
ABSTRACTS

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Design and production of personalized cervical orthosis using CAD/CAM systems

(pages 109-113)

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Keywords: cervical orthosis, personalized orthotics, CAD/CAM, 3D scanning.

Abstract: The aim of this work was to design and manufacture a personalized cervical orthosis using CAD/CAM systems through additive manufacturing technology. Cervical orthoses are practically used to ensure the stability of the cervical spine. The work was motivated by recent research into personalized orthoses made using additive manufacturing technologies. This study describes the methodology of 3D scanning the cervical area, CAD design, and CAM manufacturing of a personalized cervical orthosis. As a basis for modelling the orthosis, a 3D scan of the subject's head, neck, shoulders, and upper chest was obtained using an optical 3D scanner Artec Eva. The scan was processed in CAD software Meshmixer and served as a basis for the modelling of a personalized cervical orthosis, considering the support points. The orthosis was made by additive manufacturing technology Multi Jet Fusion (MJF) on a HP 5200 3D printer from biocompatible polymer PA12. The advantage of manufacturing a cervical orthosis using MJF technology is the individualized design, improved production efficiency, as well as increased quality and comfort in using the orthosis. It meets attributes such as copying the subject's morphology, airiness, lightness, and easy fastening.

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Study of iron-based composite materials using modelling and simulation

(pages 115-119)

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Keywords: Hysteresis, composite materials, soft magnetic materials, modelling.

Abstract: Composite materials are materials composed of two or more components that have different physical and chemical properties. These properties complement each other to create a material with unique properties that cannot be achieved by using the individual components alone. Modelling the effect of preparation processes on the properties of composite materials is an important tool to predict the properties of a material prior to its manufacture. This can help in optimizing the preparation technology and obtaining the desired material properties. In the present work the topicality of the problem of iron-based composite materials and the possibilities of modelling and simulation of selected models are presented.

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Enhancing business efficiency through effective inventory management: a systematic literature review

(pages 121-129)

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Keywords: inventory management practices, operational performance, supply chain performance.

Abstract: Efficient inventory management is crucial for various industries' operational performance and financial success. As market demands evolve and technological advancements progress, the complexity and importance of inventory management have increased, making it essential for maintaining a competitive advantage. This study aims to systematically review existing literature to understand the impact of inventory management practices on operational performance across different industries and contexts. Employing the PRISMA framework for systematic literature review, the Scopus database was the primary source for selecting relevant articles. The initial search yielded 791 results, refined through rigorous inclusion and exclusion criteria, ultimately resulting in the thorough analysis of 12 critical articles. This review's findings highlight that advanced inventory management systems, such as deep reinforcement learning and real-time analytics, significantly enhance operational efficiency. These systems facilitate more effective information sharing and enable tailored inventory strategies, which improve supply chain performance. This improvement is particularly evident in sectors such as healthcare and manufacturing, where precise inventory control is critical. Furthermore, financial metrics like days inventory outstanding correlate positively with firm performance, underscoring the strategic importance of inventory management in achieving financial success. The study highlights the importance of advanced inventory management practices in enhancing operational efficiency and financial performance despite high setup costs, technological complexity, and data quality issues. This study synthesizes research on inventory management practices, offering insights for businesses to enhance operational performance and emphasizes the need for continuous innovation for competitiveness.

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Study on reverse logistics and its significant importance – review (pages 131-139)

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Keywords: supply chain, reverse logistics, operation management, refurbishment, resale.

Abstract: Reverse logistics (RL) has become increasingly significant in the field of supply chain and operation systems in recent years. One of the key components of operation and supply chain systems for carrying out business activities in a more methodical and effective manner to boost value addition for end users is reverse logistics. Returning final used goods from the customer's end to the manufacturer via a store is known as reverse logistics. The main purpose of reverse logistics is to make the final product flow from customer back to seller or manufacturer in order to reuse the product by recycling this reduces the cost of remanufacturing the product also it adds value to the customers through recycling the product. In this article attempt has been made to conduct extensive survey on logistics and its significant role in supply chain operations. In addition to that literature analysis is done by referring from various *top-rated* journals around the globe. The survey questions were prepared to collect the inputs from various customers to further reframe the design of Reverse logistics.

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Forecasting the number of road accidents on a weekday (pages 141-150)

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Keywords: road accident, forecasting, weekday.

Abstract: Every year, a considerable number of people lose their lives on Polish highways. Although this number remains significant, it has been steadily decreasing over time. Despite a reduction in accidents since the pandemic began, the overall figures are still relatively high. To effectively minimize road accidents, it is essential to identify which days experience the highest frequency of collisions and to predict the number of accidents in the upcoming years. The objective of this article is to forecast the number of accidents occurring on Polish roads for each weekday. To achieve this, monthly accident data from the Polish Police statistics for 2007 was analyzed, resulting in predictions for the years 2022-2024. The findings of the study suggest that there will likely be a decrease in accidents on Polish roads compared to pre-pandemic levels; however, the ongoing impact of the pandemic complicates these results. The research employed various time series models using the Statistica program.

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Design of an affordable dynamic arm support for motorized wheelchairs

(pages 151-155)

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Keywords: upper limb disabilities, assistive technologies, dynamic arm support, wheelchair, four-bar linkage.

Abstract: Upper limb impairments, resulting from various neurological and neuromuscular conditions, significantly impact daily activities and limit social participation. Assistive technologies, particularly dynamic arm supports, offer promising solutions to enhance independence for individuals facing these challenges. This paper presents the development of an affordable dynamic arm support, designed with a focus on static balancing. The support utilizes a four-bar linkage mechanism to allow smooth vertical movement while maintaining the orientation of the armrest. Furthermore, the integration of rotational and prismatic joints enhances the device's adaptability, enabling horizontal movements. Through comprehensive mathematical modeling and prototype testing, we introduce a cost-effective arm support that effectively counterbalances the arm's weight, ensuring ease of movement and stability across various spatial orientations.

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Technology and effective tax rates: innovative approaches to tax burden

(157-163)

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Keywords: effective average tax rate, effective marginal tax rate, intangible assets, technology.

Abstract: The indicators of the effective tax burden on corporations present effective tax rates, taking into account the impact of all the design features mentioned in the legislation. The paper addresses the issue of effective taxation through the method of calculating EMTR and EATR with a focus on intangible assets in 2004, 2015 and 2023. The analysis determined the tax depreciated shield, which tracked the amount of tax savings on capital investment and the economic rent of the project with taxation, focusing on the magnitude of the financial benefit of the project with an aspect on taxation. The analysis showed that a 3% increase in the statutory rate over the study period, increased the effective average corporate rate on intangible assets by 13.56%. The annual tax saving achieved for 2023 on intangible assets was at 17.17% with a payback period of five years.

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Intellectual capital valuation in digital economy: a review of corporate and national perspectives

(pages 165-170)

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Keywords: digital economy, intellectual capital, technological readiness, human capital.

Abstract: Intellectual capital (IC) has emerged as a critical driver of organizational value and competitive advantage in the knowledge-based economy. Unlike tangible assets, IC encompasses intangible assets such as human capital, structural capital, and relational capital, which collectively contribute to the innovative capacity and strategic positioning of firms and economies. Despite its significance, measuring intellectual capital poses substantial challenges due to its intangible nature and the lack of standardized valuation methods. This paper aims to provide a brief overview of the components and methods used in the measurement of intellectual capital at both corporate and national levels.

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The importance of logistics in the circular economy of agricultural enterprises

(pages 171-178)

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Keywords: logistics, circular economy, agribusiness, sustainability.

Abstract: The article is intended to show the role of logistics in the circular economy. This is because it encompasses the actual flow of products from their source of production to the final consumer, taking into account all the tasks and activities involved, ensuring efficient, sustainable and economic processes. Circular economy aims to maximise product value through eco-design, increased sustainability, improved quality, eco-efficiency and the widespread use of renewable

materials. This approach promotes waste reuse, recycling and recovery, as well as treating waste as a valuable resource. The agricultural industry deserves special attention in the context of the circular economy, so improvements have been proposed to change the agricultural enterprise to a greener and more practical one that applies the principles of the circular economy. Thus, biogas production, the transportation of slurry via pipeline system and the creation of an on-site photovoltaic panel farm were suggested. The application of these improvements could make the company independent and use only its resources. Furthermore, by using renewable energy sources, the company could increase its competitiveness in the market, become an independent entity and reduce its operating costs, all while increasing its efficiency.

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The biotechnology of using mesenchymal stem cells in regenerative medicine

(pages 179-183)

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Keywords: mesenchymal stem cells, regenerative medicine, biocompatibility, technology.

Abstract: Mesenchymal stem cells (MSCs) have garnered significant attention in regenerative medicine due to their multipotent capabilities and ability to differentiate into various cell types, including osteocytes, chondrocytes, and adipocytes. Sourced from bone marrow, adipose tissue, umbilical cord blood, and other tissues, MSCs possess immunomodulatory properties, making them ideal candidates for tissue repair and therapeutic applications. Their capacity to migrate to sites of injury and secrete bioactive molecules that promote tissue regeneration and inhibit inflammation is crucial in treating a range of conditions. Recent advancements have highlighted MSCs' role in the regeneration of bone, cartilage, cardiac tissue, and neural networks. They are also being explored in the treatment of degenerative diseases such as osteoarthritis, myocardial infarction, and neurodegenerative disorders. Despite the promising therapeutic potential, several challenges remain, such as optimizing cell delivery methods, understanding long-term effects, and addressing regulatory hurdles for clinical applications. This article aims to introduce mesenchymal stem cells and their main uses in regenerative medicine, offering a comprehensive overview of their biological properties, current clinical applications, and the potential challenges that need to be addressed for broader therapeutic use.
