ABSTRACTS

Influence of AI-driven sustainable human resource management on employee creative performance
(pages 153-163)

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Abstract: The research explores how AI-powered sustainable HR practices influence employee creative performance within India's IT sector through the mediating role of individualised agreements. The research applies structural equation modelling to examine survey data from 360 IT professionals based on the frameworks of the Job Demands-Resources model and Social Exchange Theory. AI-based training and performance management systems raise creative performance levels and show that ideals partially mediate these relationships. The research results reveal contextual differences because ideals mediate recruitment effects and performance management outcomes but show no significant mediation for training interventions, likely because of the sector's inclination toward standardised learning approaches. The research delivers significant theoretical advancements by analysing AI-HRM systems in emerging economies and exploring personal work arrangements' limits in tech-heavy settings. These insights serve as essential guidance for practitioners deploying HR technologies that successfully combine standardisation with personalisation to promote workplace innovation. The research reveals surprising results about the minimal direct influence of sustainability orientation. The research advocates for integrated strategies to synchronise sustainability initiatives with innovation objectives within India's IT sector.

Technical procedure in vitro evaluation of human stem cell growth using the MTT assay
(pages 165-169)

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Abstract: The aim of this study is the practical determination of the proliferation rate of human stem cells in a biological environment using laboratory methods. Stem cells are unique in their ability to self-renew and differentiate, which distinguishes them from most differentiated cells, such as cardiac muscle cells, which cannot regenerate after injury. This makes stem cells highly significant in the fields of regenerative medicine and experimental pharmacology. The study utilized the MTT assay, a colorimetric technique that enables the visualization of cell viability through mitochondrial activity. Viable cells reduce MTT into a formazan dye, measurable by a spectrophotometer. The experiments were conducted using an inverted microscope and spectrophotometer in laboratory conditions. Based on data evaluation, we assessed the proliferation activity and formulated conclusions about the mitotic behavior of stem cells under controlled in vitro conditions. This method offers a useful approach for monitoring cellular responses to pharmacological treatments and for supporting tissue regeneration research.

Optimization of the process of forecasting the number of traffic accidents
(pages 171-177)

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Abstract: The primary goal of this paper is to develop a methodology for optimizing the forecasting process of traffic accident occurrence. Traffic accidents remain a critical societal and economic issue, and existing forecasting approaches often fall short when applied to complex, variable, or incomplete datasets. To address this challenge, the paper proposes a structured multi-criteria optimization framework grounded in formal decision theory. The core of the methodology lies in formulating a multi-objective optimization problem (ZO) that includes sets of admissible solutions, vector-valued objective functions, and dominance relations. The proposed model enables both quantitative and qualitative evaluation criteria to be integrated into the forecasting process. The study details an algorithm that identifies dominant, non-dominated, and compromise solutions, using normalization techniques and distance measures to support solution selection. A case study demonstrates the model's ability to determine optimal forecasting solutions based on multiple conflicting criteria. The approach is characterized by flexibility and generalizability, allowing its application in diverse scenarios involving accident prediction. The results confirm that the proposed method improves both the transparency and robustness of traffic accident forecasting. This methodology may support decision-makers and analysts in the development of effective, data-driven strategies for road safety planning and accident prevention.

Application and potential of 4D printing in medicine
(pages 179-192)

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Abstract: 4D printing represents a groundbreaking technology that extends the possibilities of 3D printing by adding a dynamic dimension—time. By using smart materials capable of changing their shape or properties in response to external stimuli such as temperature, humidity, or pH, new horizons are opening, especially in the field of medicine. This article presents the basic principles of 4D printing, explains the nature of functional materials and mechanisms that enable programmable behaviour, and focuses on specific applications in the medical context. The most promising areas include implants that can adapt to anatomical changes, targeted drug delivery systems, bioprinting of tissues and organs, and novel types of rehabilitation devices. The article also discusses the benefits of this technology, such as reduced invasiveness of medical procedures, improved functionality of medical devices, and enhanced treatment personalization. At the same time, it reflects on the challenges associated with 4D printing development—from material selection and technical or regulatory limitations to the need for interdisciplinary collaboration. The goal of this paper is to present the current state of knowledge in this field, identify its potential and limitations, and support further research and clinical validation of 4D technologies in medicine.

Design and technological development of robotic platforms for agricultural plant care

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Abstract: In the context of modern agricultural transformation, the integration of robotic systems into plant care is emerging as a vital solution to address challenges such as labour shortages, increased production demands, and the need for sustainable farming practices. This research focuses on the mechanical design and fabrication of a compact, modular robotic platform specifically tailored for agricultural plant care applications. The robot is designed to operate in greenhouses or open fields and is equipped with a four-wheel differential drive system, a chain transmission mechanism, and a load-distributing aluminium top plate to support essential components such as a water tank. Finite Element Analysis (FEA) was conducted to validate the structural reliability of the chassis and loadbearing elements, showing low stress and strain well below material limits, thereby ensuring operational stability and safety. A prototype was manufactured using accessible materials and methods, demonstrating the feasibility of the proposed design in terms of assembly, mobility,

and structural integrity. This study contributes a mechanically robust and scalable foundation for future integration with sensors and control systems, advancing the development of smart, automated agricultural robotics.

Mechanical testing of 3D printed samples made of flexible TPU material
(pages 201-206)

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Keywords: TPU, 3D printing, Fused Deposition Modeling, mechanical testing.
Abstract: This scientific article deals with the mechanical testing of samples produced by 3D printing technology from thermoplastic polyurethane (TPU), which is a flexible polymer with elastomeric properties. The aim of the study was to evaluate the mechanical behaviour of TPU material under different printing parameters and loads, especially in compression. The samples were printed using the FDM (Fused Deposition Modeling) method with variable settings such as layer orientation, infill, layer thickness and printing speed, while a standardized shape of test specimens according to ISO 604 was used. Testing revealed a significant dependence of mechanical properties on layer orientation and infill degree. TPU showed high elasticity and energy absorption capacity, which confirms its potential for applications where flexibility, shock absorption and shape adaptability are required. The results point to the importance of optimizing printing parameters to achieve the desired mechanical properties in practice.

Role of digital innovation and business transformation for sustainable to micro, small and medium scale enterprises in Tamil Nadu: an analytical study
(pages 207-211)

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Keywords: digitalization, business innovation, SMEs, Industry 4.0., Tamil Nadu.
Abstract: Small and medium-sized enterprises (SMEs) account for approximately 90% of all businesses and nearly 50% of global employment, with a significant share of these jobs held by women. Therefore, evaluating SME performance in business innovation and examining frameworks that integrate sustainability is crucial for addressing poverty and gender inequality in line with international standards. This study focuses on the role of digital innovation and technology transfer in fostering sustainability within the SME sector in Tamil Nadu. SMEs in this region face numerous challenges while simultaneously encountering new opportunities arising from digital transformation. Existing research highlights how digital technologies can enhance operational efficiency, reduce environmental impact, and promote social equity. By analysing relevant literature, conducting surveys, and interviewing key stakeholders, this research examines the current status of digital innovation and technology transfer among SMEs in Tamil Nadu and assesses their implications for sustainable development.