SuTra2024

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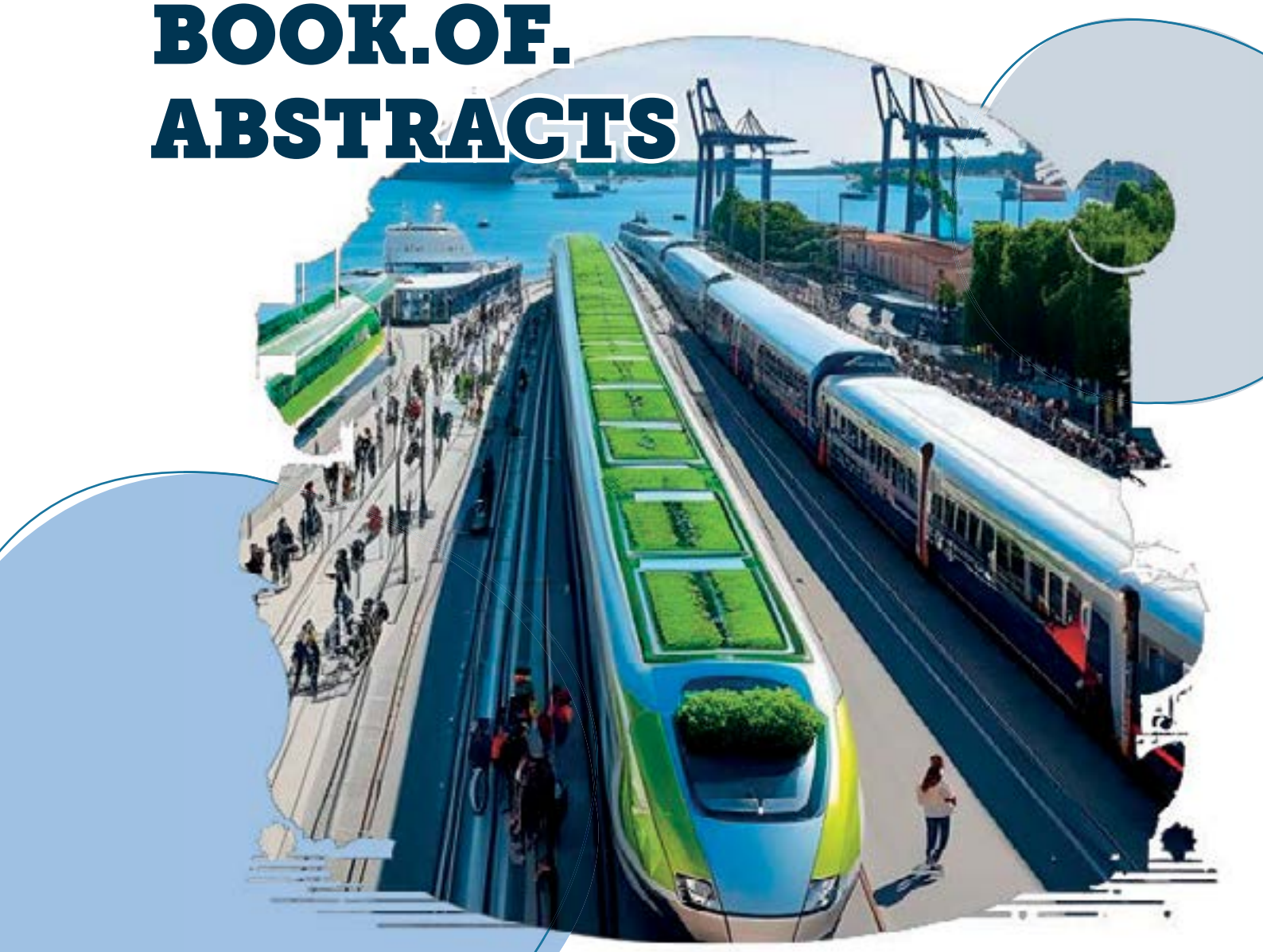

International.Conference. on.Sustainable.Transport

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Welcome from the Chair | Preface to the second edition

Dear Colleagues and Friends, dear All

Welcome to the second edition of the International Conference on Sustainable Transport (SuTra 2024). This book of abstracts reflects our collective journey toward this event in which you are participating.

In a world where globalization is rapidly evolving, the transportation of goods and people faces growing challenges. To meet the increasing demand across various transport modalities, we must focus on the sustainability of these systems. The SuTra conference aims to promote multidisciplinary research and practical experiences that explore solutions to reduce transportation's environmental impact. The topics discussed highlight the need for a comprehensive, interdisciplinary approach covering all modes of transport—maritime, rail, road, air, and inland waterways—and combining both professional and scientific perspectives, with a focus on sustainable forms of mobility and the help of intelligent transport systems.

Our goal is to foster collaboration among academia, industry, and government, creating a platform for stakeholders committed to advancing sustainable transport. The ideas and innovations shared here will contribute to developing more sustainable and efficient transportation practices.

This year's conference is being held at Terme Sveti Martin Resort in Croatia. The resort provides an ideal setting for our gathering, with excellent amenities in a peaceful environment nestled in the Međimurje region. Međimurje County was awarded with the prestigious Green Destination award for sustainable tourism, becoming the first region in Croatia to receive this certificate. For this reason, we would like to especially thank the Tourism Board of Međimurje County for their cooperation in organizing the conference, and we believe that this green and natural venue environment, recognised as a destination of excellence, completely reflects the vision and the mission of the SuTra Conference. The location is easily accessible from major airports in Zagreb, Graz, and Ljubljana, making it a convenient venue for participants.

We look forward to insightful discussions, meaningful collaborations, and a successful conference. We extend our gratitude to all supporting partners who have contributed to the realization of this event.

Thank you for joining us at SuTra 2024 and contributing to the advancement of sustainable transportation and looking forward to see you again on SuTra 2026.

Best regards,

SuTra 2024 Chairs

Contents

KEYNOTE LECTURES

Value chain redesign as a means of decarbonising the transport sector

Stephanie E. Trpkov

Agrodox Ltd., Zagreb, Croatia

Comprehensive policies like the European Green Deal, the Sustainable and Smart Mobility Strategy, and the Fit for 55 package have laid the groundwork for decarbonising the transport sector. The targets set by the policies such as reducing GHG emissions from transport by 90% by 2050and achieving a 100% reduction in CO2 emissions for new cars and vans by 2035 are ambitious.

Businesses and investors are called upon to work with policy makers, academia and civil society to implement the needed changes. Are the stakeholders on the same page? The keynote will examine the issue of sectoral decarbonisation from a business perspective. It would highlight challenges and opportunities as well as present specific ways by which redesigning the value chain could significantly accelerate the green transition and support the achievement of the overarching climate goals, while maintaining or enhancing industry competitiveness.

Stephanie E. Trpkov is a serial entrepreneur and business strategist with 18 years industry experience driving decarbonisation and Smart City projects across the CEE region. She has founded several companies, the latest being Agrodox® Ltd. with partner, the climate-smart trading platform for green commodities that integrates data analytics, carbon offsetting, smart contracts and AI.

Stephanie E. Trpkov is an Executive MBA holder and currently researching the ways decarbonisation can be accelerated to create value in heavy industries as part of her doctorate. She is an alumnus of the Cambridge Institute of Sustainability Leadership (CISL), a longstanding member of the UNECE team of specialists on innovation and competitiveness policies, and also served as an expert contributor to the Sustainable Urban Mobility Action Cluster of the European Innovation Partnership for Smart Cities and Communities, fostered by DG-MOVE.

Large-scale challenges require large-scale insights: Invigorating evidence-based active and sustainable transport solutions

Prof. Dr. Sergio A. Useche

University of Valencia, Spain

While the current Sustainable Development Goals (SDGs 2030) provide a comprehensive framework to approach transport sustainability (the what), the avenues for translating it into practice (the how) remain undisclosed for many stakeholders. This entails key risks such as conducting ineffective, theoretically-weak, contextually unaware, or just redundant interventions targeted at promoting active/sustainable travel modes.

Apart from representing a frequent constraint in mobility decision-making, the current research gaps pose the challenge of invigorating, improving, and connecting evidence-based outcomes to benefit several strategic sectors, including policy, practice, planning, and advocacy.

Nevertheless, the past years –along with both successful and improvable experiences– have helped visibilizing the importance of increasing large-scale research on active/massive transportation affairs, especially regarding users' attitudinal and behavioral factors, addressing strategic groups for sustainable mobility such as pedestrians, public transport users, and cyclists.

This keynote lecture aims to address key current trends in user-based sustainable travel research, and how it can contribute to conduct better interventions. It will append some interesting research drifts, translation-to-practice tips, and original large-scale research outcomes gathered through the past two editions of the "Bike-Barometer" study, which has so far constituted the largest cyclist-focused study conducted across the five continents.

Dr. Sergio A. Useche is a professor at the University of Valencia (Spain). His research focuses on sustainable and active transport from a human factors approach. His key interests include user-based transport decarbonization, behavioral constraints for sustainability, and safety issues in cycling, walking, and automated mobility. He has spoken at over 45 international conferences, contributed to more than 30 funded research projects, and published over 100 indexed scientific papers. Ranked as one of the Top 2% most influential researchers worldwide (Stanford Ranking) and with more than 2000 Scopus citations, his work is highly regarded in several journals. He serves as an Associate Editor for publishing groups such as Elsevier, PLOS, SAGE, and Frontiers. He has also received two "Top 1% Peer Reviewer" awards from Web of Science and is part of the Research Institute on Traffic and Road Safety (INTRAS), which was recently awarded the Medal of Honor in Road Safety by the Spanish Government.

Terme Sveti Martin, Croatia, 26 - 28 September 2024 International Conference on Sustainable Transport

ABSTRACTS

Air Traffic and Transportation in Function of Smooth Development of Supply Chain

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Igor Štimac
Zagreb Airport Ltd., Croatia

Air, Rail, and Road Transport

Regardless of the context, the smooth development of supply chains is of particular importance for the quality of life of all citizens on the planet. Supply chains enable the provision of necessary inputs for production, as well as the delivery of finished products to end users. Any disruption in the development of supply chains results in a disruption of the balance between supply and demand on the market, with all the negative consequences, which are manifested as shortages of certain products, inflation, the emergence of the black market, crime and, in extreme cases, conflicts and wars. The transportation process plays a significant role in the development of supply chains because it connects all its phases, from the delivery of raw materials to production facilities, through storage to distribution to end users. Also, transportation enables the application of circular economy principles in the context of a modern approach to the supply chain. All types of traffic and transportation can occur in supply chains. Air traffic and transportation is important for the development of supply chains, especially when it comes to supply chains of certain categories of materials and products and due to the action of special circumstances that change the context. In the paper, applying the methods of scientific cognition, it is proved that supply chains cannot take place without traffic and transportation, including air traffic and transportation, and that the management of the transportation process in air traffic is a condition for the quality development of supply chains in which both air traffic and transportation are present. In these cases, the quality of the air traffic and transportation process significantly determines the quality of the entire supply chain.

Keywords: *supply chain; air traffic and transportation; quality; circular economy.*

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Predicting Profit-Loss using an Amalgamated Baseline Long Short-Term Memory Network with Self-aligned Criminal Search for Fulfillment Cost Challenges

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Intermodal and Multimodal Transport

The paper introduces an Amalgamated Baseline Long Short-Term Memory with a Self-aligned Criminal Search Optimization Algorithm Model to forecast profit or loss in product fulfillment, aligning with the critical management goal of optimizing costs. The model undergoes training with a substantial dataset, validation for optimality, and subsequent testing with smaller datasets, providing an optimal solution for predicting and conducting comparative analysis to ensure profitable fulfillment execution. From a business analytics and management standpoint, the predictive analysis outlined in this paper offers valuable insights for creating dashboards and integrated performance metrics, thereby enhancing overall organizational efficiency.

Keywords: *machine learning; logistics; supply chain management; transportation; simulation.*

Literature

Jackson et al [1] utilizes the GPT-3 Codex to automatically generate simulation models for logistics systems from natural language descriptions, showcasing the successful creation of functional simulations for queuing and inventory management systems. The refined language model simplifies the development process, offering a technological foundation for effective human-AI

collaboration in building simulation models for logistics systems. Hasan et al. [2] investigate the intermodal freight diversion from road to inland water transport (IWT) in Bangladesh for domestic transportation through ports. It identifies cost, time, reliability, flexibility, and environmental factors as significant barriers and recommends operational, organizational, fiscal, and regulatory measures to facilitate the modal shift. Comparative analysis along the Dhaka–Chittagong trade corridor reveals that, despite longer transit times, IWT offers lower total logistics costs than road transport, and further infrastructure improvements could enhance its competitiveness, making it an attractive option for reducing transport costs and time.

Takeyasu et al. [3] explores optimization in sea and air transport by formulating mathematical models considering transportation costs, warehouse stock fees, and reduced costs for volume discounts. The expanded objective function, incorporating a "Multi-step tournament selection method," aims to minimize expenses under specified constraints, enhancing decision-making in international logistics by applying genetic algorithms. The research demonstrates practical advancements by incorporating volume discounts and expanding constraints, contributing to more effective decision-making in global logistics management. Engblom et al. [4] investigates the self-reported logistics costs of manufacturing and trading companies in Finland, comprising six components: transport, warehousing, inventory carrying, logistics administration, transport packaging, and indirect costs. Analysing panel data from 241 companies in 2005 and 2008, the study utilizes various methods, including GLMM and principal component analysis, revealing that logistics costs, influenced by factors such as time, employees, turnover, industry, and internationalization, tend to be lower in larger companies with caution advised when interpreting changes in costs over time due to the influence of background variables.

Novelty

In this study, we have developed a machine-learning model, the Novel Amalgamated Baseline Long Short-Term Memory Network with a Self-aligned Criminal Search Algorithm ALSTM-SCSOA, to address cost management challenges in predicting Profit or Loss for Product Fulfillment Problems. Utilizing a dataset comprising consignor-to-consignee details and other factors affecting overall fulfillment costs, the model enables the prediction of whether a shipment will result in profit or loss.

Acting as an initial assessment tool for consignors, it helps determine the viability of product fulfillment from warehouse to consumer before actual shipment, enhancing decision-making in the fulfillment process. The model is based on LSTM Network by Hochreiter et al. [6], Srivastava et al. [7], and Zhang et al. [8] and accessed using the dataset from Kaggle [5], provided by Sai Charan Komati.

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Comparative analysis of external costs of rail and road freight transport in five Central European regions

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Nives Domjan Kačarević & Ivan Cvitković
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Intermodal and Multimodal Transport

The research of this paper focuses on assessing the external costs associated with different modes of freight transport, comparing rail and road transport. The key results of the analysis include the assessment of external costs such as noise, air pollution, climate change, accidents, and congestion for road and rail transport. The results show significant savings when switching from road to rail transport. The study [1] encompasses three savings scenarios: the use of electric freight trains, diesel freight trains, and a combination of 50% electric and 50% diesel freight trains. The most savings are achieved using electric trains, with annual savings of up to 6.7 million euros. The geographical analysis includes assessments from five different partners (countries) and their cases, where variations in external costs are expressed in ton-kilometers (tkm) saved on roads and required on railways. Rail transport shows lower greenhouse gas emissions, reduced noise, lower energy and land consumption, and positive social effects such as increased safety and less congestion. Key political and economic factors affecting the efficiency of the rail system have been identified, including lack of support, regulatory gaps, and complex staff training regulations. The results of this paper research indicate significant potential for cost reduction and improvement of the sustainability of the transport system by switching to rail transport, particularly through the optimization of external costs and better infrastructural connectivity.

Keywords: *external costs; freight transport; rail transport; road transport; sustainability.*

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Generative AI in Intelligent Transport Systems Use Cases

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ITS and Telecommunications

The increasing demands on transportation networks due to globalization necessitate innovative solutions for sustainable and efficient transport systems. This session explores the transformative potential of possible use cases of Generative AI in revolutionizing Intelligent Transport Systems (ITS). We will focus on how Generative AI's unique ability to create new content—from synthetic data for training robust models to optimized designs and simulations—can drive innovation across various areas of ITS: Data Augmentation and simulation [1], Predictive Maintenance [2], Optimized System Design, and Personalized and adaptive Services [4].

Keywords: *generative AI; GAI; artificial; intelligence; ITS.*

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Massive Data Sets - an Opportunity for Precise Traffic Analysis

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ITS and Telecommunications

Fundamental consideration of the development of the transport system must, necessarily, be based on relevant traffic analyses. Very extensive traffic researches (traffic counting, user surveys, vehicle speed measurement, etc.) are often required for on-desk traffic analyzes. Physical (on-site) traffic researches beside that can be very expensive, are also, often, very imprecise and with questionable quality. This can ultimately result with inadequate traffic solutions. Extremely dynamic development of digital technologies and the extraordinary increase in the use of smart mobile phones represents one of the possibilities for improving the traditional methods of collecting basic traffic data. Above all, this is reflected in the ability to monitor the movement of mobile phones (tracking the movement of the mobile phones via signals from base stations/antennas). Collected data are very precise and reliable. The researcher can collect different types of data, e.g. data about the origin, destination, route and speed of movement. If necessary, data on the gender and age of the owner of the device, country of origin, etc. can be also collected. The most important is to secure absolutely complete protection of personal data (completely anonymous use of data). The aforementioned possibility was used during the preparation of the Master Plan for the Development of the Traffic System of the Functional Region of the Northern Adriatic, and it showed extremely successful results. After the data were collected and aggregated, they were implemented in a traffic model (the VISUM software package was used). Based on provided

traffic simulations list of specific traffic solutions were proposed. In addition, further use of the anonymized mass data sets for traffic analysis is carried out through the INTERREG Croatia-Italy cross-border project MIMOSE, in which the researchers reanalysed traffic flows in the Northern Adriatic area and compared with previously conducted analyzes (the difference in analysis time is 5 years). This made it possible to compare nominated traffic projections and critically review the quality of proposed and implemented traffic solutions from the first study. The results of this comparative analysis prove the accuracy of the proposed traffic solutions and thus confirm the potential of using this modern approach to collecting traffic data. The only challenge for potential users may be the price for providing those data, which must be paid. However, in the end, that price is substantially lower than the price of conducting basic traffic surveys on-site with significantly greater precision.

Keywords: *digital technologies; mass data sets; traffic analysis; traffic planning; sustainable transport solutions.*

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Optimal solution to the location problem by determining the number and locations of source nodes using the Solver tool in the military domain

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ITS and Telecommunications

The role of modern logistics infrastructure in the military domain is to respond to the challenges of the location problem for the purpose of logistical support by optimizing the determination of the number and locations of source nodes and the transport schedule of a certain substrate (homogeneous cargo units such as pallets), with the ultimate goal of achieving sustainability in the military domain. The subject of research in this paper is to define and carry out an analysis of destination demand satisfaction, the number and location of source nodes of the military storage complex (MSC) of the military organization's transport network. Furthermore, on the basis of the obtained results, determine how it can function as a choice from which the demand of a specific location and other locations can be met as much as the capacity of the source in a specific location allows. The aim of the research is to investigate how the transport schedule is determined using the location of the source nodes and towards which destination and by which transport route. The results of the research showed the determination of the quantity of goods with which a particular source satisfies the demand of the destination in such a way that the demand of the destination is satisfied with the least costs and that the capacity of the source is not exceeded, which is a key factor in obtaining an optimal solution to the given location problem.

Keywords: *information tool; optimal solution; expense reduction; source nodes.*

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Examples of urban traffic management systems

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The paper analyzes examples of good traffic management practices related to Real-time passenger information, Split Cycle and Offset Optimization Technique system, Congestion Charge and Parking Management system in several European cities. The aim of this paper is to analyze urban mobility examples of good traffic management related to less pollutant emissions, lower energy consumption, reducing congestion in urban centers, better traffic flow and optimizing demand for crosswalks.

Through research activities, elements of the decision support system in smart cities with application in transport have been defined. A platform for aggregating data in the decision-making function for urban transport and mobility will enable the development of multimodal transport solutions in cities. The scope of the platform is to ensure more efficient use of various resources, public-private infrastructure and assets in the field of urban transport and mobility. To protect the environment and increase the safety of the transport system in urban areas it is necessary to measure traffic, environmental and meteorological parameters

The outcomes of the research are examined and tested in the function of monitoring and management of integrated traffic in the city of Rijeka thus enabling the achieving of transport and mobility sustainability in the urban area.

Keywords: *sustainable transport; urban mobility; urban transport; traffic management.*

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Logistics aspects of maritime transport in the light of the military rise of the BRICS states

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Logistics and Supply Chain

The dynamic growth of international trade is in search of new global maritime transport routes due to climate change, which inevitably effects on maritime infrastructure and security development. Military and economic power have several indicators by which they can be measured. Military power is derived from the economic power, while on the other hand, these allocated resources affect economic power. A significant indicator of military power is military expenditure, and one of the indicators of economic power is certainly the size of port traffic. The aim of this paper is to provide a more detailed insight into the connection between military allocations and port container traffic. The analysis was made on a sample of five BRICS countries – Brazil, Russia, India, China and South Africa. The analysis was done using a simple linear regression model. The results showed that there is a strong relationship.

Keywords: *BRICS; military spending; international maritime traffic; climate changes.*

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ESG Rating for Freight Forwarding Industry

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The concept of ESG (Environment, Social and Governance) is very old. But it took the present form in 2004, after the publication of United Nation's report entitled – Who Cares Wins. Almost after 20 years, most of the governments realised the need for and importance of the ideology and passed various enactments for the implementation of ESG ideology. This initiative has a rampant growth which is visible now. Majority of fortune 500 companies publishes ESG report along with their annual report.

According to, Who Cares Wins, sound corporate governance and risk management systems are crucial pre-requisites to successfully implement policies and measures to address environmental and social challengesFinally, successful investment depends on a vibrant economy, which depends on a healthy civil society, which is ultimately dependent on a sustainable planet. ESG is a long-term transformational force. It is immature and unrealistic to expect short term results from ESG implementation.

The study seeks to understand the discrepancy in ESG score for the same company evaluated by different rating agencies. Since ESG does not have a globally standardised rating system, the literature review helps to identify all potential gaps and to suggest solutions to fill the gap. Currently there are various ESG rating agencies which collects data from company websites, annual reports, CSR reports / Sustainability reports, media sources, company disclosures, NGO reports, stock exchange filing, survey etc.

Keywords: *ESG; freight forwarding; logistics; environment.*

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The Essential Role of Crane Simulators in Port Safety and Efficiency

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The use of crane simulators in modern port operations is essential to ensure the safety, efficiency and operational readiness of crane operators, especially given the challenges of handling large vessels, unpredictable weather conditions and maintaining high safety standards. These advanced training tools provide a highly realistic environment where operators can learn and practise the skills required to handle different types of cranes such as ship-to-shore (STS), rubber-tyred gantry (RTG) and mobile harbour cranes in a risk-free environment. Simulators can replicate complex scenarios, such as limited distances between ship and shore, sudden storms, high winds and poor visibility, allowing operators to hone their skills in dealing with real port operations. They are essential for training emergency procedures such as emergency stops and unexpected vessel movements. This is crucial to prevent accidents that have occurred in the ports of the northern Adriatic, such as cranes breaking down or ships breaking apart. Well-trained personnel prepared for any handling scenario can improve operational efficiency, reduce loading and unloading times and handle different types of cargo, from standard containers to dangerous goods. The article introduces a sustainable approach to building the crane simulator based on the serviced cabin of the port crane and presents the benefits of the simulator classroom as a learning environment where teachers, students and observers work together to acquire the required knowledge. As part of the project "UL for a Sustainable Development - ULTRA", the new didactic resource will serve as a tool for the simulation, modelling and analysis of cargo handling processes and systems in intermodal transport.

Keywords: *crane simulator; learning environment; digitization in higher education; ULTRA project.*

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Analyses of maritime accidents using the HFACS method, case study

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The maritime sector is affected by constant change in a complex operational environment. Maritime accidents can lead to loss of property and lives, significant economic losses, and potential changes and disruptions to global transportation and logistics. Over the decades, safety in the maritime industry has increased due to improvements in ship systems and technology. However, accidents at sea caused by human factors are still significant. According to the European Maritime Safety Agency (EMSA), human factors were identified as the main cause of 59.1% of accidents between 2014 and 2022 [1]. The fact that accidents at sea caused by human factors occur again and again underlines the need for effective mitigation measures. The investigation and analysis of maritime accidents are recognized tools for defining and understanding the factors contributing to accidents in order to propose and implement appropriate mitigation measures. This paper analyses maritime accidents investigation reports to identify critical areas that need to be improved to reduce the number of maritime accidents caused by human factors. For this case study, 115 official investigation reports of merchant vessels of 100 gross tons or more from 2012 to 2024 were collected from the United Kingdom Maritime Accident Investigation Branch (MAIB) database [2]. A systematic analysis of official data on accident causes, safety issues, actions taken and recommendations was carried out. Using the Human Factor Analysis Classification System (HFACS) methodology framework, key areas were identified that require appropriate change to reduce the number of maritime accidents. The implementation of sufficient measures in these areas could help to reduce the number of marine accidents caused by human factors and consequently increase the safety of navigation.

Keywords: *HFACS; maritime accidents; human factors; accident analysis.*

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Coastal flooding risk for major seaports in Croatia

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This study investigates the risks of coastal flooding for major seaports in Croatia, focusing on Rijeka, Zadar, Šibenik, Split, Ploče, and Dubrovnik. Coastal flooding is a significant concern for these ports due to their economic importance and the potential impacts on infrastructure, trade, and local communities. The assessment of coastal flooding risk is based on a detailed analysis of high sea levels in the Adriatic Sea, which includes the effects of tides, storm surges, and waves [1,2]. Flooding scenarios are evaluated for return periods of 25, 100, and 1000 years, providing a comprehensive understanding of both frequent and rare extreme events. Additionally, the analysis considers both present and future climate conditions, with future scenarios accounting for projected mean sea level rise based on current climate models and IPCC projections [3]. Results indicate significant variability in flooding risk among the ports. Rijeka is identified as being at the highest risk of coastal flooding, primarily due to its geographical location and local topography. Under future climate scenarios, the risk is exacerbated by projected sea level rise, leading to increased frequency and severity of flooding events. All seaports are projected to experience an increase in flood risk under future climate conditions, highlighting the need for adaptation and mitigation strategies. The findings provide critical insights for policymakers, port authorities, and urban planners, emphasizing the need for enhanced coastal defenses, improved early warning systems, and strategic infrastructure investments to mitigate the impacts of coastal flooding. This analysis and results emphasize the importance of integrating climate change projections into coastal planning and management.

Keywords: *flood risk; coastal flooding; climate change; sea level rise; seaports; Croatia.*

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Possibilities for analysing maritime accidents and incidents based on data collected from navigation systems

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Following a series of major maritime accidents, the IMO has adopted amendments to Chapter V of the SOLAS Convention requiring passenger ships and other ships of 3000 GT and above on international voyages to be equipped with Voyage Data Recorder (VDR) or simplified VDR (S-VDR). This paper provides a close analysis of possibilities for maritime accidents and incidents investigation based on data from various navigation systems. VDRs or S-VDRs must be designed to continuously record the prescribed data from various navigation systems during the ship's voyage. Various navigation systems on board ships such as the Electronic Chart Display and Information System (ECDIS), Global Navigation Satellite System (GNSS) receivers or the Automatic Identification System (AIS) can improve Maritime Situational Awareness (MSA). Despite the development of navigation systems, devices and equipment aimed at reducing the impact of human error and consequently increasing the level of safety of navigation, maritime accidents and incidents at sea continue to occur. After analysing the available resources, the authors conclude that various navigation systems can be subject to cyber-attacks, which in some cases affect the safety of navigation. Using examples to analyse specific maritime accidents and incidents, the advantages and disadvantages of using the VDR and various navigation systems during the voyage are highlighted. The authors make suggestions for improving the use of these systems in the investigation of accidents.

Keywords: *VDR; navigation systems; maritime accident and incidents investigation; safety of navigation.*

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Navigating the Future of Maritime Mobility with TRANS@H2 project

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Maritime and Inland Transportation

The TRANS@H2 project represents an ambitious initiative designed to revolutionize sustainable maritime transport through the integration of green hydrogen technologies [1]. This comprehensive endeavor seeks to address the pressing challenges of climate change and environmental degradation by fostering the development and deployment of zero-emission fuel solutions within the maritime sector. At its core, the project aims to transform cross-border sea mobility, making it more sustainable and environmentally friendly, by introducing hydrogen-fueled vessels and the requisite refueling infrastructure across strategic maritime routes.

The initiative is aligned with the European Green Deal's objectives and the EU's "Restore our Ocean and Waters" mission, reflecting a strong commitment to ecological sustainability and innovation in transportation [2]. By leveraging cutting-edge research, pilot demonstrations, and collaborative efforts across sectors, TRANS@H2 endeavors to create a scalable model for green maritime logistics that could significantly reduce the industry's carbon footprint.

Key components of the project include the design and development of hydrogen-powered ships, the establishment of hydrogen fuelling stations in participating ports, and comprehensive feasibility studies aimed at assessing the viability and impact of such interventions [3]. These efforts are complemented by extensive stakeholder engagement, policy analysis, and the development of strategic investment plans intended to facilitate the widespread adoption of hydrogen fuel technologies in the maritime domain.

The project is marked by collaborative approach, involving a broad consortium of partners from various sectors, including maritime transport, energy, technology, and environmental advocacy. This multidisciplinary collaboration underscores the project's holistic approach to addressing the challenges associated with maritime emissions and showcases the potential of cross-sectoral partnerships in driving environmental and technological advancements [4].

In conclusion, the TRANS@H2 project stands as a pivotal initiative in the transition towards a more sustainable and zero-emission maritime transport sector. By focusing on the development and implementation of green hydrogen solutions, the project not only contributes to the reduction of greenhouse gas emissions but also sets a precedent for future innovations in sustainable transport technologies [5]. Through research, pilot projects and collaborative efforts, TRANS@H2 paves the way for a more sustainable future for maritime transport, reflecting a step forward in the global effort to combat climate change and preserve oceans and waters.

Keywords: *sustainable maritime transport; green hydrogen technologies; zero-emission fuel solutions; Interreg TransH2 project.*

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Quality Control of Concessionaire Operations in Croatia

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According to the general definition, a concession is a permit to perform an activity conditioned upon special approval. By means of a concession, the public authority (directly the state, local self-government, or another public legal entity) awards a specific entity the right to economically utilize common or other goods, the right to perform works, or the right to provide services. In a legal sense, a concession consists of two acts – the decision on the concession, by which a certain right is awarded, and the concession contract, which details the obligations between the awarder and the concessionaire. The European Concessions Directive defines concessions as a "contract for pecuniary interest," while the Croatian Concessions Act, aligned with the directive, states that concessions are "rights acquired by contract." Concessions are awarded for numerous and very diverse economic activities. The awarder of the concession, by explicit legal provision, continuously supervises the work of the concessionaire and the fulfillment of obligations from the concession contract. The awarder is thus responsible for monitoring the payment of the concession fee. In Croatia, the concession fee is equated with tax contributions. However, the awarder has another obligation – to oversee the quality of the concession performance. This obligation to supervise the quality of work by the concessionaire is particularly important for concessions based on which public service or generally an activity of public interest is performed. These include, for example, concessions in ports open to public traffic, in line transport, nature protection, veterinary public health, or for airports. While the issue of concession supervision in terms of paying the concession fee is legally and practically well regulated, the issue of supervising the quality of the concessionaire's work, and even determining the minimum quality of public service provision by the concessionaire, is neither detailed in regulations nor in practice. This paper will outline the obligations and possibilities of supervising the quality of work of the concessionaire by the awarder according to Croatian

regulations, with a special emphasis on concessions for the provision of port services in public ports and concessions for coastal line maritime transport, considering the Concessions Directive and Croatian national regulations.

Keywords: *concessions; concessionaire supervision; Concessions Directive; Concessions Act*.

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Navigation scenarios designed for COLREG-compliant Decision Support System validation

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Maritime and Inland Transportation

Integrating Decision Support Systems (DSS) in navigation represents a progressive phase in the evolution towards greater connectivity among vessels and overall situational awareness of the navigators. However, there is a significant gap in the understanding and exploration of navigation systems from the users' point of view. It is important to recognize that a decision made at a navigational bridge is influenced by the navigator's experience, understanding, and application of the international rules.

The SafeNav project aims to develop an artificially intelligent collision avoidance system as a crucial step towards achieving automated ships. The project focuses on designing an innovative DSS system tailored to maritime applications. Future DSS systems will be integrated into the Integrated Navigation System (INS) on the vessels' navigation bridge to enhance navigation safety and environmental protection. The system will utilize data collected from onboard navigation sensors and incorporate sensor data from multiple sources in DSS through advanced digital technology.

Developing and validating COLREG-compliant DSS systems for maritime navigation necessitates rigorous adherence to the International Regulations for Preventing Collisions at Sea (COLREG) rules. Furthermore, this study presents a comprehensive framework for designing navigation scenarios to validate COLREG-compliant DSS in the open sea. These scenarios encompass a wide range of maritime situations, including head-on encounters, crossing and overtaking situations, multi-vessel interactions, operations in reduced visibility, adherence to responsibilities between vessel rules, and scenarios in heavy traffic.

Each scenario is meticulously crafted using Full Mission Bridge (FMB) Wärtsilä - Transas Marine Navi Trainer Professional (NTPro) 5000 to simulate realistic conditions, ensuring the DSS can make appropriate and timely decisions to avoid collisions and navigate safely. After extracting data from the Wärtsilä simulator, numerical and computational tasks were conducted in MATLAB_R2018b programming language and numerical computing environment. The validation process involves executing these scenarios in a controlled simulation environment, monitoring the DSS's decisions, and evaluating its performance against established COLREG standards. This study provides a crucial step towards enhancing maritime safety by developing advanced, COLREG-compliant navigation support technologies facing an autonomous future.

Keywords: *decision support system; COLREG; collision avoidance; integrated navigation system; autonomous navigation.*

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Designing an integrated timetable and an integrated network for railway passenger public transport for the node Varaždin in Croatia using graphic maps

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Varaždin is a railway local and a regional railway node in the northern Croatia. The railway lines from Međimurje region, from Koprivnica, from Novi Marof and Zabok and from Ivanec and Golubovec meat in the node. That is the overall number of four lines. The node offers a limited range of local railway services, mostly designed for secondary schools' pupils and students. The modal share in the region is very low, around 2%. The railway network is dense and although non-electrified and only sigle track, it offers the potential for better local and regional services. Such services could increase the modal share of the passenger rail and they can also serve as the backbone for an integrated passenger transport system, which is a strategic goal for the region of northern Croatia and Varaždin as the biggest and most important city of the region. A survey was carried out to establish a modal share in Varaždin county, plus to establish a potential for usage of the integrated passenger public transport in the region. In order to design a service in line with the carried survey and attractive enough for the citizens to use it, a novel approach was used, designing the graphic and schematic network of local and regional lines, plus an integrated clock-face timetable for the railway node Varaždin. The existing timetable offers very limited or practically non-existent connections in the railway node Varaždin, therefore limiting the possible journeys that include traveling on more than a one line only. The new timetable was designed to be an integrated clock-face timetable, which is based on the graphic design of the new network. Also, this approach is a novel approach that has never been used in this region, nor in Croatia before. This approach is testing weather the planning of the railway public transport system and railway timetables via graphic methods is possible and can such design approach produce a network according to the customers' needs. This is the combination of using graphic designing methods for modelling the high accessibility public transport passenger network and timetables. The graphic planning used is also novel while it combines the design of the network that simultaneously shows both local (suburuban) and regional lines, with clearly showing which category of trains (lines) is serving which node, also showing the nodes with possible transfers among the lines of different categories.

Keywords: *integrated public transport; local railway public transport; regional railway public transport, public transport map; harmonized timetables; railway passenger transport.*

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Traffic safety culture of commercial vehicles drivers in Novi Sad

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Traffic safety culture is a relatively a new concept that has recently gained attention in the field of traffic safety. Traffic safety culture appears to be an intuitive and powerful concept that explains observed differences in international, regional, and demographic accident risks, as well as propensity for high-risk behavior. This paper presents the concept and potentials of the application of traffic safety culture. This paper analyzes the attitudes and behavior of commercial vehicles drivers in the area of Novi Sad.

Keywords: *traffic safety; culture; commercial vehicles; driver.*

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Road safety in Croatia: A Comparative analysis of Croatia's Two National Road Traffic Safety Programs

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This paper presents a comparative analysis of two National Road Traffic Safety Programs of the Republic of Croatia: the previous Program for the period from 2011 to 2020 and the new Plan for the period from 2021 to 2030. The paper analyzes data on traffic accidents, the consequences of these accidents, and the impact of police preventive measures on safety improvement. Key factors affecting the safety situation are identified, including the number of vehicles, drivers, violations, and police activities. The focus is placed on comparing the goals, activities, and measures, as well as the involvement of various entities responsible for road traffic safety. The new National Road Traffic Safety Plan for the period from 2021 to 2030 builds on the previous Program but also introduces new strategies and measures. The main goals remain similar: reducing the number of traffic accidents and fatalities on the roads. However, the new Plan introduces innovative approaches and technologies and heavily relies on data analysis and monitoring the effectiveness of implemented measures. The Plan also emphasizes the importance of intersectoral cooperation and the involvement of the broader community in implementing safety measures. The comparative analysis of these two Programs shows continuity in goals and approaches, as well as significant progress in the use of technology and analytics. While the previous Program laid the foundations for systematic monitoring and improvement of road traffic safety, the new National Road Traffic Safety Plan brings more advanced methods and broader community involvement. This paper provides an overview of the key aspects and a comparison of the two Road Traffic Safety Programs in the Republic of Croatia, highlighting continuity and innovation in the approach to improving road safety.

Keywords: *road traffic safety; national program; national plan; ministry of the interior; traffic accidents; preventive measures.*

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The effectiveness of social networks in the implementation of the National road safety plan: Analysis of educational and promotional activities in the first phase (2021.-2023.)

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Air, Rail, and Road Transport

Road traffic safety represents a significant challenge for many countries, including Croatia. According to the National road safety plan for the period 2021.-2030., the goal is to reduce the number of fatalities in traffic accidents and the number of serious traffic accidents by 50% by 2030. The plan is implemented through the division of responsibilities in 13 key areas of action. Activities are divided into engineering, legislative, and educational measures, and the plan is organized into three phases (2021.-2023., 2024.-2026., 202.7-2030.). The National plan is based on the principles of a systematic safety approach and an understanding of the factors affecting the safety of all road users. Media are one of the ten factors in the National road safety plan that influence road traffic safety. This paper aims to investigate the role of new media, with an emphasis on social networks, in the context of communication related to road traffic safety and their contribution to achieving the goals of the National road safety plan in the first phase of implementation. Using the method of content analysis on social networks, the social networks of responsible entities representing institutions accountable for implementing specific measures were analysed according to defined measures in their respective areas of action. This paper focuses on the educational measure, which includes the implementation of preventive educational and promotional activities. A second analysis was conducted on the social networks of the National road safety plan, focusing on the educational measure and the implementation of preventive educational and promotional activities. Through content analysis on social networks, responsible institutions were identified based on the type of educational

measure, which includes preventive and promotional activities. The analysis included the number of followers, posts, views, type of content, area of action, and activities. The findings of this paper revealed which responsible institutions and to what extent used social networks for education and promotion of road traffic safety, and whether social network users reacted to the published content through the number of views and reactions relative to the number of followers on the analysed social networks. These data provide insight into the effectiveness of communication strategies in implementing measures and activities to reduce the number of traffic accidents.

p: *social networks; road traffic safety; National Road Safety Plan; content analysis method; traffic accident prevention.*

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Smart Traffic Sign for Advisory Speed

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Air, Rail, and Road Transport

The smart traffic sign for advisory or recommended speed is an innovative IT solution that is installed on the roads to improve road safety and traffic flow. It can be defined as a new complex system of elements that independently collects data on current road conditions, weather conditions, and traffic flow conditions, processes the collected data, and, through the implementation of a fuzzy logic system, independently makes a decision on the safest vehicle speed in current conditions. The smart traffic sign consists of sensors for collecting data from the environment, a control unit, an LED panel, and solar power elements. The smart traffic sign is completely autonomous in its operation; it does not need an internet connection or any other connection to the cloud or server, and as a power source, it uses electricity from its solar panels. A smart traffic sign independently determines and displays the safest speed for current road and traffic conditions without control from a control center or human assistance.

Keywords: *Smart road sign; Variable message sign; road safety; speed limit; advisory speed.*

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Efficiency of resolution actions measures of crash spots on Varaždin county roads using EU funds

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Air, Rail, and Road Transport

EU funds have greatly contributed to the development of the Republic of Croatia, especially after the beginning of July 2013. Many funds have become more easily available for Croatians and the scope of available means has increased. Croatia has become more competitive, developed and, most important, economically equal to some of the Eurozone countries.

This thesis focuses on the efficiency of using EU funds, especially in the part regarding rehabilitation of crash spots in Varaždin county. The research is mainly financed by the National plan of road safety partly financed by the EU funds. It has been conducted between 2014-2024. The plan was chosen because of its financial hybridity and also because the Police department of Varaždin county has provided its opinion on the necessity of rehabilitation for every crash spot.

The results represent the opinion on benefits of the Plan regarding its quality of rehabilitation of crash spots, the effects of rehabilitation and the potential lower number of car accidents at observed crash spots, and the justified expenditure of funds.

The research will provide a basis for future research and monitoring of the long-term effects of EU funded projects on traffic safety. This can stimulate continuous monitoring and evaluation of measures taken to improve traffic safety, thus creating a foundation for further research.

The results of the research can serve as a basis for raising awareness of the importance of investing in traffic safety and as educational material for local stakeholders, drivers and the general public, and finally the research can

contribute to greater transparency in the use of public funds and EU funds for traffic safety, which can result in better by monitoring the effect of investments.

Keywords: *EU funds; National program of road safety; crash spots.*

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Analysis of Citizens' Satisfaction with Important Elements of Sustainable Cities: Mobility, Proportion of Green Areas, Air Quality, and Noise Pollution

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Smart and Sustainable Cities

This paper investigates residents' satisfaction with certain aspects of the quality of life in their places of residence, with a particular focus on sustainability factors. The analysis is based on a survey conducted on a sample of 407 respondents from different parts of the Republic of Croatia. The examined factors include the proportion of green areas, air quality, mobility, and noise. The results show that respondents are generally satisfied with the proportion of green areas in their place of residence (average score 3.916) and air quality (average score 3.661). On the other hand, respondents expressed dissatisfaction with mobility (average score 3.428) and the impact of noise on the quality of life (average score 2.236). The data indicate the need for optimizing the transportation system to meet the community's needs in terms of mobility fluidity and accessibility. Furthermore, the results highlight the importance of maintaining and improving green areas and air quality in urban environments to enhance the overall quality of life for residents. This paper covers key findings and recommendations from the research, providing a concise overview of the study's objectives, methodology, and results. The paper also includes a review of other research conducted by various authors [1,2,3,4].

Keywords: *air quality; city management; green areas; mobility; noise pollution.*

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Improving the public bus network and timetables in Varaždin County in Croatia

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Smart and Sustainable Cities

Varaždin County had around 160.000 inhabitants and it is located in the northern part of Croatia. Together with its capital Varaždin, it is forming an important industrial and business region. However, it has been struggling for many years now with the decline of public transport modal share, both bus and rail. Simultaneously, the modal share of cars is rising, reaching almost 70%, which brought all the negative effects of car usage such as high level of harmful emissions, congestions, scarce of parking spaces and accidents. In order to decrease the car usage and to increase the usage of public transport, trains and buses, more attractive solutions for traveling with PT must be designed. These solutions should include integrated passenger transport systems, with harmonized timetables meaning simple and fast transfers among all bus lines and train lines, while using the common tickets. The first step in reaching an integrated system is designing an integrated local bus network, for local, county, public transport, with harmonized timetables among the lines in important nodes, like Varaždin or Ivanec or Ludbreg and similar. Before designing such a network, a survey was carried out among the citizens of Varaždin County. The survey revealed the current overall modal share, plus it also revealed that more than 70% of its citizens is willing to use an integrated bus system with and integrated network, harmonized timetables among the lines for easy transfers. It also revealed that the current timetable offers minimal

number of connections with limited accessibility of the region, leading to decline in ridership. To show the potential of development of the network, a novel approach was used, combining the new graphical schematic network design, with the well routed network prepared for the implementation of the integrated timetables and also integrated clock-face timetables. This offers all the possible transfer possibilities in the network, boosting the accessibility of the region up to almost 100%. Public transport maps are probably one of the most common forms of graphic communication and certainly one of the most recognizable cartographic items in the world. They are present in most developed urban areas and help millions of users navigate their cities daily. Public transport maps have become effective visual tools for communicating spatial concepts and presenting navigational information—such as route directions, types of transportation, stations, connections, landmarks, etc.—through a specific graphic language and design techniques. Cartographic approach was used to plan the routing of the lines and then planning the timetables. This approach is a novel one, and it has never been used in this region before. This approach is testing weather the planning of the road public transport system via graphic methods is possible and can such a network be designed to satisfy the customers' needs.

Keywords: *integrated public transport; local public transport; public transport map; harmonized timetables; bus transport.*

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Internet of Things in Smart Port Technologies

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Smart and Sustainable Cities

Intelligent ports are service systems for port transport based on modern electronic information technology. Their features include the provision of various information services for port participants based on the collection, processing, issuance, exchange, analysis and use of relevant information. Intelligent ports are connected to the Internet of Things in order to achieve efficient data sharing and stability of port services, that is, they are new generations of ports, which contain intelligent port infrastructure and integrated and smart management and services.

IoT (Internet of Things) technology is the basis for the development of intelligent ports. Sensor technology enables objects to perceive and connect with the environment, RFID technology enables communication with the environment. At the same time, the machine-to-machine (M2M) relationship allows them to exchange data. The sum of all the aforementioned technologies creates the Internet of Things, which enables all business and transport facilities in the world to are connected to each other. Thus, handling equipment, ships, containers, vehicles and instruments, which are widely distributed in global ports, are connected to this network.

IoT (Internet of Things), by extending human senses and collecting business data directly from the operation terminal in ports, can eliminate manual collection errors, improve collection efficiency, and deliver instantly to every corner of the Earth with the help of the Internet.

Keywords: *intelligent ports; IoT (Internet of Things); Internet; transport; communication.*

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Measurability of City Logistics – An Indicator based Model for the City of Linz

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Smart and Sustainable Cities

Urbanisation, a major trend of our time, affects cities of all sizes, including Linz in Upper Austria. The increasing number of inhabitants and commuters poses new challenges for urban goods supply, further exacerbated by the rise of e-commerce. Maintaining sustainable aspects like city centre living space and ecological sustainability is crucial to keep city centres vibrant and attractive for retailers, restaurants, and cultural venues. A smart city logistics concept, such as Sustainable Urban Logistics Planning (SULP), is needed to meet requirements for economic efficiency, social and ecological sustainability, and customer satisfaction. Such a SULP requires effective management by measurable metrics, leading to the development of a key performance indicator model similar to a balanced scorecard.

Results: The research produced a customized key performance indicator model for Linz, highlighting the most critical sustainability dimensions. The application of the AHP method provided a clear prioritization of these dimensions, facilitating targeted and effective urban logistics strategies.

Implications: This approach enhances urban logistics efficiency, supports sustainable urban development, and informs decision-making with measurable data. It also promotes stakeholder engagement and offers a scalable and adaptable framework for other cities.

Limitations: The model's effectiveness relies on the availability and quality of data, and its findings are context-specific to Linz. Expert bias and implementation challenges may affect the outcomes, and the dynamic nature of urban environments requires regular updates to the model.

Keywords: *last mile; urban logistics; AHP method; city logistics indicators.*

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Deep Learning Algorithms and Artificial Intelligence as a Method for Predicting Urban Evolution

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Smart and Sustainable Cities

Cities have the most important role in global networks, the advantages and risks of AI system integration can be seen very realistically within cities as research subjects. The emergence of artificial intelligence and deep learning algorithms has moved from smart ontologies to the logic of urban artificial intelligence. This paper explores the ways in which new technologies change the systems that create them. By connecting artificial intelligence and the city and through the analysis of a series of case studies, the conclusion is reached that the digital development of robots, autonomous vehicles, changes social and legal platforms, in order to limit and contain the critical points of artificial intelligence. Technological evolution usually outpaces regulatory changes, and it is increasingly difficult to monitor such systems and understand the social impacts they can have. To take full advantage of AI's potential for cities, carefully balancing opportunities and risks is the purpose of managing AI.

Keywords: *artificial intelligence; deep learning algorithms; city; regulatory changes; urban planning.*

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Sufficiency of electric charging stations in urban areas

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Sustainable Mobility

The quantity of electric charging stations in urban areas has become an increasingly significant topic in the 21st century, given the growing number of electric vehicles and the need for infrastructure to support their charging. Urbanization and a rising awareness of environmental issues are encouraging people to transition to electric vehicles, further boosting the demand for charging stations. A key factor in the successful adoption of electric vehicles is the availability of charging stations at all times, especially in urban areas where most residents rely on public transportation or live in apartments without private garages. Therefore, cities must rapidly expand the network of charging stations to accommodate the growing number of electric vehicles. This includes installing charging stations in public parking lots, shopping centers, residential buildings, and other key locations in urban centers. Improving the infrastructure for charging electric vehicles not only facilitates the transition to sustainable mobility but can also significantly stimulate economic development, reduce emissions of pollutants, and decrease dependence on fossil fuels. Thus, investment in a greater quantity of electric charging stations in urban areas is crucial for creating more sustainable and pleasant urban environments. This paper will present an overview of the amount of electric charging stations in the Republic of Croatia and the European Union, according to the statistical data of charging service providers, as well as the EV index, which serves to compare the readiness of countries at the EU level regarding the wider use of electric vehicles.

Keywords: *electric charging station; electric vehicle; urbanization; EV indeks.*

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Does early cycling onset help promote sustainable transport engagement? A study in five Balkan countries

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While it is known that promoting cycling entails multiple benefits for both transport sustainability and people's physical and mental health [1], there are user-related issues, such as individuals' cycling enrollment ages, whose implications of cycling outcomes remain under-addressed in the scientific literature [2-3]. Therefore, the aim of the present study was to assess the relationships among cycling onset ages, use patterns, cycling behaviors, and safety-related outcomes among current cyclists, as well as their link to riders' willingness to increase cycling frequency for urban trips.

This study, part of the Bike-Barometer project, and conducted in several countries of the Balkans, collected data from 1,741 cyclists (M= 34.21 years; 62% male) from Croatia, Bosnia and Herzegovina, Greece, Romania, and Serbia. They responded to an electronic macro-survey addressing their history with the bicycle, current riding patterns, cycling safety skills, risky and protective cycling behaviors, and safety outcomes.

At a descriptive level, cycling enrollment in the region tends to start at very early ages, with 46.4% of current cyclists beginning before age 5 and 47.8% between ages 6–11. Moreover, it is worth highlighting generational differences such as the fact that nowadays younger cyclists started cycling significantly earlier than older bicyclists. At a behavioral level, cyclists who began cycling at an earlier age tend to be less likely to engage in unintentional risky behaviors, and to have a better knowledge of cycling regulations. Also interestingly, the earlier the bicycle enrollment, the greater the individual's willingness to replace trips made by other means with cycling trips. Nevertheless, there is a 'flip side' of the coin, as helmet use seems to be lower among those cyclists with an earlier age of initiation, who also tend to interact more often with connected devices while riding, even after controlling for age.

Given the several 'benefits' of invigorating earlier and long-lasting cycling enrollment, these findings provide a solid foundation for developing strategies to promote both cycling engagement and safer cycling practices in the region. However, the results of this study suggest that challenges involving both passive (e.g., helmet wearing) and active (e.g., mobile phone use) cycling safety issues still need to be addressed to significantly reduce safety threats, and create a safer and inclusive environment for bicycle riders.

Keywords: *cycling; enrollment ages; cycling outcomes; safety skills; Balkan countries.*

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Enhancing Active Transportation: Supporting Safe and Sustainable Cycling and Walking in Croatian Elementary Schools

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Sustainable Mobility

This research evaluates initiatives supporting safe and sustainable cycling and walking among elementary school pupils from four Croatian cities: Zagreb, Varaždin, Split, and Slavonski Brod. The research uses a mixture of methods, including survey data and qualitative meetings with children, parents, teachers, and municipal officials [1-2]. The data collection methods included before and after intervention assessments that explore modifications to traveling habits, perceived safety, and environmental awareness, in addition to observational research and GIS mapping for analysing infrastructure and traffic patterns of area within schools in chosen four cities. The initial findings show that educational workshops, enhancements to infrastructure (e.g., bike lanes, pedestrian crossings), and neighbourhood initiatives significantly increase children' the potential of walking or cycling to school. Zagreb and Split, with bigger infrastructures have greater initial opportunity for active transportation but confront challenges in terms of traffic density and safety. Varaždin and Slavonski Brod show considerable involvement from the community and an opportunity for flexible solutions. Significant challenges involve maintaining infrastructures addressing parental worries about security and introducing active transportation courses into educational programs [3-5]. The research presented here gives policymakers, urban planners, and educators helpful perspectives, highlighting the vital importance of integrating infrastructure, support for policies, and involvement from the community to promote an active transportation mindset and improve urban sustainability in Croatian cities.

Keywords: *urban mobility; road safety; infrastructure improvement; community engagement.*

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Green Transition and Sustainable Mobility: Literature Review

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Sustainable Mobility

Green transformation has a goal towards economically sustainable growth and an economy that is not based on fossil fuels and overconsumption of natural resources. Due to the European Green Deal that wants to make Europe climate-neutral by 2050, it is turning to green technology, creating sustainable industry and transport, and cutting pollution. The green transformation deals whit many areas, including transportation as one of key areas in reducing air pollution precisely by defining and finding new sustainable modes of transport. The main goal of green transition is to direct companies and entire economies to improve energy efficiency, use renewable energy sources, reduce greenhouse gases, etc. To research and review novelties in the field of green transition and sustainable mobility numerous world literature has been researched. In this research, papers within the Scopus databases were used to gather information on the research topic which shows that a large number of authors have researched the area of green transition and sustainable mobility but there is insufficient correlation and connection between green transition and sustainable mobility. A search of Scopus using the following approach (TITLE-ABS-KEY ("green transition") AND TITLE-ABS-KEY ("sustainable mobility") resulted in 18 scientific papers. From the aspect of sustainable development, it is necessary to monitor further development and activities undertaken in order to reduce the harmful effects of mobility and transport on the environment and the overall economy.

Keywords: *green transition; sustainable mobility; sustainable development*.

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The relationship between creative solutions in outdoor marketing and young drivers' distraction

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Sustainable Mobility

Following an increase in the number of vehicles and traffic in large urban areas, marketing platforms such as roadside advertising have also began developing rapidly. The stakeholders in the advertising industry have become more creative in capturing the attention of drivers, which leads to more distracted driving. Research on driver distraction has shown that almost 90% of drivers glance at advertising surfaces at least briefly while driving, and statistical data on traffic accidents prove that driver distraction, along with other dangerous elements in traffic, is one of the leading causes of traffic accidents. A liberal consumer economy enables advertising without serious regulation, and extremely large roadside advertisements equipped with intense LED lighting are largely replacing the classic static advertisements (billboards), which in turn are increasingly creative with various extensions and go beyond the advertising space, with dynamic objects, additional lights, 3D installations, and similar. All the above does not speak in favour of increasing traffic safety; on the contrary, it emphasises an increasing number of elements which decrease traffic safety through driver distraction.

Keywords: *traffic safety; OOH creativity; driver distraction.*

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The connection between sustainable mobility and sustainable tourism: a literature review

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Sustainable Mobility

Due sustainability demands related to EU Agenda 2050, numerous stakeholders face challenging times due to climate change and urbanization. Among other issues this also includes sustainable transportation in cities as well as planning and achieving sustainable ways of transport. The concept of sustainable mobility lies in providing accessible transportation options that are safe and efficient in minimizing negative environment and society issues while assuring economic growth. Sustainable tourism, on the other hand, emphasizes responsible travel that preserves natural and cultural resources and improves the well-being of local communities. In management research, transport and tourism „have traditionally been separated"[1]. Nowadays, the integration of sustainable mobility and sustainable tourism is a key in achieving the goals of sustainable development. This paper conducts a literature review that investigates the interrelationship between sustainable mobility and sustainable tourism. For analysing those two concepts database Web of Science (WOS) was used. The search included phrases ("sustainable mobility") AND ("sustainable tourism"). The search indicates that there are few studied that explore both concepts. The aim of the paper is to identify the main theoretical frameworks, methodological approaches and summarize key findings in research dealing with the integration of these two important areas of sustainable development.

Keywords: *sustainable mobility; sustainable tourism; sustainable transportation.*

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Bike-sharing as a measure of cycling strategies in Novi Sad

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Sustainable Mobility

Congestion in urban areas, lack of parking space, noise and pollution are just some of the problems facing modern society. The challenges facing society are numerous and require the application of sustainable mobility principles to overcome the negative effects of transport. The use of bicycles as a non-motorised mode of transport is one of the ways to influence the reduction of traffic problems. The promotion of cycling has been significantly influenced by bike-sharing systems. In fact, these systems are considered to have played a key role in promoting cycling in cities for more than a decade [1].

The importance of the bike-sharing system was also recognised by the City of Novi Sad, which implemented the system in 2011 under the name NS bike. During the implementation of the system, it is planned to offer a fleet of about 600 bicycles, with 60 docks installed in the city at a distance of 400 to 500 metres. The implementation of the system should take place in several stages until the planned capacity of the fleet and docks is reached. Now, 13 years later, the situation is far from what was planned. Of the planned 60 docks, only 16 have been installed in the city area, and the fleet consists of about 140 bicycles. Although continuous work is being done to improve the cycling infrastructure in Novi Sad and the services provided by the NS bike system, the realisation of the planned capacity and the level of service provided to the users of this system is still very scarce. Therefore, it is very important to analyse the current state and functioning of the NS bike system in relation to the initial state, during the first years of implementation. It is also important to compare the attitudes of the users of the NS bike system and to determine what has changed in their attitudes and habits during the past period.

The survey of users of the NS bike system was carried out in May 2013 and determined the gender and age of the users, the frequency of bike rentals, the time of day the bikes are used, the purpose of the trip, etc. [2]. Nine years later, in June 2022, a new user survey was conducted. Comparing the results of the survey with the results of the 2013 survey, and simultaneously comparing the current state of the NS bicycle system with the state in the initial period, it is possible to draw certain conclusions that will affect the elimination of existing deficiencies in the system. The obtained results can significantly influence the further development of the bike sharing system in Novi Sad. Future development strategies should take into account user requirements regarding the necessary bicycle infrastructure, the number of bicycles required, the number and location of docks, etc.

Keywords: *bike-sharing; infrastructure; survey.*

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Maintaining sustainable mobility by using High occupancy vehicle lane (HOV) – an example of Karlovac-Zagreb highway

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Sustainable Mobility

There is no doubt about negative effects of traffic on the environment, the increasing number of motor vehicles makes problems even worse every day. Therefore the priority for traffic organisation and urban environment lies in finding ways to reduce the number of vehicles on the roads with the purpose of reducing environment pollution, but also in keeping at the same time the reached mobility level of people and goods. One of the ways to achieve the balance between environmental pollution reducion and people and goods mobility level is High occupancy vehicle lane (HOV). High occupancy vehicle lane is a restricted traffic lane reserved for the exclusive use of vehicles with a driver and at least one passenger, including carpools, vanpools, and transit buses. These restrictions may be only imposed during peak travel times or may apply at all times. Evidence suggests that HOV lanes can have a positive impact on congestion, but the impact of HOV lanes depends on travelers' behaviors and on whether HOV lanes incentivize carpooling. The purpose of this article has been to show some positive sides of HOV lanes and to illustrate it with a example of the city of Zagreb.

Keywords: *carpooling; High occupancy vehicle lane; congestion; mobility; city of Zagreb.*

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STUDENTS' ABSTRACTS

Circular logistics as part of the supply chain

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Logistics and Supply Chain

The circular economy is an imperative of the modern world burdened by the ever-increasing production of excessive amounts of waste. The concept of a circular economy refers to all aspects of human activity that are based on the reduction of waste and its negative impact on the environment. In the circular economy, logistics systems are also changing; there is a development of reverse logistics that ensures ecologically sustainable production management. There is an increasing emphasis on closed-loop systems instead of traditional open-loop systems. It is also necessary to consider the traditional concept of the life cycle of the product and extend it with repairs, recycling and other procedures that encourage longer use of the product, which directly affects the reduction of the amount of produced waste. In reverse logistics, the emphasis is on the full utilization of products and minimizing potential waste. Reverse logistics brings benefits for all parties, from consumers to retailers, but it also brings with it a multitude of technical, economic and even political challenges. Companies that want to survive on the market and be competitive, decide for return logistics, which, among other advantages, helps them to create a reputation in a world that increasingly wants to be "green" and "environmentally aware". The aim of this paper is to show the development of logistics in the last five years and the trends in the development and implementation of reverse logistics based on the existing literature.

Keywords: *return logistics; supply chains; ecology; competitiveness.*

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What influences the profitability of logistics companies in Croatia?

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Logistics and Supply Chain

Since joining the EU in 2013 and the Schengen area in 2023, the opportunities for the development of logistics companies have increased. Accession to the EU and the Schengen area offers many advantages for a small open economy like Croatia. In addition to its geostrategic position, the infrastructural development of the port of Rijeka and the development of connecting infrastructure with the hinterland, accession to the EU and the Schengen area offers significant advantages for logistics through reduced border delays, lower costs, harmonized regulations, etc. Logistics is an important economic sector in Croatia and more than 2,700 companies in Croatia are registered in the logistics sector. The aim of this study is to examine the determinants of business profitability of logistics companies in Croatia and to offer guidelines for profitable business in logistics. Our analysis is based on the financial data for logistics companies in Croatia classified according to NACE Rev. 2 and covering the period from 2012 to 2022. The data comes from the Orbis database. All stakeholders in the logistics sector seeking to increase the profitability of logistics companies can use the conclusions of the study as a guide.

Keywords: *Croatian logistics market; logistics firms; firm profitability; regression analysis.*

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WECDIS application and future development

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Maritime and Inland Transportation

The paper is focused on the development of the Electronic Chart Display and Information System (ECDIS) from its beginnings to its application in military purposes and its future enhancements. The ECDIS system used on warships must meet specific requirements. This system is known as "WECDIS" (Warship ECDIS), which is intended to replace paper charts in peacetime navigation and wartime operations. The system must be compatible with Electronic Navigational Charts (ENC) and comply with NATO standards (STANAG 7170, STANAG 4564). Based on research conducted among experts, the future development and potential threats to the system's use were analyzed. This paper presents measures to reduce potential errors when using the system and recommendations for better utilization.

Keywords: *ECDIS; WECDIS.*

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Increasing the safety of school children through active forms of transportation: analysis of road infrastructure and influencing factors

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Air, Rail, and Road Transport

Childrens are limited by their physical, cognitive and social development, which makes them more vulnerable in road traffic than adults. Due to their short stature, it is more difficult for them to see the transparency of the traffic situation and they are difficult for drivers and other participants to see. Every four minute, one child loses his life prematurely on the roads, and many of them are often seriously injured. A change in way of thinking is urgently needed in order to ensured that roads serve their purpose, but on the other hand provide safety for all who use them, including children, but also vulnerable road users such as pedestrians, cyclist and motorcyclist. The focus of the research lies on road signs and signalling that inform drivers about the presence of children on the road in front of or near educational institutions. The research was conducted through a combination of quantitative and qualitative methods, including analysis of traffic data and research studies. Improving traffic signals and infrastructure in school zones is essential for reducing the risk of traffic accidents and protecting children in traffic. This research provides a basis for further interventions and policies aimed at improving safety of children in traffic in the Republic of Croatia. The research is based on the collection of data on the presence of traffic signs and signalling in school zones throughout the Republic of Croatia. The data analysis includes an overview of posted signs, their visibility and adequacy in notifying drivers of the presence of children on the road. In the reduces speed zones that have been created, child pedestrian fatalities have seen a drastic drop of 77% and cyclist fatalities by 28%. As more than 25.000 people are still killed on European roads every year, it is crucial to take all possible measures to improve road safety. The vast majority of European countries have signed the UNECE Convention on Road Traffic, also

known as the Vienna Convention of 1968., and thereby committed themselves to providing education on road traffic safety. UNECE has not adopted a unified framework according to which the signatory states must provide such education, so all European countries have introduced their own different systems of road safety education. Some of the detected problems on Croatian roads are the lack of traffic signs, poor environmental management, lack of road markings, inappropriate speed. In order to solve or alleviate the mentioned problems and to increase the safety of children, there are a number of measures and ways of arranging the streets. In addition to safety measures for vehicles and infrastructure engineering, education about traffic safety and mobility plays an important role in creating safer Croatian and European roads. The regulation of laws and the adoption of pilot projects and programs in the Republic of Croatia would greatly affect children's safety, as well as the implementation and marking of school routes adapted to children.

Keywords: *school zones; traffic safety; traffic regulation; vulnerable group of road users.*

Is city management smart management?

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Smart and Sustainable Cities

The concept of a smart city represents an urban environment that provides its residents with a high-quality and comfortable life. Cities that invest in improving and maintaining their competitive position can be considered smart, with the key to success lying in the cooperation between authorities and citizens. Managing smart cities is a complex and intricate process; therefore, it is crucial to implement measures and maturity assessments to further enhance cities and maintain competitiveness. Continuous evaluation and analysis of indicators demonstrate how sustainable and smart a city is. The research focuses on evaluating the maturity of city management in Northern Croatia by determining the maturity level of cities. The methodology for assessing city management maturity includes 19 indicators covering various areas. Each indicator is assigned a level from 1 to 5, and the results are analyzed using the SMOP equation (Surface Measure of Overall Performance). Six cities in Northern Croatia were selected for the study: Krapina, Varaždin, Čakovec, Koprivnica, Križevci, and Đurđevac. Indicators analyzed include areas such as the economy, education, energy, environment and climate change, finance, governance, health, housing, social conditions, recreation, security, solid waste, sports and culture, telecommunications, transport, urban/local agriculture and food security, urban planning, wastewater, and water. Maturity assessment is conducted for each city and indicator, and results are compared using charts to demonstrate city sustainability. The aim is to compare the maturity levels of the selected cities and thereby assess which dimensions cities need to improve their management in order to enhance economic, ecological, and social dimensions to achieve sustainability and competitiveness.

Keywords: *smart cities; cooperation; technology; quality of life; competitiveness; sustainability.*

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The key role of electromobility in the future of sustainable transport

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Sustainable Mobility

Electromobility is the concept of using "electric powertrain" for transporting people and goods with a view to support sustainable development.[1] Electric vehicles (EVs) are a promising technology for achieving a sustainable transport sector in the future, due to their very low to zero carbon emissions, low noise, high efficiency, and flexibility in grid operation and integration.[2] In many regions, there is a lack of progress with electricity decarbonization which significantly limits the potential emission and air quality benefits of EVs.[3] For the purposes of research on the mentioned topic, a survey was used as the most common method of data collection from respondents who have direct insight and attitudes of participants in the transport system, and who generate transport demand. Survey data from 2021, when approximately 600 participants took part in the survey, were used, which will be compared with the data obtained from the survey that was implemented in 2024. By comparing the surveys, it is concluded that individuals who use private cars on a daily basis do not favor electric vehicles, but are thinking about buying the same. When it comes to price, they are initially more expensive, but the government as such offers the possibility of incentives and subsidies to encourage citizens to buy. In addition, the cost of filling is significantly lower compared to the cost of fuel, which also affects the overall cost of maintenance itself, which was agreed by the majority o survey respondents.

Keywords: *electric cars; infrastructure; batteries; environmental impact; electricity.*

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PROJECTS' SUMMARIES

Name of the Programme: HORIZON.2.5 - Climate, Energy and Mobility
Programme priority: HORIZON-CL5-2021-D6-01-12
Programme specific objectives/mission: Controlling infection on large passenger ships
Call: HORIZON-CL5-2021-D6-01
Project ID and acronym: 101069764, Healthy Sailing

Prevention, mitigation, management of infectious diseases on cruise ships and passenger ferries

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The COVID-19 pandemic has had a significant impact on the passenger shipping industry. To address this, the EU-funded HEALTHY SAILING project will introduce innovative, multi layered, risk and evidence-based, cost-effective and tested measures for infectious disease prevention, mitigation and management differentiated for large ferries, cruise ships and expedition vessels. The project will adopt a comprehensive approach covering preparedness and response to known infectious diseases frequently occurring on passenger ships, as well as those that have never occurred but for which preparedness is essential, and diseases of unknown origin to ensure readiness for future emerging pathogens/pandemics. HEALTHY SAILING will cover the entire passenger/crew journey from home to ship and back.

Project partners: Panepistimio Thessalias; Academia Navala Mircea Cel Batran; Celestyal Ship Management Limited; Erevnitiko Panepistimiako Institouto

Systimaton Epikoinonion Kai Ypologiston; Ethnicon Metsovion Polytechnion; Ethniko Kai Kapodistriako Panepistimio Athinon; Evropaiko Epistimoniko Somateio Gia Tin Igeia Kai Tin Igieini Stis Thalassies Metafores; Fondazione Bruno Kessler; Frederick University Fu; Goeteborgs Universitet; Instituto De Salud Carlos III; Istituto Superiore di Sanita; Leibniz-Institut fur Plasmaforschung Und Technologie Ev; Sea Jets Naftiki Etairia; Simfwd P.C.; Sveučiliste u Rijeci, Pomorski Fakultet; Teknologian Tutkimuskeskus Vtt Oy; Universitaetsklinikum Hamburg-Eppendorf; Universitetet I Sorost-Norge; Carnival PLC; RCL Cruises Ltd; Viking Hydrogen As; MSC Cruises SA; University of Greenwich; University of Surrey

Project links: healthysailing.eu

Acknowledgement: This project has received funding from the European Union's Horizon Framework Programme under Grant Agreement number 101069764.

Name of the Programme: Erasmus+ Programme (ERASMUS2027)
Programme priority: Alliances for Innovation aim to strengthen Europe's innovation capacity by boosting innovation through cooperation and flow of knowledge among higher education, vocational education and training (both initial and continuous), and the broader socio-economic environment, including research.
They also aim to boost the provision of new skills and address skills mismatches by designing and creating new curricula for higher education (HE) and vocational education and training (VET), supporting the development of a sense of initiative and entrepreneurial mind-sets in the EU.
Programme specific objectives/mission: These partnerships shall implement a coherent and comprehensive set of sectoral or cross-sectoral activities, which should be adaptable to future knowledge developments across the EU.
To boost innovation, the focus will be on talent and skills development. Firstly, digital competences have become increasingly important in all job profiles across the entire labour market. Secondly, the transition to a circular and greener economy needs to be underpinned by changes to qualifications and national education and training curricula to meet emerging professional needs for green skills and sustainable development. Thirdly, the twin digital and green transition requires an accelerated adoption of new technologies, in particular in the highly innovative deep tech domains, across all sectors of our economy and society.
Call: Partnerships for Innovation - Alliances (ERASMUS-EDU-2023-PI-ALL-INNO)
Project ID and acronym: 101139879, GREENPORT

GREENPORT Alliances

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GREENPORT Alliances project targets an overlooked sub-sector within the Green Deal's strategy to decarbonise the maritime industry: that of in-port services. Vessels such as tug boats and pilot boats, and personnel such as harbour masters, carry out an important role of ensuring the safety of port assets and vessels whilst in port. However, because of these service vessels' small size, and because larger vessels pollute much more, in-port operations have not been included in the EU's emission reduction targets.

The lack of enforced targets does not mean the sector is not polluting. Moreover, greener technology, whilst in development, is not yet ready for large scale commercial use. Nonetheless, the actors within the sector themselves show a willingness to reduce emissions.

GREENPORT posits that a change in human behaviour can reduce the environmental impact of in-port services in the short- to medium-term. Modifications can be made to day-to-day operations, with better use of existing digital technologies, that would contribute to a significant drop in emissions. To achieve this, we require re/training and education for current/future personnel.

GREENPORT thus brings together 10 organisations from 8 countries in education, research, and industry to:

- Pool knowledge and resources to conduct a needs identification, data collection and analysis exercise;
- Use this information to develop curricula along 3 modular learning lines. GREENPORT will target (i) HEI students (future personnel) through integration of developed material into existing HEI programmes; (ii) working professionals via a short accredited vocational course; and (iii) the educators and trainers of both streams through an eLearning train-the-trainer course;
- Pilot all 3 learning streams;
- Implement a comprehensive evaluation exercise to assess its effectiveness;
- Implement wide-ranging dissemination and sustainability strategies to promote the GREENPORT framework within the sector for maximal uptake.

Project partners: Piri Reis University; AcrossLimits; Constanta Maritime University; Antwerp Maritime Academy; Nikola Vaptsarov Naval Academy; University of Rijeka; European Tugowners Association; MarTe; European Maritime Pilots Association; Administration of the Port of Aveiro

Project links:

www.greenportalliance.eu; www.facebook.com/greenportalliances; www.instagram.com/greenport.alliances; https://www.linkedin.com/company/greenport-alliances

Acknowledgement: The GREENPORT Alliances project is funded under the Erasmus+ Programme - the European Union's programme for education, training, youth, and sport.

Name of the Programme: European Space Agency
Programme priority: Implementation Arrangement Croatia
Programme specific objectives/mission: Type e. Education activities (University courses leading to a qualification (BSc or MSc) in space related topics that correspond to the needs of Croatian space industry.
Call: Third Call for Outline Proposals under the Implementation Arrangement with the Government of Croatia
Project ID and acronym: HR-08 4000143488, ESARS

Remote Sensing in a Function of Sustainable Development of the Maritime Sector

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As the Republic of Croatia has a long-standing maritime tradition, there is a need to align the leading maritime educational institutions with the latest world trends and technology. Remote sensing is crucial for monitoring maritime transport and its environmental impacts. Yet specialized courses in this field are lacking in Croatia and Europe.

This project, undertaken by the University of Split – Faculty of Maritime Studies, aims to fill this gap by establishing an elective course titled "Remote Sensing in the Function of Sustainable Development of the Maritime Sector." The project duration is 18 months. Key project outcomes include the creation of a comprehensive syllabus and educational materials, and the establishment of a high-quality collaborative model between academia and industry.

The aim of the developed course is to equip students with knowledge about remote data, which is essential for the sustainable development of ports, marinas, maritime transport, and the cities they serve. By the end of the course, students will be able to use the knowledge and skills they have gained to conduct further research, seek employment, or apply for projects that contribute to the sustainable development of ports and their surrounding cities. This includes working towards energy efficiency, reducing sea pollution, and other aspects of sustainable development. The course is developed in collaboration with LIST LABS, a Croatian company with over a decade of experience in Earth Observation.

Project partners: LIST LABS d.o.o.
Acknowledgement: European Space Agency

Name of the Programme: Erasmus+
Programme priority: KA220-HED - Cooperation partnerships in higher education
Programme specific objectives/mission: Stimulating innovative learning and teaching practices
Call: KA220-HED Cooperation partnerships in higher education
Project ID and acronym: 2022-1-HR01-KA220-HED-000090031, MareLaw

Upgrading and harmonization of Maritime law STCW based curriculum for Maritime students

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According to the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) and national regulations, all seafarers should have knowledge in maritime law. This means that all Maritime Higher Education Institutions (MHEI) should consider Maritime Law as a mandatory subject. Maritime Law courses taught at MHEI are specific and different from those taught at Law faculties since Maritime Law is usually the only contact maritime students have with legal issues. Therefore, Maritime Law course is more difficult to master for students of MHEI compared to students of Law faculties. Namely, students of MHEI have no prior knowledge of law and they need to learn concurrently fundamental legal concepts as well as the specifics of legal regulation of maritime affairs within Maritime Law courses. Upgrading and harmonization of Maritime law STCW based curriculum for Maritime students – The MareLaw project aims to improve and harmonize elements of the maritime law curriculum in accordance with the STCW Convention at the participating maritime universities partners. The project comprises four work packages whose activities will lead to the achievement of the final project objectives, namely the improvement of teachers' digital, pedagogical and professional competences, the acquisition of specific practical knowledge and the strengthening of institutional connections.This should lead to the necessary harmonization at the level of the partner institutions and improve the connection between the MHEIs.

Project partners: University of Split, Technical University of Catalunya, Riga Technical University.
Project links: https://marelaw.pfst.hr/
Acknowledgement: Erasmus +, MareLaw project

Name of the Programme: KA220-HED - Cooperation partnerships in higher education Call 2023

Programme priority: Stimulating innovative learning and teaching practices. Addressing digital transformation through development of digital readiness, resilience and capacity.

Programme specific objectives/mission: The main objective of the project is to enhance navigational safety, measured through statistically significant differences (gap analysis) in the maritime communication skills of shore service operators and higher education students before and after the implementation of a digital educational pilot study enacted through instructional videos and chatbots, and potentially to contribute to a reduction of human, environmental, societal, and/or economic losses resulting from maritime accidents.

Call: Call 2023 Round 1 KA2

Project ID and acronym: DigiMar

Digital Education for Maritime Communication

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The main objective of the project is to enhance navigational safety, measured through statistically significant differences (gap analysis) in the maritime communication skills of shore service operators and higher education students before and after the implementation of a digital educational pilot study enacted through instructional videos and chatbots, and potentially to contribute to a reduction of human, environmental, societal, and/or economic losses resulting from maritime accidents.

Other project objectives are:

– to develop learner-centered and needs-based teaching practices so that the digital educational content closely simulates the authentic situations that the users (will) need in their professional lives;

– to develop open-access digital educational tools relevant for the maritime industry and the broader society;

– to develop open-access instructional videos and chatbots that will support continuous and self-directed learning, allow the interaction between the research and educational dimensions, and strengthen the links between education, research, innovation, and practical use;

– to promote the lifelong learning dimension of higher education;

– to support and develop new forms of interdisciplinary cooperation among higher education teachers from different disciplines involved in the project;

– to exploit the potential of digital technologies and develop the digital competencies of the target group users and of higher education teachers;

– to use the digital tools for the creation and analysis of language databases, and the creation of maritime communication simulation tasks;

– to develop a database that can be later utilized for the development of a wider maritime communication library to be used in AI-based speech recognition and communication management solutions;

– to be in line with the strategic priorities of the Digital Education Action Plan (2021-2027) in that the project supports high-quality, inclusive, and accessible digital education, and presents digital opportunities for the education and training community, policymakers, academia, and researchers;

– to develop, deploy, and evaluate open-access digital educational tools expected to increase the capacity and readiness of the involved institutions to manage an effective shift toward digital education;

– to assess improvements in navigational safety as a result of the digital education pilot study;

– to provide research-based recommendations for a revision of the standard protocol of communication.

The project consists of five work packages, each further subdivided into several WP activities: WP1: Project Management, WP2: Maritime Communication Standard- and Data-based Content Development, WP3: Digital Educational Tool Development, Deployment and Evaluation, WP4: Maritime Communication Standard- and Data-based Benchmarking, WP5: Exploitation and Dissemination.

The improvement in maritime communication skills and consequently safety of navigation will be achieved through an open access research-based digital educational tool consisting of instructional videos and chatbots for routine maritime communication, and an open-access inventory of data-based simulation tasks in maritime communication for maritime students. An important outcome concerns recommendations for a systemic revision of the international maritime communication standard.

Project partners: University of Ljubljana, Slovenia; University of Montenegro, Maritime Faculty Kotor, Montenegro; University of Rijeka, Croatia; Chalmers Tekniska Hoegskola AB, Sweden; Norwegian Coastal Administration, Norway; Uprava Pomorske Sigurnosti i upravljanja lukama, Montenegro; AB Yrkeshogskolan Vid Abo Akademi, Finland; Ministrstvo za infrastrukturo, Uprava republike Slovenije za pomorstvo, Slovenia; Swedish Maritime Administration, Sweden, Fintraffic Vessel Traffic Services Ltd., Finland

Project links: https://digimar.si/

Acknowledgement: funded by the European Union

Name of the Programme: Interreg CENTRAL EUROPE project CE0100127 Rail4Regions

Programme priority: Rail4Regions partners co-design solutions addressed to transport and spatial planners to integrate regional rail lines to the freight transport network as means to improve the accessibility and economic feasibility of rail freight transport.

Programme specific objectives/mission: The partners develop solutions to optimise regional rail lines and access points and create action plans to encourage the uptake of their solutions in regional development plans.

Call: CE Call 1

Project ID and acronym: CE0100127 Rail4Regions.

Interreg CE Rail4Regions

Ante Klečina, Nikola Biškup, Nives Domjan Kačarević & Ivan Cvitković

University North, Koprivnica, Croatia

The objectives of this project are to enhance spatial and transportation planning for better accessibility to railway freight transport and to increase the usage of regional railway lines for freight transport, there by reducing carbon emissions. The project focuses on identifying and analyzing bottlenecks in freight railway transport, developing new approaches in spatial and transportation planning, promoting new solutions through regional and transnational initiatives, and integrating policies and implementing new solutions. The project runs from February 2023 to January 2026, with a budget of 2.30 million euros, 80% of which is funded by the ERDF. The project involves 12 partners from 9 countries, including Croatia (University North and Varaždin County). The Rail4Regions project aims to improve the capacity of spatial and transport planning to

enhance the accessibility of the railway freight transport network and regional development.

Project partners: University North, Croatia; Thuringian Ministry for Infrastructure and Agriculture, Germany; University of Applied Sciences Erfurt, Germany; University of Žilina, Slovakia: Institute of Traffic and Transport Ljubljana I.I.c., Slovenia; Varaždin County, Croatia; Rail Cargo Hungaria Goods Transport Private Limited Company, Hungary; Malopolska Regional Devolpment Agency, Poland; KORDIS, Czechia; LCA Logistics Center Austria South, Austria; T BRIDGE, Italy; Province of Novara, Italy

Project links: https://www.interreg-central.eu/projects/rail4regions/?tab=home

Acknowledgement: Co-funded by the European Union

Name of the Programme: Interreg Euro-Med Programme 2021/27
Programme priority: Greener MED
Programme specific objectives/mission: RSO 2.4 Promoting climate change adaptation and disaster risk prevention, resilience, taking into account eco-system-based approach
Call: 2nd call for Thematic projects
Project ID and acronym: Euro-MED0200675-FRED

Fire free MED

Neven Grubišić, Ana Malovrh & David Brčić
University of Rijeka, Faculty of Maritime Studies, Croatia

The FRED project focuses on preventing and mitigating climate change impacts in the form of wildfires. The overall objective of the FRED project is to implement advanced ICT/UAS (Unmanned Aircraft System) remote sensing tools for climate change adaptation, disaster risk prevention and mitigation in the wildfire segment. The project tackles the common challenge of adaptation to and mitigation of climate change impacts: by providing a prevention tool – dynamic fire risk maps (based on fuel maps + other data such as anthropogenic impact, phyric history, meteo etc.), by providing a mitigation tool for unfortunate events when the fires do break out, shortening the reaction time (by early warning functionality) and minimizing the damage to human life and the economy and by providing a pool of data for subsequent analysis of the scientific community. The mitigation factor lies in the operational value of the UAV support like line of fire identification, men tracking, search and rescue, fire propagation model to support operational decision-making, hotspot detection in post-fire terrain maintenance etc. All the above aggregated in a single spot: Wildfire risk prevention and mitigation platform.

The project will enhance the prevention capacity of relevant authorities in six pilot areas across different countries (Croatia, Slovenia, Italy, Portugal, Bosnia-Herzegovina and Montenegro), both directly and indirectly through the utilization of the results among beneficiaries.

Project partners: University of Rijeka, Faculty of Maritime Studies; RGO Communications Ltd.; Fire and rescue service Sezana; Rocca di Cerere UNESCO Global Geopark; National Park Una; Municipality of Ulcinj; Public fire brigade of the Town of Mali Losinj; Centre of Integrated Geomorphology for the Mediterranean Area; Democritus University of Thrace; CIMBAL – Intermunicipal Community of Baixo Alentejo

Project links: https://fred.interreg-euro-med.eu/

Acknowledgement: The project is co-funded by the European Union

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