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PROMOTING HUMAN POSITIVE FUNCTIONING THROUGH THE INTEGRATION OF POSITIVE PSYCHOLOGY AND AGEING PSYCHOLOGY WITH DESIGN AND ENGINEERING RESEARCH.

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KEYNOTE Presentation

Positive Psychology has demonstrated, through numerous studies, in synergy with Design, that it can give life to effective projects for health and well-being in the different stages of life. An example, which will be explored in greater depth, concerns the emerging area of research on the relationship between frequenting art venues, particularly museums, and the psychological and social well-being of people of all ages. This result, which is linked to various individual psychological processes under study, is also the fruit of the construction of stimulating and appropriate environments for experiencing knowledge, personal growth, stress reduction, a field of research and intervention of Design and Engineering. A second area of research concerns the phenomenon of population ageing, which is defined by the WHO as a true "global challenge". It requires multidisciplinary research and intervention efforts, in order to promote active, independent and quality ageing for the greatest possible number of people. Even in this field of research, the synergy between Psychology in its various theoretical declinations, Design and Engineering can represent a valid response to this social challenge. Indeed, new areas of research demonstrate interesting connections between healthy lifestyles and cognitive, physical, and social functioning, highlighting the role of resources such as creativity in longevity. Research in Engineering and Design could provide new tools to improve or enhance these transversal skills and abilities.

Keywords: positive psychology, ageing psychology, design, engineering research

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CHALLENGES AND OPPORTUNITIES OF TEXTILE WASTE MANAGEMENT IN SERBIA'S CIRCULAR ECONOMY

Visnja Mihajlovic
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KEYNOTE Presentation

The growing volume of textile waste presents a significant environmental and economic challenge worldwide, and Serbia is no exception. This paper explores the current state of textile waste management in Serbia, examining the current legislative framework, collection systems, recycling capacities, and public awareness levels. Serbia's textile waste sector remains largely underdeveloped, with most post-consumer textiles ending up in landfills or informal channels. The lack of infrastructure, limited investment in recycling technologies, and weak enforcement of environmental policies further hinder progress. This study identifies key trends likely to shape the future of textile waste management in Serbia, including the adoption of EU-aligned regulations, increased participation of the private sector, and rising consumer consciousness about sustainability. By analysing current barriers and highlighting future opportunities, the paper offers recommendations and directions for building a more efficient and sustainable textile waste management system in Serbia.

Keywords: textile waste, sustainable development, circular economy, recycling

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INTEGRATING VISUAL LITERACY AS A CORE COMPETENCY ACROSS HIGHER EDUCATION DISCIPLINES

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KEYNOTE Presentation

In the twenty-first century, the growing use of images and visual media is changing what it means to be "literate." The rise of smartphones and digital platforms has made it easy for anyone to create and share content. As a result, images are no longer just supporting text—they are now a main way people share information. While reading and writing text are still important in higher education, there is a clear need to include visual literacy in education as well. Unfortunately, there are still few standard tools, materials, or frameworks for teaching this skill.
Visual literacy, the ability to understand and create visual messages, is now essential for success in both education and the workplace. It must become a key part of courses not only in graphic communications but across many different fields.
This presentation will highlight the urgent need to teach visual literacy in higher education, especially within graphic communications. It will introduce a new core curriculum course designed to help students learn how to analyze and create effective visual content. This course will cover visual language, design principles, digital media tools, and multimedia communication. Importantly, visual literacy also prepares students for an AI-driven world. As artificial intelligence tools increasingly work with images, videos, and design, students must be able to communicate effectively using AI visual media. By learning visual literacy, students will be better prepared to work alongside AI, make informed decisions, and succeed in a rapidly changing digital world.

Keywords: visual literacy, education of graphic communication, visual language, design principles

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INFLUENCE OF DRYING TEMPERATURE AND GRAPHITE CONCENTRATION ON THE PERFORMANCE OF GRAPHITE-BASED CONDUCTIVE INK

Rahela Kulčar[1], Iva Šarčević[1], Teodora Lukavski[1], Katarina Itrić Ivanda[1], Marina Vukoje[1], Tomislav Cigula[1]
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ORAL Presentation

In this study, the influence of drying temperature on certain characteristics of a conductive ink, such as electrical conductivity and abrasion resistance, was investigated. The conductive ink was experimentally formulated using graphite powder (particle size less than 20 μm) as the conductive component. A water-based printing ink was used as the binder, while graphite was added in concentrations of 30% and 40%. The ink was prepared by homogeneous mixing until a smooth paste was obtained and applied onto a smooth polymer-based paper using a glass rod to achieve a uniform coating layer. All samples were dried for 15 minutes in an oven at 60 °C, 80 °C, 100 °C, and 120 °C. After drying and cooling, surface resistance was measured, and an abrasion test was performed to assess the adhesion and durability of the coating layer. It is expected that higher drying temperatures improve the contact between graphite particles, thereby increasing conductivity, while higher graphite concentrations contribute to the formation of a more stable conductive network. However, excessively high temperatures may cause binder degradation and a decrease in mechanical resistance. The results contribute to a better understanding of the influence of processing parameters on the electrical and mechanical properties of conductive coatings and may serve to optimize formulations and drying procedures in the development of functional printed materials.

Keywords: conductive ink, graphite, abrasion resistance, ink drying

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COMPARATIVE ANALYSIS OF COLOR REPRODUCTION IN DIGITAL AND FLEXOGRAPHIC PRINTING OF PACKAGING MATERIAL

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ORAL Presentation

The study sought to answer the question of how a given digital printing technology reproduces colours on a typically frequently used packaging material (20µ thick transparent polypropylene) as a printing substrate, and how the colour reproduction characteristics of digital and flexographic (flexo) printing compare. The study revealed the impact of prepress (printing plate production technology) on colour reproduction in flexographic printing. The research focused on 10 flexographic printing samples produced using different printing plate production processes and/or different printing machines. Similarly, a sample was produced using a digital printing process on an HP Indigo 20000 printing machine. The print sample used for the CMYK colour space tests was a GMG flexochart.
By measuring, comparing, and evaluating the colour profiles of the 11 print samples, it was found that both digital and flexographic printing technologies can cover approximately half of the Lab colour spectrum. Both the technology and type of printing plate production and the screen structure used on the printing plate have a clear impact on the colour gamut reproduction capability of flexographic printing.

Keywords: Packaging material printing, flexography, digital printing, scene reproduction.

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3D GRAPHICS APPLICATION AND IMAGE QUALITY RESEARCH

Renata Gudaitiene[1], Giedrius Jonaitis[1], Aidas Gudaitis[2]

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ORAL Presentation

Three-dimensional (3D) technologies are increasingly gaining significance in the creation of various media and industrial products, as well as in digitalization processes, which undoubtedly contribute to sustainable development by reducing material and energy consumption. The connection between 3D modelling and sustainability lies in the ability of digital modelling to minimize the physical impact on the environment, enhance the understanding of sustainability processes, and support the development of sustainable solutions prior to production or design. 3D technologies can be employed not only in the creation of individual products but also in designing building exteriors and interiors, technological lines, equipment, and engineering solutions, while simultaneously preserving cultural and historical heritage. In the process of digitizing various objects, a common challenge is achievement of realistic visualisations, which depends on lighting parameters and the rendering environment. Therefore, the aim of this study was not only to identify the areas of 3D technology application but also to investigate the qualitative parameters of image generation.

The study utilized both analytical and empirical research methods. This involved a review of relevant literature, as well as the creation of 3D graphic objects in different software environments using Autodesk 3ds Max and Blender, employing various rendering engines.

During the study, the possibilities of applying 3D technologies were discussed. Following the generation of 3D graphic visualizations in different environments, the qualitative effects of lighting and colorimetric parameters were evaluated.

Keywords: three-dimensional (3D) graphic, 3D application, sustainability, lighting effects, visualization.

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ASSESSING INFOGRAPHICS AS A TOOL OF VISUAL COMMUNICATION IN TEACHING AND LEARNING

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ORAL Presentation

In recent years, infographics have gained popularity in online teaching and learning as a means of visually presenting information. While widely used as a communication tool, little is known about how infographics influence students' interpretation and understanding of concepts compared to text-only materials. The literature highlights challenges such as poor application of design principles, ineffective use of layout and colour, and inclusion of irrelevant visuals, which may affect learning outcomes.
This paper explores the impact of infographics on students' comprehension of art and design concepts compared to text-based information. The study was conducted in the Department of Design and Studio Art at the Central University of Technology, Free State, South Africa, during the 2018/2019 academic year. Two experimental groups were used: one received information in text form (N=23) and the other through infographics (N=20). Quantitative data were collected and analysed to assess performance differences.
The findings indicate no significant difference in the mean test scores between the two groups. The performance of the two groups on the test was similar, with the average scores showing no meaningful variation. These results suggest that infographics, while engaging, may not necessarily enhance student understanding of art and design concepts more than traditional text-based approaches.

Keywords: Infographics, teaching and learning, text, visual communication, visual representations

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ON THE SUSTAINABILITY OF DIGITAL MEDIA

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ORAL Presentation

In the need to keep up with rapid innovations individuals and enterprises are urged to join the largest global computer network comprised of billions of connected devices, servers, and the underlying infrastructure. Most people are aware of the fact that the digital world has a significant environmental impact. This awareness drives the efforts of companies and organisations to make a good impression in this aspect as well.
The World Wide Web Consortium recently introduced Web Sustainability Guidelines to make web products and services more sustainable. An efficiency index was created that quantifies the relationship between a data centre's total power consumption and power dedicated to IT equipment. It has a huge effect on marketing whether the infrastructure runs on dirty or clean energy. Thus, stakeholders of the internet seem to be willing to take benign efforts towards the usual goals of environmental awareness. But sustainability has a wider scope than just the environment, factors of the society and economy are also required to complete the picture of ‘planet, people and prosperity”. In this work sustainability of digital media is reviewed in a broader context. The UN sustainable development goals provide a comprehensive framework and solid starting points to visit some crucial aspects of the sustainability of digital media.

Keywords: sustainability, digital media, word wide web, energy efficiency

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INVESTIGATING BRAND COLOR ACCURACY OF DYE SUBLIMATED TEXTILES

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ORAL Presentation

Textiles do not currently encompass a large part of the print industry; however, they are one of the fastest growing segments. With emerging production alternatives growing in popularity including dye sublimation, direct-to-garment printing, and direct-to-film, the need to ensure color accuracy becomes even more important and arguably more difficult due to the switch from spot colors with screen printing to CMYK on these newer technologies. This paper builds on a previous study which examined color brand accuracy and durability of two brand colors using the three most common production processes on a variety of textiles. Results revealed that performance varied based on material, process, and ink color. This study seeks to focus on a single process, dye sublimation, and analyze color accuracy on three different textile samples, consisting of polyester and polyester blends and expand to include a broader spectrum of brand colors based on the athletic branding for eighteen universities in the United States. Our primary research goal is to determine if there are parts of the color spectrum that are more difficult to print consistently using dye sublimation on the three different textiles. The findings will add to existing research by providing recommendations for brands and printers who print textiles with dye sublimation.

Keywords: Color accuracy, dye sublimation, textiles

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COLOUR REPRODUCTION IN DRY OFFSET PRINTING FOR BEVERAGE CANS: A STUDY OF CONVENTIONAL AND VARIABLE PROCESSES

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ORAL Presentation

In this research, we have examined the critical role of colour control in dry offset printing technology for beverage cans, emphasising its contribution to sustainable production. In the presented study, we have compared conventional and variable dry offset printing while maintaining identical manufacturing conditions, with a focus on the stability and precision of colour reproduction. Measurements conducted, ΔE2000, tone and gloss values, were obtained on a defined red colour reference patch. The first phase of the experiment involved printing without any prior colour management inputs. It resulted in inferior colorimetric values, underscoring the essential role of colour management, continuous measurement and process control. Through the second phase of the experiment, we have systematically monitored key colorimetric and surface parameters after the colour management procedure was applied. The results gained indicated that both printing methods are capable of maintaining colour reproduction within acceptable tolerance ranges, confirming their suitability for industrial applications. An interesting finding was that variable printing exhibited slightly greater uniformity in certain printed areas. Ink consumption was also assessed and remained within expected limits for both methods, reinforcing the principles of material efficiency and waste reduction. These findings demonstrate that stringent colour control directly supports sustainable production practices and indicate that variable printing represents a relevant and reliable alternative within the dry offset process. Future investigations should address more complex designs with higher technical demands and incorporate sampling of a broader range of colours, enabling a more precise characterization of the limitations and potential of this specific printing process through increased data quantity.

Keywords: dry offset printing, colour control, variable printing, colorimetric parameters

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WOMEN IN THE GUTENBERG GALAXY

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ORAL Presentation

The aim of this study is to explore the situation of women in the printing industry. It examines the effects of their increasing participation in the industry. It also looks at the extent to which the principles of equal opportunities and equal treatment apply to them. Publications on the subject were identified through a systematic literature search based on Web of Science. The results of the literature review are organized around four themes. Numerous publications have appeared around the extraordinary and successful women who ran printing workshops before the industrial revolution after losing their entrepreneurial husbands or fathers. After the industrial revolution, i.e., the spectacular mechanization of industry, women mainly performed simpler, skilled work as folders and seamstresses, i.e., they were involved in the less prestigious and lower-paid tasks of book production. In addition, the works of art created by women and the innovations in their approach often did not receive the spotlight they deserved at the time. Throughout history, women in several countries have tried to break male dominance by joining forces in various ways. In England, for example, in response to the "threatening" behaviour of trade unions, women formed their own printing organization, the Women's Printing Society. Today, women's movements still exist in the printing industry, mainly in Anglo-Saxon countries. A targeted questionnaire survey of 32% of all employees in the Hungarian printing industry was conducted to assess the proportion of women employed in the printing industry by education and position. The aim and result of the study are twofold: to draw attention to the importance of the issue and to provide international examples to shape attitudes.

Keywords: Women in Print, Publication about women, Women’s movements

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COMPARATIVE TESTING OF THE CARRYING CAPACITY OF PAPER SHOPPING BAGS

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ORAL Presentation

Environmental awareness and sustainability are playing an increasingly important role in everyday life. With increasingly stringent regulations and social expectations, the importance of recyclable and biodegradable materials is growing. Paper bags are important for their packaging function and are also symbols of sustainable shopping habits.

The popularity of paper bags has grown rapidly in recent years. The use of paper bags contributes to the creation of an environmentally conscious image. At the same time, there are a number of questions regarding the practical usability of paper bags, such as their durability, water resistance, and contribution to sustainability goals.

During our everyday shopping, we often encounter paper bags of varying quality and reliability. Therefore, we examined how well these bags meet different consumer needs and conditions of use. We explored how willing costumer to pay extra for sustainability.

The aim of our research is, on the one hand, to review the historical, environmental, and sustainability aspects of paper bags. On the other hand, it is to demonstrate the practical applicability of paper-based packaging materials. We analysed the experiences and habits of paper bag users through a questionnaire survey. In addition, we conducted various physical and mechanical tests focusing on the load capacity, moisture resistance, and durability of paper bags. The aim of the research is to provide a comprehensive overview of how paper bags meet sustainability and practical expectations.

Keywords: paper bag, shopping bag, paper-based packaging, paper bag capacity, carrying capacity, environmentally conscious shopping, sustainable packaging

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A FUTURE BUILT ON TRADITION - MODERN PRINTING KNOWLEDGE AND TRAINING CENTRE IN BÉKÉSCSABA

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ORAL Presentation

The southeastern region of Hungary has a long tradition of printing. Békéscsaba has been considered a “printers’ town” for a century and a half. There are more than a hundred printing and graphic design companies operating in the area, all of which require well-trained professionals. Printer’s training has been taking place in the city since 1964. It was therefore not surprising that in 2018, Békéscsaba allocated a significant part of its financial framework for the "Modern Cities" government supported program to the creation of a knowledge and training centre that provides a supply of skilled workers for this industry, which is so important to the city, in a state-of-the-art technological environment and with educational methods that reflect the future.
The institution, which was implemented according to the original strategy and handed over in 2021, provides secondary education covering the entire spectrum of the printed communications business. The study presents and analyses the extremely successful, nationally recognized, future-focused training provided here from the perspective of students, teachers, and printing companies alike. They also strive to ensure the transfer of knowledge in the international arena for their students who excel in professional competitions.

Keywords: printer’s town, printing education, future-focused training, “Modern Cities” program

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THE IMPACT OF IMAGE-BASED LEARNING ON PROFESSIONAL SKILL DEVELOPMENT IN BEAUTY AND HAIRDRESSING EDUCATION AS PART OF FASHION EDUCATION IN TAIWAN

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ORAL Presentation

This study examines the impact of Image-Based Learning (IBL) on professional skill development in Taiwan's beauty and hairdressing education within the fashion education framework. Using a quasi-experimental design, 120 experienced practitioners were divided into an experimental group receiving a 6-week IBL program, featuring video tutorials, 3D simulations, and real-time feedback, and a control group using traditional methods. Outcomes included technical skills, creativity, emotional regulation, and stress management, assessed via practical exams, K10 scales, eye-tracking, and surveys. The IBL group showed significant improvements across all measures, with large effect sizes, outperforming the control group's moderate gains. Subgroup analysis revealed consistent benefits regardless of gender, experience, or role. Qualitative feedback emphasized greater engagement, confidence, and practical relevance. These results highlight IBL as an effective, scalable tool for enhancing both technical expertise and emotional resilience in Taiwan's competitive beauty sector, supporting its integration into ongoing vocational training.

Keywords: Image-Based Learning, Beauty and Hairdressing Education, Professional Skill Development, Fashion Education in Taiwan, Emotional Resilience

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THE RISE OF MYCELIUM-BASED MATERIALS ACROSS INDUSTRIES: A REVIEW

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ORAL Presentation

The growing search for ecological material alternatives has positioned mycelium as a promising candidate across multiple industries. This review surveys recent developments in architecture, packaging, product design, fashion, and emerging specialized applications. Within the built environment, mycelium composites are explored for insulation, lightweight structures, and acoustic panels, combining functionality with reduced environmental footprint. The packaging sector integrates mycelium not only as foamed replacements for polystyrene but also in molded protective components and biodegradable containers, directly addressing waste management challenges. Product design highlights the aesthetic adaptability of mycelium through furniture, interior elements, and consumer goods. In fashion, research and practice converge on mycelium-based leathers that provide ethical, compostable alternatives for clothing, footwear, and accessories. Beyond these fields, special areas such as biomedicine, filtration systems, and space exploration investigate mycelium for its structural and regenerative capabilities. By bringing together diverse case studies, this article emphasizes how mycelium-based materials move beyond mere substitution toward innovative design possibilities, signalling a transformative role in material culture.

Keywords: biodesign, mycelium-based materials, biocomposites, sustainable materials, circular economy

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PRACTISING ENGAGEMENT FOR TRANSITION DESIGN

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ORAL Presentation

The aim of this research is to investigate how the core values of *Transition Design* can be utilised to inform more effective sustainable practices within the European Textile Manufacturing sector, with particular emphasis on the wool manufacturing industry in Scotland. Working with Transition Design methodology (systems analysis, co-design etc.) future goals can be defined, designers can become facilitators for systemic change, addressing the so-called „wicked problems" which resist progress.

The present study focuses on ethnographically specific practices – working with a diverse range of traditional maker communities who were affected by industry and globalisation – including a series of pilot studies entitled *Co-creating an Eclectic Atlas of Cloth* to illustrate the effectiveness of experiments based on participatory engagement for qualitative data collection. In this case participants provided personal items (e.g. a piece of cloth) and were asked to trace its provenance thus encouraging self-reflection and demonstrating how personal behaviour, purchasing patterns, and cultural values inform sustainability narratives – this was followed by a discussion prompting radical visions for future practice.

The outcomes of the case studies and workshops contribute to discussions and further research on the role of design and designers in facilitating systems-level transformation and offer practical insights for reshaping sustainable design practices with stakeholders in the textile industry.

Keywords: Transition Design, Ethnography, Sustainability, Textile Industry, Co-Design

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ASPECTS AND ATTITUDES OF CREATIVE THINKING: COGNITIVE AND NEUROAESTHETIC PERSPECTIVES IN DESIGN PRACTICE

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ORAL

This paper examines creativity as both a personality trait and a cognitive process, with a focus on its manifestation in art and design. It introduces the *Cognition–Apperception–Limn (CAL)* framework, which describes the mental–manual transformation of perception into material form.

Drawing on the theories of Guilford, Alexander, Csíkszentmihályi, and Ramachandran, the study situates creative thinking at the intersection of divergent cognition, design methodology, and neuroaesthetic mechanisms. Guilford's model of divergent thinking—fluency, flexibility, originality, and elaboration—frames creativity as a multidimensional and adaptive skill.

From a neuroaesthetic viewpoint (Zeki, Ramachandran, & Hirstein), the paper explores how perceptual and emotional responses shape artistic experience. Two complementary modes of creative cognition—*top-down* (knowledge-driven) and *bottom-up* (data-driven)—interact to produce both continuous engagement (*Flow*) and moments of sudden insight (*Aha effect*).

Manual sketching supports these states by allowing spontaneous ideation, while digital tools often constrain them. Integrating cognitive and experiential dimensions, the paper argues that creativity emerges from the dynamic interplay between perception, cognition, and manual expression, offering valuable insights for contemporary design education and interdisciplinary research. Understanding this process enriches both design pedagogy and interdisciplinary research in art, science, and technology, highlighting the evolving relationship between human creativity, cognitive mechanisms, and the aesthetic mind.

Keywords: Art&Design, Creativity, Cognitive Design Process, Neuroaesthetics, Divergent thinking, Fow State, Aha Effect

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BIOREMEDIATION STRATEGIES FOR POLLUTED SOILS: ADVANCING SUSTAINABLE ENVIRONMENTAL RESTORATION

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ORAL Presentation

The increasing accumulation of antibiotics in soils due to their extensive use in agriculture, veterinary practices, and medicine poses serious risks to microbial diversity, food safety, and public health by promoting the spread of antibiotic resistance genes. Conventional remediation techniques are often inefficient, expensive, and environmentally disruptive. This study investigates microbial bioremediation as a sustainable alternative for mitigating antibiotic contamination in soil ecosystems. A specialized bacterial consortium, designated PARC containig *Pseudomonas fluorescens* (6×10^6 CFU/mL H_2O), *Azotobacter chroococcum* (3×10^6 CFU/mL H_2O), and *Rhodococcus phenolicus* (3×10^6 CFU/mL H_2O) was prepared and applied at 100 mL per kilogram of contaminated soil containing 23,800 µg/kg of antibiotics. Over a 180-day incubation period under controlled conditions, antibiotic residues in the PARC-treated soil were reduced to 12,300 µg/kg, while the untreated control retained 21,600 µg/kg. The significant degradation efficiency achieved by the consortium highlights the synergistic metabolic interactions among the bacterial strains. These findings demonstrate that targeted microbial consortia can serve as efficient, eco-friendly tools for soil detoxification. The approach offers a scalable and cost-effective strategy for restoring contaminated soils, thereby contributing to sustainable land management and advancing global efforts toward environmental resilience and pollution mitigation.

Keywords: Bioremediation, Environmental restoration, Soil pollution, Bacterial consortium, Sustainable technologies.

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ECONOMIC AND ECOLOGICAL CONDITIONS CONCERNING SOME EXPERIENCES OF UPPER MISSISSIPPI RIVER VALLEY IN US

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ORAL Presentation

Study analyses correlations among main economic and ecological variables of the United States of America for researched period of 2010-2021. Correlations of different variables connects with conditions of Upper Mississippi River Valley. Study within correlations of economic and ecological conditions focuses on agricultural gross value added produced by irrigated agriculture, growing rate of GDP with annual growth and per capita, gross fixed capital formation in share of GDP and its annual growing rate, value added of total manufacturing in share of GDP with annual growing rate. Study emphasizes CO2 emissions in economic sectors, as on-farm energy use, agrifood systems waste disposal, food processing, food household consumption, energy. Study uses Statistical Program for Social Sciences, which provides possibilities to analyse correlations among different economic and ecological conditions of US concerning issues of Mississippi River. In 2021 annual GDP growth, value-added total manufacturing and gross fixed capital formation increased by more than 5%, and CO2 emissions less decreased by 5% in food processing and by 12% in energy CO2 emissions. Emissions CO2 of food household consumption decreased by 19% and emissions CO2 of on-farm energy use decreased 16% comparable to last years. More increase of economic growth connects with less CO2 emissions for researched period. Contradictive correlations between increasing economic growth and decreasing CO2 gas emissions have been little more than for one decade. In order to realise successful economic development trends, there is an important for increasing the green innovative investment for increasing benefit for society and natural background as base of our survival life.

Keywords*:* Agricultural value added, Correlations, Food consumption, Gas emissions, Household, Variables

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SUN EXPOSURE AND HEALTH OF HUMANS

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ORAL Presentation

Lack of sunlight can even cause autoimmune disease. If humans stay in the sun wisely, if humans don't burn, then they can use the wonderful healing effects of sunlight. It is not good if humans are afraid of harmful UV rays, since our immune system and our entire body need sunlight. Studies reported that sunlight may play a key role in preventing autoimmune diseases. Vitamin D intake is of great importance in the prevention of autoimmune diseases, and this vitamin is produced in our body by sunlight. It was reported that there may be a connection between sunlight and autoimmune diseases. The studies found that children and young people who spent at least 30-60 minutes outdoors every day had a 55% lower chance of developing the disease, in contrast to those who almost never spent time outdoors. Sunlight not only helps increase vitamin D levels, but it has other health benefits: e.g., it stimulates the skin's immune cells and positively changes the functioning and functionality of the immune system, which can help prevent various immune diseases, including multiple sclerosis. These diseases tend to develop mainly in places where there is less sunlight. Do not lie in the sun during the hottest part of the day, and always make sure never to get sunburned, as this increases the risk of skin cancer. If humans spend time outdoors regularly, they can avoid many diseases. If humans do get sunlight, the risk of some cancers is reduced. Studies have shown that men may be at lower risk for the following types of cancer: bladder, colon, small intestine, and prostate. Women may be at lower risk for colon, bladder, and breast cancer due to sunlight exposure. Avoiding or not getting enough sunlight may be a risk factor for high blood pressure and heart attack-related death. Also, exposure to sunlight, in moderation, may reduce the risk of cognitive decline later in life, e.g., people living in Mediterranean areas have a 50% lower risk of developing multiple sclerosis, a disease that affects the brain. Sun exposure is linked to increased brain volume. This is important because as our age, our brains shrink, and our brain cells die.

Keywords: sun exposure, health of humans, autoimmune diseases

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SOIL DRYING AND HEAT–MOISTURE DYNAMICS UNDER SIMULATED SOLAR RADIATION USING INFRARED ENERGY

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ORAL Presentation

The soil's water and energy balance play a fundamental role in regulating the hydrological cycle and near-surface climatic conditions. Previous studies have demonstrated that coupled heat and moisture transport processes strongly affect soil evaporation and temperature dynamics. Building on this foundation, our study investigated the drying behaviour of soil columns exposed to infrared radiation simulating solar energy, with particular focus on heat and mass transfer at the soil-air interface.

Laboratory experiments were performed on soil samples of different initial moisture conditions, including natural, water-saturated, and frozen states. Each experiment involved 12 hours of infrared exposure followed by 12 hours without irradiation, forming a 48-hour day–night cycle. Temperature and moisture were measured at three depths, while surface temperature patterns and airflow dynamics were monitored with an infrared camera.

Results showed pronounced temperature fluctuations and moisture loss in the upper soil layers. Infrared imagery clearly revealed convective airflows forming above the soil columns during heating.

The experimental setup proved effective for analysing coupled heat and moisture transport. These findings enhance understanding of soil evaporation mechanisms and contribute to the development of sustainable soil–water management strategies.

Keywords: Convective boundary layer, Environmental sustainability, Heat and mass transport, Infrared-induced soil drying, Soil–atmosphere interactions

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ENERGY EFFICIENCY AND EMPLOYMENT ISSUES IN EU-27 IN 2020S

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ORAL Presentation

Recently energy productivity globally became in centre of international attention, by which economic competitiveness can be strengthened based on securing adequate or more income conditions for future economic prosperity. The study analyses correlations of energy productivity with employment conditions in EU-27. The study focuses on correlations and significance among real GDP per capita, investment share of GDP, employment issues, tertiary educational attainment, energy productivity in euro per kilogram of oil equivalent, final energy consumption, final energy consumption in households and share of renewable energy in gross final energy consumption. Statistical analyses are essence of research method, as statistical package for social sciences in study. Increasing euro per kg of oil equivalent energy opposite to efficient energy productivity did not stimulate to increase the investment share of GDP and by little increase of investment to increase to real GDP per capita in period of 2010-2023. Share of renewable energy in gross final energy consumption ensured the EU to realize its main goal to decrease carbon-dioxide gas emissions. For future economic growth of EU-27 there is important, that more efficient energy productivity should be followed by economic policy to transfer into more green development by using more educated and skilled human resources.

Keywords: Correlations, Employment, Investment, Real GDP, Significance,
Tertiary educational attainment

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FUTURE OF ECOTOXICOLOGY AND ENVIRONMENTAL SAFETY

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ORAL Presentation

By understanding the implications of toxicants exposure on soil, water, and biotics, regulators can create safer environments for future generations. Continuous evaluation and adjustment of regulations based on ongoing research results are essential for maintaining eco-balance. In modern toxicology, four areas are recognized: 1) forensic toxicology; 2) clinical toxicology; 3) environmental toxicology, and 4) ecotoxicology. Environmental toxicology focuses on the study of toxicants impact on nonhumans. Ecotoxicology, recently specialized with environmental toxicology, currently playing a central role in environmental regulations. So, the challenges in eco-assessments persist, ongoing research and innovation remain key to overcoming them. As concerns about eco-degradation rise, ecotoxicology testing will continue to protect the environment. This field progress will have lasting implications for environmental health and safety, ultimately benefiting both current and future generations. Environmental safety is paramount for conserving the planet's natural resources. Ecotoxicology measuring ensures that human development does not come at the expense of eco-integrity. Ecotoxicology monitoring addresses how pollutants affect soil microbiomes, plants, and animals. By evaluating the interactions between various pollutants (e.g., pesticides, heavy metals, etc.) and biotics. These investigations provide valuable insights into eco-health. So, ecotoxicology investigation plays an indispensable role in shaping environmental regulations and promoting sustainable practices. Ecotoxicology monitoring serves as a critical component in assessing environmental safety. Experiments were carried out to study the impact of 125 pesticides and 65 heavy metal salts on various soil microbiomes in vitro and in vivo systems. By understanding these effects, it can minimize eco-damage of the biosphere. Environmental safety regulations rely on such tests to set permissible exposure levels for toxicants. Importantly, such testing helps in predicting long-term eco-effect and early warning signals of ecosystem degradation through the development of strategies to mitigate adverse effects and protect the life of ecosystems.

Keywords: Ecotoxicology, pollutants, Environmental safety, in vitro, in vivo experiments

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SOME EXPERIENCES CONCERNING LOWER MISSISSIPPI RIVER VALLEY IN US

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ORAL Presentation

The study focuses on main features of Lower Mississippi River Valley accompanying with some economic and ecological conditions. The study overviews these economic and ecological conditions for the period of 2010 and 2021. From point of view the study analyses annual freshwater resources, nitrous oxide emissions from different sectors, as agriculture, power industry energy, transport energy, foreign direct investment, forest areas, high-technology export in manufactured exports, imports of goods and services in percent of GDP, industry including construction in value added in percent of GDP, inflation, merchandise trade in percent of GDP, population density and urban population growth. The study analyses correlations of different economic and ecological variables based on statistical package for social sciences. The research analyses correlations of annual freshwater withdrawals, which are declared as very strong valued by -82.8% with nitrous oxide emissions from power industry energy, by 89.8% with forest area in km2, by -80.8% with industry including construction in value added in GDP and by 80.1% with population density as people per km2 of land area. The high-technology export can globally provide more increasing competitiveness for the US economy. The wide-side national cooperation should be increasing to develop more favourable conditions of Lower-Mississippi River – even with Upper Mississippi River – for interest of the American society.

Keywords**:** Annual freshwater resources, Competitiveness, Correlations, High-technology export, Imports of goods, Nitrous oxide emissions

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EFFECT OF WASTE EGGSHELL PARTICLES ADDITION ON THE OPTICAL PROPERTIES OF PAPER

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POSTER Presentation

For this study, eggshells were collected during household food processing, and their protein membrane was manually separated from each eggshell. Membrane-removed eggshell waste was subjected to washing, drying, grinding, and sieving processes. The size of the prepared eggshell powder was less than 45 μm and was used, as an alternative to industrially precipitated calcium carbonate, in the production of laboratory paper. Filter paper was used as the basis for the paper pulp, while the filler content was varied from 5 to 20%. To determine the effect of adding eggshell powder on the optical properties of the paper, papers with the same $CaCO_3$ content were produced in parallel as a control. It was observed that adding both types of fillers, eggshell powder and calcium carbonate, to laboratory-produced paper increases its reflectance. However, the impact on L*a*b* values of paper is different for these fillers. Calcium carbonate increases its lightness (L* value) more than eggshell powder and reduce the a* and b* value unlike eggshell powder that increases them.

Keywords: eggshell waste, filler, optical properties, paper

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ECO-FRIENDLY PRINTING WITH AGRO-INDUSTRIAL WASTE: REVIEW OF ADVANCES IN FUNCTIONAL TEXTILES

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POSTER Presentation

The growing demand for sustainable and eco-friendly solutions in the textile and graphic industries highlights the urgent need to replace conventional synthetic dyes with natural alternatives. This review aims to provide an overview of recent advances in the use of agro-industrial waste as a valuable source of bio-based pigments and binders for printing applications. The main objective is to demonstrate how natural colorants such as anthocyanins or carbon-based pigments like biochar and activated carbon, can serve as options for achieving both aesthetic and functional properties in textiles. Furthermore, the review discusses the role of eco-friendly binders in formulating stable printing pastes. Special attention is given to functional outcomes such as antimicrobial activity, antioxidant capacity, and dielectric properties. By summarizing current progress and challenges, the paper emphasizes the potential of natural pigments and agro-industrial by-products to drive innovation in textile printing. The review also identifies existing limitations, including colour stability and scalability of production, and highlights future perspectives for integrating natural pigments into advanced functional materials. In this way, the study contributes to building a foundation for sustainable, innovative, and environmentally responsible printing technologies.

Keywords: agro-industrial waste, natural pigments, eco-friendly printing, functional textiles

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RESEARCH ON THE INFLUENCE OF PACKAGING DESIGN AND MATERIALS ON CONSUMER CHOICE IN CHOCOLATE PURCHASES

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POSTER Presentation

This study focuses on the design of cardboard chocolate packaging that combines functionality with aesthetic appeal. Emphasis is placed on the use of environmentally friendly materials and current trends in packaging design. Three distinct designs on three different materials were developed, each representing a unique approach—minimalist, eco-friendly, and playful—to explore how varying styles and materials influence consumer perception. Using an online survey and a focus group, consumer opinions regarding various packaging concepts were gathered. Prior to conducting the study, three hypotheses were proposed regarding the impact of packaging on consumer purchasing decisions. Hypothesis 1 stated: Packaging design significantly affects purchasing choices, with consumers showing greater preference for chocolate with distinctive and eye-catching packaging. Hypothesis 2 posited: Consumers favor packaging made from environmentally friendly materials. Hypothesis 3 suggested: Hidden messages within packaging enhance customer loyalty and encourage repeat purchases. Based on the results of the online survey and the focus group, the findings confirmed that consumers value eco-friendly materials and standout designs, while also responding positively to the idea of hidden messages as a strategy to foster repeat purchases. The study concludes that packaging strongly affects product perception, underscoring the importance of thoughtful, user-oriented, and environmentally conscious design.

Keywords: Packaging design, Visual appearance, Cardboard, Survey, Consumer opinion

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FENTON OXIDATION FOR MAGENTA DYE DEGRADATION IN THE PRESENCE OF MICROPLASTICS IN PRINTING WASTEWATER

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POSTER Presentation

Improper disposal of plastic waste and synthetic dyes have led to widespread environmental pollution, including microplastics and persistent pollutants in wastewater. Therefore, there is an urgent need for innovative, efficient and environmentally sustainable solutions.

This study aims to evaluate the effectiveness of a Fenton oxidation process for the removal of Magenta printing dye from both synthetic solution and real printing wastewater containing polyethylene terephthalate (PET) microplastics. The influence of five process parameters and optimization process was investigated using definitive screening design. The selected statistical model indicates a maximum process efficiency of 91% for synthetic solution, achieved under the following optimal conditions: dye concentration of 111.2 mgL^{-1}, nano zero valent iron dose of 37.49 mgL^{-1}, microplastic concentration of 3.7 gL^{-1}, hydrogen peroxide concentration of 8.8 mM and pH 4.4. Finally, Fenton oxidation resulted in 85% dye removal in real printing wastewater, suggesting that the proposed method is a viable approach for the industrial treatment of organic pollutants in aquatic environments.

Keywords: Magenta dye, polyethylene terephthalate, Fenton oxidation, definitive screening design, optimization

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CHANGES IN THE GLOSS OF OXIDATIVELY DRIED OFFSET PRINTS DURING THE DRYING PROCESS

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POSTER Presentation

In this article, we examine the changes in the gloss of offset prints after printing. At the moment of printing, the ink transfer occurs under the influence of the pressure force and several processes are initiated simultaneously: the ink is absorbed into the print medium, and the ink begins to crosslink under the influence of oxygen in the air. The ink is applied to the print medium while still wet and reflects the light radiation falling on it differently than the already dried ink. The aim of our study is to find a correlation between the change in surface gloss and the drying process of the printing ink.

During the test prints, we used oxidatively dried printing ink and two paper-based print media with different structures, absorbent offset paper and glossy art paper with a coated surface. For both types of paper, measurements were made immediately before printing, immediately after printing, and in the hours and days that followed. The measurement results and their evaluation confirm that the surface gloss of the prints changes as a function of time. The drying time, the gloss change, and the formation of the cross-linked structure are influenced by the storage conditions. In the case of absorbent paper, the printing ink loses its surface gloss, while in the case of non-absorbent paper, the gloss increases during the drying process, since the ink film dries on the surface of the print medium, and the formation of the cross-linked structure also takes place here.

Keywords: offset printing, offset ink gloss, color measurement

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ELECTRICAL STABILITY OF TAPIOCA STARCH AND GRAPHITE-BASED CONDUCTIVE INK UNDER MECHANICAL DURABILITY TESTS ON DIFFERENT SUBSTRATES

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POSTER Presentation

Due to the increasing awareness of the industrial impact on the environment, recent technological developments often try to diminish its influence by including more environmentally friendly materials and processes. This research introduces an environmentally friendlier conductive ink made by mixing tapioca starch with graphite particles (size < 20 μm). The aim of the research was to determine electrical stability of the prepared ink films on different printing substrates when exposed to mechanical influences. The ink was prepared by homogenization on a magnetic stirrer with heating until the desired viscosity was achieved, i.e. gelatinization of tapioca starch, and after cooling, it was coated onto different substrates.

Electrical conductivity of the printed samples was measured before and after mechanical tests to evaluate the durability and functional stability of the developed ink across different substrates. The development of the new ink formulation focuses on its application as a visible design element on packaging.

Keywords: electrical conductivity, tapioca starch, graphite, mechanical durability

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THERMO- INSULATION MATERIALS FOR TEXTILE GOOD MANUFACTURING

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POSTER Presentation

Different thermo- insulation materials are used manufacturing garments and other textile goods to create a layer of trapped air to retain heat of a human body. The insulation materials can be divided into two groups: flat 2D materials and free fibres. On the bases of the origin, there are available natural material waddings and synthetic fibre waddings. Cotton, silk, wool and down as wadding materials have longest application. They can ensure different comfort level and properties. Polyester waddings are used starting from 20 th . They are hydrophobic and cheaper than the most part of natural origin waddings. Sustainable and advanced wadding materials improve performances to reduce negative properties of both, traditional natural and synthetic origin waddings.

Keywords: Thermal insulation; Wadding materials; Natural fibres; Synthetic fibres; Sustainability; Comfort.

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DENIM UPCYCLING AND THE REVIVAL OF CRAFT TECHNIQUES: A SUSTAINABLE APPROACH TO CONTEMPORARY FASHION

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POSTER Presentation

The textile industry has a significant negative impact on the environment, as exemplified by the production of a single pair of jeans, which requires approximately 3,500 liters of water and releases around 33.4 kg of CO_2 into the atmosphere—contributing to the acceleration of climate change in the long term. Moreover, this type of production relies heavily on the use of harmful chemical substances, which can cause various health problems for workers who are directly exposed to them. Improper disposal of these chemicals into the environment can lead to the pollution of waterways and ecosystems. In a world increasingly confronted with the consequences of overconsumption and environmental degradation, unique, handcrafted clothing is emerging as an important factor in sustainable development, standing in contrast to the widespread influence of fast fashion. Such garments are not merely an aesthetic choice, but also a profound ethical and ecological decision made by the individual. The aim of this paper is to present the process of creating garments using traditional textile enhancement techniques such as patchwork, macramé, smocking, natural fabric dyeing, and redesign.

Keywords: denim, sustainable practices, upcycling, textile waste, fabric enhancement techniques

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MEASURING THE SHAPE-CHANGING ABILITY OF TEXTILES BY DRAPE TEST WITH ANGULAR SAMPLE-HOLDING TABLE

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ORAL / POSTER Presentation

The goal of this work was to make the results of the drape measurement clearer. Draping is a 3-dimensional, complex shape change caused by gravity. It characterizes the ability of textiles, with low bending stiffness to adapt to the shape of an object in a complex way, and therefore, knowing it is important, especially from the point of view of simulating the behaviour of textiles. In a draping test, a circular sample is placed on a circular sample-holding table, its edges are allowed to bend down, and then the draping coefficient and the number of waves are calculated based on its planar projection. However, both factors have a large standard deviation, and strangely, the number of waves is not unambiguous. In our research, we replaced the circular table with regular, polygonal sample-holding tables of 3-15 corners, which had the same area, and investigated how the number of table corners is related to the draping coefficient and the number of waves. We compared the results obtained on the polygonal sample-holding tables with the results measured on the circular table. In our article, we present the course of the research, the testing equipment and how we changed it, the tested 7 types of fabrics, and the results obtained. Our results prove that with the use of a polygonal sample-holding table, the number of waves can be clear, the size and arrangement of the waves can be uniform, and so the uncertainty of the measurement results can be reduced, and the repeatability of the test can be improved. Based on the data, the regular six-sided sample-holding table can be recommended for the drape test; only very rigid samples cannot follow its corners with their waves, and the draping coefficient is almost the same as that measured on a round table. The optional use of the hexagonal sample-holding table can be recommended, especially for comparative testing of fabrics for the same purpose.

Keywords: Material science, Engineering, Textile testing, Draping, Shape change, Sheet-like materials

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POSSIBILITIES FOR THE APPLICATION OF RENEWABLE ENERGY SOURCES IN RURAL AREAS

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POSTER Presentation

This paper explores the **possibilities of applying renewable energy sources (RES)** in rural areas of the Republic of Serbia, aiming to increase energy efficiency, reduce environmental pollution, and promote sustainable development. By analysing the characteristics of rural areas, demographic indicators, and the current state of agricultural holding, the paper identifies key potentials and challenges in the use of RES. Special attention is given to solar energy, wind energy, biomass, biogas, and geothermal energy, as well as their technical possibilities and practical applications in agriculture and households. Based on a survey on the awareness of rural populations regarding renewable energy sources, the study analyses attitudes, knowledge levels, and readiness for investment in RES. The results show significant potential for the development of renewable energy in rural areas of Serbia, emphasizing the need for greater education, institutional support, and financial incentives. This paper concludes that integrating renewable energy sources can contribute to the development of sustainable and energy-independent rural communitas.

Keywords: renewable energy sources, rural development, solar energy, biomass, sustainable development

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