

EAI/Springer Innovations in Communication and Computing

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Michal Cehlár
Natália Horňáková *Editors*

Smart Cities: Importance of Management and Innovations for Sustainable Development

Towards Mobility, Internet of Things and
Smart Cities

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Preface

The editors are delighted to introduce the monograph of the 10th edition of the EAI International Conference on Mobility, IoT and Smart Cities which was held in the Bratislava as co-located conference with the 10th year anniversary of the Summit Smart Life.

This scientific monograph reflects the cutting-edge research, breakthroughs, and insights shared by experts and visionaries in the fields of mobility, Internet of Things (IoT), and smart city development. The authors featured within these pages represent a diverse tapestry of academia, industry, and government, united by a common goal: to explore and advance the transformative potential of technology in enhancing smart life.

The book comprises the following chapters:

Chapter “[Changes of the Calculation of the Ride Utilization Coefficient Due to the COVID-19 Pandemic](#)” aims to point out the fact that when calculating the price for transport, it is necessary to react to the changed conditions in the field of road freight transport, which have arisen due to the ongoing pandemic. If the transporter did not respond to this fact when calculating the price, its calculation could provide a distorted view of its real costs.

Chapter “[Increasing the Resilience of the Municipalities Citizens to Crisis Event with the Support of Social Networks](#)” focuses on assessing the potential of the social network, and the opinions of residents on the use of social networks in case of crisis events were determined using a questionnaire. Methods were proposed for the use of social networks by crisis managers in the municipalities.

Chapter “[Sustainable Mobility for the Sustainable Development of Modern Urban Agglomerations](#)” is oriented towards potential of sustainable transport systems based on social and environmental transformation. The development of a sustainable transport system should be based on increasing the functionality and accessibility of public transport, as well as on changing the structure of “supply chains” focused on a wide range of consumer preferences, facilities, and personalized mobility services.

Chapter “[Mathematical Model of Transport Stream Sustainability at Road Network Areas During Traffic Jams](#)” proposes the mathematical model which considers

process development dynamics. In addition, to speed and density gradients of traffic flows, the dynamic properties of vehicles, the multi-lane of highways, and the time of delays at pedestrian crossings and traffic lights are considered.

Chapter “[Air Quality Improvement Based on the Application of Emission Monitoring System with Triangulation](#)” presents the evaluation of the triangulation methods of air quality data. Subsequently, a statistical smart city model was developed, which provided CO, CO₂, NO₂, PM, and SO₂ emission data based on distribution of emission classes, fuel types, and implementation of renewable technology.

Chapter “[Machine Learning Regression Model in MATLAB for Predicting Gas Emissions During the Pellet Combustion](#)” investigates regression in MATLAB, which trains a model on known input and output data so that it can predict future outputs. Regression model for a prediction of the formation of gas emissions (carbon monoxide and nitrogen oxides) during pellet combustion was proposed.

Chapter “[Intelligent Devices Used in Healthcare](#)” regards the technologies that support the construction of intelligent health care in several important areas. Subsequently, focus is put on existing problems with intelligent healthcare and propose their solutions. In the end, evaluation of the prospects of intelligent health care within the framework of a smart city is presented.

Chapter “[Assessment of Risks Significance in Degreasing and Pickling Processes](#)” delves into hazardous substances as well as biological agents which employees encounter while performing the work duties, which can endanger their health. The purpose of the study carried out in the paper is to implement appropriate tools such as the risk criteria assessment method and the risk matrix within a metallurgical company with the special focus on the used oils.

Chapter “[Methods of Choosing Technology for Improving the Environmental Indicators of Vehicles](#)” deals with a new methodology for choosing technology for the modernization of vehicles to improve their environmental indicators. The proposed method provides an opportunity to assess the performance of the equipment in the process of its operation according to one general criterion, which makes it much easier to choose the technology of modernization to improve ecological indicators.

Chapter “[An Engaging Mobile Application for Tourists with Gamification Elements That Promotes Lesser-Known Coffee Shops in the Copenhagen Suburbs](#)” is oriented towards how to design an engaging mobile application with gamification features that, for tourists, promotes lesser-known coffee shops in the Copenhagen suburbs. The gamification involves a timer, badges, leaderboard, and a mascot. The mascot encourages and guides the users to engage in specific actions within the application.

Chapter “[Image Transmission in LoRaWAN: An Experimental Study on Transmission Time](#)” investigates the differences in transmission times. An experimental study was conducted, exploring various configurations for end-devices while considering regional restrictions such as duty cycle limitations. The findings reveal that it is possible to transmit images within the confines of the protocol specifications.

Chapter “[The Effect of a Face Wall on a Cellular Structure During Bending](#)” is oriented towards the investigation of the influence of the front wall on the cell

structure of the Schwarz P type during bending. Porous specimens were designed in a 30% volume ratio with $10 \times 10 \times 10$ mm unit cells distributed regularly in all three orthogonal axes. The results show the influence of the front wall, with the maximum stresses increasing with the number of walls, and this trend was best described by a second-order polynomial equation.

Chapter “[Big Data Analytics: A Systematic Literature Review on Fields of Application as Well as Costs and Risks in Management Reporting](#)” regards the systematic literature review delves into its multifaceted applications and evaluates the inherent costs and risks associated with Management Reporting. The analysis highlights the growing importance of data management and decision support systems in corporate reporting, explaining how to use large data volumes while minimizing obstacles.

Chapter “[Sustainable Development of Rural Areas: Machine Learning for Semantic Segmentation of Agricultural Fields](#)” delves into the proposed model of semantic field segmentation based on a convolutional neural network. The chapter presents the results of semantic segmentation of Ukrainian fields on the example of Poltava and Dnipropetrovsk regions, which mainly correspond to statistical data.

Chapter “[Measurement of Data Transmission Speed in 5G and 4G LTE Mobile Networks Between a Moving Vehicle and the Environment](#)” presents and investigates 5G network data transfer rates, evaluating offerings from four Slovakian mobile operators. The chapter details the application layer, system components, and synchronization service, and the research illuminates 5G network performance in moving vehicles, underscoring network reliability and low latency’s critical role in the connected vehicle landscape.

Chapter “[Optimization of 3D Computer Model Parameters for Spherical Elements Modeling](#)” presents modelling of spherical elements based on the developed computer model. The chapter also deals with the main fragments of encoding the source text of a 3D computer model for modelling spherical elements, which made it possible to optimize the model parameters.

Chapter “[The Clean Energy as Solution for Global Challenges and Sustainable Development](#)” introduces the new eFusion technology which represents contactless, cost-effective drilling technology and opens opportunity for global utilization of cost-competitive and CO₂-free geothermal energy. The eFusion technology is one of the breakthrough technologies needed to achieve carbon neutrality by 2050, under the Paris Climate Agreement. Local sources of energy significantly decrease distribution energy.

Chapter “[Virtual Influencer—A New Phenomenon in the Marketing Communication or Illusion?](#)” reviews the perception of virtual influencers by Slovak consumers. Respondents’ approach to virtual influencers was mostly positive, and primary Generation Z knows term virtual influencer and recognizes the activities carried out by them. Finally, managerial implications of implementation of virtual influencer in marketing communication are indicated.

Chapter “[Tools for Creating Business Models in Smart Cities](#)” examines tools that can be used for creating business models of public smart services based on the Business Model Canvas. The result is the introduction of several tools for the

creation of business models in the context of smart cities, which are separately described and compared.

Chapter “[Current Challenges of Autonomous Vehicles in Relation to Regulatory Issues](#)” considers regulation of autonomous vehicles in the Slovak Republic in relation to current challenges in the European Union. The chapter deals with the theoretical background of the issue, the analysis of the legal regulations in connection with autonomous vehicles at the international level and in the Slovak Republic, as well as the analysis and presentation of the new Act No. 429/2022 Coll. on the development of automated vehicles.

Chapter “[Use of Artificial Intelligence in Supply Chain Management](#)” addresses the concerns of ChatGPT about the accuracy and reliability of its content and statements by conducting a qualitative content analysis, drawing upon existing literature, to identify customer-oriented supply chain metrics. The findings of the analysis demonstrate a profound comprehension of Supply Chain Key Performance Indicators (KPIs), affirming the AI’s highly precise informational capability.

Chapter “[Green Skills as an Opportunity to Reassess the Slovak Education System](#)” deals with issue of green skills and importance of their development in the context of the shift towards green economy. The aim of the chapter is to analyse the current state of the art generally and in the Slovak Republic (SR) and subsequently propose the recommendation for the development of green skills, also in connection with other types of skills and point out the necessity of relevant changes, both at the level of policies and the educational system.

Chapter “[Loyalty Programs in Postal Services in Accordance with the Concept of Smart Cities](#)” is devoted to the issue of the loyalty program using in postal services. A loyalty program is a marketing tool for acquiring new customers and maintaining existing ones. The chapter also addresses suggestions and recommendations for improving the loyalty program of Slovenská pošta, a. s.

Chapter “[Product Packaging in the Context of Unsustainability: Slovak Consumers’ Opinions on the Complexity of Selected Products and Their Excessive Packaging](#)” explores and identifies the insights of Slovak consumers about the complexity of selected products and the excessive packaging of products, focusing on the aspect of their non-sustainable aspects. The focus was put on food. As the most complex products, the respondents listed cleaning detergents, cosmetics, and services. Food was indicated to have the most excessive packaging.

Chapter “[Assessment of the Managerial and Marketing Changes in the German Pharmaceutical Market from the Point of View of the Wholesalers](#)” aims to show where wholesalers stand in the necessary transformation and how they can become involved in the individual channels to maintain the supply situation together with pharmacies.

Chapter “[A Qualitative Analysis of the Impact of Marketing Tools on \(Over\)consumption in the B2C Market Depending on the Gender of Customers](#)” reviews the results of a qualitative analysis of the impact of selected marketing tools and activities on (over)consumption in the B2C market depending on the gender of the customers. A representative marketing research study with a sample of 4888

respondents to identify the characteristics of current marketing management and marketing activities of organizations was conducted.

Chapter “[Unlocking Smart Mobility Potential in the Slovak Republic: A Comprehensive Analysis of Indicators, Clustering, and Regression Insights](#)” put focus on the relationship between transportation indicators, and their impact on traffic safety in municipalities. The study utilizes regression analysis to assess the influence of indicators variables on traffic safety outcomes. The chapter also provides the recommendations for practice, emphasizing the importance of improving local accessibility, enhancing the public transport network, and focusing on international accessibility to enhance traffic safety.

Chapter “[Digital Currency as an Option Payment for the Goods in E-commerce](#)” proposes a general procedure for the establishment of virtual currency payment options in e-commerce based on the analysis findings which is focused on the analysis of the possibility of introducing cryptocurrency payments in e-commerce. The chapter also includes an analysis that compares the commonly used cryptocurrencies Ethereum and Bitcoin.

Chapter “[Supporting Smart Cities Through Marketing Communication in the Field of Public Transport](#)” deals with marketing, with an emphasis on marketing communication in large transport companies. The goal is, based on selected managerial and statistical methods, to analyse the current situation in the field of marketing in large transport companies and propose measures to increase the quality of the service provided by transport companies to make urban public transport more attractive to its customers.

The editors extend heartfelt gratitude to all the authors, reviewers, and participants who have contributed to the success of the conference, summit, and the compilation of the book. May the ideas shared within these pages serve as driver for continued exploration, innovation, and progress in the dynamic realm of Mobility IoT and Smart Cities.

The editors strongly believe that you will find inspiration and valuable insights within these pages which will collectively navigate the exciting path towards a smarter, more connected future.

Prague, Czech Republic
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