSTRACT:
During the past three decades, significant transformations took place in the former European communist countries, which resulted in their integration into the global economy and an increase in living standards. However, the first few years of the transition to a market economy were accompanied by a drastic drop in output, an increase in unemployment, high inflation and an increase in inequality. Reducing income inequality is one of the most important economic and political issues in Europe, since it consists of heterogeneous countries characterized by disparities in per capita income. The subject of this paper is the analysis of the impact of international migration on the level of income inequality in transition countries that have joined the European Union, CEE-11 and the countries of the Western Balkans. The research used a panel regression model as a methodological framework, and the time frame was limited to the period 2000-2020. The results show that international migration contributes to the reduction of income inequality in the analyzed countries.

Keywords: *international migration, income inequality, European transition economies, panel regression*

FINANCIAL MANAGEMENT AND CONTROL ON THE EXAMPLE OF EDUCATIONAL INSTITUTIONS IN BOSNIA AND HERZEGOVINA AND SERBIA

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ABSTRACT:
Our work was based on one segment of financial management and control in public institutions, namely educational institutions of primary, secondary and higher education in Bosnia and Herzegovina and Serbia. The authors of the paper are employed in public institutions and are directly or indirectly involved in the system of establishing and implementing financial management and control: generation of business processes, activities, records resulting from the mentioned activities, identification of risks, elimination of risks. Accordingly, we will present examples of problems and solutions that we encountered in the process of establishment and implementation, as well as examples of "good practice". In addition to the above, in the paper we tried to answer the question of connecting the financial management and control system with the ISO standard and the preparation of public institutions, specifically educational institutions, for ISO certification.

Keywords: *finance, control, educational institutions, method of analysis and synthesis, method of description*

ASSOCIATION BETWEEN MENTORSHIP AND CAREER DEVELOPMENT OF INSURANCE COMPANY EMPLOYEES

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ABSTRACT:
Career development is a multifaceted process, encompassing the evolution of occupational interests, competencies, and the integration of work-life experiences over an individual's lifespan. The symbiosis between career development and mentorship is evidenced by the pivotal role that mentorship programs play in facilitating personal growth, professional skill enhancement, and the strategic navigation of career trajectories. This study aimed to empirically investigate the association between mentorship and the career development of renowned Serbian insurance company employees. The sample of this study consisted of seventy (n=70) participants. A two-component survey, digitally-delivered to participants was used to collect data. The survey was filled out by participants and returned through the mail. Analysis of the data was conducted by (descriptive statistics, Kolmogorov-Smirnov test, Pearson correlation coefficient) SPSS 21.0 (IBM SPSS 21.0, SPSS Inc., Chicago, USA). The main findings indicate a positive correlation between mentorship and career development (p=0.05), positively impacting employees' professional growth. Furthermore, a significant link between mentorship and improved job performance suggests that supported employees contribute more effectively to organizational objectives. These findings underscore mentorship's crucial role in fostering employees' career development.

Keywords: *Professional growth, mentorship, association, development*

THE IMPORTANCE OF THE DEVELOPMENT OF THE INTERNAL CONTROL IN PUBLIC COMPANIES OF THE REPUBLIC OF SERBIA

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ABSTRACT:
The paper analyzes the place and role of public companies and the necessity of establishing professional internal control. The dilemma of whether the aforementioned service replaces already defined competencies and functions of control at different levels is removed and indicates that the existence of the aforementioned service in no way relieves the responsibility of competent persons for the implementation of control within their competencies It is emphasized that modern security problems, research in the sphere of management, and clearly expressed requirements of professional work represent a reference framework within the limits of which it is possible to unambiguously define role of internal control.
The first part describes the competence, importance, and purpose of the existence of the internal control service, provides key definitions, and describes the sequence of activities as well as the methodology used in the work on individual cases. Then, in the second part, the key challenges of introducing modern internal controls in public companies by modern international practice and European criteria are stated, described, and explained, as well as the progress achieved in this way in terms of preventing or mitigating the assessed risks. The third part lists the main results and indicates the possibility of modification and expansion of internationally accepted and widely used control methods and standards, but also provides guidelines in the light of new challenges in the functioning of public enterprises. In this regard, special importance is given to the development of integrity, competencies, and emotional qualities of members of the internal control service.

Keywords: *public company, crisis management, corruption, internal control*

AN APPROACH TO MARKETING MANAGER SELECTION BASED ON THE USE OF THE PIPRECA-S METHOD

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ABSTRACT:
The selection of suitable managers for important positions in the organization can have a significant impact on the efficiency and functioning of the organization. Therefore, this article presents a multi-criteria decision procedure for personnel assessment in the hospitality industry based on the use of the Simplified Pivot Pairwise Relative Criteria Importance Assessment (PIPRECIA-S) method. The applicability and usability of the proposed approach was examined using the example of the selection of a marketing manager in hospitality industry, but can easily be adapted for similar cases of candidate selection.

Keywords: *marketing manager, personnel selection, hospitality industry, MCDM, PIPRECIA-S*

MANAGEMENT OF DEVELOPMENT OF A SUSTAINABLE GASTRONOMIC TOURISM OFFER OF THE MORAVICA ADMINISTRATIVE DISTRICT (SERBIA)

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ABSTRACT:
Gastronomic tourism (gastro-tourism) is a form of tourism that is characterized by a high level of attractiveness on a global level. Following world trends, various forms of tourism offer based on food and drink have become one of the indispensable elements of the tourism offer of the Republic of Serbia, as a destination that has a variety of high-quality gastronomic products. Gastro-characteristics within Serbia differ among its individual geographical-administrative areas. The Moravica administrative district, as part of Serbia, also has gastro-tourism in its tourism offer, which is the subject of this paper. The aim is to establish the existing and potential elements of the gastro-tourism offer that could contribute to the sustainable development of the mentioned area. The focus is on the analysis of the state of agriculture, tourism events and gastronomic products by which the Moravica administrative district is recognizable or could be in the future. Also, an important element of development is the existence of educational institutions that enable formal education in the field of gastronomy, as well as the existence of scientific and research institutions in the field of agriculture. Based on the analysis of the current situation, guidelines were given for the management of the improvement of the gastro-tourism offer of the Moravica administrative district while simultaneously respecting the principle of sustainable tourism.

Keywords: *gastronomy, gastronomic tourism, sustainable tourism, tourism destination management, event tourism*

GLOBAL ECONOMIC CYCLES AND THE RESPONSE OF ECONOMIC POLICY

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ABSTRACT:
Past decades of economic development worldwide have been characterized by increasingly frequent economic fluctuations, prompting questions in economic science about the causes of economic cycles and necessary economic policy responses to cyclic fluctuations. The forms of economic cycles are determined by national specificities of each economy as well as international events, increasingly transmitting from one country to another or to several others. In recent decades, financial crises in developed world economies, starting from USA and EU, are most often resolved through monetary policy measures. These crises are characterized by simultaneous occurrences of economic stagnation alongside inflation growth, over-indebtedness of most countries, fluctuations in interest rates, disruptions in supply due to global geopolitical events, energy crises, and more. The necessity of state involvement in addressing these complex issues and restoring macroeconomic stability to the global economy is becoming increasingly apparent.

Keywords: *economic cycles, economic crisis, economic policy, macroeconomics*

THE EFFICIENCY AND PROFITABILITY IN THE BANKING SECTOR: A COMPARATIVE ANALYSIS OF THE REPUBLIC OF SERBIA AND OTHER WESTERN BALKAN COUNTRIES

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ABSTRACT:
During the second decade of the 21st century, the banking sector, observed on an international level, faced numerous challenges. These included, among other things, globally low interest rates, digital transformation that increased competition in the field of banking services, and finally, the COVID-19 crisis, which created additional pressure on the banking sector. It is believed that in such an environment, more efficient banks are more resilient to unfavorable market movements and are better positioned to deal with increased competition. Additionally, banks that achieve stable and competitive profitability rates typically have a greater chance of growth and expanding their business activities. When it comes to the Republic of Serbia and other Western Balkan countries, these characteristics are particularly important due to their transition to market economies and integration into international financial flows. In this regard, the aim of this study is to provide a deeper understanding of efficiency and profitability in the banking sector through a comparative analysis between the Republic of Serbia and other Western Balkan countries, and to identify key similarities and differences among the mentioned countries. The study employs a qualitative methodology, grounded in the predominant application of dynamic macroeconomic analysis method and comparative analysis method.)

Keywords: *efficiency, profitability, banking sector, Republic of Serbia, Western Balkans*

FROM THEORY TO PRACTICE: QUALITY MANAGEMENT TOOLS IN DIVERSE INDUSTRIES

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ABSTRACT:
To maintain or enhance its market position, a contemporary business must adhere to the principles of quality control in its operations. During daily operations, manufacturing companies encounter a multitude of defects in their products. It is crucial to promptly identify the root cause of a defect when it arises and implement preventive measures thereafter. To achieve this, leveraging quality management tools becomes imperative. This article analyzes quality management systems in different industries in Serbia, the use of quality management tools such as statistical process control, Ishikawa diagram, Pareto analysis, etc. which help determine the root causes of product defects. Based on the presented cases it can be concluded that quality tools are used in companies, structured into organizational units, but their choice varies according to the type of work processes, so the possibilities of applying individual quality tools vary by work system.

Keywords: *quality management tools, statistic process control, control chart, Ishikawa diagram, Pareto analysis*

RE-EXAMINING THE THEORY OF HOMO ECONOMICUS USING THE INSTRUMENTS AND METHODS OF NEUROSCIENCE

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ABSTRACT:
From the second half of the 19th century, the „Homo Economicus model“, which was established by John Stuart Mill, retained its role in economic theory until today. The concept of „calculating man“ has been subject of various interpretations over time, while the main contribution to the further development of this model was provided by theorists of the classical and neoclassical economic though. The roots of this term come from the theory of rational choice, which indicates that people choose the most optimal solution, with the intention of maximizing their own interest. In accordance with this thesis, it was concluded that people react rationally to stimuli, which are placed in their immediate environment. With that attitude, the influence of the emotional state, intuitive reaction and insufficient information of people decision-making process was neglected. Criticism of the theory of perfect rationality was provided by representatives of behavioral economic though, who developed the theory of „bounded rationality“. Through the development of ICT technologies, medical devices have been innovated, which are used to measure the impulses of brain activity and the state of the human organism. With the aim of analyzing the causes of irrational-decision making by respondents', we apply various neuroscientific techniques. This research paper defines methodes such as: photon emission tomography, steady state topography, facial coding, positron emission tomography, functional magnetic resonance imaging, eye tracking, galvanic skin response, magnetoencephalography, electroencephalography. The methodological part of this research includes descriptive statistics, defining the „EEG“ index and qualitative analysis to reveal the limitations of neuroscientific studies. The key contribution of this research involves the definition of neuroscientific tool, for the purposes of analyzing the decision-making process and criticizing the theory of perfect rationality.

Keywords: *Homo Economicus, Irrational behavior, Medical devices, Neuroscientifics methods, Bounded rationality.*

DEVELOPMENT PERSPECTIVE OF CORPORATE BONDS IN THE REPUBLIC OF SERBIA

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ABSTRACT:
To cope with the competition, which has become very strong in the conditions of globalization and liberalization, companies are often forced to invest in new facilities and equipment. These investments are mostly long-term in nature and exceed the amounts of accumulated funds. Consequently, companies are often compelled to borrow in various ways or to sell part of their ownership through stock issuances. If they opt for borrowing in the financial market, which is most often the case, corporate bonds can play a very important role in this process. However, unlike market-oriented financial systems, where this type of securities plays a very significant role in the company financing process, corporate bonds are less represented in bank-centric financial systems. Considering that, the World Bank defined a corporate bond development support program in the Republic of Serbia in 2023, which should contribute to the development of these securities in the future period.

Keywords: *direct financing, corporate bonds, securities, borrowing*

LEAN CONSTRUCTION: WASTE IDENTIFICATION AND ELIMINATION IN SUPPLY CHAIN

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ABSTRACT:
The concept of waste in construction is a current research topic that needs to be addressed, and this problem needs to be pointed out more clearly. The lean concept of waste is based on the idea that it is necessary to eliminate activities that do not add value, with the primary goal of reducing or eliminating waste to improve performance. In this paper, through a literature review and expert interviews, the topic of identification and conceptualizing waste in the construction supply chain is addressed, with a focus on the processes of design and execution of construction works. The results of this paper provide guidelines for developing a strategy for more efficient supply chain management and indicate the importance and impact of waste during value creation.

Keywords: *lean construcion, waste elimination, value creation, supply chain*

CRISIS MANAGEMENT- A KEY FACTOR OF BUSINESS SURVIVAL AND SUCCESS

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ABSTRACT:

Crises have become a constant in both life and business today. Organizational crises occur in various forms such as natural disasters, wars, terrorist attacks, human errors accidents, system failures etc. In such circumstances, the organization could lose strategic harmony with the internal and external environment and gets into problems. Crises bring uncertainty and problems to the organization, threatening its survival and sustainable development. Crises are not limited to the size or type of organization, therefore every modern organization needs crisis management. From the moment of crisis organizations management has limited time to react rationally to the changes caused by the crisis, therefore the main task of crisis management is to prepare a plan for dealing with situations that are unimaginable and potentially highly destabilizing. Crisis represents a danger for the business of the organization, from the moment of the outbreak of the crisis there is a limited time to react rationally to the changes it causes. That means crisis management is a proactive process that involves responding to the crisis before it happens, during the crisis and after it. The main task of crisis management is to prepare organization plan to confront with situations that are unimaginable and potentially highly destabilizing. The main activity of such management is focused on the analysis of the internal and external environment and the identification of strategies for preventing crises. Thus, the negative consequences of unwanted events during the life cycle of the organization can be minimized and mitigated in this way.

Keywords: *Crisis, Crisis Management, Modern organization, Business surivival and success*

EMERGING TRENDS IN THE DEVELOPMENT OF THE SERBIAN STARTUP INNOVATION ECOSYSTEM

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ABSTRACT:
The Serbian startup innovation ecosystem is experiencing a period of dynamic growth and evolution, marked by emerging trends that are reshaping the landscape of entrepreneurship and innovation in the region. Recent research indicates that the ecosystem has continued to grow at nearly 30% annually, despite increasingly challenging global and local circumstances, which is reflected in the increase in the number of startups in the idea phase and pre-seed phase. Through a comprehensive review of recent literature and industry reports, this paper examines the latest developments and emerging trends shaping the development of the Serbian startup innovation ecosystem aiming to contribute to a deeper understanding of the dynamics and opportunities within the region's entrepreneurial landscape. It also provides valuable implications for understanding of the factors driving entrepreneurial activity and innovation in the region. These include the growing prominence of deep tech startups leveraging advanced technologies such as artificial intelligence, blockchain, and biotech, and the expanding role of ecosystem startup support organization such as science and technology parks, accelerators, regional innovation startup centers and academic innovation incubators in supporting startup growth and success.

Keywords: *Serbian startup ecosystem, innovation, emerging trends, startup entrepreneurship*

JACOBI OPERATORS ON STATISTICAL MANIFOLDS

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ABSTRACT:
In this paper we give definition statistical manifolds and its complex version, holomorphic statistical manifolds. Also, some of the important results that are valid on (holomorphic) statistical manifolds are given. The results are obtained as a generalization of the results on complex manifolds, in particular on Kaehler manifolds (complex space forms). The main interest of this paper are Jacobi operators. We define Jacobi operators using a statistical curvature tensor and show some original results on statistical manifolds with commuting Jacobi operators. In particular, we show relation between sectional curvature and manifold flatness on one hand and the condition that Jacobi operators commute on the other hand.

Keywords: *statistical manifolds, Jacobi operators*

GEOGRAPHIC POTENTIALS OF SINJAJEVINA FOR SPORTS AND RECREATION TOURISM

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ABSTRACT:

The paper analyzes the state and potential of geographical factors as a basis for the development of sports and recreational tourism in the Sinjavina mountain, which is located in the central part of Montenegro. Sinjavina is the highest and most spacious mountain plateau in the Balkans with diameters of 40 kilometers in length and 20 kilometers in width. It is rich in mountain peaks, vertical rocks, undulating mountain slopes, river canyons, glacial lakes... on which numerous forms of sports and recreational activities in different parts of the year. Built tourist facilities they do not meet the modern requirements of the market. The road infrastructure, the interest of the resident population, the engagement of municipal and state authorities, but also private entrepreneurs, as well as sports and recreation organizations and individuals are a guide to the valorization of this beautiful mountain. For sports recreation, Sinjavina is challenging throughout the year, but it offers special charm to visitors in summer and winter. The numerous peaks and ascents, the dynamism of the relief are outstanding for hiking, from beginners to experienced mountaineers, and staying in nature and cycling routes are an exceptional opportunity for mountain lovers, but also for herdsmen who spend the summer on this beautiful mountain with their herds. In the winter, Sinjava is a "white desert", but the snow cover and those enjoying the wilderness are frequent visitors on organized tours on sleds, skis, and snowshoes. Even though it is an arid karst plain, Sinjavina has its advantages, which modern society is discovering and exercising to an increasing extent.

Keywords: *relief, sport, tourism, sports tourism, Sinjajevina*

SNOW ON THE SKI TRACKS EXTENDS THE SKI SEASON IN KOLAŠIN

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ABSTRACT:

Ski resorts in Kolašin in the north of Montenegro have been under construction for the past forty years. Kolašin 1450 started operating in the nineties of the last century, and since 2007 it has been privately owned. With its modernization, as well as the construction of the "Kolašin 1600" ski resort, the Bjelasica mountain gained over 50 kilometers of ski trails. It is a great sports tourism potential, but also a potential that, like other ski resorts, does not depend only on natural conditions. Man, along with nature, is the decisive factor that drives everything around him, including the ski resorts on the Bjelasica mountain. In the period behind us, the owners of the ski resort on Bjelasica built more and waited for nature. However, the time has come for man to turn to nature, to better study and understand it, thereby helping both himself and nature. In the future, the Kolašin ski resorts will not be able to "ski in nature", but man will have to meet the natural conditions, to build, but also to take risks. The construction of dozens of hotels on Bjelasica will be less exposed to the risk of capacity filling if their owners invest in snowmaking of the ski slopes. Risk management is on the move. It was also when hotel complexes and tourist facilities were designed, but also when the provision of water resources and snow cannons is the most necessary investment. In order for the ski resorts to provide the basis for their development, they must, in addition to wellplanned trails, have a high-quality snow cover, and this will only be possible if, along with the acquisition of snowmaking cannons, dams are built on the watercourses that line the ski resorts.

Keywords: *Ski resorts Kolašin, skiing, risk management, snowfall, tourism*

MODELING OF FUEL COSTS AS A FUNCTION OF PROFIT

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ABSTRACT:
In modern business conditions, one of the often-present problems in the functioning of companies is a drop in profits in unequal and unpredictable time intervals. As a result, liquidity is often an acute disease of the modern financial system. The subject of analysis in this paper is a transport company that has reported a loss in business in the last three calendar years. The goal of the statistical analysis is to analyze the impact of fuel costs on the company's profit, which is applied in the work. By analyzing the movement of fuel cost variables and profit and their mutual interaction, relevant conclusions are reached on how to get out of the loss zone by monitoring the fuel cost variable. In the presented model, it is assumed that all other variables remain unchanged in the analyzed time interval.

***Key words**: fuel costs, profit, analysis, regression* model.

THE PROCESS OF PREPARING A BUSINESS PLAN

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ABSTRACT:
The development of a business plan involves highly diverse and specialized theoretical as well as practical knowledge. The primary goal of this work is to consider the theoretical and methodological foundations of business planning, to define more closely some concepts of essential importance for the creation of a business plan, as well as to discuss formally indispensable parts of a business plan. Every document concerning planned business activities and the financial effects of those activities represents a business plan. The sole condition for a specific business document to be considered a business plan is that it contains future business activities. Business plans are accompanied by financial effects, as every business activity to a greater or lesser extent affects the financial results of the company. A business plan can be written with the aim of reducing the number of employees or selling part of the company's assets. In the usual understanding, business plans are equated with new investment ventures.
When a business plan is developed for internal purposes, the author can independently choose the form and content, which is not the case when a business plan is developed for external users.

Keywords: *Plan development, financial effects, investments, ventures*

SECURITY SYSTEM OF A LARGE SPORTS MANIFESTATION

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ABSTRACT:
For physical education, as well as for performing any other human activity, it is necessary to provide certain material conditions. Material conditions, among other things, include facilities in which a certain type of activity is carried out. When it comes to sports, as part of physical culture, the issue of facilities gains special importance. In order for any sports branch to develop, be directed, and performed properly, the existence of an appropriate environment - a sports facility of suitable quality - is necessary. The XX century represents an era of intensive development for physical culture, and the construction of sports facilities experiences its heyday during this period. The development of technology, engineering, the creation of new construction and other materials, enable better and more functional solutions. On the other hand, these same factors also influence the use of facilities in terms of their versatility and mass availability. Facilities intended for the entire population, all age groups, are being arranged, accessible to everyone. In addition to narrowly specialized facilities intended for only one activity, spaces of versatile use are also arranged for mass use.

Keywords*: Physical culture, Safety, Facilities, Construction*

FINANCIAL SUCCESS ANALYSIS OF COMPANIES OPERATING IN THE BIST HEALTH SECTOR USING THE TOPSIS METHOD

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ABSTRACT:

Businesses need financial information to see their past and current performance and to make decisions regarding their strategic goals, and they obtain this information from financial statements and their analysis (Işıldak, 2018, p.117). The purpose of financial performance measurement is to provide information to those who will make decisions about the financial situation of the business. Financial performance analyzes can support business managers in making future decisions, as well as provide information about the business to those who will invest in the business and enable lending institutions to make decisions about granting loans to the business (Yükçü and Atağan, 2010, p. 28).

Multi-criteria decision-making methods (MCDM) can be defined as mathematical methods that can be used to reach the most accurate decision in decision-making problems with multiple alternatives. These methods, which are frequently used and developed today, are methods that enable the optimal decision to be easily reached by saving both time and cost. In this study, analysis was made by applying TOPSIS (Technique for Order Preference by Similarity to Ideal Solution), which is one of the multi-criteria decision-making methods. It is among the findings of the study that the TOPSIS method is a cost-free and simple method that can be applied to make the best choice among a certain number of alternatives, when the correct evaluation factors and the importance levels of the evaluation factors are determined correctly.

In this study, the financial performances of healthcare sector companies traded in Borsa Istanbul for the 2020-2022 period were examined with the TOPSIS method, one of the multi-purpose decision-making methods, and the companies were ranked according to the results obtained. While analyzing the companies, data obtained from financial statements were used. In the analysis, liquidity ratios, activity ratios, financial structure ratios and profitability ratios were used from the ratios obtained from the financial statements. According to the data obtained, companies are ranked according to their performance over the years.

Keywords: *Financial Performance, Financial Ratios, BIST Health Sector, TOPSIS.*

FINANCIAL SUCCESS EVALUATION OF COMPANIES OPERATING IN THE BIST HEALTH SECTOR WITH RATIO ANALYSIS

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ABSTRACT

Company valuation is the process of determining the intrinsic or true value of a company. This process helps investors make an effective, conscious and correct investment decision. Ratio analysis is the comparison of at least two groups or classes in the data in financial statements by proportioning them. This method aims to obtain more meaningful results than examining financial statement items one by one. It examines and analyzes the relative (proportional) relationships of the items in the financial statements of the business. This type of analysis enables evaluation by comparing standard values with the previous year's results of the business, industry averages or the rates of a successful business. Ratio analysis is important for understanding the financial health of the business and making future decisions. Business owners and managers should monitor these ratios regularly.

In this study, the financial performances of healthcare sector companies traded in Borsa Istanbul for the 2021-2022 period were analyzed using financial ratios. The data used in the study was obtained from the Public Disclosure Platform and the data published by relevant businesses for the purpose of informing the public. As a result of the study, information was provided to both the companies examined, investors and researchers in the light of the results obtained from the companies examined. In order to increase the depth of the study, the time series of the data used may cover longer periods.

Keywords: *Financial Performance, Financial Ratios, BIST Health Sector.*

IMPACT OF DIGITALIZATION AND INNOVATIONS TO BUSINESS OPERATIONS

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ABSTRACT:
Technological progress, such as digitalization, artificial intelligence and automatization, transforms traditional manner in which we do business in modern market conditions. In modern world, which changes rapidly, innovation and education play key roles in adjustment to global changes. Innovations, in particular technological ones, change the way we learn and primarily the manner in which we apply knowledge in business. Digital platforms, AI, VR and AR technologies open up new approaches to support business, enabling access to knowledge and resources all over the world. Topic of research in this paper is impact of digitalization and different types of innovations to business operations. The aim of this paper is to examine positive and negative effects through the prism of impact by which new economic opportunities are opening, but also negative effects where digitalization may lead to loss of jobs and inequality in society, in particular regarding the workers with lower qualifications and levels of education.

Keywords: *technological progress, digitalization, artificial intelligence, innovation*

ECONOMIC EFFECTS OF SPORTS EVENTS ON THE EXAMPLE OF THE EUROPEAN KICKBOXING CHAMPIONSHIP FOR JUNIORS AND CADETS

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ABSTRACT: *Studying history of sport, as well as sports events, has long become an academic science. The breaking point in modern history when sport is concerned, was a gradual change in apprehending of amateur and professional sport, or more precisely the occurrence of professionalism among young sportsmen, which has been a sacred and intangible issue for a long time. In accordance with modern tourist demands, there are various selective forms of tourism such as manifestation or event tourism.*

Current researches and analyses have shown that sports events make a substantial effect on narrow, as well as broad settings. It would be a great mistake to have an one side approach to the effects of events on settings and stakeholders. In fact, in event management practice there are positive and negative effects of events on both settings and stakeholders. The main task for the manager is to support positive effects of events and minimize or overcome the negative ones. During our study we will try to analyze more precisely the effects of European kickboxing championship for cadets and juniors, and the host city of Budva as the main issue of our research. Considering the fact that this event held in Budva was attended by competitors and officials from 41 countries, we can rightfully state that it was a foreign tourist consumption, i.e. ''invisible export''. The total analysis of economic effects of the aforementioned event can't be completely calculated, because there is a lack of non-accommodation data. Therefore, we are going to analyze those economic effects we have gathered from the hotel accommodation, the tourist organization, health institutions and sports centers where the competitions were held.

Key words*: sports tourism, manifestations, competitors, economic effects*

LEGAL AND POLITICAL SCIENCES, SOCIOLOGY, PSYCHOLOGY,

DIGITAL FOOTPRINTS IN THE COURTROOM: THE RISE OF SOCIAL MEDIA EVIDENCE IN CRIMINAL TRIALS

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ABSTRACT:
In the contemporary judicial landscape, the proliferation of social media has inaugurated a new era in evidence collection, fundamentally altering the paradigms of criminal litigation. This paper underscores the expanding role of digital footprints from platforms like Facebook, Twitter, and Instagram highlighting the judicial system's challenges of technological advancement and traditional evidentiary standards.
A significant portion of the study is dedicated to examining the legal and ethical implications of using social media as evidence. This includes a critical analysis of privacy concerns, considering the fine line between lawful evidence gathering and infringement of individual privacy rights. The paper also discusses the implications of social media evidence on the right to a fair trial, considering how such evidence can be both incriminating and exculpatory. Furthermore, the paper addresses the challenges of authenticating social media content in a legal context, where the ease of digital manipulation poses significant hurdles. It evaluates current legal frameworks and judicial precedents guiding the admissibility and reliability of such evidence.
In its conclusion, the paper reflects on the future trajectory of social media's role in criminal justice. It posits that as social media continues to permeate everyday life, its evidentiary value and challenges will only magnify, necessitating adaptive legal strategies and policies. This comprehensive analysis aims to equip legal professionals, academics, and policymakers with a deeper understanding of the complexities and ramifications of social media in criminal trials, advocating for a balanced approach that upholds justice and respects individual rights.

Keywords: *Social Media, Criminal Trials, Digital Evidence, Privacy, Authentication.*

PROCEDURE OF FORCED DETENTION OF MENTALLY ILL PERSONS IN NON-LITIGATIVE PROCEDURE

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ABSTRACT:
Law on non-litigation procedure of the Federation of Bosnia and Herzegovina ("Official Gazette of the Federation of Bosnia and Herzegovina", number: 2/98, 39/04, 73/05, 80/14 -other law and 11/21; hereinafter: ZOV) prescribes the procedure of detaining a mentally ill person in a hospital, without his/her consent, i.e. forcibly. This court procedure requires the participation of the Center for social work and a neuropsychiatrist, in the capacity of a medical expert, as well as a representative from the ranks of lawyers appointed by the court on the side of the detained person. These procedures are of an urgent nature because, first of all, it is about restricting the freedom of the detained person, and, in fact, it is not about a sanction in criminal proceedings, which is determined by a final court decision. This paper will provide an analysis of the mentioned procedure, more precisely, the importance of the urgency of the procedure and the participation of the mentioned actors participating in that procedure. In addition, and in relation to the context in question, the rights arising from the European Convention on Fundamental Human Rights and Freedoms, which, according to the Constitution of Bosnia and Herzegovina, are imperative will be pointed out.

Keywords: *detention, urgency, neuropsychiatrist, human rights, center for social work*

ANALYSIS OF PROJECTILE EFFECTS ON DIFFERENT TYPES OF MATERIALS

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ABSTRACT: *This paper presents an analysis of the use of optical methods (recording with a high-speed camera and a thermal imaging camera) for analyzing the impact of projectiles on obstacles of different materials and structures. Through a comparative approach, optical methods showed the possibility of application and gave an assessment of their reliability for such tests. The analysis of the data obtained from the video with a high-speed camera and a thermal imaging camera gave results predominantly in the form of modification of the material that the projectile hit. The analysis of the final state of the target after the impact of the projectile has an exceptional military application because the obtained results speak of the effectiveness of protection using different materials. Three types of materials were observed in the research: granular materials, polymer materials (a typical example is Kevlar) and armor steel. The modification of the material is measurable in the final state (permanent change in the material after the impact) but also during the relaxation immediately after the impact of the projectile. Two analyzes are possible: comparison of the state before and finally after the impact of the missile, development of material relaxation dynamics.*

Keywords: *optical methods, high-speed camera, thermal imaging camera, granular materials*

VIOLATION OF INTERNATIONAL AGREEMENTS IN MILITARY CONFLICTS

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ABSTRACT:
In this paper the implementation of international agreement has been analysed, wheather there is the implementation of the most important law agreements in military conflicts when the conflicts start.
The most important norms of international agreement are analysed and the fact wheather they have been applied in the situations when the armed conflicts happen. Furthermore, leading states are considering their point of views about international agreements and the avoidance of them regarding their signing and ratification. The question is which interests are the leading ones, protection of civilians or economic prosperity of worldwide giants.
In the paper we would like to emphasize the respect of international agreements which is the ground of rights and respect of basic human rights. Also, there will be mentioned the basic human rights that are jeopardized directly during military conflicts and that the civilian are those who pay tribute in these conflicts. The author analyses the justification of human rights derogation during the war, if we have in consideration that the respect of human rights during the military conflicts is actually the base of respect of basic human rights and international humanitarian law.

Key words: *international agreements, military conflict, civilians, leading states, human rights*

BUSINESS ETHICS IN COMPANIES

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SUMMARY:
The aim of the paper is the analysis of business ethics in companies in the northwestern part of Croatia, that is, the researching of employees' attitudes about ethical attitudes and dilemmas, the company's code of ethics, decision-making and manager's behavior towards employees in the context of ethical principles.
In this way, the characteristics of business ethics among employees in the company, between employees and superiors and the characteristics of decision-making resulting from presumed ethical dilemmas were researched. The paper used a quantitative methodology in the form of a survey in which 129 respondents participated. More than 80% of respondents believe that their supervisor behaves ethically and makes ethical decisions, builds unity within the company, respects employees, is fair and honest with employees, and tries to help them. Also, more than 70% of respondents believe that collegial relations prevail in the company which improve interpersonal relations. However, when the respondents have to express themselves about specific ethical dilemmas related to the company's ethical practice, 2/3 of the respondents would act unethically when their superior asked them to do so. Furthermore, the respondents would use their private connections and acquaintances, depending on the situation and the seriousness of the problem, for work purposes.
The paper concludes that business ethics is responsible business behavior due to the fact that it helps improve interpersonal relationships and build an ethical business climate.

Keywords: *business ethics, northwestern Croatia, survey*

PARENTAL COMPETENCIES OF MOTHERS OF ADOLESCENTS- DIVORCED AND THOSE IN MARITAL UNION

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ABSTRACT:

The research aims to compare parental competencies of mothers of adolescents who are married and of those ones who are divorced. Moreover, the goal is to examine certain mental health aspects: psychological well-being, anxiety and depression. The research included 201 respondents. The following questionnaires were used: Parenting Scale of Competence (Gibaud-Wallston & Wandersman, 1978), shortened version of Ryff's Scale of Psychological Well-Being (Ryff, 1989), Beck's Depression Inventory (Beck et al., 1979), and Zung's Self-Rating Depression Scale. The results show that there are differences in prominence of parental competent and psychological well-being in favour of mothers in marital union, as well as anxiety and depression in favour of divorced mothers. The differences on of sociodemographic variables have not been found in terms of parental competencies. Received data can be used in practical work with parents of adolescents either at the personal or family crisis level.

***Key words**: parental competencies, divorce, adolescents, psychological well-being*

AGGRAVATED MURDER

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ABSTRACT:
Life represents the most significant good, the value that underlies all other human values. It is the basis for the realization of the other achievements of humanity. If there was no right to human life, as a cornerstone of the corpus of other human rights, then it would not make any sense. Today, there is no legal order that does not protect the right to human life. This protection is achieved through different branches of law (medical law, environmental law, etc.), but in this respect criminal protection is the most important. Therefore, the crime of murder is one of the most serious crimes. With every murder, humanity loses one member of the community, and man is deprived of his life, which is irrevocably good. The general, social interests in this sphere take precedence over individual goods and values. The legislator in the sphere of protection of life invokes the subjective rights of the individual in order to better protect him. Yet, in addition, it is precisely the human right to life that is violated on a daily basis, human lives being extinguished, not naturally, but by violence, by force, and most often by other people, the same people who should just take the right to life as the supreme postulate of all of us.

Keywords: *life, right to life, legal order, criminal protection, murder.*

HUMANITIES: PHILOSOPHY, PHILOLOGY, HISTORY, THEOLOGY

JACQUE LACAN'S *SINTHOME* AS THE SELF *EXILE* FROM *THE* TRAUMA

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ABSTRACT:
The concern of this paper is to point out one of the (im)possible ways of subject's attempt to go through the Trauma caused by the repeated process of the Symbolic initial castration as well as by certain ontological traumatic experiences when lacanian identity functions – ego subject/cartesian subject function, hysteric and neurotic function – may appear not sufficient for subject to cope with the Trauma, or when the Trauma is absolutely out of subject's conscious control. According to Jacque Lacan's psychoanalitic theory subject identity or the Self relies on the Borromean knot – the Real, the Symbolic and the Imaginary. The Real, that is unconscious, is impenetrable, but it comprises *jouissance* – pleasure in pain – which equates to the *jouissance* of object petit *a*, object of desire separated from the subject in the initial mirror stage of the Self constitution as well as in the process of subject's initiation/castration in the battery of the Symbolic signifiers – language. Searching for the meaning of the Self *constitues* the symptom, so the subject must respond to the symptom in the Symbolic register in order to develop it in the illusionary Imaginary which may barely be considered as „place" where the satisfying solution can be find. Final Lacan rethinks psychoanalysis in the light of creating the new, individualised Symbolic register perceived in between neurosis and psychosis, that is *lalanguage* referring to the term *lallation*, the language separate from meaning – the language a child immersed in before acquiring articulated language. Analysing the writing of James Joyce Lacan allots Joyce a psychotic or *exile from oneself* identity structure and re-invents symptom formulating his new notion of the *synthome*. The *synthome* may be perceived as self-creating fiction of oneself existence and the Self which annulates the universal Symbolic, the Name-of-Father signifier, the Other and also may provide *direct connection* of subject to the *jouissance*, *new jouissance* as well as the creation of a neosubject. Lacan's use of Joyce the writer is not to apply psychoanalysis to a litterary subject, but to offer an alternative temporary existence of the subject's identity, the Self especially in the initial stage of facing the Trauma.

Keywords: Lacan, psychoanalysis, the Self, the Trauma, *sinthome*

THE PROFESSIONAL-CONTEXTUAL INDICATORS OF PROFESSIONAL IDENTITY

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ABSTRACT:
Professional identity, a part of the broader social identity, develops by performing professional roles. It's a multifaceted entity whose development, in addition to psychological factors, is influenced by many socio-historical and cultural factors. The goal of this paper is to systematize previous research on professional-contextual conditions that support or hinder the development of pedagogues' professional identity. Earlier research identified following indicators: professional socialization as a process of internalizing the professional group's values into the individual's identity; work experience; activity in the professional and social community; characteristics of and satisfaction with the work environmen and relationships. Similarly, Brot and Myers (1999) identified three categories of professional-contextual conditions that are relevant to the development of the school pedagogues' professional identity: 1) Experience, distinguishing between length of service and work experience that brings knowledge acquired through working in schools and through community activities; 2) Characteristics of school counseling services, especially the issue of distribution of time and duties among counselors and whether any distribution is possible; 3) Basics of work, operationalized through developmental characteristics and potential problems among students and expectations of school management/decision makers. The results of this analysis show that qualitative indicators (school climate, quality of pedagogues' engagement in professional communities) are more relevant indicators of professional identity than quantitative indicators (length of service, geographical and structural characteristics of the school). However, professional identity represents a multiple entity and it is not possible to predict absolutely all its determinants, which means that this is an almost inexhaustible topic for future research.

Keywords: *professional identity, social identity, pedagogue,work environment*

LINGUISTIC CHALLENGES IN IT COMMUNICATION

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ABSTRACT:
Communication is the most important activity of a manager and his decisive competence, this also applies to the IT sector. Moreover, in relation to meetings, telephone or written communication, the most important is face-to-face, although electronic communication is the most prevalent. Inability to communicate is one of the ten biggest obstacles to a manager's success. The former dilemma of management theorists, whether humor is necessary and useful for business, no longer exists today. Humor is a powerful motivational factor. That's why you should strive for well-measured humor. Although some are still skeptical about the contribution of humor in business, research has shown that managers who have a strong sense of humor advance professionally faster and further. Because traditional business communication is increasingly becoming "colorless" and formal.

Keywords: *it communication, management, obstacles*

SPATIAL CONFINEMENT AND PSYCHOLOGICAL TRAUMA IN EMMA DONOGHUE'S *ROOM*

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ABSTRACT:
The paper explores the relationship between enclosed physical space and psychological trauma in Emma Donoghue's novel Room. The novel centers on Jack, a five-year-old boy, and his mother, Ma, who are confined to a single room, completely isolated from the outside world. Having never left this space, Jack perceives only the room and its inhabitants as his reality. It hypothesizes that the physical confinement in the novel serves as an instigator for the characters' traumatic experiences and responses. The theoretical framework integrates Yi-Fu Tuan's spatial concepts with trauma theory, providing an interdisciplinary lens for analyzing the novel's portrayal of space. The paper's premise is that the room's limited and controlled environment shapes the protagonists' perception of reality. Through a detailed analysis, the paper argues that the room, as a confined space, functions dually as a protective sanctuary and a source of trauma. Upon his departure from the room, Jack yearns for its security and familiarity. This analysis is further supported by Judith Herman's concepts on recovery from trauma, which frames the latter part of the novel when Jack and Ma transition to the outside world. The novel questions our understanding of trauma within and beyond the physical confines of space, ultimately exploring how identity and perception are shaped and reshaped in literary works.

Keywords: *space, confinement, trauma, Emma Donoghue, Room.*

PRAGMATICS OF METAPHOR: A FULL CIRCLE

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ABSTRACT:
In this paper we explore the pragmatic treatment of metaphoric expression since the very onset of pragmatics as a linguistic discipline. We shall firstly present the Gricean approach – the implicature analysis, long since abandoned but has proven relevant in recent cognitive-inferential studies. Following the modified implicature analysis, the two current approaches will be explored – explicature analysis and modified explicature analysis. However, special attention will be dedicated to those aspects of theory that treat certain metaphoric expressions of special poetic nature as contributing to the implicit content only. This approach seems to indicate that pragmatics have made a full circle to the implicature analysis, at least when extended literary metaphors are in question.

Keywords: *metaphor, pragmatics, Relevance Theory, implicature, explicature*

FOSTER'S DYSTOPIAN INTIMATION OF THE POSTHUMAN ERA

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ABSTRACT:
The aim of the paper is the analysis of the dystopian science fiction short story "The Machine Stops" by the English novelist Edward Morgan Foster. The given piece of literature paints a dark picture of the future of humanity forced to live in isolation while every human being is controlled by an all-powerful Machine that eventually ceases to function thus causing an overall catastrophe. The total dependence of humans on the Machine, which Foster insists on, prophetically hints at the ominous outlines of the posthuman phase of human development which seems to have begun. Written at the beginning of the last century, this work of fiction raises a whole complex of social, ethical and philosophical aspects that are now an integral part of cyber-culture. That is why a special attention will be paid to them and the correlations with dystopian prose that marked the epoch of modernism will be established.
Keywords: *modernism, dystopia, cataclysm, humanity, technology.*

THE MANY-FACETED 20TH-CENTURY EXPERIMENTAL THEATRE: WHERE IS THE THEATRE HEADED?

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ABSTRACT:

The paper follows the development of the experimental theatre during the 20th century as it traces various ways in which drama had evolved in the forms of different types of theatres and artistic movements. The evolution of avant-garde performances will be shown through examples that belong to Theatre of the Absurd, Theatre of Cruelty, Epic Theatre, Guerrilla Theatre, In-Yer-Face Theatre, Theatre of the Oppressed, expressionist drama, surrealist drama, and performance art. The goal of the paper is to examine the value of these innovations in performance styles and to make conjectures about the future of the theatre based on the reached conclusions.

Keywords: *experimental theatre, expressionism, surrealism, avant-garde, performance art.*

TRANFORMATION OF MEANINGS IN THE SCREEN VERSION OF FAIRY STORY IN RUSSIAN CINEMA

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ABSTRACT:

The article examines the issues of transformation of value guidelines in fairy tale films of Russian cinema for children. Film products from the 30-40s of the last century to the present are analyzed. The issues of the influence of ideology on the semantic dominants of children's cinema are considered. The issues of the peculiarities of the mythologization of the main character of fairy tales in cinema are explored. The influence of world cinema on the fairy tales of Soviet and modern Russian cinema is examined using specific examples. For example, correlation, parallels and allusions with the film by German director Fritz Lang "Nibelungen" and the film - fairy tale by director Alexander Rowe "Kashchei the Immortal" (1945), where the image of the main character of the Soviet film, like Siegfried in "Nibelungen", is built on the strict canons of heroism -mythological narrative. Moreover, A. Rowe uses Lang's film not so much for the purpose of conscious manipulation with someone else's text in the system of the author's, individual culture, but as a model, a source of successful, ready-made solutions that the creators of folklore traditions naturally and without any reflection borrow from each other. The experience and features of creating joint fairy tale films after World War II, in the creation of which countries from different socio-economic systems took part, are considered. The reasons for the success of films on screens in the USSR, but also abroad are analyzed, demonstrating the successes of domestic cinema in artistic and technical terms, promoting the best examples of folk culture and literary classics of Russia in the 50-60s of the last century, as well as the reasons for the decline of this genre in the 80s. 90 and the reasons for the revival of interest in this genre and the successful experience of modern Russian filmmakers in the last 10 years.

Keywords: *Cinema for children, Russian children's cinema, fairytale film, meanings, tradition, mythology*

ANALYSIS OF PARAMETERS THAT INFLUENCE THE EFFECTIVENESS OF TEAMWORK

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ABSTRACT:
Teamwork is becoming an increasingly important aspect of organizational dynamics and therefore it is necessary to understand the factors that contribute to or limit the productivity of teams. The aim of the research is to analyze how different parameters, such as communication, leadership, motivation, diversity of team members and organizational culture, affect the effectiveness of teamwork.
Various methodologies were used in the research, including employee surveys, analysis of internal documents and case studies. The results of the research indicate that parameters such as openness of communication, leader support and diversity in the team are key factors that positively influence the productivity and innovation of teams. Also, it was discovered that organizational culture plays a key role in shaping team dynamics and that it is important to align the organization's values with the team's goals.

Key words: *Teamwork, efficiency, productivity, communication, leadership, motivation,*

FROM POLICY TO PRACTICE: DIGITAL EQUALITY GENDER MAINSTREAMING IN EU POLICIES

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ABSTRACT:
This paper examines the progress and challenges of gender mainstreaming within digital policies in the European Union (EU). It offers an in-depth analysis of the various strategies and practices implemented across EU member states to enhance woman's digital inclusion. Despite significant advancements, the persistent digital gender divide necessitates a comprehensive review of these initiatives, considering the evolving digital landscape and its implications for gender equality.
The paper highlights diverse and multidimensional practices in gender mainstreaming across the EU. These practices encompass policy areas beyond ICT, including health, education, and financial inclusion. Key strategies involve government support and partnerships with multiple stakeholders, ranging from specific activities like workshops to broader institutional strategies and networks. Despite progress, challenges such as limited access to technology, cultural biases, and the absence of gender-sensitive policies are identified as barriers to achieving full gender mainstreaming in digital policies. The EU's specific strategies include integrating gender-specific objectives in national digital agendas, implementing targeted programs for women and girls, and employing gender criteria in policy project assessments.
The review concludes that the EU's approach to gender mainstreaming in digital policies serves as an exemplary model for other regions. However, it underscores the need for continuous policy evaluation and adaptation to meet emerging challenges in the digital gender divide. The article advocates for sustained collaborative efforts among governments, private sectors, and international organizations to ensure sustainable and inclusive digital development.

Keywords: *Gender Mainstreaming, Digital Policies, European Union, Digital Gender Divide, ICT, Gender Equality, Digital Inclusion.*

POETIC-EXEGETICAL CHARACTERISTICS OF MARY'S SONG (LUKE 1, 46-55)

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ABSTRACT:
In the paper, we present the basic poetic-exegetical characteristics of Mary's song from the Gospel of Luke (1, 46-55), with a special focus on the following problematic areas: the question of authorship (whether the song belongs to Mary or Elizabeth), the positioning of Mary's song in the Gospel of Luke in relation to other Gospel and broader biblical textual material, the structure of the song itself, its liturgical character, the processes of poeticizing prayer ecstasy, and the themes addressed in the song: poetic glorification of God, humility, obedience, socio-Christian principles, the unity of man and God, which also raises the question of the genre determination of Mary's song as a 'poetic prayer.' From a theopoetic perspective, Mary's song, as it indicates Christianity before the birth of the Messiah and before Christianity begins at all, takes on the character of annunciation, a poetic prelude to the upcoming Christianity. It can be concluded that the place of the song, on the poetic level of Luke's Gospel text, becomes the place of constituting the truth of Christianity itself.

Keywords: *Theotokos, Mary's Song, Literary Mariology, Biblical Literature, Theopoetics*

SOCIAL FEMININATIVES FROM PERSPECTIVE OF LITERATURE AND LINGUSTIC NORM AND LEGAL NORM

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APSTRAKT: *This paper considers status of feminine nouns of semantic category nomina agentis et professionis from the point of view of linguistics and legal regulations. Derivative processing of social femininatives in the most representable grammars published in the second half of the 20th century and beginning of 21st century, is compared to their treatment in modern referent publications. The conclusions are thereby connected with the segment of national legislation intended towards provision of gender equality, referring prevention and suppression of gender discrimination in language by committing their users to use femininatives and absolute avoidance of generic forms when referring to persons in female. The aim of this research is explication of (non)compatibilities of normative and legal rules and linguistic rule on use of names for occupations, professions and titles of women.*

Key words: *female nouns, social femininatives, generic form, Law on Gender Equality*

IMPROVING COMMUNICATION AS A KEY STRATEGY FOR ACHIEVING GOALS OF PROJECT TEAMS

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ABSTRACT:
This paper explores the significance of communication in achieving success within project teams. Through an analysis of available literature and research, we highlight the central role of communication in shaping team dynamics and performance. We examine how transparent, open, and continuous communication within teams contributes to a better understanding of goals, tasks, and expectations for each team member. Additionally, we investigate how communication can mitigate the risk of misunderstandings and conflicts within teams. We analyze the impact of different communication channels and technologies on the effectiveness of teamwork, emphasizing the need for adaptability and timely information delivery. By examining specific examples of best practices, we explore concrete strategies such as regular meetings and clear objectives that can enhance communication within project teams. Finally, we emphasize the importance of continuous development of communication skills within teams as a key factor for the long-term success of projects.

Key words*: communication, project teams, teamwork, organization, communication channel, technologies*

THE ROLE OF THE SCHOOL PRINCIPAL IN EMPLOYEES' MOTIVATION

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ABSTRACT:
Motivation is a complex and continued process; therefore, it requires an interdisciplinary approach of the manager. Managers – school principals must invest in knowledge and skills so that they can “lead” their employees, as well as act in a changing environment. To motivate the employees is the basis of quality and successful managing of a team. It is the easiest to motivate people who are cooperative, hardworking, and dedicated. It is often heard that a leader is born, not made. An open-minded and accessible person who has charisma can master the necessary knowledge and skills to become a good manager, unlike a person characterised by selfishness and egocentricity, regardless the skills and expertise. To lead employees successfully, the manager must have the appropriate power. The sources of power are different, depending on the managers themselves and their role in the organization: legitimate power – based on the authority and hierarchy of the function itself; the power of rewarding – rewarding desirable behaviour in the form of earnings, promotion, rewards; coercive power – influence through punishment; referential power – influence on employees through personal example; professional, expert power – based on the professional knowledge of the manager. Regarding this and in the research that we will present, we examined whether the motivation to work among employees is conditioned by the role of the school principal and his approach to work. Bearing in mind that the degree of aspiration differs for each individual and is influenced by various factors, the field of interest in this work is what is the key role of the school principal, the role in management, what are the knowledge, skills and abilities that the school principal should possess, so it could influence the increase in the motivation of employees in the collective he manages.

Key words: *Motivation, school principal, leader, employees, manager*

THE IMPORTANCE OF EMPATHY IN EFFECTIVE LEADERSHIP

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ABSTRACT:
The 2022 global leadership study by Harvard Business Publishing Corporate Learning highlights that the best leaders are those highly motivated to create positive changes for their employees, organizations, and society as a whole. Through various research methods, such as focus groups, interviews, and literature review, ten key abilities for leaders at all levels have been identified. However, the research indicates that successful leadership cannot be fully explained solely through abilities, skills, and micro-skills. Seven character qualities, termed "leadership superpowers" have been identified as key human traits or values that shape and motivate truly effective leaders.
Empathy, a basic emotion expressed by simply acknowledging someone else's experience, is ranked as one of the most important superpowers. Although 77% of senior leaders consider empathy important, most respondents said their leaders do not consistently express empathy. The data suggest that employees now expect greater empathy from their leaders and that organizations practicing empathy see deeper employee engagement. However, only 47% of senior leaders in the survey think their organizations value empathy.
Empathy is central to building trust and authentic leadership, making it important for the development of today's leaders. However, the lack of consensus and clarity in defining this competence is an obstacle to their practical application. The aim of this paper is precisely to explore the role and nature of the competence of empathy in leadership through a review of specific knowledge, attitudes, and skills needed for its development, which can be useful for professional development, hiring, and leadership education program design.

Keywords: *Empathy, Leadership, Engagement, Trust, Professional Development*

REQUIREMENTS FOR SUSTAINABLE LEADERSHIP

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ABSTRACT:
In the business environment of the modern era, the key challenge that stands out more and more is related to the concept of sustainability. Accordingly, leaders are required to develop specific competencies in order to effectively direct the organization towards the practice of sustainable development. This paper presents a systematic review of the literature that focuses on the key competencies of sustainable leadership, offering insights from different perspectives. The analysis of previous research shows the diversity of approaches and categorization of key competencies of sustainable leadership. The most frequently mentioned competencies are systemic thinking, anticipation, normative, strategic and interpersonal competence. However, the lack of consensus and clarity in defining these competencies is an obstacle to their practical application. Further research is necessary to identify the key components of sustainable leadership and their interrelationships. Also, it is important to consider the context and specific requirements of organizations in different industries in order to develop tailored strategies for developing sustainable leaders. This paper contributes to a better understanding of the key competencies of sustainable leadership, while highlighting the need for further discovery and development of clear guidelines for developing leaders capable of leading organizations towards a more sustainable future.

Keywords: *Sustainable leadership, Key competencies, Systemic thinking, Anticipation, Normative competence.*

ENVIRONMENTAL ACTIVISM OF ADOLESCENTS AS A PREDICTOR OF ECOCENTRIC WORLD VIEW

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ABSTRACT: *The aim of this research was to examine significant differences in the ecocentric world view with regard to the environmental activism of adolescents, that is, which of the investigated manifest variables of pro-environmental attitudes and pro-environmental behaviors gives the maximum contribution to the latent function (factor). The study was conducted on a pertinent sample of 186 adolescents (61.10% female; M = 18,50.88; SD =0.35). the following measuring instruments were used: a test of factual knowledge about the environment,environmental concern, and pro-environmental behavior. The tests have satisfactory reliability of the internalconsistency type: environmental apathy (α = 0.72), needs for nature (α = 0.80), pro-environmental behavior (α =0.78). One statistically significant discriminatory function was extracted using canonical discriminant analysis, atthe level of significance (p ≤ 0.03), with the values of the F test of Wilks's lambda (Wλ = 0.57), the canonicaldiscrimination coefficient (r = 0.47) and 72.16% of the explained variance, which was interpreted as ecocentricorientation towards the world. The calculated standardized coefficients of canonical discrimination indicate a dominant positive interaction of medium intensity between the manifest variable of anthropocentrism, and a negative correlation of low intensity between the predictor of environmental apathy and the extracted latent dimension. In addition, the significance of the centroid indicates that the discrimination on the bipolar discriminatory function is relevant. The obtained positive sign of the centroid of the cluster – highly active participants suggests their willingness to take responsibility. On the other hand, the negative sign of the centroid signals a group of inactive participants characterized by the absence of a sense of belonging to nature and emotional affinities towards it, as well as a lower frequency of pro-environmental behaviors.*

Key words: *high school seniors, pro-environmental attitudes, pro-environmental behaviors, discriminatory function*

SUSTAINABLE DEVELOPMENT, ECOLOGY, ENERGY EFFICIENCY AND RENEWABLE ENERGY SOURCES

MULTI-CRITERIA DECISION-MAKING APPROACH FOR REGENERATION OF ABANDONED AREAS: SELECTION OF REMEDIATION TECHNIQUES

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ABSTRACT:
Regeneration of areas that are no longer active and burdened by previous use represents an essential segment of cities' resilience to the global challenges of the 21st century. Traces of the past activities of these areas are visible through the legacy of neglected buildings and other infrastructural facilities, often accompanied by the presence of pollutants in the soil. Thus, implementing soil remediation is one of the primary prerequisites for restoring and reusing abandoned areas. The optimal remediation technique is selected depending on the type of pollutant and its concentration in the soil. In choosing the appropriate technique, it is necessary to consider the impact of the method on the environment, the complexity of the procedure, the costs, the degree of efficiency and the time required to remove pollutants. The paper examines a multi-criteria decision-making approach in the restoration phase of abandoned areas related to the choice of remediation techniques. By applying the Analytical Hierarchical Process (AHP) method and considering various aspects of the choice of remediation techniques, the paper aims to rank biological, physical-chemical and thermal soil remediation methods and indicate the most significant ones in pollutant removal.

Keywords: *multi-criteria decision-making approach, AHP method, soil remediation, abandoned areas*

MICROALGAE IN THE EUROPEAN PROTEIN TRANSITION AS PART OF EUROPEAN GREEN DEAL

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ABSTRACT:
As the world faces challenges related to environmental degradation and food security, this paper delves into the pivotal role of microalgae in the European protein transition. The shift from animal-based to plant-based proteins is a cornerstone in mitigating the environmental impact of traditional agricultural practices.
Microalgae cultivation offers a multifaceted solution by harnessing non-arable land, thus circumventing competition with food crops. These tiny organisms thrive in diverse environments, utilizing marginal lands and even urban spaces to yield high-protein biomass. By doing so, they provide a sustainable source of nutrition without encroaching on limited arable land resources.
Moreover, the integration of microalgae into agriculture not only diversifies protein sources but also supports traditional farming. Microalgae's utilization as soil improvers and bio-stimulants fosters healthier plant growth, enhancing crop yields while reducing reliance on synthetic fertilizers. This synergy between microalgae and traditional farming practices not only contributes to the protein transition but also promotes ecological sustainability.
Furthermore, the paper underscores the significance of microalgae in the broader context of the energy transition. Their potential for biofuel production and carbon sequestration aligns with the European Green Deal's objectives, offering a renewable energy source while mitigating carbon emissions.
In summary, this paper advocates for the integration of microalgae in the European protein transition as a pivotal component of the European Green Deal. Through their versatile applications in protein production, agricultural sustainability, and energy generation, microalgae emerge as a promising solution to foster a more sustainable and resilient future.

Keywords: *microalgae, protein, energy, sustainable, energy transition.*

THE NORTH ATLANTIC OSCILLATION AND ITS INFLUENCE IN THE MEDITERRANEAN REGION

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ABSTRACT:
The North Atlantic Oscillation (NAO) is dominant low-frequency atmospheric oscillation in the Northern Hemisphere. It has extensive and pronounced climate impacts around the globe. The NAO is highly seasonal oscillation with two distinct phases defined by a positive and negative NAO indices. We present the NAO influence on the climate parameters in the Mediterranean region. This influence, especially on the amount of precipitation, is more pronounced in the winter than in the summer part of the year. A positive NAO phase leads to a decrease in precipitation over the Mediterranean and Southern Europe (south of 45^0N) and an increase over Northern Europe. A negative NAO phase affects these regions in the opposite way. Switches from negative to positive NAO phases are followed by noticeable changes in the average precipitation of the Mediterranean basin, such as the decrease observed between the mid-1960s and the 1990s. Montenegro is part of the Mediterranean and the influence of the NAO is recorded especially in the winter part of the year from November to April.

Keywords: *The North Atlantic Oscillation, Mediterranean, precipitation, temperature*

EXPLORING MICROBIAL FUEL CELLS: HARNESSING ALGAE AND HYDROGEN FOR SMALL-SCALE ELECTRICAL GENERATION

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ABSTRACT:
This paper explores small-scale bioreactors' potential for electrical energy generation using algae and hydrogen in Microbial Fuel Cells (MFCs). Microbial Fuel Cells harness microbial metabolic processes to convert organic matter into electricity, presenting a sustainable energy production avenue.
Algae, with their rapid growth and photosynthetic prowess, offer an abundant source of organic compounds for MFCs. Their cultivation in diverse environments provides readily available biomass for energy generation. Concurrently, the integration of hydrogen in MFCs showcases an alternative approach due to its high energy density and clean combustion process.
The study investigates the operational principles of these bioreactors, emphasizing the mechanisms driving electricity generation in MFCs. It highlights their efficiency, scalability, and sustainability, indicating their potential in decentralized energy generation for remote power supply, portable electronics, and wastewater treatment.
Addressing current challenges such as optimizing reactor design and enhancing microbial activity, this paper aims to pave the way for wider adoption and commercial viability of these systems.
In conclusion, the integration of algae and hydrogen in small-scale bioreactors for electricity production demonstrates promising prospects. Leveraging microbial activities and renewable resources, these systems offer a pathway toward sustainable and decentralized electrical energy generation.

Keywords: *bioreactor, microbial fuel cell, electrical energy, algae, hydrogen*

EFFECT OF CHELATING AGENTS ON SELECTED METALS IN VINEYARD SOILS

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ABSTRACT:
Contamination of soils with potentially toxic metals is a well-known current global problem. Numerous technologies have been developed for remediation of land contaminated with toxic metals. The aim of this research is to show the general ability of natural chelating agents to extract selected metals from contaminated soil. The following chelators were used: EDTA, salts of carboxylic acids (CA) and amino acids (AA). The following metals were tested: Al, Cr, Mn, Fe, Ni, Cu, Zn and Pb. Aluminium, Cr, Mn, Fe, Ni showed the following decreasing complexation trend: EDTA > CA > AA and for Cu, Zn, Pb, that trend is: EDTA > AA > CA. Lead and Cu showed the highest chelating ability, while Al, Fe and Mn showed the weakest.

Keywords: *soil, metals, remediation, chelators, complexation*

SPECIFIC CHALLENGES AND POTENTIAL NEGATIVE EFFECTS OF RENEWABLE SOURCES ON THE ENVIRONMENT

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ABSTRACT:
Climate change is a serious global problem caused by increased amounts of greenhouse gases in the atmosphere. They are the result of burning fossil fuels, deforestation and industrial production.
The production of energy from renewable sources aims to reduce the emission of greenhouse gases, especially from the aspect of environmental protection. Although renewable energy sources generally have less negative impact on the environment compared to fossil fuels, they are not completely impact-free. The paper will present specific challenges and potential negative impacts of renewable sources on the environment.
In the face of climate change, it is clear that the production of electricity from fossil fuels causes a number of threats to the environment. The production of electricity from renewable sources has priority in solving global climate changes and their impact on the environment. Also, the goal is to encourage environmental awareness, which is necessary in the further development of technologies. Investing in scientific and technological research opens up the possibility of solving global problems and encourages the use of renewable resources.
Since all sources do not have the same impact on the environment, the differences are investigated and acceptable solutions are sought. Thus, research has shown that, for example, geothermal energy has the lowest CO2 emissions. However, in order to maintain neutrality in relation to other resources, it is necessary to achieve 100% recycling of process water.
Namely, the goal of this paper is to show the needs of the development of ecological awareness of modern society. Regardless of which form of energy source (renewable and/or non-renewable) we exploit, we somehow affect the environment and the future of the Planet as a whole..

Keywords: *environmental awareness, renewable energy sources, climate change, production, CO_2 emission.*

EUROPEAN AIR QUALITY POLICIES AND STRATEGIES – A REVIEW

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ABSTRACT:
Aspirations towards development and modernization of life caused a problem that engulfed the whole world – air pollution. A growing number of recent research indicate the negative influence of air pollution on the environment, economy, human health, and life quality. Consequently, responsible bodies of the European Union and European countries have implemented a series of air quality policies and strategies. This paper includes a review of recent European policies and strategies, publication trend analysis, and the most frequently applied measures. Based on the collected results, the measures that led to the greatest progress and the way of their implementation on the territory of the Western Balkans were recommended.

Keywords: *air pollution, environment, human health, life quality*

POLLUTANT PARTICLES IN THE AIR ON THE TERRITORY OF KOSOVSKA MITROVICA

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ABSTRACT:
Climate change is the most common change that has been discussed in the wider scientific community over the last decade. The impact of pollutant particles on all areas of the environment is so great that environmental protection is an extremely important global issue. Air is one of the areas of the environment without which there is no life on the planet. Clean air is the basis for the life of humans, animals, and plants on earth. The composition of gases in the atmosphere plays a very important role in influencing the climate. The change in the composition of clean air due to the presence of pollutant particles has a negative effect on the composition of the atmosphere, which has significant consequences, including damage to the Earth's ozone layer and climate change. Air pollution has been linked to various negative effects on human health, including heart attacks, asthma attacks, bronchitis, and other respiratory symptoms. Therefore, it is very important to monitor air quality and know its composition. In this paper, we will show what pollutants are present in the air, focusing on the Kosovska Mitrovica region, how they affect, and how to reduce them with the aim of a healthier environment.

Keywords: *climate change, air pollution, environmental protect.*

STATE AND PERSPECTIVES OF SUSTAINABLE FISHERY DEVELOPMENT IN THE REPUBLIC OF SERBIA

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ABSTRACT:
The strategies of the European Green Deal, titled "From Farm to Fork," are focused on establishing fair, healthy, sustainable and environmentally friendly food supply chains. The European Union represents a significant market for the placement of Serbian agricultural products. To continue this trend, it is necessary to improve the development of organic agricultural production through the implementation of measures which will enhance animal welfare, ensure the supply of organic seeds, reduce the carbon footprint of the agricultural sector, and minimize the use of plastic, water, and energy. Fishery in Serbia, as a branch of agriculture, has seen a significant decline in recent years and this is even more obvious when compared to its real potential. The causes include the lack of state support for producers, pollution, the disappearance of spawning grounds and natural habitats. The Serbian market is supplied with fish from domestic production – aquaculture, open water fishing, but it is most frequently filled with imported fish. Aquaculture in Serbia is mainly focused on the production of trout and carp. Serbia utilizes only 10% of its capacity for fish production. The greatest potential for expanding fish farms can be located in the territory of Vojvodina, where infertile land could be turned into a sustainable resource. State support in the form of grants for establishing new and reconstructing existing fish farms, as well as equipment procurement, would significantly contribute to improving the development of sustainable fishery in Serbia. The paper analyzes the current state of fishery and the prospects for the development of sustainable fishery in Serbia in line with the European Green Deal. In addition, the possibilities for improving fishery in protected areas are considered.

Keywords: *development, sustainable fishery, Republic of Serbia*

MANAGING AND POSSIBLE IMPROVEMENT OF ENERGY EFFICIENCY OF SPORTS BUILDINGS; CASE STUDY SERBIA

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ABSTRACT:
The majority of sports buildings in Serbia were constructed between 1960 and 1980, a period when energy efficiency was not a top priority. Even if energy efficiency was considered, the technology and materials used during that time have become outdated in terms of efficiency. These buildings primarily rely on traditional, fossil fuel-based energy sources. With increasingly strict regulations on energy efficiency, it is crucial for these facilities to undergo renovation and subsequent maintenance to reduce energy consumption.
Sports buildings are naturally well-suited for the integration of Renewable Energy Sources (RES), given their spacious open areas and outdoor surfaces. However, this paper investigates the implementation of passive solar technologies in these manmade structures as a means of achieving energy savings. The case studies involve sport center built in Belgrade during the 1980s. Various passive measures, as zenithal lighting, are applied to the building structure, along with the measures resulting benefits in terms of reducing total annual energy consumption for space heating and improving indoor environmental comfort. Gained conditions were simulated using the software package Integrated Environmental Solutions Virtual Environment (IES VE 2016).
Finally, bearing in mind the need to raise awareness about the sustainable aspect of all structures, including such facilities, among management, basic recommendations in maintenance and decision-making will be given as a foundation for future steps in understanding such an important context.

Keywords: *sports buildings, energy efficiency, passive strategies for improvement, management*

MICROCLIMATIC FACTORS INTEGRATED ASSESSMENT METHODOLOGY FOR URBAN AREA SUSTAINABLE MANAGEMENT.

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ABSTRACT: *The challenges associated with urban area management with take into account climate warming impact on the cities environment are today in the center of attention of scientists. This study is devoted to the development of a comprehensive methodology for assessing the microclimatic conditions of the city, based on sanitary-hygienic standards of microclimatic factors and criteria for the state of the environment. The main microclimatic factors are air temperature, solar radiation, humidity, wind speed and direction. The technique allows taking into account the green areas of the city. The microclimatic influence of the green zones of the city is assessed by quantitative indicators of the impact of vegetation cover on radiation, temperature, air humidity, and wind speed. Changes of factors due to environmental violations also have been considered. This methodology is directed to create comfortable living conditions and ensure the health of the city's population. An integrated multifactorial approach allows us to achieve a methodology that contributes to the sustainable development of urban areas. Due to purposed methodology, we support the long-term planning and implementation of not only sustainable urban greening, but also mitigation of negative impacts of global climate change. According to the principles and direction of the methodological approach, obtaining a more detailed, with a synergistic effect of the factors under consideration, ecological and microclimatic zoning will enable its effective application in the design of landscape design, adjustment of the landscape architecture of the city.*

Keywords: *methodology, microclimatic factors, urban area, climate change*

ECOLOGY AND SUSTAINABLE ECONOMIC DEVELOPMENT IN THE REPUBLIC OF SRPSKA

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ABSTRACT:
The ecological crisis today marks the "culmination" of the crisis of modern industrial society and its way of thinking. Today, it especially limits the reached limits of a certain type of development and modernization of the entire society on the assumption of using natural resources. In the first part of the paper, the focus will be on the analysis of sources of environmental financing in certain countries of the world, and in the second part, the focus will be on the regulation of this problem in the Republic of Srpska. Republic of Srpska has defined certain legal solutions in this regard, but practice has shown that it is necessary to refine those solutions. That is why the focus of this work is on certain aspects of improving the solutions concerning the sources and methods of financing environmental protection in the Republic of Srpska as an entity within Bosnia and Herzegovina.

Keywords: *environment, ecological crisis, financing*

APPLICATION OF DATA ENVELOPMENT ANALYSIS IN THE EFFICIENCY EVALUATION OF WASTE MANAGEMENT: A PRISMA-GUIDED SYSTEMATIC REVIEW

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ABSTRACT:
In this paper the systematic literature review of Web of Science-indexed publications regarding the efficiency evaluation of waste management with the application of Data Envelopment Analysis is provided. For the identification, presentation and analysis of relevant papers Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines for systematic literature reviews have been applied. The Web of Science scientific database was surveyed with the keywords "Data Envelopment Analysis" and "waste management". After implementing all the steps according to PRISMA guidelines, a total of 12 published papers, available as full-text papers written in English, were qualitatively analysed. This research contributes not only in the complements of the existing scientific literature, but also provides significant guidelines to scientists and policymakers on the effective management of waste as one of the key problems of nowadays.

Keywords: *waste management, Data Envelopment Analysis, PRISMA*

CLASSIFICATION OF EUROPEAN COUNTRIES ACCORDING TO THE ACHIEVED LEVEL OF SUSTAINABLE DEVELOPMENT

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ABSTRACT:
In order to assess the progress of selected European countries in achieving and establishing sustainable development, in this paper, a multivariate statistical analysis was conducted, focused on simultaneous examination of the interdependence between the Sustainable Development Goals Index, Environmental Performance Index and Human Development Index values, on the example of 41 European countries, selected as observation units based on data availability. The used research methodological framework is based on the combined application of hierarchical agglomerative and non-hierarchical clustering procedures. More precisely, the classification of the selected countries, based on the representative values of three key indicators of different aspects of sustainable development in 2021, was carried out using the "optimal" hierarchical clustering method, while the statistical evaluation of validity and quality of the proposed classification was performed by comparing it with the results of a non-hierarchical procedure. The interpretation of the final classification structure was carried out on the basis of a quantitative description of the isolated clusters' profiles, with the aim of identifying the extent of (eventually present) disparities in terms of the achieved level of sustainable development among the observed European countries in 2021.

Keywords: *Sustainable Development Goals Index, Environmental Performance Index, Human Development Index, Cluster analysis, selected European countries.*

ANALYZING ENERGY RETROFIT AND INDOOR ENVIRONMENT OF THE PUBLIC BUILDINGS IN SERBIA

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ABSTRACT:
The basic research question is what measures can be taken to improve public buildings in terms of improvement of energy efficiency while maintaining or upgrading optimum values of the comfort for the occupants. The research should provide basic guidelines for measures to improve the use of thermal insulation materials on the building's thermal envelope in the aim of energy saving. The subject of the this paper is the examination of strategies, techniques and possibilities for optimizing energy performance in the rehabilitation processes of universal sports halls within the sports centres, as well as the theoretical and analytical verification of the suitability of various applied measures in accordance with existing regulations and prescribed thermal comfort conditions for this type of facilities. The results can have a practical application because improvement measures aimed at energy optimization of existing sports facilities were investigated and represent a real case study, selected building existing in Belgrade. Most of the buildings of this kind in Serbia were built from 1960 to 1980. Energy sources in these kinds of buildings are traditional, fossil fuel based. Since regulations on energy efficiency are more stringent today, these facilities must be renovated and then well maintained in terms of energy consumption. The case study includes sport centre Vozdovac built in 1976. in Belgrade. Different Passive House measures applied on the building, measures related with reduction of total energy for space heating and conditions of the indoor environment were simulated in software package Integrated Environmental Solutions Virtual Environment.

Keywords: *sports building; energy efficiency; thermal envelope improvement, comfort*

THE IMPORTANCE AND ROLE OF MOUNTAINEERING FOR THE PROTECTION OF MOUNTAIN NATURE

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APSTRAKT:
The paper analyzes the positive and negative impact of mountaineering activities on mountain nature, as well as the measures and activities carried out by mountaineering associations at different levels, in order to reduce the negative impacts to an acceptable level and further improve the positive ones. UIAA and EUMA, in cooperation with regional and national mountaineering associations and similar organizations, make an increasing contribution to the protection of mountain nature and sustainable development in these areas. Mountains represent the most valuable and attractive spaces at the national and global level, but at the same time they are fragile ecosystems very sensitive to various human activities. Mountaineering activities are generally perceived positively by the public, and mountaineers are considered nature lovers and protectors, who contribute to the promotion of mountains and their tourism valorization through their activities. The trends of returning to nature and the promotion of healthy lifestyles have led to the pressure of a large number of visitors, most often in protected mountain areas, which leads to breaking the carrying capacity. In such a situation, the cumulative impact of seemingly small negative effects creates big problems in the long run. Protected areas need management aware of current and potential problems, and capable of finding appropriate solutions. Sustainable solutions imply an integral approach, coordination and cooperation between different stakeholders from local to national and global levels.

Keywords: *Mountaineering, Mountaineering associations, Protection of mountain nature, Sustainable development*

CITY LOGISTICS STRATEGIES

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ABSTRACT:
The life and survival of people in cities would be unthinkable without satisfying the basic needs that are conditioned by the daily logistics operations. Efficient distribution of goods is one of the basic imperatives affecting the sustainability of cities. In addition, a large concentration of people in cities requires and imposes the disposal of waste and other recycling materials. City logistics is the concept of integrating existing resources to solve problems caused by the constant rise in population and number of vehicles in urban areas. Logistics activities also represent a threat to the processes that is inexorably harder to maintain. Emissions, particulates, noise, destruction of vegetation, poor utilization of energy, resources and transport capacity, traffic accidents, general degradation of quality of life are just some of the negative impacts. Sustainable distribution of goods is a priority in many cities, for this reason many of the proposed measures would have a significant impact on the balance between a large population whose needs must be met and the negative impact of the processes that occur as a result of meeting the basic needs of the population. The paper will be presented to study the impact of the means of transportation involved in the distribution of goods, the flow of traffic, as well as their impact on the environment during the unloading of goods in retail stores.

Keywords: *City logistics, Environment, Capacity lane*

CONFECTIONARY WASTE AS RAW MATERIAL FOR BIOETHANOL PRODUCTION BY SIMULTANEOUS SACCHARIFICATION AND FERMENTATION

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ABSTRACT:
Currently, biofuel such as bioethanol is considered as a prospective replacement for fossil fuels. Considering substantial sugar and starch content, valorization and conversion of the confectionary waste to value-added products, such as bioethanol, offers a possibility to decrease the adverse environmental impact of food wastes and contribute to the economy and eco-friendly industrial production of bioethanol. In this study, the potential of confectionary waste based on the cream cake as feedstock for bioethanol production was experimentally investigated by simultaneous saccharification and fermentation (SSF) using distillers' yeast Saccharomyces cerevisiae. The results indicated that confectionary waste based on the cream cake is rich in sugar which can be directly fermented to ethanol by yeast, and also wheat starch which can be converted to fermentable sugar by enzymatic hydrolysis. In this work, starch liquefaction was performed enzymatically by technical alpha-amylase, followed by simultaneous saccharification using glucoamylase and fermentation by yeast. The maximal ethanol yield reached 39 mL per 100 g and 41 mL per 100 g of dry matter confirming that cream cake confectionary waste is a highly efficient feedstock for bioethanol production. Utilization of this raw material in biorefinery for bioethanol production is promising since it enables significant savings in energy for media preparation, anti-foaming agents, and chemicals.

Keywords: *bioetanol, biofuel, confectionary waste, fermentation, yeast*

EDUCATION, ONLINE EDUCATION – ELEARNING

EDUCATIONAL EFFECTIVENESS – THE KEY OF QUALITY EDUCATION

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ABSTRACT:
Educational effectiveness is a concept that has emerged from the need to define the meaning of quality education today. Although it is often used interchangeably with the concept of educational efficiency, it is of great importance to emphasize the distinction between these terms. This paper analyzes and determines the concept of educational effectiveness and the historical development of this concept through phases. Considering educational effectiveness as a broader concept, it practically represents the union of three narrower concepts. The first is systemic effectiveness, dependent on the policies and broader social and societal context of an environment. The second is school effectiveness, consisting of leading organizational and contextual indicators that directly influence teaching and learning. Within the third concept, effective teaching is characterized by numerous factors, with a focus on the teacher. In conclusion, the significance of ensuring and improving the quality of education in developing countries is emphasized, along with suggestions for research on the current state, forming the basis for enhancing educational effectiveness as a core component of quality education.

Keywords: *educational effectiveness, systemic effectiveness, school effectiveness, teaching effectiveness, quality of education.*

DIGITAL LITERACY OF PEOPLE WITH INTELLECTUAL DISABILITY

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ABSTRACT:
Technology and technological achievements have advanced in all areas since the beginning of the twenty-first century. When it comes to people with intellectual disabilities (ID), people of this population are increasingly using different types of technology. The aim of this paper was to review the available literature that examined the level of digital literacy of people with ID, the necessary prerequisite skills for mastering digital literacy by people with ID, as well as to present the interventions implemented in order to increase of digital literacy of this population. The available literature was collected through Google Scholar, Scopus, Web of Science and ProQuest search engines. Based on the results of the literature review, we can conclude that it is necessary to increase the competences of people with ID in the domains of digital literacy. In addition to the people with ID, it is also necessary to increase the digital literacy skills of the special education teachers themselves, as well as increasing the capacity of schools for the education of people with ID in the form of purchasing various technological devices. From the earliest age, it is necessary to work on increasing the necessary prerequisite skills for mastering digital literacy by people with ID that is, on acquiring the ability to read, write and reading comprehension. Although the interventions implemented in order to increase the digital literacy skills of people with ID presented in this paper have proven to be effective, it is of great importance that these interventions are accompanied by the application of scientifically proven interventions.

Keywords: *digital literacy, intellectual disability, prerequisite skills, interventions.*

LABORATORY ACTIVITIES TO INTRODUCE THE QUALITATIVE ANALYSIS OF BIOMOLECULES IN THE COMMON FOOD STUFF – AN EXAMPLE OF INQUIRY-BASED TEACHING IN THE CHEMISTRY CLASSROOM

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ABSTRACT:
The inquiry-based teaching methodologies have important place in the laboratory school practice and science education [1]. Inquire-based learning combines the hands-on activities with student-centred discussion, and, in the same time, promotes the students engagement, collaboration and self-confidence [2], as well as their critical thinking and problem-solving abilities. Herein we present practical examples of inquiry-based activities for the qualitative determination of the presence of carbohydrates, starch, proteins and vitamin C in common food stuff. The developed activities were realized with the third and fourth grade students from the vocational school (The first technical school, Kragujevac, Serbia). The students were requested to perform the qualitative tests for the determination of starch (Iodine test), reducing sugars (Fehling test), proteins (Biuret test) and vitamin C (Iodine test), prior to the realization of final task where they needed to choose adequate methods and solve real-life conceptually based problems using acquired knowledge and skills. Confirmatory and structured inquiry teaching were applied and the students were equipped with experimental procedures. The applied methodology has been used to reinforce students' existing knowledge and connections with real-life concepts.
Keywords: *inqury-based teaching; biomolecules; chemistry*

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OUTSIDE-OF-THE-BOX STEM TEACHING FOR PRIMARY SCHOOL CHILDREN IN SERBIA ON TOPIC DIVERSITY OF NATURE - WATER

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ABSTRACT:
It is well known that STEM education and its early implementation has great benefits for the development of thinking and reasoning skills in younger children, and that early and appropriate experiences can influence and foster interest in STEM. Also, advantages of STEM education are reflected in interdisciplinarity and connection to real life experiences.[1][2]In this study we conducted (2nd grade students, N=29, Primary school “Moma Stanojlovic”, Kragujevac, Serbia) some hands-on activities that mimicked certain real-life scenarios in order to evaluate their impact on student motivation, perception and acquired knowledge. Faculty staff took the role of “STEM ambassadors” and with the help of teacher the experiments involving water cycle in nature, surface tension, capillary force, reflection, reaction medium and heat capacity were conducted through various game-like hands-on activities and demonstrations. The concept of inquiry-based teaching was used, and children were encouraged to ask questions, make suggestions and draw conclusions. Due to the young age of participants, the appropriate data were collected by the teacher through the interview. The results have shown that children gained more lasting knowledge and were highly collaborative and motivated to participate in all activities. It was noticed that the practical nature of proposed activities gave children the feeling of participating in a game or a free activity, so they were more engaged in their learning process, and it was perceived that hands-on activities better match the energy levels of children of that age and the need for a diversity of sensory stimuli.

Keywords: *STEM, Chemistry, Primary school educatiom*

[1] *Y. Li, Promoting the Development of Interdisciplinary Research in STEM Education, Int. J. STEM Educ., 2018, 1, 1-6.*
[2] *Y. Li, Promoting the Development of Interdisciplinary Research in STEM Education, Int. J. STEM Educ., 2018, 1, 1-6.*

AN INTEGRATED MODEL OF LEADERSHIP PRACTICES IN SCHOOL SETTINGS

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ABSTRACT:
It is clear from empirical research that school leadership is one of the crucial determinants of school functioning. Consequently, researchers are interested in the question of what leadership behaviors are needed in the school environment. This paper aims to examine effective leadership practices that individuals in different roles in the school organization can perform. A presented model of leadership practices is integral for two reasons. First, practices are derived from different models of educational leadership, such as instructional and transformational leadership. Second, this model includes a range of activities that are characteristic not only of leadership but also of educational management. An additional quality of the presented model of leadership practices is its generality and relevance for different types of instructional and school outcomes. Identifying effective leadership practices has important implications for practitioners and creators of professional development programs for school leaders. In the conclusion of the paper, recommendations for future research are discussed.

Keywords: *educational leadership, leadership practices, leadership models, school*

EFFICACY OF ARTIFICIAL INTELLIGENCE CHATBOT IN SOLVING PROBLEMS IN GENERAL CHEMISTRY

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ABSTRACT:
The free availability of artificial intelligence chatbots and their increasing application in all areas of life has caused great interest and discussion among researchers in the field of education. The aim of this work was to identify the efficacy of artificial intelligence in solving tasks in chemistry. Chatbots ChatGPT was used to solve problems in general chemistry test designed for the first-grade students of high school. Chatbots score in solving problems was 68.75%, which is above the average achievement of students (48.9%). The additional explanations provided by the Chatbot are very useful for students. However, it is evident that for now ChatGPT does not have the necessary knowledge of chemistry content to be relible in solving problems and providing explanations, so the teachers' fear of losing the job to artificial intelligenceis unfounded.

Keywords: *artificial intelligence, chatbot, chemistry, high school students*

ENHANCING STUDENTS` KNOWLEDGE AND SKILLS IN STEM EDUCATION

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ABSTRACT:
The application of STEM (Science, Technology, Engineering, and Mathematics) in teaching is becoming increasingly important due to its positive impact on the acquisition of knowledge and understanding of the teaching content. STEM integrates various disciplines through practical, problem-based activities, resulting in multiple positive effects on educational outcomes. STEM education has been found to increase student interest. Additionally, the integration of STEM disciplines into the education system contributes to the development of 21st-century skills crucial for the future labor market: creativity, innovation, critical thinking, teamwork, problem-solving, as well as the development of digital skills. Empirical data indicate that students readily accept the integration of content from different disciplines in both curricular and extracurricular activities. This paper discusses the characteristics of STEM education and its potential applications. Furthermore, it provides concrete examples of STEM education for elementary school students.

Keywords: *STEM, natural sciences, physics, elementary students*

NON-FORMAL EDUCATION AMONG UNIVERSITIES' STUDENTS IN THE REPUBLIC OF SERBIA

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ABSTRACT:
Skills may be acquired in youth from formal and non-formal education. Non-formal education, including non-traditional learning experiences in and outside of the classroom, might better focus on the student as it is open and flexible to their needs and interests. As well as, it plays a key role in shaping skills, knowledge and overall personal development. Non-formal education may not only bolster acquiring the skills necessary for the labor market to contribute to a student's overall future career, but might also engender a sense of social belonging. Research has repeatedly suggested that non-formal education better provides for the needs of students as it assists students in both comprehending themselves and the world around them. Moreover, literature has pointed to the positive impact of it to foster progress in students across all areas of life, indicating thus far that participation in such education programs may be able to improve critical thinking, problem-solving and leadership skills. On the other side, some studies have raised concerns about ensuring the quality and consistency of in-formal education programs, as well as equal access to such opportunities for all students, regardless of their background. Further, the integration of digital platforms, online courses and virtual learning experiences has expanded the reach of non-formal education, enabling access to a wider range of resources and opportunities beyond the boundaries of the physical classroom.
This paper investigates the degree of satisfaction with participation of students in non-formal activities. Survey has been conducted from June to December 2023, the results are presented descriptively.

Keywords: *Non-Formal Education, Students, Survey, Serbia.*

COMPETENCES IN THE FIELD OF INFORMATION TECHNOLOGIES AS A BASIS FOR IMPROVING TOURISM SERVICES: ANALYSIS OF TOURISM STUDY PROGRAMS IN THE REPUBLIC OF SERBIA

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ABSTRACT:
Constant improvement and innovation of tourist services has become necessary if one wants to maintain or improve the existing position on the tourism market. Information technologies are among the indispensable components of modern tourism business, and their role is becoming greater over time. Employees' acquaintance with modern technologies, their willingness to introduce and apply them in business can determine future business success. The formal education system is one of the ways in which existing and future employees in tourism can improve their technological knowledge and skills. Based on the increasingly significant role they play in tourism, competences in the field of information technologies as a basis for improving services in tourism are the subject of this paper. The aim is to analyse the accredited study programs of tourism that are implemented at institutions of higher education in the Republic of Serbia from the aspect of the representation of subjects in the field of information technology.

Keywords: *higher education instituitons, higher education, curriculum, IT competences, tourism studies*

PROBLEMS AND SOLUTIONS TO INCREASE THE EFFICIENCY OF ENGINEERING GRAPHIC COURSE

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ABSTRACT:
There has been a great market demand for the engineers with advanced levels of knowledge in the field of CAD technologies. The first course at the Faculty of Technical Sciences in Čačak, where CAD technologies are studied, is Engineering Graphics. The students enrolling these studies have different prior knowledge in this field. Therefore, the Engineering Graphics course is adapted to the intermediate level of knowledge. In order to overcome this gap between market demands and acquired knowledge of CAD technologies, the possibilities of teaching improvements have been explored, so that future engineers acquire the advanced level of knowledge required at the market. A survey was organized for students and the paper analyses the results. The survey provides information of the difficulties experienced and perceived when learning CAD technologies. The survey results also provide basis for recommendations for developing learning materials and approaches.

Keywords: *Computer graphics, education, CAD technology, SolidWorks*

EXPLORING ONLINE FORMATIVE ASSESSMENT AND FEEDBACK PRACTICES IN HIGHER EDUCATION

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ABSTRACT:
At the beginning of the 21st century, the research is primarily focused on summative assessment in the field of higher education, while theoretical investigations of formative assessment in the mentioned domain are less common (York, 2003). Numerous authors advocate for research on formative assessment within online and blended learning in higher education. Additionally, online formative assessment is becoming increasingly prevalent, leading to the emergence of the term formative e-assessment. Studies also indicate a growing need for more frequent use of formative evaluation in tertiary education. As teachers are given the autonomy to choose which evaluation forms and techniques to apply, as well as the methods for providing feedback to their students, this paper presents specific forms of e-formative assessment and feedback in higher education.

Keywords: *formative assessment, providing feedback, higher education*

INTERCULTURAL COMPETENCES AND EXTRA-CURRICULAR ACTIVITIES OF PRIMARY SCHOOL STUDENTS

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ABSTRACT:
The paper analyzes the intercultural competences of students as a set of skills necessary for life in the 21st century. The work is based on the study of theories of interculturality, but also on the analysis of the conducted empirical research. Given that the modern age implies cooperation with members of different cultures, nations and nationalities, it was necessary to examine which activities influence their development. In addition to formal education, extracurricular activities are an important factor in the upbringing and development of every child. The paper deals with the study of the level of intercultural competences in relation to the type of extracurricular activities that students attend. The research was conducted on 150 final grade students in two elementary schools. The extracurricular activities identified by the research are grouped into the following categories: music and dance activities, foreign language courses and sports. The instrument constructed for research purposes is the Intercultural Competence Scale-ICC. The results of the scale are linked to the activities that the students attend. The obtained results unequivocally indicate that students who attend foreign language classes achieve statistically significantly higher results on the scale of intercultural competence, compared to their peers who engage in other activities. The conclusions derived from the obtained results can be useful for the further direction of pedagogical practice, but also for the theoretical development of social sciences.

Keywords: *intercultural competences, extracurricular activities, intercultural education*

STUDENTS SECTION

THE ROLE AND IMPORTANCE OF COMMUNICATION IN CREATING BRAND VALUE

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ABSTRACT:

Building brand value and maintaining that same value requires a lot of knowledge and work. In order for the company to survive in modern market conditions, conditioned by technological expansion and rapid changes, in which only the strongest survive, effective communication becomes a powerful resource of the brand, which profiles its strength, personality and appearance. As a measure of value, the brand affirms its competitive advantage on the principles of high quality and authenticity, so recognition is what apart it from others.
The aim of this work is to indicate the importance of communication because it has a strong role in creating brand value and positioning in the minds of consumers, because every brand has its own story, while the techniques of marketing activities strongly rely on differentiation through the brand. The emotional signet that a brand carries within itself is nothing but a promise given to consumers, the fulfillment of the needs and desires of the target market.
The brand, as quality and additional values, is positioned with a strategic approach.

Keywords*: brand, marketing communication, communication strategy.*

IMPORTANCE OF ENVIRONMENTAL MANAGEMENT

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ABSTRACT:
In domain of ecology, management plays an importan role. Society striving towards balance between economic, social and cultural development without endangering environment, requires creative and capable human resources. Therefore, need has been created for education and creation of quality management with tendency to transfor present society as a society that learns. Concept implying correlation of economic development and environment with regard to ecosystems had to be main focus to future managers. In conditions of limited natural resources, and through concept of environmental management, link is created between ecology and economy, regarding that both are turned towards developmental aims of humanity. Indisputable is the fact that protection of environment and natural resources preservation, became basis for development of numerous new technologies. Such approach requires new type of managers in search to find satisfactory solution between economic, social and environmental requests.
This paper is aimed to show the importance of the role of management, through socially responsible business operations, enabling healthy economy as well as healthy environment to future generations. Led by the managers with sufficient knoweldge and awareness, it is possible to make harmony of all the elements making integral part of business operations and protect environment in which these businesses are conducted.

Keywords: *climate change, environmental standards, sustainable transport, decarbonization and public transportation*

RESOURCE BASED ECONOMY AS POSIBLE UNIVERSAL SOLUTION FOR REACHING SUSTAINABLE DEVELOPMENT AT A GLOBAL LEVEL

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ABSTRACT:
The paper briefly analyzes the theory of Resource-Based Economy (RBE) and its unique potential for solving the biggest problems of the entire human race (sustainable development, wars, world hunger, boring and monotonous jobs, economic and political crises, destruction of the environment, global warming, disappearance of jobs due to automation, crime, corruption, lack of energy, etc.) through a systems approach and the use of science and technology for the benefit of all humanity. It shows why full sustainable development cannot be achieved in the current monetary system and why delaying the start of the controlled transition to RBE will most likely lead to a cataclysmic outcome either due to wars or climate change. On top of that, it wants to show that the transition to RBE has in some way already started with the collapse of the monetary system, the process scenario of which is developing, but that the majority of the human population is not aware of it. A new paradigm is being presented that covers all spheres of human life. The new system of arriving at decisions using the scientific method instead of the decision making process that is practiced now is also explained. The paper also calls for action and joining the academic and professional community at the global level to contribute to the further development of the RBE theory, its testing and introduction into the "mainstream" in all spheres and levels of human life and work,...

Keywords: *sustainable development, resource based economy, monetary system, socio-economic system, systems approach*

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