Second International Conference

“Transport for Today’s Society”

University “St. Kliment Ohridski” - Bitola
Faculty of Technical Sciences - Bitola
- Department for Traffic and Transport -

Книга на апстракти
Book of Abstracts

17 - 19 May 2018

Универзитет “Св. Климент Охридски” - Битола
Технички факултет - Битола
- Отсек за сообраќај и транспорт -

Втора Меѓународна Конференција

“Транспортот во денешното општество”
GENERAL PATRON OF TRANSPORT FOR TODAY’S SOCIETY CONFERENCE:

Општина Битола

TRANSPORT FOR TODAY’S SOCIETY SUBMITTED FROM:
TRAFFIC PLANNING

INFLUENCE OF GEO-SOCIAL FACTORS ON TRANSPORT MODAL SHARE IN USA AND JAPAN
Ranko Babić

EVALUATION FOR LONG-TERM TRAFFIC VOLUME FORECASTING, USING MULTIPLE REGRESSION ANALYSIS AND PRINCIPAL COMPONENT REGRESSION MODELS
Ramadan Duraku, Vaska Atanasova

MONGODB DATABASES IN BIG DATA APPLICATIONS IN TRANSPORTATION INDUSTRY
Sladana Janković, Snežana Mladenović, Stefan Zdravković, Slavko Vesković, Ana Uzelac

CROSS-SECTIONAL ANALYSIS OF AIRPORT REVENUE SOURCES
Elzbieta Marciszewska, Adam Hoszman

APPLICATION OF DIFFERENT METHODS OF MULTICRITERIA ANALYSIS FOR EVALUATION AND CRITICAL COMPARISON AT TRANSPORT INFRASTRUCTURE PROJECTS
Ivona Nedevska, Zoran Krakutovski, Darko Moslavac, Zlatko Zafirovski

ANALYSIS OF CORRELATION BETWEEN THE NUMBER OF TOURIST ARRIVALS AND PASSENGER TRAFFIC DEMAND
Justin Pupavac
MODERN SAILOR UNDERSTANDSEmergence of Maritime and the Importance of Mathematical Applications
Tatjana Stanivuk, Ajka Relja, Ivan Buzov

CITY OF BITOLA TOWARD URBAN SUSTAINABILITY
Jasmina Bunevska Talevska, Mile Biljanovski

LEARNING FROM THE PLANNING HISTORY OF BELGRADE
Vesna Zlatanovic-Tomasevic

HOW TO CREATE AN AGE FRIENDLY URBAN TRANSPORTATION SYSTEM?
Ana Trpković, Branimir Stanić

INTEGRATED REPORT - A NEW CHALLENGE FOR THE UNDERTAKINGS IN THE TRANSPORT SECTOR OF REPUBLIC OF BULGARIA
Emiliya Vaysilova

USING CROWDSOURCING POSSIBILITIES IN ROAD TRAFFIC
Stefan Zdravkovic, Dušan Mladenovic, Sladana Jankovic, Ana Uzelac

ANALYSIS OF THE BASIC CHARACTERISTICS OF TRIP WITH THE PURPOSE OF GOING TO SCHOOL
Ruzica Živković, Goran Kalamanda
TRAFFIC ENGINEERING AND DESIGN

ESTIMATION OF BICYCLE SERVICE LEVEL MODEL BASED ON REAL PERCEPTION OF CYCLISTS TRAVELING IN URBAN TRAFFIC AND ROADWAY CONDITIONS
Mevlan Bixhaku, Xhevat Sopi

SOME EXPERIENCES OF ENVIRONMENTAL IMPACT DURING THE CONSTRUCTION OF DEMIR KAPIJA – SMOKVICA MOTORWAY
Tale Geramitcioski, Vladimir Mijakovski, Vangelce Mitrevski,

ANALYSIS OF USERS’ ATTITUDES ABOUT THE TOLL COLLECTION SYSTEM IN THE REPUBLIC OF MACEDONIA
Draženko Glavić, Marina Milenković, Malenkovska Todorova Marija, Miloš Petković

QUEUEING SYSTEM WITH DIFFERENT PATIENCE OF CUSTOMERS IN QUEUE. A SPECIFIC EXAMPLE PARKING GARAGE "SNT" IN NOVI SAD
Žarko Jevtić, Ilija Tanačkov, Zoran Papić, Jelena Mitrović Simić

BASIC ELEMENTS OF EVALUATION IN THE TRANSPORT PROJECT DEVELOPMENT PROCESS
Mirsad Kulovic
ANALYSIS OF USERS’ ATTITUDES ON THE INTRODUCTION OF CONGESTION PRICING IN BELGRADE
Marina Milenković, Draženko Glavić, Anica Kocić

COMPARISON OF ROAD TRAFFIC INTELLIGENT TRANSPORT SYSTEMS APPLICATION LEVELS IN REPUBLICS OF MACEDONIA AND SLOVENIA
Daniela Koltovska Nechoska, Evelin Krmac

METHODOLOGY FOR ANALYSING CAPACITY AND LEVEL OF SERVICE FOR INTERSECTION AT BLVD GOCE DELCEV AND BLVD KRSTE PETKOV MISIRKOV - SKOPJE (HCM 2000/2010)
Ivana Nedevska, Radojka Dončeva, Slobodan Ognjenović, Riste Ristov

EVALUATION OF ADAPTIVE AND FIXED TIME TRAFFIC SIGNAL STRATEGIES: CASE STUDY OF SKOPJE
Daniel Pavleski, Daniela Koltovska Nechoska, Edouard Ivanjko

IMPLEMENTATION OF RSAIN THE DESIGN PROCESS OF THE STATE ROAD A1, SECTION DRENOVO-GRADSKO
Riste Ristov, Slobodan Ognjenović, Radojka Dončeva, Ivana Nedevska

DENSITY ESTIMATION IN SHORT TIME INTERVALS OF A DISCRETIZED TRAFFIC MODEL-CTM
Arlinda Alimehaj Rrecaj
COMPARATIVE ANALYSIS OF TRANSPORT INFRASTRUCTURE DEVELOPMENT IN THE REPUBLIC OF SLOVENIA AND IN THE REPUBLIC OF MACEDONIA
Sebastjan Škerlič, Verica Danchevska

CYCLING INFRASTRUCTURE – MOBILIZING OF CITY
Marija Malenkovska Todorova, Jasmina Bunevska Talevska Mile Biljanovski

ANALYSIS OF TRAFFIC DEMANDS AND CONDITIONS OF RURAL STATE ROAD NETWORK IN REPUBLIC OF SERBIA
Vladan Tubić, Marijo Vidas, Nemanja Stepanović
MOTOR VEHICLES

DYNAMIC CHARGING OF ELECTRICAL BUSES
Mikołaj Bartłomiejczyk

THE IMPACT THAT PREVENTIVE INSPECTION OF TECHNICAL FUNCTIONALITY OF MOTOR VEHICLES HAS ON THE IMPROVEMENT OF TRAFFIC SAFETY IN REPUBLIKA SRPSKA
Tihomir Djurić, Djordje Popović, Vladan Djurić, Vedran Bilic

A FLEET MANAGEMENT SOFTWARE FOR MONITORING THE CONDITION OF FLEET UNITS AS A SUPPORT FOR PREVENTIVE MAINTENANCE
Ivo Dukoski, Emel Hamza Sherif, Nikolce D. Talevski

OPTIMIZATION OF VEHICLE OPERATIONS IN THE ROAD FREIGHT TRANSPORT
Jovan Mišić, Pavle Gladović, Milan Stanković

DETERMINATION OF THE ROLLING RESISTANCE COEFFICIENT FOR THE AUDI A4 VEHICLE
Zdravko B. Nunić, Dario Miletić, Mesud Ajanović, Milan Đudurović

ENERGY EFFICIENT MANAGEMENT SYSTEM FOR SOLAR CARS TECHNOLOGY
Zlatko V. Sovreski, Simeon Simeonov, Feta Sinani, Elizabeta Hristovska, Vangelica Jovanovska
TRANSPORT AND ENVIRONMENT

METHODOLOGY FOR SELECTION OF DISPERSION MODEL
Beti Angelevska, Aleksandar Markoski

SPIDER’S WEB AS AN ALTERNATIVE BIOINDICATOR OF AIR POLLUTION CAUSED BY MOTOR VEHICLES
Nataša Stojić, Snežana Štrbac, Mira Pucarević, Dunja Prokić, Biljana Panin, Siniša Sremac
TRAFFIC SAFETY

CONSULTANTS TRAINING IN NETWORK AND INFORMATION SECURITY IN TRANSPORT
Mariya Hristova, Dimitar Dimitrov

SAFETY BELT – A CHANCE TO SURVIVE
Zoran Joshevski, Stoimko Zlatkovski, Pero Stefanoski

THE IMPORTANCE OF MEASURING SAFETY PERFORMANCE INDICATORS REVIEWING REPUBLIC OF SRPSKA’S CONDITIONS
Bojan Marić, Krsto Lipovac, Dragana Nenadić, Milan Tešić

MOTORCYCLE SAFETY FEATURES, CONTEMPORARY ELEMENTS OF ACTIVE AND PASSIVE SAFETY
Dušan Mladenović, Mladen Marina, Dragan Sekulić

TRAINING OF CANDIDATES FOR DRIVERS IN TRAFFIC AND TRANSPORT IN MACEDONIA COMPARED TO EU STANDARDS AND DIRECTIVES
Elmir Mustafai, Merita Mustafai

PROPOSED MODEL OF LEADING TRAFFIC SAFETY NATIONAL AGENCY IN THE REPUBLIC OF MACEDONIA
Cvetanka Ristić, Boro Ristić
TRANSPORT LOGISTICS

IDENTIFYING PARAMETERS OF LOGISTIC PERFORMANCE FOR DISTRIBUTION OF BEVERAGES IN MEDIUM ROUTES WITH MEDIUM SIZE TRANSPORTATION VEHICLES
Ema Berisha-Krasniqi, Ivo Dukoski, Ilir Doçi, Muhamed Krasniqi, Njazi Selmani

DEVELOPMENT OF A NEW LOGISTICS INFORMATION SYSTEM IN A TRANSPORTATION COMPANY
Nikola Brković, Marko Vasiljević, Željko Stjepanović

CONTEMPORARY MEANS FOR MANIPULATION IN THE CONTAINER TERMINALS
Ile Cvetanovski, Vaska Atanasova, Verica Danchevska, Cvetanka Cvetanovska

REVERSE LOGISTICS OF TEŠANJ – WASTE MANAGEMENT SYSTEM
Emir Galijašević, Zdravko Nunić, Asib Alihodžić

USE OF PROTECTIVE EQUIPMENT AS A FACTOR FOR IMPROVING LOGISTIC PERFORMANCE WORK SAFETY
Mladen Gavranović, Enis Mulalić, Biljana Vranješ

DETERMINATION OF STATISTICAL DISTRIBUTION OF INPUT PARAMETERS OF THE QUEUING SYSTEM IN THE STORAGE SYSTEM
Eldina Mahmutagić, Željko Stević, Zdravko Božičković, Ranko Božičković
PLACE AND ROLE OF DANGEROUS GOODS SAFETY ADVISOR
Milica Miličić, Tatjana Savković, Pavle Pitka, Predrag Atanasković, Ivana Milenković

MULTICRITERIA MODEL FOR THE SELECTION OF THE TRANSPORT SERVICE PROVIDER-
SINGLE VALUED NEUTROSOPHIC NUMBER BASED APPROACH
Dragan Pamučar, Vesko Lukovac, Milena Vukić

ROUTE EVALUATION FOR HAZMAT TRANSPORTATION BASED ON BWM-EDAS METHODS
Marko Vasiljević, Branislavka Marković, Željko Stević, Nenad Vasiljević

PACKAGING OF MEDICAL AND CLINICAL WASTE IN PRESCRIBED PACKAGING
Bojan Ožegović, Siniša Sremac, Nataša Stojić, Tanja Arsić, Jelena Hodak
URBAN TRANSPORT SYSTEMS

METRO TRAFFIC MANAGEMENT SCHEME BASED ON WAGONS TRAVELLING IN AUTONOMOUS MODE
Dimiter Dobrev, Dimitar Dimitrov

TOWARD SUSTAINABLE URBAN MOBILITY: WHAT IS THE MAIN DISADVANTAGE IN SKOPJE
Nikola Krstanoski

ANALYSIS OF HEADWAY DISTURBANCE IN URBAN PUBLIC TRANSPORT – CASE STUDY OF NOVI SAD
Pavle Pitka, Milan Simeunović, Tatjana Savković, Milja Simeunović, Ivan Škiljaica

DEVELOPMENT PRACTICES OF A PUBLIC SERVICE OBLIGATION CONTRACT
Jakša Popović, Mirjana Bugarinović

ANALYSIS OF PASSENGER WAITING TIME ON PUBLIC TRANSPORTATION LINE WITH LONGER HEADWAY
Dejan Radivojev, Milan Simeunović

THE IMPORTANCE OF THE SERVICE QUALITY OF PUBLIC TRANSPORT WITH THE AIM OF INCREASING TRAFFIC ACCESSIBILITY
Milan Stanković, Pavle Gladović, Dejan Bogičević, Vladimir Popović
RAILWAY TRANSPORT

APPLICATION OF FUZZY AHP APPROACH
ASSESSMENT OF CRITERIA FOR THE
EVALUATION OF EFFICIENCY OF RAILWAY
UNDERTAKINGS
Aleksandar Blagojević, Iskra Stojanova, Boro Đorđević, Života Đorđević

PROPOSAL OF THE METHODOLOGY FOR QUALITY
ASSESSMENT OF THE TRANSPORT ROUTES IN
RAILWAY PASSENGER TRANSPORT
Milan Dedík, Jozef Gašparík, Matúš Dlugoš

COMPARISON OF ARTIFICIAL INTELLIGENCE
MODELS FOR DIMENSIONING OF TRANSPORT
CAPACITIES IN RAILWAY FREIGHT TRANSPORT
Kire Dimanoski, Gordan Stojić, Gligorche Vrtanoski

SERVICE QUALITY INDICATORS IN MODELS AT
RAILWAY PASSENGER TRANSPORT: A
BRIEFLITERATURE REVIEW
Dragan Đorđević, Gordan Stojić, Snežana Mladenović, Ana Vulević

SYSTEM SAFETY APPROACH AND ITS
APPLICATION IN RAILWAY TRANSPORT
UNDERTAKING MANAGEMENT
Nikolay Georgiev

PREDICTING THE PERFORMANCE OF THE
RAILWAY SYSTEMS
Aleksandra Gojić
REDUCING THE PASS-BY NOISE OF EXISTING FREIGHT WAGONS
Bas Leermakers, Dragan Nešić

SIMULATION OF RAILWAY OPERATIONS
Sanjin Milinković, MilanMarković, Slavko Vesković, Gordan Stojić

TRAIN BRAKING DISTANCE CALCULATION USING FUZZY LOGIC
Milan Milosavljević, Dušan Jeremić, Dušan Vujović

THE CONCEPT OF RISK MANAGEMENT IN THE RAILWAY SECTOR
Miroslav Prokić, Branislav Bošković

FACTORS OF COMPETITIVENESS IN THE RAIL FREIGHT TRANSPORT MARKET: CASE OF CORRIDOR X
Miloš Stanojević, Branislav Bošković, Mirjana Bugarinović

LEVEL CROSSING RELIABILITY USING FUZZY FAULT TREE ANALYSIS
Goran Tričković, Milan Milosavljević, Zoran Bundalo, Marko Bursač

INDUSI AUTOSTOP SYSTEM TYPE RAS 8385 SAFETY SOLUTION FOR CONVENTIONAL RAIL
Mia Viduka, Darko Barišić

LIBERALIZATION OF RAILWAY PASSENGER TRANSPORT MARKET AND ITS IMPACT TO TRANSPORT COMPANIES
Martin Vojtek, Zdenka Záhumenská, Martin Kendra, Jozef Gašparík
TRAFFIC PLANNING
INFLUENCE OF GEO-SOCIAL FACTORS ON TRANSPORT MODAL SHARE IN USA AND JAPAN

Ranko Babić
Railway School of Applied Studies
Zdravka Ćelara 14
Belgrade, Serbia
babic57@mts.rs

Abstract

Apparent discrepancies between modal shares in USA and Japan we tried to explain through analysis of various geographical, social and even historical factors. We took into account topography, administrative organization of country, population distribution, transport networks, lend use, industrial versatility, telecommunication infrastructure, and even evolution of settlements, not individually but through their synergy. Particular attention is devoted to settlement size distribution, observed through administrative organization of state territory. Commuting modal share in large and small cities is analyzed. The core finding is that the difference in modal share in these two countries is superfluous and is just the result of dominated social factors, since each population behaves in similar way under similar conditions.

Keywords - population distribution; car; high speed railways; settlement; commuting; modal chain
EVALUATION FOR LONG-TERM TRAFFIC VOLUME FORECASTING, USING MULTIPLE REGRESSION ANALYSIS AND PRINCIPAL COMPONENT REGRESSION MODELS

Ramadan Duraku  
Department of Traffic and Transport  
University of Prishtina “Hasan Prishtina” Faculty of Mechanical Engineering  
Sunny Hill nn, 10 000 Prishtina, Kosovo  
ramadan.duraku@uni-pr.edu

Vaska Atanasova  
Department of Traffic and Transport  
University “St.Kliment Ohridski”, Faculty of Technical Sciences  
Makedonska Falanga 33, Bitola, Macedonia

Abstract

In this paper we were focused in finding a suitable model for traffic volume forecasting in Anamorava region, using multiple regression analysis (MLR). In the beginning we have identified demographic and socio-economic variables that have an impact in traffic generation. However, due to the very high correlation between variables (multi co-linearity phenomenon) it was impossible to include all of them in the model. In order to overcome this phenomenon and take into account as many variables as possible in setting up a final model and with the aim of increasing its forecasting capability, a new methodology was used, using principal component (PC) as an input. Datasets for annual daily traffic average (AADT) in the period from 2004 to 2016 are used to forecast traffic volume in this region. As a result, mathematical equations were established and multiple regression analysis (MLR) as well as principal component regression (PCR) models were developed separately, in which case their results were compared and evaluated using some performance indicators. Comparing the results, we found that the PCR model performs much better than MLR due to the implementation of (PCs) for traffic volume forecasting in the main road network of this region.

Keywords - traffic volume; methods; forecasting model; performance indicators, region
MONGODB DATABASES IN BIG DATA APPLICATIONS IN TRANSPORTATION INDUSTRY

Sladana Janković, Snežana Mladenović, Stefan Zdravković, Slavko Veskić, Ana Uzelac
University of Belgrade
Faculty of Transport and Traffic Engineering, Vojvode Stepe 305
Belgrade, Serbia
s.jankovic@sf.bg.ac.rs

Abstract

M2M (Machine-to-Machine) technologies provide a number of solutions in logistics and transport, such as fleet management solutions, asset tracking systems, parking space management and payment, road tolls, traffic volume monitoring, connected road signs, traffic lights and cameras, connected navigation, passenger services, etc. The data obtained is huge and need high performance to be usable. NoSQL data systems are the answer to it. When compared to relational databases, many NoSQL systems share several key characteristics including a more flexible data model, higher scalability, and a superior performance. Although there are dozens of NoSQL databases, they primarily fall into one of the following three categories: document databases, graph databases and databases based on key-value and wide column model. MongoDB is an open-source document database. In this paper the possibilities of using MongoDB databases in innovative applications of Big Data in the transportation industry will be explored.

Keywords - NoSQL database; document database; Big Data technology
CROSS-SECTIONAL ANALYSIS OF AIRPORT REVENUE SOURCES

Elzbieta Marciszewska, Adam Hoszman
Department of Transport
Warsaw School of Economics, al. Niepodleglosci 162
Warsaw, Poland
elzbieta.marciszewska@sgh.waw.pl

Abstract

Most airports around the world have a dichotomic structure of revenue that is generated from both aeronautical and non-aeronautical activities. The aim of the paper was to analyze how this structure changed over time and what factors were beyond these changes. Moreover, within each of the aforementioned categories of revenue there are different particular sources of revenue identified. The paper focuses on the structures of aeronautical and non-aeronautical revenues. Also, the changes in these structures were examined. The research included both aggregated data (global and continental levels) as well as data for particular airports. Due to scarcity of comprehensive data that is available free of charge data retrieved from airport reports and websites were used. The results of the research showed (contrary to expectations) that the share of non-aeronautical revenue in total revenue has been declining slightly in recent years (globally) after a couple of decades of growth. The reasons behind that were identified to be market saturation in well-developed economies, the structure of passenger traffic growth (with emerging markets being characterized by the highest growth pace) and other factors. Moreover, within aeronautical revenue a shift from aircraft-based to passenger-based charges was noticed which should be attributed to the pressure exercised by airlines on the reduction of the airport charges that are consider costs of airlines (passenger charges are transferred onto passengers as ticket price add-ons). With the rapid development of passenger air transport sector, the changes are likely to continue and their dynamics will be highest on the fastest growing emerging markets.

Keywords - airport revenue; aviation revenue; non-aviation revenue
APPLICATION OF DIFFERENT METHODS OF MULTICRITERIA ANALYSIS FOR EVALUATION AND CRITICAL COMPARISON AT TRANSPORT INFRASTRUCTURE PROJECTS

Ivona Nedevska, Zoran Krakutovski, Darko Moslavac, Zlatko Zafirovski
Chair of Railways, Faculty of Civil Engineering Skopje
University Ss. Cyril and Methodius, Faculty of Civil Engineering,
Blvd. Partizanski odredi No.24, 1000 Skopje
ivona.nedevska@live.com

Abstract

This paper presents a methodology for route selecting in the planning and designing of railway alignment based on the Multi Criterion Decision Process. The proposed methodology provides usage of Multi-Criteria Analysis, examines the advantages and disadvantages of the considered methods, and explains how their common applications relate to their relative strengths and weaknesses. Final result of the Multi-Criteria Analysis is selection of the most suitable route in accordance with the adopted criterion and existing constraints. The developed methodology is based on three different methods for Multi-Criteria Analysis, notably Weighted Sum Model – WSM, AHP method (Analytic Hierarchy Process) and VIKOR method. Evaluation is performed for railway alignment of two alternatives on the Corridor 10, on the section from station Dracevo (Skopje) and station Veles. The results confirm pertinence and usefulness of Multi – Criteria Analysis.

Keywords - planning and designing; railway alignment; alternative selection; multi criterion decision making; Weighted Sum Model; Analytic Hierarchy Process; VIKOR method
ANALYSIS OF CORRELATION BETWEEN THE NUMBER OF TOURIST ARRIVALS AND PASSENGER TRAFFIC DEMAND

Justin Pupavac
Management of Sustainable Development
Faculty of Tourism and Hospitality Management, Primorska 42,
p.p.97, 51410 Opatija
Opatija, Republic of Croatia
justin.pupavac@gmail.com

Abstract

More than 14 million tourists visit the Republic of Croatia annually. However, it is road traffic that is dominant, i.e. most tourists arrive in personal cars, so there is a discrepancy in demand for services of particular transport modes. Accordingly, this scientific debate will explore the correlation between the number of tourist arrivals and transport demand for certain transport modes in Croatia, measured by static and dynamic operating indicators in passenger traffic. The proposed study can be used to determine the actual contribution of tourist arrivals to the development of passenger transport demand and to point out imbalance in transport demand resulting from forced and aggressive construction of modern road infrastructure. Research results are based on methods of descriptive statistics and statistical method of correlation and regression analysis.

Keywords - tourist arrivals; traffic demand; passenger traffic; correlation
MODERN SAILOR UNDERSTANDS EMERGENCE OF MARITIME AND THE IMPORTANCE OF MATHEMATICAL APPLICATIONS

Tatjana Stanivuk¹, Ajka Relja², Ivan Buzov¹

¹University of Split
Faculty of Maritime Studies, Rudera Boškovića 37
Split, Croatia
tstanivu@pfst.hr
²University of Split
Poljička cesta 35
Split, Croatia

Abstract

Mathematics has left an indelible mark on human history from the first civilizations to present days. It influenced all branches of science and economics with its revolutionary discoveries and achievements. Mankind quickly understood that sea was source of food that provided possibility for trade, and also faster path between two places on earth’s surface. Therefore, the development of seamanship and mathematics can be parallelly observed; from the ancient Greek where the foundations of astronomical navigation and trigonometry have been laid throughout the loxodrome and the Newton’s laws, to today’s application in modern technology. Numerous electronic navigation devices apply mathematical models to calculate the ship's stability and navigational paths. Such calculations are often facilitated with the creation of tables. Therefore, the aim of this paper is to determine the importance of mathematics in maritime education, not only to keep the maritime transportation safe, but also to keep it economically effective.

Keywords - mathematics; maritime transport; education; sailors
CITY OF BITOLA TOWARD URBAN SUSTAINABILITY

Jasmina Bunevska Talevska
St. Kliment Ohridski University - Bitola
Faculty of Technical Sciences - Bitola
Makedonska Falanga 33, Bitola, Macedonia
jasmina.bunevska@tfb.uklo.edu.mk

Mile Biljanovski
City of Skopje
Bul.Illinden br.82, 1000 Skopje

Abstract

The current urban planning principles are based on the renewal and use of the cities’ available potentials, with the aim of their sustainable development. Today, as many authors have stated, there is no doubt that urban reconstruction is a much better direction for the development of smart cities since numerous challenges threaten the ability of cities to become viable pillars of sustainable development. The main objective of this paper is to define the urban sustainability directions of the city of Bitola, R. Macedonia, on its road towards development as a compact city, a compact environment with high density population and mixed functions, as well as to underline the principles and assessment procedure for the revitalization of the city center in Bitola as a sustainable urban form.

Keywords - urban sustainability; compact city; mixed functions
LEARNING FROM THE PLANNING HISTORY OF BELGRADE

Vesna Zlatanovic-Tomasevic
Association of Engineers of Belgrade, Kneza Milosa 7A/III
Belgrade, Serbia
vesnazlatanovic@yahoo.com

Abstract

During the work on the research of planning documents, the General Plans of the City of Belgrade, the competition work for the General Plan of Belgrade URBS-MAGNA from 1921 was found. The work was rewarded at the organized international competition for GUP Belgrade, the capital of the newly formed state after the First World War. The first prize in the competition was not awarded, and the second prize was awarded to the team of authors of the competition work URBS MAGNA, Jan-Marcel Auburtin, Albert-Henri Parenti (authors that won the second prize in 1919 at the Contest for the Plan of Paris), Jean-Emile Naville and Achille-Henri Chauakuet, associate architect Milan Zloković. By analyzing the available documents, it was concluded that after the end of the competition and awarded awards, the GUPs of Belgrade were made, that until the Second World War partially accepted some of the ideas from this competition solution, as well as the GUPs made after World War II, when the new socio-economic conditions and modernist planning influenced the development of the city. The new part of the city was built on the left bank of the Sava - Novi Beograd, as a part of Belgrade connecting it with Zemun and the part of the city on the left bank of the Danube was also built. It is important to say that the created GUPs of Belgrade recognized and applied the far-sighted vision and ideas of planners from 1921 on the metro as the main public transport in the city, which still exist after 100 years. Until 2003 all GUPs of Belgrade had planned the metro, which was not realized despite the extremely intensive construction of the city. Until this day, bottlenecks in the existing urban tissues of the city have not been solved in Belgrade, which represents enormous obstacles for the further development of Belgrade almost 100 years later.

Keywords - GUP Belgrade; plan; development of the city
HOW TO CREATE AN AGE FRIENDLY URBAN TRANSPORTATION SYSTEM?

Ana Trpković, Branimir Stanić
University of Belgrade
Faculty of Traffic and Transport Engineering, Vojvode Stepe 305,
Belgrade, Serbia
a.trpkovic@sf.bg.ac.rs

Abstract

Increasing number of older population represents a global demographic trend, as well as growing density in urban areas. Aging and urbanization introduces significant changes in the structure and character of traffic demands in modern cities. Urban traffic and transportation systems, which are primarily in function of their users, should offer the equality and equity in service for all participants of transportation process. Bearing in mind that mobility represents one of the basic human needs, it is clear that it can not be disabled or limited by inadequate system performances. Regarding this, during previous period, developed countries have started process of inspection, redefining and adapting their transportation systems according to older population requirements. The main goal is to create age friendly transportation environment with appropriate and safe mobility options for seniors. The paper gives a brief overview of the past work in this field around the world and in Serbia.

Keywords—elderly; urban transportation system; age friendly design
Abstract

In today's world, the development of human civilization is so rapid that "the future is today, not tomorrow." Globalization is in all spheres of public life and changes the conditions for their functioning. People responsible for the prosperity in a global aspect and in all areas must unite efforts to improve living conditions for present and future generations. Through the most valuable resource of the 21st Century - "Information", it is possible to register, summarize and analyze problems and achievements in the field of economic prosperity, environmental protection and social justice. In this connection, the paradigm regarding the reporting of companies is changing. This is in line with the European Parliament and Council Directive 2014/95 / EU adopted on 22 of October 2014. The latter was transposed into the accounting legislation of the Republic of Bulgaria and entered into force on 01.01.2017. The undertakings in Bulgaria, including those in the transport sector will broaden the scope of their reporting. The annual financial statements will contain not only financial but also corporate non-financial information: social and environmental information (so-called integrated reporting). The purpose of this report is to clarify the need for integrated reporting in undertakings and its essence as a new holistic approach to the reporting of business organizations.

Keywords – transport undertakings; social and environmental aspects of reporting; integrated reports
USING CROWDSOURCING POSSIBILITIES IN ROAD TRAFFIC

Stefan Zdravković, Dušan Mladenović, Sladana Janković, Ana Uzelac
University of Belgrade
Faculty of Transport and Traffic Engineering, Vojvode Stepe 305, Belgrade, Serbia
s.zdravkovic@sf.bg.ac.rs

Abstract

Crowdsourced data collection influences not only the further development of the road traffic but also the smart city as a whole. Through crowdsourcing, citizens can contribute in collecting data using sensors that are already embedded in their mobile devices. The range of new applications based on the crowdsourcing concept is wide and diverse: it can be used to estimate the real-time bus arrivals; or to provide more accurate information related to the current traffic congestions that can further be used to improve navigation. In this paper we will discuss the challenges related to the data collection and focus on the advantages that crowdsourcing could bring to the road traffic. The implementation of 4G LTE in cars is an additional source of information that we will consider. By combining user data such as location signals and search queries, control centres are able to find different origin-destination patterns. This way we can fulfil the promise of ubiquitous technologies making life better.

Keywords – crowdsourcing; road traffic; 4G LTE
ANALYSIS OF THE BASIC CHARACTERISTICS OF
TRIP WITH THE PURPOSE OF GOING TO
SCHOOL

Ružica Živković, Goran Kalamanda
University of Novi Sad, Faculty of Technical Sciences,
Department of Traffic Engineering, Trg Dositeja Obradovića 6
21000 Novi Sad, Serbia
rujkanaaaa@gmail.com

Abstract

Children can travel with the purpose of going to school by going to school accompanied by an adult, or they will independently realize their journey. A wide range of research shows that children spend less time without escorts to travel to and from school, outdoors or socializing with friends in the neighborhood than they were in the past, with whether children traveling with the purpose of going to school independently realize or will travel accompanied by an adult, influenced by factors related to parents, factors that represent the characteristic or attribute of the child, age and gender, and the mode of work of educational institutions. In countries that have been studying the independence of children with regard to the realization of a trip with the purpose of going to school, measures aimed at improving the stability in the realization of these trips are applied. The most popular measures, that is, the concepts that contribute to improving childhood stability are school travel plans, walking bus and bicycle train concepts, as well as safe routes on the way to school. This paper analyzes the attitudes and habits of pupils and students in the territory of Ub municipality in terms of how to travel from home to school and back, as well as the difficulties and dangers they face when traveling, in order to determine the way in which it gender, as a factor, independence of the realization of a trip whose purpose is going to school.

Keywords - trip with the purpose of going to school; gender; age
TRAFFIC ENGINEERING
AND DESIGN
ESTIMATION OF BICYCLE SERVICE LEVEL
MODEL BASED ON REAL PERCEPTION OF
CYCLISTS TRAVELING IN URBAN TRAFFIC AND
ROADWAY CONDITIONS

Mevlan Bixhaku
University of Prishtina, Faculty of Mechanical Engineering,
Department of traffic and transport
mevlanbixhaku@hotmail.com

Xhevat Sopi
University of Gjilani “KadriZeka”
Faculty of Economics

Abstract

Bicycle levels of service (BLOS) methodologies have been developed for suburban and urban as well as for rural road segments. Previous researches have mainly used video simulations to survey riders about their riding behaviours and to gauge their perceptions about safety and their comfort level. Thus, the present study is based on real perceptions from bicyclists traveling in actual urban traffic and roadway conditions. The present paper describes, various operational and physical factors along with user perception data sets were collected from 13 road segments in the city of Pristina. For the estimation of a mathematical model for the Bicycle Level of Service, a linear regression model was used. Incorporating outputs of the regression model, a predictive equation is presented that can identify under what level a segment is offering services for bicycle use.

Keywords - Bicycle Service Level; real perception of cyclist; safety; comfort
SOME EXPERIENCES OF ENVIRONMENTAL IMPACT DURING THE CONSTRUCTION OF DEMIR KAPIJA – SMOKVICA MOTORWAY

Tale Geramitcioski, Vladimir Mijakovski, Vangelce Mitrevski, University St. Kliment Ohridski Bitola Faculty of Technical Sciences, Makedonska Falanga 33 Bitola, Macedonia tale.geramitcioski@uklo.edu.mk

Abstract

This paper presents the results of the impact of measured gases on environment as a result of blasting in the tunnels and impact of measured gases from the asphalt base that is part of the construction area in the project E-75 Motorway, section Demir Kapija – Smokvica. Measured values of gases CO, CO₂, NO, NO₂, NOx, after blasting are very high with significant impact on the environment. Dust (PM particles) with high level of emission due to tunnel’s rock base and operation of asphalt plant contribute to high air and environment pollution.

Keywords – tunnels; asphalt base; air pollutant; environment
ANALYSIS OF USERS’ ATTITUDES ABOUT THE TOLL COLLECTION SYSTEM IN THE REPUBLIC OF MACEDONIA

Draženko Glavić¹, Marina Milenković¹, Malenkovska Todorova Marija², Miloš Petković¹
¹University of Belgrade
Faculty of Transport and Traffic Engineering, Vojvode Stepe 305
Belgrade, Serbia
drazen@sf.bg.ac.rs
²University "St. Kliment Ohridski"
Faculty of Technical Sciences, Makedonska Falanga 33
Bitola, Republic of Macedonia

Abstract

In order to have an efficient toll system and satisfied users, toll managers need to periodically investigate the users' experience and their requests regarding the usage of toll facilities. Bearing this in mind, toll managers can introduce a wide range of measures, aiming to improve the operation of a toll system and to increase efficiency and LOS. By doing this, toll authorities meet requests and demands of freeway users. For that purpose, the aim of this paper is to examine the users’ attitudes regarding the toll collection systems on the territory of the Republic of Macedonia. Users’ attitudes were collected by conducting an online Google questionnaire. The obtained data were statistically analysed and the results of this analysis can be used to help decision makers to optimize the toll collection system in Macedonia.

Keywords - toll collection system; users’ attitudes; freeway
Abstract

Usually dimensioning the capacity of the stationary traffic system - the parking garage recognizes only input process of customers who have accessed the service from the queue. However, input process of customers is divided into patient and impatient customers. Impatient customers limit their presence on the queue themselves, i.e. interrupt. They are burdening a part of the queueing system that is designed to form a queue, and they themselves decided to loss. Therefore, planned system corrections are usually insufficient for impatient customers. The characteristics of this specific flow, parameters of patience and comparative capacity analysis are explained in detail in this paper.

Keywords - queueing theory; parking garage; customers patience
BASIC ELEMENTS OF EVALUATION IN THE TRANSPORT PROJECT DEVELOPMENT PROCESS

Mirsad Kulovic
College of Traffic Engineering
Paneuropean University APEIRON,
Pere Krece 13, Banja Luka,
Bosnia and Herzegovina
mirsad.f.kulovic@apeiron-uni.eu

Abstract

Each step of the transport project development process requires the evaluation of alternative actions in order to make the best decision. Evaluation of any transport project is the decision-making process based on the assessment of the positive and negative impacts of alternative options in relation to individual and multiple criteria. The most visible and well-known traditional step that involves explicitly evaluating alternatives is the planning step at the level of the traffic network or at the level of the entire traffic system. The following common steps are the choice of the location of the traffic object and its design. Usually, the evaluation criteria are: economic efficiency, environmental impact, traffic safety, traffic efficiency, economic development and socio-cultural criterion. Each step of the project development process needs to assess the degree of risk and uncertainty. In other words, it is necessary to have a ready answer to the question "what if.......?". The sensitivity analysis should cover different levels of factors, such as system use and economic conditions, and should help to strike a balance between competitive goals. The next element in building a consensus is to take into account the importance of public participation and multiple stakeholders – participants. This paper defines the categories of traffic system influence and the reasons and dimensions of the project evaluation. The paper also explains the project value measures and presents a procedural framework for the evaluation of traffic projects.

Keywords – transport; project; evaluation; development
ANALYSIS OF USERS’ ATTITUDES ON THE INTRODUCTION OF CONGESTION PRICING IN BELGRADE

Marina Milenković, Draženko Glavić, Anica Kocić
University of Belgrade
Faculty of Transport and Traffic Engineering, Vojvode Stepe 305
Belgrade, Serbia
marina.milenkovic@sf.bg.ac.rs

Abstract

With the increase of the motorization in the last decades, large cities face congestion problems. Congestion causes numerous negative consequences such as: air pollution, noise, delays, space occupation etc. City authorities try to solve this problem using the traffic demand management (TDM) models. One of TDM models is congestion pricing. Bearing in mind the evident problem of congestion in the central city zone in Belgrade, the aim of this paper is to examine users' attitudes on the introduction of congestion pricing. Users' attitudes were collected by conducting a poll of questions related to the socio-demographic characteristics of users, O-D matrix of car drivers, and questions regarding the policy of congestion pricing. The results of the questionnaire provide a basis for introducing the congestion pricing strategy in Belgrade.

Keywords - users' attitudes; traffic; environment; central city zone
Abstract

Intelligent transport systems (ITS) rely on the application of advanced information and communication technologies in transport and covers all modes and elements of transport systems including vehicles, infrastructure, users, all of which in dynamic interaction. With the ability to receive, process, analyze and share information in real time, as core feature, ITS can help reduce congestion and emissions while smoothening door to door mobility, all-together contributing to transport efficiency.

The traffic related problems like congestions, safety, carbon footprint, high costs, etc., could not be solved entirely only through new road infrastructure, so measures like ITS can help by providing the basis for connecting technology, society, and transport systems with systems for automation, communication and information exchange.

This paper presents analysis and comparison of ITS application levels in Republic of Macedonia and Republic of Slovenia. The research was carried out within the framework of the bilateral research project cooperation between these countries.

Keywords - Intelligent Transport Systems, ITS services, ITS application
METHODOLOGY FOR ANALYSING CAPACITY AND LEVEL OF SERVICE FOR INTERSECTION AT BLVD GOCE DELCEV AND BLVD KRSTE PETKOV MISIRKOV - SKOPJE (HCM 2000/2010)

Ivana Nedevska¹, Radojka Donceva², Slobodan Ognjenovic², Riste Ristov³

¹DAVOS LTD, Partizanski Odredi 17-3/20
Skopje, Macedonia,
ivana.nedevska@live.com
²University Ss. Cyril and Methodius,
Faculty of Civil Engineering, Partizanski odredi 24
Skopje, Macedonia
³PROSTOR DOO Mosha Pijade 2
Kumanovo, Macedonia,

Abstract

The augmentation of motorization level leads us to the need for mobility and demands better infrastructure, in urban and suburban areas. The complexity of this problem is especially notable in urban areas where the space delimitations, functional characteristics and different transportation must be considered.

The intersection between boulevard Krste Petkov Misirkov and boulevard Goce Delcev, in Skopje, has been analyzed with the methodology for capacity and level of service, according to HCM. Both boulevards are with three lanes before the intersection, and two additional lanes for left and right turns in the intersection area, and this is one of the most frequent intersections in Skopje. Number of vehicles is determined by measuring the traffic, and those inputs are used to analyze three solutions: the current solution (signalized intersection), roundabout and junction (leveled roundabout). Anyway, this analysis is based on custom measurements within a week.

Keywords - intersection; analysis; roundabout; capacity; level of service; Highway Capacity Manual
EVALUATION OF ADAPTIVE AND FIXED TIME TRAFFIC SIGNAL STRATEGIES: CASE STUDY OF SKOPJE

Daniel Pavleski, Daniela Koltovska Nechoska
Faculty of Technical Sciences
St. Kliment Ohridski University, Bitola, Blvd 1st May, nn
Bitola, Republic of Macedonia
dhany_mk@hotmail.com

Edouard Ivanjko
Department of Intelligent Transportation Systems,
Faculty of Transport and Traffic Sciences, University of Zagreb, Vukelićeva 4
Zagreb, Republic of Croatia

Abstract

Signalized intersections and belonging signal plans are powerful means for effective urban traffic management. Numerous strategies have evolved over the time, from fixed time to intelligent signal plan control strategies that respond and react to traffic conditions in real time. This paper presents an evaluation and comparison of the impact of fixed time and UTOPIA adaptive traffic signal control strategies for the chosen urban corridor in the wider center area of the City of Skopje, Macedonia. A topic that still requires more attention from the research community. This paper presents a continuation of the author’s previous research where a framework to test UTOPIA adaptive control using the microscopic simulator VISSIM was described. Obtained new results include the influence of fixed time signal plans which are compared with UTOPIA’s results and analyzed in details using the following performance measures: delay, queue length, travel time, intersection level of service, number of stops and vehicle throughput.

Keywords - signal plan control strategies; intelligent transportation systems; UTOPIA; microscopic simulation; urban corridor
 IMPLEMENTATION OF RSA IN THE DESIGN PROCESS OF THE STATE ROAD A1, SECTION DRENOVO-GRADSKO

Riste Ristov\textsuperscript{1}, Slobodan Ognjenovi\textsuperscript{2}, Radojka Don\textsuperscript{č}eva\textsuperscript{2}, Ivana Nedevska\textsuperscript{3}

\textsuperscript{1}PROSTOR DOO Mosha Pijade 2
Kumanovo, Macedonia,
risteristov333@yahoo.com,

\textsuperscript{2}University Ss. Cyril and Methodius, Faculty of Civil Engineering
Partizanski odredi 24
Skopje, Macedonia,

\textsuperscript{3}DAVOS LTD, Partizanski Odredi 17-3/20
Skopje, Macedonia,

Abstract

Road safety mostly depends on the level of equipment in both civil engineering and traffic aspect. The obsolete methods and standards of equipment and the non-application of the experience measures of the Western countries can also be cited as additional reasons for unreliable roads. Considering the fact that the roads are supposed to provide for maximal safety to the users, the equipment level has to be appropriate, without any derogations due to physical, financial or any other reasons.

This paper will present part of the remarks identified by RSA in the design documentation related to the Drenovo-Gradsko road, and the methods and technical measures necessary to overcome them.

Keywords - RSA; traffic; accidents; equipment; safety
Abstract

Estimation of density in short time intervals is important in lots of traffic modelling and control strategies of freeways and urban arterials. For more, the possession of short time density values for particular parts of the freeway segment, play an important role on providing drivers with information about events or traffic incidents. As an important parameter, nevertheless is it impossible to measure, density is required to be estimated on-line.

Relying on the close relationship of density and traffic flow described by fundamental diagram, it is possible to estimate traffic densities only by having flow measurements on the entry and exit sections of a freeway segment. In this paper is given a discretized macroscopic model, called cell transmission model (CTM) which is then enriched with a recursive technique known Kalman-Filter (KF), for the purpose of the minimization of the error between the observed and modeled flows, in order to increase the accuracy of the modeled traffic densities.

**Keywords** - cell transmission model; time step; Kalman Filter; density; error covariance
COMPARATIVE ANALYSIS OF TRANSPORT INFRASTRUCTURE DEVELOPMENT IN THE REPUBLIC OF SLOVENIA AND IN THE REPUBLIC OF MACEDONIA

Sebastjan Škerlič
University of Ljubljana,
Faculty of Maritime Studies and Transport Pot pomorščakov 4,
6320 Portorož, Slovenia
sebastjan.skerlic@fpp.uni-lj.si

Verica Danchevska
University”St. Kliment Ohridski” of Bitola,
Faculty of Technical Sciences, Makedonska falanga 33,
7000 Bitola, Macedonia

Abstract

The article analyses the development of transport infrastructure and suprastructure and of the transport network in the Republic of Slovenia and in the Republic of Macedonia. The purpose of the article is to provide a systemic recommendation for improvements to the transport policy of both countries. It was determined that both countries are currently not investing enough in the railway industry. Without planned investments, the flows of goods will circumvent Slovenia, which could affect the development of logistics in the future. The same applies to Macedonia, where investments are also lacking. With the increased development of transport infrastructure, international goods flows in a very important transit area of SE Europe will be intensified.

Keywords - transport infrastructure; transport network; flows of goods; comparative analysis; Macedonia; Slovenia
Global trends such as urbanization, urban sprawl, traffic congestion, transport-related pollutions, safety and security issues, and climate change, make it necessary to adapt and improve the entire urban transport system. Therefore, it has become obvious that one of the appropriate ways of dealing with mentioned urban issues is the shift from automobile trips to other transportation forms called active transport, (walking and cycling). Cyclimg is a mode of transport which has had an important role in the "Mobilise Your City" concept, focused on offering an attractive and complementary alternative to individual motorized transport. The value of such an approach, depends, among other things, on the sustainable urban infrastructure.

Encouraging more people to cycle is one of the main goals of the "Skopje Velo-city 2017" project. Additionally, the improvements of the cycling infrastructure is a vital part of strategies, pathways and measures directed towards switching to more sustainable transport modes.

**Keywords** – mobilizing of city; active transport mode; cycling infrastructure; Skopje Velo-city 2017 project
ANALYSIS OF TRAFFIC DEMANDS AND CONDITIONS OF RURAL STATE ROAD NETWORK IN REPUBLIC OF SERBIA

Vladan Tubić, Marijo Vidas, Nemanja Stepanović
University of Belgrade
Faculty of Transport and Traffic Engineering, V. Stepe 305
Belgrade, Serbia
vladan@sf.bg.ac.rs

Abstract

This paper includes general analysis of traffic flow characteristics on primary state road network in Republic of Serbia for the 1990 – 2015 period. Categorization of Republic of Serbia rural state road network includes four types of roads (IA, IB, IIA and IIB), from which the focus in this paper is on primary road network (first two categories of roads). The analysis is based on network subdivision in three functional entities and collected data on values of basic parameters as Average Annual Daily Traffic (AADT) and Vehicle Kilometers. Transportation demand changes on motorway road sections in Republic of Serbia, where long distance traffic flows are present, are further analysed. Analysis of transport demand and supply is basis for efficiency estimation (Capacity and Level of Service), based on which general conclusions and recommendation are given for the future activities on road network.

Key words - traffic flow; Level of Service; capacity; AADT
MOTOR VEHICLES
Abstract

Night charging and fast charging are currently the two most common systems for charging electric buses. Despite the fact that numerous trial installations were started, neither of these two systems has obtained unqualified approval of the users. The alternative is to charge vehicles in motion - dynamic charging which combines the advantages of trolleybus transport and of electric buses: the main supply source are traction batteries; however, the charging is performed in motion, without the necessity of stopping the vehicle.

Keywords - Electric bus; trolleybus; traction batteries; dynamic charging; in motion charging
THE IMPACT THAT PREVENTIVE INSPECTION OF TECHNICAL FUNCTIONALITY OF MOTOR VEHICLES HAS ON THE IMPROVEMENT OF TRAFFIC SAFETY IN REPUBLIKA SRPSKA

Tihomir Djuric, Djordje Popovic, Vladan Djuric
Faculty of Traffic in Doboj,
University of East Sarajevo, Vojvode Mihica br. 52,
Doboj, 74000, Republika Srpska
drtihodj@gmail.com

Vedran Bilic
„Autoprevoz”, Gradiska, Cede Kovacevica 12,
Gradiska, 78400, Republika Srpska

Abstract

Considering the fact that traffic safety depends largely on three main factors: person, vehicle and road, institutions and individuals who use the vehicles in traffic are obliged to take necessary measures that their vehicles are in order and that they have the required installations and equipment. Their technical functionality contributes to the safe flow of road traffic and the safety of people and goods. Technical inspection is one of the most important measures of social intervention in the field of traffic safety. Within the technical inspection, the condition of the various components and installations of the vehicle is controlled, but the highest significance from the aspect of the traffic safety is the control of the braking and steering system on the vehicle. The aim of this paper is to determine the true technical correctness of vehicles on roads in the Republic of Srpska and BiH according to the age of the vehicle.

Key words - technical functionality of motor vehicles; traffic safety and technical inspection of vehicles
A FLEET MANAGEMENT SOFTWARE FOR MONITORING THE CONDITION OF FLEET UNITS AS A SUPPORT FOR PREVENTIVE MAINTENANCE

Ivo Dukoski  
Technical faculty – Bitola, Transportation department Bitola,  
Republic of Macedonia  
divo@t-home.mk;  
Emel Hamza Sherif  
Crisis Management Center,  
Resen, Republic of Macedonia  
Nikolec D. Talevski  
ELEM – REK Bitola, Novaci bb,  
Bitola, Republic of Macedonia

Abstract

Today's transport units in fleet composition are characterized by relatively large opportunity for transport effect. These are complex repairable technical systems which technical conditions are changing according to the realized volume of transportation and the number of miles spent.

In the field of transport – logistics services, there are different information that should be identified and recorded. The rapid pace of development of activities requires such information to be entered in the software solutions so the access to them can be faster and more efficient. To ensure time picture of the situation of units at exploitation and maintenance, in this paper is shown a transport – logistics information support for recording data from processes of exploitation and maintenance of fleet unites in the area of preventive maintenance. The system has been tested and verified with real transportation data.

**Keywords** - information systems; fleet management; preventive maintenance
OPTIMIZATION OF VEHICLE OPERATIONS IN THE ROAD FREIGHT TRANSPORT

Jovan Mišić
Master student at University of Novi Sad, Faculty of Technical Sciences, Department of Traffic Engineering, Trg Dositeja Obradovića 6, 21000 Novi Sad, Serbia
jovanmmsc60@gmail.com

Pavle Gladović
University of Novi Sad, Faculty of Technical Sciences, Department of Traffic Engineering, Trg Dositeja Obradovića 6, 21000 Novi Sad, Serbia

Milan Stanković
Department for Road traffic, College of Applied Technical Sciences, Aleksandra Medvedeva 20, 18000 Niš, Serbia

Abstract

In an effort to respond to transport demands, transport relays are exposed to daily observation of entire transport process, in order to satisfy clients expectations, in the most efficient and effective way. This paper is conceptualized on the basic size of the vehicle fleet, the structure of the vehicle fleet, meaning that this paper presents measured indicators of the operation of the vehicle fleet on the specific transport task in the observed period, as well as the costs that are dependent on the total kilometers traveled by the fleet, i.e. the variable costs. These indicators are measured for the existing situation. On the basis of these indicators, the operation of the fleet was optimized. This optimization of the vehicle fleet in the observed case is based on effort to increase the coefficient of utilization of the travelled distance, i.e. to suppress as much as possible the empty round trips in the existing system. Based on these calculations, differences in time and costs are displayed, and improvements are suggested.

Keywords - vehicle fleet; vehicle load optimization; road traffic technology
DETERMINATION OF THE ROLLING RESISTANCE COEFFICIENT FOR THE AUDI A4 VEHICLE

Zdravko B. Nunić¹, Dario Miletić², Mesud Ajanović¹, Milan Dudurović³
¹University of East Sarajevo
Faculty of Transport and Traffic Engineering, Vojvode Misica 52
Doboj, Bosnia and Herzegovina
zdravkonunic56@gmail.com
²University of East Sarajevo, Faculty of Theology Foča,
Bosnia and Herzegovina
³M. Tepića 5, Prijedor 79100,
Bosnia and Herzegovina,

Abstract

The movement of a motor vehicle on a surface is achieved by rolling the wheel, resulting in a constant change in the radial deformation of its individual parts in which an elastic force appears and which is proportional to the deformation. As a consequence of internal displacement in the material influenced by this force, energy losses occur, and they are manifested by the emergence of the rolling resistance. Therefore, the aim of this study is to determine the value of the rolling resistance coefficient depending on the two factors, the condition of the surface on which the vehicle moves and tread depth of tyres. The research was carried out using experimental “free stop” methods on a horizontal road taking into account the above-mentioned factors and five repetitions in total. The paper presents an example of the calculation of the rolling resistance coefficient for the Audi A4 vehicle, and it can be concluded that the value of the rolling resistance coefficient affects the increase in fuel consumption. The results obtained by this research confirm the aim of the paper itself.

Keywords – tyre; road; interaction; rolling resistance
ENERGY EFFICIENT MANAGEMENT SYSTEM FOR SOLAR CARS TECHNOLOGY

Zlatko V. Sovreski
University "St. Climent Ohridski" Bitola - Faculty of Technical Sciences - Department of Traffic and Transportation Engineering
Republic of Macedonia
zlatko.sovreski@uklo.edu.mk

Simeon Simeonov
University "Goce Delcev" Shtip - Faculty of Mechanical Engineering, Republic of Macedonia

Feta Sinani
University of Tetovo

Elizabeta Hristovska
University "St. Climent Ohridski" Bitola
Faculty of Technical Sciences - Department of Industrial Management
Republic of Macedonia

Vangelica Jovanovska
University "St. Climent Ohridski" Bitola
Faculty of Biotechnical Sciences - Republic of Macedonia

Abstract

This paper summarizes the basic assumptions that led to a thesis which investigates the use of high efficiency solar cells used by solar cars, with the main aim of minimizing energy consumption in such a vehicle. A solar car is special in the way that there is not only energy consumed, but also generated. This energy should be used in the most efficient way, for example with the use of a combination of different energy storages, such as high efficiency batteries and super capacitors.

Keywords - solar energy; solar cell; wsc (world solar challenge); super cap
TRANSPORT AND ENVIRONMENT
METHODOLOGY FOR SELECTION OF DISPERSION MODEL

Beti Angelevska
Faculty of Technical Sciences
University “St. Kliment Ohridski” Bitola
Bitola, Macedonia
beti.angelevska@tfb.uklo.edu.mk

Aleksandar Markoski
Faculty of Information and Communication Technology
University “St. Kliment Ohridski” Bitola
Bitola, Macedonia

Abstract

Dispersion modeling of air quality is a primary regulatory tool for prediction of levels of pollutants in the air. The process of dispersion modeling is routinely used for assessment of the effectiveness of traffic management measures, considering their impact at air quality. In this paper, a methodology for selection of appropriate dispersion model for air pollution research is developed and elaborated. Once selected, the dispersion model has been used for “what-if” analysis, assessing the impact that traffic flow reduction has at air quality. Obtained results clearly underline the irreplaceable significance of properly selected dispersion model for assessment of current and future air quality referring traffic management measures. The intention of this developed methodology is not to make an unnecessary burdening to those who perform and conduct traffic management and air quality assessment. The methodology, above all, should be understood as a tool for upgrading the modeling process and for facilitating the communication between everyone included in the processes of managing and modeling.

Keywords – dispersion modelling; methodology; air pollution
SPIDER’S WEB AS AN ALTERNATIVE BIOINDICATOR OF AIR POLLUTION CAUSED BY MOTOR VEHICLES

Nataša Stojić, Snežana Štrbac, Mira Pucarević, Dunja Prokić, Biljana Panin
Faculty of environmental protection, Educons University
Vojvode Putnika 87
Sremska Kamenica, Serbia
natasa.stojic@educons.edu.rs

Siniša Sremac
University of Novi Sad, Faculty of Technical Sciences, Trg Dositeja Obradovića 6, Novi Sad, Serbia

Abstract

Dust has a high absorption potential and therefore the surface of the particles of dust accumulate a large number of toxic compounds including carcinogenic polycyclic aromatic hydrocarbons (PAHs) and heavy metals. The origin of these toxic and carcinogenic compounds is mainly from the traffic, as well as from the conventional fuel heating system. Usually used bioindicators of air pollution are lichens and mosses. But today the world is interested in investigating the possibility of using spiders and spider’s webs as bioindicators for the assessment of air quality. In this study, several potential sampling sites were identified and spider’s webs of different species of spiders were sampled to determine which species are most suitable for testing. In the extract of the spider’s web, the presence of 16 PAHs and 10 heavy metals was analyzed using liquid chromatography (HPLC) and inductive coupled plasma with optical emission spectroscopy (ICP-OES) system. Analysis of the results confirmed that the concentration of pollutants depends on the distance from the road and the presence (absence) of the residential units near the selected location.

Keywords – air pollution; bioindicator; heavy metals; motor vehicles; PAH.
TRAFFIC SAFETY
CONSULTANTS TRAINING IN NETWORK AND INFORMATION SECURITY IN TRANSPORT

Mariya Hristova
Department of Mathematics and Computer Science
Todor Kableshkov University of Transport
Sofia, BULGARIA
mhristova@vtu.bg

Dimitar Dimitrov
Department of Technology, Organization and Management of Transport
Todor Kableshkov University of Transport
Sofia, BULGARIA

Abstract

Network and information security training is fundamental for the security of information resources and especially for the management of real governance processes in the transport sector, including traffic management systems. This area is becoming more and more relevant as there is a tendency to increase malicious information events and incidents.

This article discusses and summarizes the main directions of the training in the new Master's Program “Network and Information Security” at Todor Kableshkov University of Transport - Sofia. The program is designed according to the European Union requirements for ensuring a high level of information systems and networks security. All major factors influencing the security of systems and networks, their auditing, increasing users' awareness and best practices in the field are taken in consideration.

Keywords - transport; network and information security; computer information systems; internet; education
SAFETY BELT – A CHANCE TO SURVIVE

Zoran Joshevski, Stoimko Zlatkovski
University St. Climent Ohridski Bitola
Makedonska Falanga 33, Bitola, Macedonia
zjosevski@yahoo.com

Pero Stefanoski
University American College Skopje
Skopje, Macedonia

Abstract

The problem concerning vehicle safety and the passengers in vehicles, dates since the very beginnings of the automobile industry. In order to increase safety in automobiles, various systems for active and passive safety are built in. Passive safety systems, such as safety belts and airbags, are in fact systems that restrict the driver’s movement. Their goal is to decrease the intensity of injuries in traffic accidents. The purpose of placing safety belts in vehicles is that, in case of a crash, or intensive deceleration, to prevent translator displacement and throwing the drivers body forward, hens hitting his head on the windscreen or the steering wheel.

In this paper, results of the research carried out in R.Macedonia, about the usage of safety belts by the drivers and passengers in vehicles, will be presented.

Keywords - safety systems; airbags; safety belts; windscreen
THE IMPORTANCE OF MEASURING SAFETY PERFORMANCE INDICATORS REVIEWING REPUBLIC OF SRPSKA’S CONDITIONS

Bojan Marić¹, Krsto Lipovac² Dragana Nenadić¹, Milan Tešić³
¹Faculty of Transport and Traffic Engineering, University of East Sarajevo, Doboj, Bosnia and Herzegovina
bojomaric@yahoo.com
²Faculty of Transport and Traffic Engineering, University of Belgrade, Belgrade, Serbia
³Agency for Traffic Safety of Republic of Srpska Banja Luka, Bosnia and Herzegovina

Abstract

The United Nations General Assembly passed a series of resolutions on global traffic safety, including the 2009 Resolution, setting out the Decade of Traffic Safety, from 2011 to 2020. The main goal of the Resolution is to reduce the number of people killed in traffic accidents by 50% compared to the forecasted number in 2020. In this regard, newer and more modern approaches to the establishment of traffic safety have been developed since the traditional, applied approach to determining the state of traffic safety (traffic accidents and their consequences) is not “human”. One of the modern approaches to determining the state of traffic safety that is developed is measuring the indicators of the safety performance of traffic. Traffic Safety Performance Indicators provide a picture of the current state of traffic safety (before someone fights), whose values combined with the consequences of traffic accidents can recognize in a very reliable way the key problems of traffic safety. The paper describes one segment of the modern approach to solving traffic safety problems; the situation regarding the measurement of indicators in the selected country (Serbia) is presented, and specific indicators related to the behavior of the participants in the traffic are described, and should be periodically measured, monitored and reported about. Accordingly, the current state of traffic safety in the Republic of Srpska, is what is done about Safety Performance Indicators (SPIs), will be presented in the paper.

Keywords - control; S-safety P-performance I-indicators; selected countrie
MOTORCYCLE SAFETY FEATURES, CONTEMPORARY ELEMENTS OF ACTIVE AND PASSIVE SAFETY

Dušan Mladenović, Mladen Marina, Dragan Sekulić
University of Belgrade
Faculty of Transport and Traffic Engineering, Vojvode Stepe 305
Department for road vehicles and vehicle dynamics
Belgrade, Serbia
d.mladenovic@sf.bg.ac.rs

Abstract

The World Health Organization (WHO) has identified motorcyclists along with pedestrians and cyclists as vulnerable road users; therefore more attention needs to be drawn towards these groups in order to reduce the fatality rate. However, this study will only be covering the situation when it comes to motorcycle riders. Given that the number of registered motorcycles is increasing both in the Republic of Serbia and the European Union, the possibility of the occurrence of more traffic accidents including motorcycles is also increasing. Although the number of registered motorcycles is rising, the number of motorcycles manufactured in the European Union countries is in constant decline. According to the survey conducted by the WHO, it is estimated that riding a motorcycle is up to 10 times more dangerous per kilometer and is about 20 times more dangerous per covered hour than when driving a passenger vehicle. The number of deaths of motorcyclists (death rate) in the European Union is in constant decline, and in the Republic of Serbia this number varies from year to year. This paper will deal with the systems of active and passive safety of motorcycles and motorcyclists in order to help establish a constant fall in motorcycle rider death rate in the Republic of Serbia.

Keywords - motorcyclists; active safety; passive safety
TRAINING OF CANDIDATES FOR DRIVERS IN TRAFFIC AND TRANSPORT IN MACEDONIA COMPARED TO EU STANDARDS AND DIRECTIVES

Elmir Mustafai
Consultant for traffic planning and development
Department for traffic and roads, Municipality of Tetovo
Tetovo, Macedonia
elmmus@yahoo.com

Merita Mustafai
State University of Tetovo, Faculty of applied sciences
Department for traffic and transportation engineering
Tetovo, Macedonia

Abstract
A motor vehicle in the traffic which performs transportation, can be managed by a person who meets the requirements set by the road traffic safety. The rules for driving licenses are essential elements of the common transport policy, they contribute to improving road safety, and facilitate the free movement of persons residing in EU Member State, other than the one who issues the license. Although progress has been achieved with the harmonization of driving license rules among Member States, there are significant differences in the rules for periodic renewal of licenses and for subcategories of vehicles that need to be harmonized more fully in order to contribute to the implementation of Community policies.

Traffic accidents are the leading cause of work-related deaths in industrialized countries. The EU Directives set the requirements for initial qualification and periodic training of professional drivers. The aim of this paper is to present the national regulations in the Republic of Macedonia regarding the training of beginner drivers and professional drivers, compared to the EU directives.

Keywords - traffic safety; transportation; training and research; education
PROPOSED MODEL OF LEADING TRAFFIC SAFETY NATIONAL AGENCY IN THE REPUBLIC OF MACEDONIA

Cvetanka Ristić
Secondary school of the city of Skopje Vlado Tasevski, III Makedonska brigade bb.
1000 Skopje, Republic of Macedonia
cvetankaristic@yahoo.com

Boro Ristić
Technical faculty of science
St.Kliment Ohridski University – Bitola, Makedonska falanga 33
7000 Bitola, Republic of Macedonia

Abstract

Traffic safety is a major issue problem for the most countries in the world. Highly developed countries and countries in transition and reforms take numerous measures to improve traffic safety by using all kind of different methods and practices. World Health Organization (WHO) and World Bank have given a recommendation to all the countries in the world to establish a leading national agency for traffic safety, in order to put up the level of traffic safety. The authors of this paper have thoroughly researched well established leading agencies for traffic safety and their activities, methods and practices for improving traffic safety. Therefore, in this paper we are presenting an adapted working model or organizational structure of the leading agency for traffic safety in the Republic of Macedonia. We hope that this will help the country to organize the traffic and transportation system, and put the traffic safety into priority.

Keywords - traffic safety; leading agency; model; organizational structure
TRANSPORT LOGISTICS
IDENTIFYING PARAMETERS OF LOGISTIC PERFORMANCE FOR DISTRIBUTION OF BEVERAGES IN MEDIUM ROUTES WITH MEDIUM SIZE TRANSPORTATION VEHICLES

Ema Berisha-Krasniqi¹, Ivo Dukoski², Ilir Doçi³, Muhamed Krasniqi¹, Njazi Selmani¹

¹College of Technical Applied Sciences “Tempulli”, Prishtina, Kosovo, ema@tempulli.org
²University of Bitola, Faculty of Technical Sciences, Bitola, Macedonia
³University of Prishtina, Faculty of Mechanical Engineering, Prishtina, Kosovo

Abstract

Technology development and the advancement of transportation vehicles have increased the volume of goods carried, the cooperation between companies, the fulfillment of customer requirements and communication between people. These trends have put many challenges and demands on logistics companies to provide better, faster, more efficient and safer services. Therefore, their focus and demand is to find the best methodology to make this possible by purchasing the best vehicles, selecting optimal travel routes, minimizing time, reducing costs and optimizing the distribution process based on different conditions that exist in the market - local and international. The paper is a study about beer distribution, by analyzing the influencing parameters of transport and logistics, in order to achieve the optimal results of the vehicles travel in pre-determined routes. In order to achieve the best values of certain transport parameters, data from the local company that deals with beer distribution was used. Certain measurements of the relevant parameters during transport have been made, such as: distances between distribution centers, the speeds achieved during transportation, time spent driving during transport, the amount of load transported, the various manipulative loading and unloading times. Also are presented the cost data - the relevant prices from the logistics sector.

Keywords – transportation; distribution; influential parameters; transportation vehicles; travel routes
DEVELOPMENT OF A NEW LOGISTICS INFORMATION SYSTEM IN A TRANSPORTATION COMPANY

Nikola Brković, Marko Vasiljević, Željko Stjepanović
Faculty of Transport and Traffic Engineering Doboj
Vojvode Mišića, 52
Doboj, Bosnia and Herzegovina
nikolabrkovic@hotmail.com

Abstract

Logistics information systems (LIS) are highly significant for the efficient management of any system, especially if a logistics subsystem in which the movement of goods is the dominant activity is involved. This paper demonstrates the basis of the development of a new logistics information system for the needs of an international transportation company. Previously, a research which pertained to the analysis of the management of the company at hand with a focus on the application of a logistics information system was conducted. The research demonstrated that the implementation of numerous autonomous maintenance systems and the use of the latest driving units yields larger savings. Regardless of the generated savings, the company still confronts expenses which are caused exclusively by the human factor in all five sectors of the company. In order to remedy the omissions under consideration, the company commenced the realization of the development of a unique information system which will unite all the sectors involved in the management of the transportation company into one whole. These sectors range from the organization of the transportation process to the sectors in charge of tracking even the lowest expenditures per driving unit. The paper shows how the functioning of the given LIS and the possibilities which are created by the development and implementation of the system.

Keywords – logistics information system; transport; cost
CONTEMPORARY MEANS FOR MANIPULATION IN THE CONTAINER TERMINALS

Ile Cvetanovski, Vaska Atanasova, Verica Danchevska, Cvetanka Cvetanovska
University St. Kliment Ohridski
Faculty of Technical Sciences, Makedonska Falanga 33
Bitola, Macedonia
ile.cvetanovski@tfb.uklo.edu.mk

Abstract

With the development of modern transport technologies, many innovative solutions were proposed for manipulating containers in container terminals. Container terminals represent spaces equipped with appropriate mechanization for fast and safe manipulation of containers. In large ports, road and railway nodes, distribution centers, as well as in the transport and transport centers, such container terminals are dimensioned and organized.

The purpose of these innovative solutions is to increase the participation of intermodal transport in the overall transport process. However, only few of the proposed solutions have a perspective for wider application and range of handling areas in container terminals. In this paper we present the characteristics and advantages of modern solutions when manipulating containers in container terminals.

Keywords – containers; container terminals; modern solutions
REVERSE LOGISTICS OF TEŠANJ – WASTE MANAGEMENT SYSTEM

Emir Galijašević, Zdravko Nunić, Asib Alihodžić
Faculty of Transport and Traffic Engineering Doboj
Bosnia and Herzegovina
emrgalijas94@gmail.com

Abstract

The modern society is based on tested strategies in all spheres of its existence. Those strategies are reflected in everything, among which we include the strategy of waste management systems which make the society profitable and sustainable. Adequate waste management represents one of the major challenges that all urban environments are facing. It is necessary to manage this system in a way that will provide additional values, enable selective separation and recycling. Unfortunately, in this region this is rare, or a small percentage of waste is recycled. Therefore, the purpose of this research is to analyze the current situation in waste management systems and green logistics in the municipality of Tešanj. The residents are part of the interest group, which in deed has a lot of influence on the efficiency of this system, so the emphasis in this research is precisely on that group. The process of gathering data is done selectively through a survey that was organized online. The analysis of the collected data confirmed that a large number of citizens take care of their waste, but also that there are certain problems which are reflected due to the absence of infrastructure, as well as the improvement of cooperation between the citizens and the utility company „RAD“ d.d. Tešanj with the municipality Tešanj as the local intermediator authority.

Keywords - waste management system; solid waste; logistics
USE OF PROTECTIVE EQUIPMENT AS A FACTOR FOR IMPROVING LOGISTIC PERFORMANCE
WORK SAFETY

Mladen Gavranović
University of East Sarajevo, Faculty of Transport and Traffic Engineering
Doboj Vojvode Mišića 52, 74000 Doboj, Bosnia and Herzegovina
gavranoviers@gmail.com

Enis Mulalić
Natron – Hayat d.o.o
74250 Maglaj, Bosnia and Herzegovina

Biljana Vranješ
University of Banja Luka, Faculty of Mechanical Engineering
S. Stepanovića 74, 78000 Banjaluka, Bosnia and Herzegovina

Abstract

Protective work equipment as a term is still used under the name “HTZ” - HTP (Hygiene-Technical Protection) equipment and refers to protective clothing, footwear, gloves, helmets, safety goggles, masks as well as to all other equipment that can be used to protect employees at work from injuries and infections. Employee protection, while performing and executing business tasks, is one of the highest priorities of each company. Using "HTZ" equipment increases the safety of employees, reduces the number of injuries and costs of the company itself. The aim of this research is to raise awareness among the employees themselves, about the importance of using "HTZ" equipment, which directly have influence for reducing the number of injuries at work. In this research, the HTZ equipment will be presented in detail as well as various statistical data on the inexperience of the same. The ultimate goal of the research is to stimulate workers for constant use of HTZ equipment during their work. The end result, in addition to improving logistic performance, is the safety of logistics activities and the process reflected in the reduction in the number of hurt and the reduction of company costs that could be used for some other investments and improvement work quality of the employees themselves.

Keywords - work safety; logistic performance; protective equipment; injuries
DETERMINATION OF STATISTICAL DISTRIBUTION OF INPUT PARAMETERS OF THE QUEUING SYSTEM IN THE STORAGE SYSTEM

Eldina Mahmutagić
Neri d.o.o, Maglaj, Bosnia and Herzegovina
mahmutagiceldina24@gmail.com

Željko Stević, Zdravko Božičković, Ranko Božičković
University of East Sarajevo
Faculty of Transport and Traffic Engineering Doboj, Bosnia and Herzegovina

Abstract

The ideal option in all business systems would be to have no standby time, for example that every user should be served immediately upon entering the system. This is impossible to realize because such systems due to the large capacity are economically unprofitable. The efficiency of the mass serving system has a significant impact on the overall efficiency of the systems or subsystems where is present. The research carried out in this paper deals with the definition statistical analysis of the input parameters of the two loading fronts from machine for paper production - paper machine four (PM4), which represents the largest production machine in Natron-Hayat. The research includes and analyzes the storage system of the Natron-Hayat Company, the PM4 warehouse group, where the arrival of the means of transport, the queues of waiting and the time of serving them depend on a number of factors. On the basis of the collected data on the arrival of the means of transport that were registered at the weighing station for loading into the PM4 warehouse and the loading time for each transport means, a statistical analysis of the intensity input flow and the intensity flow of service was performed. The research carried out in this paper is necessary for further calculation of parameters of the system of queuing systems and their adequate modeling.

Keywords - storage system; queuing systems; load
PLACE AND ROLE OF DANGEROUS GOODS
SAFETY ADVISOR

Milica Miličić, Tatjana Savković, Pavle Petka, Predrag Atanasković, Ivana Milenković
University of Novi Sad, Faculty of Technical Sciences
Department of Traffic Engineering, Trg Dositeja Obradovića 6,
21000 Novi Sad, Serbia
mmilica@uns.ac.rs

Abstract

The dangerous goods are the materials that their properties (toxicity, radiation risk, corrosive properties, combustion) or chemical reactions (explosiveness, flammability, corrosiveness, evaporability, solubility) during the production, transport, storage and handling can pose a risk to people, environment or cause damage to material goods. Due to these negative impacts, their transport must be organized according to certain regulations in order to minimise accident risks, or the consequences of accident have already occurred are kept to a minimum. Therefore, it is of particular importance to professionally train and qualify all persons involved in the transport of dangerous goods.

Keywords - dangerous goods; transport process; participant in the transport of dangerous goods; DGSA
MULTICRITERIA MODEL FOR THE SELECTION OF THE TRANSPORT SERVICE PROVIDER-SINGLE VALUED NEUTROSOPHIC NUMBER BASED APPROACH

Dragan Pamučar, Vesko Lukovac
University of defence in Belgrade, Military academy, Department of logistics, Belgrade, Serbia
dpamucar@gmail.com

Milena Vukić
The College of Hotel Management, Belgrade, Serbia

Abstract

The decision-making process requires, a priori, defining and fulfillment of certain factors, especially when it comes to complex areas such as transport management in companies. One of the most important items in the initial phase of the transport process that significantly influences its further flow is making the decision which transport provider is the most favorable. In this paper a model for evaluating and selecting a transport services provider based on single valued neutrosophic number (SVNN) is presented. Neutrosophic set concept represents a general platform that extends the concepts of classical sets, fuzzy sets, intuitionistic fuzzy sets, and an interval valued intuitionistic fuzzy sets. The application of the SVNN concept made a modification of DEMATEL methode (Decision Making Trial and Evaluation Laboratory Method) and proposed a model for ranking alternative solutions. SVNN-DEMATEL model defines the mutual effects of the provider's evaluation criteria, while in the second phase of the model alternative providers are evaluated and ranked. SVNN-DEMATEL model was tested on a hypothetical example of evaluation of five providers of transport services.

Keywords – multicriteria decision making; DEMATEL; single valued neutrosophic numbers; provider selection
ROUTE EVALUATION FOR HAZMAT TRANSPORTATION BASED ON BWM-EDAS METHODS

Marko Vasiljević, Branislavka Marković, Željko Stević
University of East Sarajevo, Faculty of Transport and Traffic Engineering Doboj, Bosnia and Herzegovina
drmarkovasiljevic@gmail.com

Nenad Vasiljević
Technical School Doboj,
Bosnia and Herzegovina

Abstract

The aim of this research is to determine the most suitable route for transport of dangerous goods, using methods of multi-criteria decision making. The evaluation is made among three routes based on five criteria using Best Worst Method (BWM) and Evaluation Based on Distance from Average Solution (EDAS) method. In this research we used BWM for the determination of weighted values of criteria, while EDAS method is used to determine the most suitable rout for transport of dangerous goods from Bijeljina to Derventa. The methods COPRAS, TOPSIS and SAW were used in order to check the stability of the proposed model and the obtained results. The sensitivity analysis showed the stability of the results, where alternatives do not change their ranks.

Keywords – dangerous goods; Multi-Criteria Decision Making; EDAS
PACKAGING OF MEDICAL AND CLINICAL WASTE IN PRESCRIBED PACKAGING

Bojan Ožegović, Siniša Sremac
Faculty of Technical Sciences, University of Novi Sad, Trg Dositeja Obradovića 6, Novi Sad, Serbia
bojanozegovic@outlook.com

Nataša Stojić
Faculty of environmental protection, Educons University
Vojvode Putnika 87
Sremska Kamenica, Serbia

Tanja Arsić
Traffic and Technical School, Cara Dušana 262, Zemun, Serbia

Jelena Hodak
Savhem, Alberta Tome 4, Novi Sad, Serbia

Abstract

In accordance with the problems of waste disposal in the world and also in the Republic of Serbia, medical and clinical waste is a constant problem related to public health, environment and transport. In order to adequately dispose the generated amount of medical and clinical waste, it is necessary to provide adequate packaging with the appropriate packaging process. Generated amount of medical and clinical waste in the territory of Serbia in 2013 is 2 034 984.8 kg. According to the degree of danger and the type of medical and clinical waste, it is first necessary to put waste into primary and then secondary packaging. The seriousness of this problem is seen both in Europe and world at large, thus in The European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR) there is a special chapter on emballage and packaging of dangerous materials and it states the procedure for packing medical and clinical waste in adequate packaging.

Keywords - medical and clinical waste; emballage and packaging; dangerous materials
URBAN TRANSPORT SYSTEMS
METRO TRAFFIC MANAGEMENT SCHEME 
BASED ON WAGONS TRAVELLING IN 
AUTONOMOUS MODE

Dimiter Dobrev  
Institute of Mathematics and Informatics  
Bulgarian Academy of Sciences  
Sofia, BULGARIA 
d@dobrev.com

Dimitar Dimitrov  
Department of Technology, Organization and Management of Transport  
Todor Kableshkov University of Transport  
Sofia, BULGARIA

Abstract

In traditional subway traffic management schemes, individual metro wagons are assembled in what is known as metro trains (consists) and these metro trains stop at each and every station. This publication presents a new traffic scheme whereby each wagon travels in a solitary and autonomous fashion. The scheme comprises two modes. The first one is intended for light traffic and reduces the waiting time for boarding passengers by a factor of four. In the other mode, which is designed for heavy traffic, wagons do not stop at all stations, which results in around 30 % of energy savings, shortens travel times by nearly 10 %, and increases the metro tube capacity by 17 %. The new scheme is illustrated in a computer simulation developed with the Prolog programming language.

Keywords - metro system; metro wagon; traffic; energy saving; throughput capacity; computer simulation
TOWARD SUSTAINABLE URBAN MOBILITY: 
WHAT IS THE MAIN DISADVANTAGE IN SKOPJE

Nikola Krstanoski
University St. Kliment Ohridski, Faculty for Technical Sciences
Department for Traffic and Transport Engineering
Bitola, Republic of Macedonia
nikola.krstanoski@tfb.uklo.edu.mk

Abstract

The City of Skopje adopted its first Plan for Sustainable Mobility (SUMP) in 2011. Many measures and actions in line with recommendations from the SUMP has been implemented over the last seven years, such as the renewal of the public transport bus fleet, introduction of AVL and real time passenger information system, implementation of smart ticketing system, upgrading of the bicycle infrastructure, establishment of Center for traffic control in real time, etc. However, there is one single measure, that has the greatest potential and might have the biggest impact toward achievement of better sustainability and livability in Skopje, and yet it is missing. In this article, the author is building a case that Skopje badly needs a high performance, high speed, high capacity mode of public transport. The presented data on Skopje’s general and mobility characteristics show a strong support for such statement.

Keywords - sustainable mobility; public transport; modal choice
ANALYSIS OF HEADWAY DISTURBANCE IN URBAN PUBLIC TRANSPORT – CASE STUDY OF NOVI SAD

Pavle Pitka, Milan Simeunović, Tatjana Savković, Milja Simeunović, Ivan Škiljaica
Department of Traffic Engineering
Faculty of Technical Sciences, University of Novi Sad, Trg D. Obradovića 6
Novi Sad, Serbia
pitka@uns.ac.rs

Abstract

Quality of service of Urban Public Transport (UPT) of passengers, among other things, depends on the degree of uniformity of headway of vehicles. Determination of the degree of headway uniformity of vehicles is a complex process which demands simultaneous research in all the vehicles on a certain line, along with obligatory time synchronization of the data. Within this paper the results of research of headway uniformity in UPT in Novi Sad on the number 2 line has been shown. By using statistical and analytical parameters quantification of headway uniformity has been done together with the analysis of propagation of headway disturbance within the system.

Keywords – headway; uniformity; urban public transport
A Public Service Contract (PSO) contract defines a complete set of relations between the state as the side ordering the service and operator as the side providing the service, which makes contract draw up and management to present rather specific and delicate processes. It has been 10 years since introduction of regulation 1370/2007/EC and initial experiences indicate significant differences regarding the approach to contract draw up and the extent of its implementation. The key reasons for such a development seem to be the environment and circumstances of a country introducing a PSO. Without the previous understanding of environment and circumstances in which a PSO contract is being developed, it is not possible to understand the aims, quality and conduction of the contract. In this paper, a sublimation of experiences of selected counties in context of contract’s draw up, set up and processing of its aims, contents, allocation, surcharge and payment policy, duration and other elements, is given.

Keywords – PSO contract; passenger transport; countries experiences
ANALYSIS OF PASSENGER WAITING TIME ON
PUBLIC TRANSPORTATION LINE WITH LONGER
HEADWAY

Dejan Radivojev, Milan Simeunović
Department of Traffic Engineering
University of Novi Sad, Faculty of Technical Sciences,
Trg Dositeja Obradovića 6
Novi Sad, Republic of Serbia
radivojevdejan@uns.ac.rs

Abstract

The passengers’ behavior on suburban public transport lines is significantly different from the passengers’ behavior/the one on urban lines. According to the research results on the Novi Sad network lines, the list of passengers on urban lines where headways are under 15 minutes is random without previous consultation scheduled - stochastic. On the other hand, on suburban public transport lines when the headways over 25 minutes the passenger boarding is according to schedule, in effect the highest intensity of arrivals is immediately before leaving the vehicle. The aim of this paper is to determine different waiting time of a passenger on one public transport line when headway is over 25 minutes. The paper also presents real results obtained by measuring waiting time of passengers on one suburban line.

Keywords - passenger waiting time; suburban line; headway; bus stop
THE IMPORTANCE OF THE SERVICE QUALITY OF PUBLIC TRANSPORT WITH THE AIM OF INCREASING TRAFFIC ACCESSIBILITY

Milan Stanković¹, Pavle Gladović², Dejan Bogićević¹, Vladimir Popović¹

¹College of Applied Technical Sciences, Niš
College of Applied Technical Sciences, Aleksandra Medvedeva 20
Niš, Serbia
milanst08@gmail.com

²Faculty of Technical Sciences, University of Novi Sad
Faculty of Technical Sciences, Trg Dositeja Obradovica 6
Novi Sad, Serbia

Abstract

The satisfaction of customer needs and demands is a means to achieve customer satisfaction and to manage transportation requirements. The perceptions of the service quality of public transport by the user of the subjective character, so the user actually behaves according to its assessment of the suitability of the transport, which is generally not objective. Accessibility in the function of public transport strengthens the economy, deals with the conservation of energy and resources, increases the value and real estate development, mobility in small urban and rural communities…, and all this contributes to better quality of life. The subject of this paper is tracking the service quality in public transport in Nis, in such a way that by answering transport users, answers to the questions relevant for further analysis of the quality of the public transport system in order to increase traffic accessibility will be obtained.

Keywords – traffic accessibility; public transport; quality of service
RAILWAY TRANSPORT
APPLICATION OF FUZZY AHP APPROACH ASSESSMENT OF CRITERIA FOR THE EVALUATION OF EFFICIENCY OF RAILWAY UNDERTAKINGS

Aleksandar Blagojević
College of Applied and Legal Sciences “Prometej” Knjaza Miloša 10a, 51000 Banja Luka, B&H
aleksandar.blagojevic23@gmail.com

Iskra Stojanova
UN Environment, Key DimitarVlahov 4, 1000 Skopje, Macedonija

Boro Dakić
Railways of Republic of Srpska, Svetog Save 71, 74000 Doboj, B&H

Života Đorđević
Railways of Serbia, Nemanjina 6, 11000 Belgrad, Serbia

Abstract

The main objective of the European policy of rail transport is the development of a single railway area. The opening of railway sector to market competition impose that railway undertakings behave like any other modern enterprises in other markets and in other industries. It means, they must constantly develop and maintain competitive advantages, and be better than others. In today's very intense competition conditions this is the most difficult to achieve. The railway undertakings are challenged to find optimal solutions to operate efficiently and effectively, in order not only to survive on the transport market, but also to develop and maintain a competitive advantage. A wide range of criteria can be studied when it comes to the efficiency of railway undertakings. In most cases there are several criteria that are often mutually conflicting. The aim of this study is to define and evaluate the criteria that influence the efficiency of railway undertakings and increasing of their competitive ability and to propose a model for the evaluation of the effectiveness and efficiency of railway undertakings in order to increase the competitive ability. To solve the problem of indicators selection, it was experimented with one of the most used methods for making decisions today - Fuzzy analytic hierarchy process (FAHP).

Keywords - railway undertaking; efficiency; criteria; fuzzy AHP
PROPOSAL OF THE METHODOLOGY FOR QUALITY ASSESSMENT OF THE TRANSPORT ROUTES IN RAILWAY PASSENGER TRANSPORT

Milan Dedík, Jozef Gašparík, Matúš Dlugoš
University of Žilina
Department of Railway transport, Univerzitná 1, 01026 Žilina
Žilina, Slovakia
milan.dedik@fpedas.uniza.sk

Abstract

Nowadays the passengers would like to be transported in the best possible level of quality. Therefore is very important to create a certain methodology for quality assessment of particular transport relations. The paper is focused on analysis and rating of the quality of the passenger railway transport. At first is explained quality assessment including the description of the quality indicators, which are decisive in the railway passenger transport. Subsequently is proposed the new methodology for these quality indicators’ rating and total quality assessment of each transport routes. Consequently the methodology is tested for chosen transport routes and is concerned with monitoring quality of the transport routes in the railway network.

Keywords - railway passenger transport; quality indicators; quality assessment; transport routes
COMPARISON OF ARTIFICIAL INTELLIGENCE MODELS FOR DIMENSIONING OF TRANSPORT CAPACITIES IN RAILWAY FREIGHT TRANSPORT

Kire Dimanoski  
Faculty of Technical Science, University St. KlimentOhridski,  
Bitola, Macedonia  
kdimanoski@yahoo.com

Gordan Stojic  
Faculty of Technical Science, Novi Sad University,  
Novi Sad, Serbia

Gligorche Vrtanoski  
Mechanical Faculty, University Ss. Cyril and Methodius,  
Skopje, Macedonia

Abstract

The available capacity of the rail freight and the market demand are determining their planning and allocation. The planning and allocation is a very complex process that directly affects the efficiency and effectiveness of the rail transport, and by that, the efficiency and effectiveness of the economy.

Within this paper in order to achieve the objective a Fuzzy logics and Neural networks model were designed based on the theory of Artificial Intelligence, such as: Model for dimensioning capacity in freight transport by applying Fuzzy logic model (FL) and Hybrid Neuro - Fuzzy concept (HNF).

Produced models will allow delivering operational (capacity planning by demand for transport market) and strategic decisions (predicting demand for transporting facilities in the future). The testing of the models is applied to the example of Macedonian Railways Transport JSC (MRTJSC) railway operator which core business is the transportation of passengers and goods in domestic and international markets. After which both models were compared and the possible usage was analyzed.

Keywords - modelling; dimensioning; railway freight wagons; fuzzy logic; neural networks
SERVICE QUALITY INDICATORS IN MODELS AT RAILWAY PASSENGER TRANSPORT: A BRIEFLITERATURE REVIEW

Dragan Đorđević¹, Gordan Stojić², Snežana Mladenović³,
Ana Vulević¹
¹Institute of Transportation CIP
6/IV Nemanjina Street,
Belgrade 11000, Serbia,
dragandjordjevic@hotmail.com
²University of Novi Sad, Faculty of Technical Sciences,
6 Trg Dositeja Obradovica Street,
Novi Sad 21000, Serbia
³University of Belgrade, Faculty of Transport and Traffic Engineering,
305 Vojvode Stepe Street,
Belgrade 11000, Serbia

Abstract

It has become very popular lately to focus on implications that could be the policy or further investment which affect service quality in the railway passenger transport. Knowing and understanding passengers’ satisfaction with railway passenger system is of crucial importance for rail transport operation companies if they want to apply their actions in the right direction. These concerns for the services need to be done with the analysis of the perceptions directly expressed by the passengers. The increasing literature in the field of service quality for the railway passenger transport shows an increasing concern for this topic. Because of that, the main goal of this paper is to present different ways of measuring and monitoring service quality. In the conclusion, it can be said that service quality has positively influenced the way journey satisfaction can be controlled and improved and the manner of introducing new strategies for the existing railway passengers as well as the new ones.

Keywords - service quality; passenger satisfaction; railway transport; modelling
SYSTEM SAFETY APPROACH AND ITS APPLICATION IN RAILWAY TRANSPORT UNDERTAKING MANAGEMENT

Nikolay Georgiev
Todor Kableshkov University of Transport
Faculty of Transport Management, 158 Geo Milev Str
Sofia, Bulgaria
ngeorgiev60@gmail.com

Abstract

Each transport undertaking is a complex "technological" system operating under the conditions and influence of a range of technical, technological, social, economic and even political factors. In distinction from many other human activities, the technical exploitation in the railway undertaking (infrastructure manager, railway carrier) is characterized by a set of particularities which must be taken into account when considering the problems of its management, especially including those in the field of operating safety. In the light of these particularities, it should be noted that the proper considering and complex understanding the characteristics of every single subsystem of the railway undertaking is a very important condition for achieving a reliable and safe technical exploitation. This necessitates a choice (and adaptation to the specifics of technical exploitation in the railway undertakings) of a new approach towards the analysis of the operational reliability and safety which is based on the system approach and basically in line with the principle: the greater the losses of failures of a technological object are, the higher the minimum acceptable level of its reliability is. This article discusses the nature and specifics of the system approach to operating safety (system safety) and its applicability to the management of railway undertakings.

Keywords – railway transport; operating safety; system safety; safety management
Abstract

Regulatory bodies, in order to achieve better quality of market monitoring and harmonization of recorded parameters, mutually exchanges the information through different forms of cooperation. One of the attempts to compare the market situation through recording the performance of the rail systems is the Report "2015 European Performance Index Railway" made by the American consulting company Boston Consulting Group (hereinafter BCG). The aim of the research was the creation of a unique form for performance measurement, which would comprehensively demonstrate the level of development of railway systems. With this intention, the BCG created RPI (Rail Performance Index) which represents a collective performance assessment of the railway systems. The BCG has shown that value of RPI (or railway systems performance) is in correlation with the level of public investment in the railway sector, as well as with percentage of allocated grants for infrastructure managers. This paper presents a fuzzy system which aims to predict RPI index, depending on the two inputs: the normalized value of public investment per capita and the percentage of allocation of subsidies for infrastructure managers. Input and output variables and their linguistic values were projected in accordance with data taken from the BCG report for 2015. Projected fuzzy system had been used to predict the RPI index based on multiple combinations of input data. The results of the analysis are shown tabular and graphically.

Keywords - Boston Consulting Group; RPI index; railway system performance; fuzzy systems; performance prediction
REDUCING THE PASS-BY NOISE
OF EXISTING FREIGHT WAGONS

Bas Leermakers, Dragan Nešić
Intergovernmental Organisation for International Carriage by Rail (OTIF)
Technical Interoperability Department, Gryphenhübeliweg 30
Bern, Switzerland
Bas.Leermakers@otif.org

Abstract

Urbanisation and globalisation has intensified traffic. More traffic means more noise and rail freight is an important noise contributor. Research shows that exposure to excessive noise affects people’s health and for this reason, the railway sector and the legislator are aiming to reduce, in particular, rail freight noise. Some European states, such as Germany and Switzerland, have taken national measures to reduce rail freight noise by banning the use of noisy freight wagons from 2020/2021. In order to avoid the negative effects of unilateral measures as much as possible, the European Commission and the EU Agency for Railways intend to develop a coordinated approach across the EU. The OTIF Secretariat is following these developments closely in order to ensure consistency between EU noise abatement policies and COTIF international railway law [1].

After describing what the causes of rail freight noise problems are and what the possible solutions might be, this paper proposes a possible way forward that is in accordance with the legal provisions of COTIF and would enable noise abatement on specific railway corridors. In particular, it suggests that noisy wagons should not be prohibited, but that some lines or corridors should be declared compatible with silent wagons only.

Keywords – rail freight noise; noise abatement; coordinated approach; retrofitting; silent freight corridors
SIMULATION OF RAILWAY OPERATIONS

Sanjin Milinković, Milan Marković, Slavko Veskić
University of Belgrade
Faculty of Traffic and Transport Engineering
Vojvode Stepe 305, Belgrade, Serbia
s.milinkovic@sf.bg.ac.rs

Gordan Stojić
University of Novi Sad - Faculty of Technical Sciences,
Trg Dositeja Obradovica 6, Novi Sad, Serbia

Abstract

Simulation modelling is often a first alternative when choosing a model for complex railway systems analysis. Railway technology and operations are difficult to analyze by classical analytical approach. Therefore, creating a simulation model of a technology operations in railway stations, or moving of trains on a selected network, or similar complex railway systems, is enabling researchers to efficiently and quickly analyze those systems. Today, a computer simulation model of a railway system can be developed fast and with much details, as new simulation techniques and specialized computer applications are developed as user friendly. Experimenting with a rail simulation model is essential when preparing some operational, tactical or strategic plans for railways. The paper gives a review of a contemporary simulation approaches, techniques and comparation of different simulation methods fora systems of a trains movement on a rail network.

Keywords - railway transport and traffic; simulation modelling; railway simulation
Train braking distance is one of basic precondition for safety of railway system. There are many external factors that affect braking distance which can cause changes in its length. For that purpose, fuzzy logic system based on experience is proposed.

In this paper, we propose a fuzzy logic system that selects the most likely control rule from a set of control rules. Input variables are speed, grade, braking force and braking equipment response time. The aim of this paper is to determine train braking distance and difference between calculated braking distance and data from the field. Output variable is provided by a fuzzy logic system. Fuzzy logic system is simulated using Matlab in fuzzy logic toolbox. FLS is tested on different train categories and different conditions on the field.

Keywords - fuzzy logic; Matlab; train braking distance
THE CONCEPT OF RISK MANAGEMENT IN THE RAILWAY SECTOR

Miroslav Prokić, Branislav Bošković
University of Belgrade
Faculty of Transport and Traffic Engineering, Vojvode Stepe 305
Belgrade, Serbia
miroslav.miki22@gmail.com

Abstract

New transport policy of the railway sector in Europe is aimed at creating a unified and open transport market, establishing an interoperable railway network and achieving greater competitiveness on it. The result is the emergence of private rail operators and a large number of new procedures that have not been implemented so far. In line with the above, a new approach to safety in the railway sector has been introduced in order to maintain and improve the existing level of safety. The basis of this new approach to safety is the application of risk management concept. Concept of risk management provides proactive approach in order to prevent the occurrence of unwanted events. This paper presents the current ambience in the rail sector, the reasons for the introduction of the concept of risk management, the legislative framework and the process of risk management itself, explaining all processes and terms that are necessary for understanding the concept.

Keywords – safety; interoperability; risk management
FACTORS OF COMPETITIVENESS IN THE RAIL FREIGHT TRANSPORT MARKET: CASE OF CORRIDOR X

Miloš Stanojević, Branislav Bošković, Mirjana Bugarinović
University of Belgrade
Faculty of Transport and Traffic Engineering, Vojvode Stepe 305
Belgrade, Serbia
miloss19g70@gmail.com

Abstract

Following its recent transportation policies, EU has initiated a strong development of Pan-European Corridor IV and introduced it to the RFC policy (making it Rail Freight Corridor 7), a direct competitor of Pan-European Corridor X. Luckily, Chinese state owned - as well as private - investments in Greek ports present an unexpected opportunity for Corridor X to catch-up with the development and to re-establish itself as an important partner on the EU transport market. The goal of this paper is to disclose factors of corridor competitiveness from the group of factors such as the time of transport, price, quality of the service, capacity, access charges etc. Afterwards, their mutual influence will be discussed, and the effect that they have to the corridor’s overall competitiveness. Paper analyses methods for determination of relevant set of factors, and their final evaluation. Comparative analysis is then used to discuss the present state of competitiveness of Corridor X, in relation to Corridor IV, with the main goal of attracting new cargo flows into the network, by mostly „conquering“ them from the eastern, neighbouring rival Corridor IV.

Keywords – competitiveness; Corridor X; railway market
LEVEL CROSSING RELIABILITY USING FUZZY
FAULT TREE ANALYSIS

Goran Tričković, Milan Milosavljević, Zoran Bundalo, Marko Bursač
The school of railway applied studies
Zdravka Čelara 14
11000 Belgrade, Serbia
tricko86@gmail.com

Abstract

Fault tree analysis (FTA) is one of the basic and most used methods for safety and reliability analysis of technical systems. This method is especially suitable for analysis system, which failures can cause serious consequences that affect on human lives and environment.

Level crossing systems constitute one of the most important sources of accidents in the railroad domain. By using the technique we proposed herein, values are transformed into the fuzzy numbers to give a realistic estimate of failure possibility of a basic event in FTA. The aim of this paper was to form a model which can identify scenarios and events that have the most affect on unwanted top event. This can lead to reduce number of accidents on level crossing. Model was tested for one level crossing in Pirot for basic top event “Passing the train by the unsecured level crossing”.

Keywords - fault tree analysis; level crossing; fuzzy
INDUSI AUTOSTOP SYSTEM TYPE RAS 8385
SAFETY SOLUTION FOR CONVENTIONAL RAIL

Mia Viduka, Darko Barišić
ALTPRO
Velika cesta 41, 10020 Zagreb
mia.viduka@altpro.hr

Abstract

INDUSI (Punktförmige Zugbeeinflussung - PZB) is the most widespread automatic train stop system in the world. It has been installed on over 75 000 km of railway track just on the conventional European Railways (excluding, private operators and metro railways around the world). One of the reasons for its success is the fact that it is a standard automatic train stop system in the technologically most developed railway in the world - Deutsche Bahn. The paper will demonstrate the functionality, availability, reliability of automatic train stop system and describe some of the applications in a variety of railway signalling systems. ALTPRO as a company with extensive experience in the development, manufacturing and maintenance of all INDUSI (PZB) ATPS systems will display several modernization projects of the system and show why INDUSI, due to its structure and basic concepts, currently fits best into all modern railway signalling systems.

Keywords - ATP; PZB; INDUSI
LIBERALIZATION OF RAILWAY PASSENGER TRANSPORT MARKET AND ITS IMPACT TO TRANSPORT COMPANIES

Martin Vojtek, Zdenka Záhumenská, Martin Kendra, Jozef Gašparík
University of Žilina
Department of Railway transport, Univerzitná 1, 01026 Žilina, Slovakia
martin.vojtek@fpedas.uniza.sk

Abstract

Market liberalization is a great contemporary trend in many fields of economy. Liberalized transport market, where the transport demand is meeting with transport offer, is evolving dynamically. Private railway passenger operators want to increase their market share together with national railway passenger transport companies therefore the quality of passenger transportation is getting higher, which positively influences the attractiveness of railway passenger transport. The article is focused on these current trends of liberalization in railway passenger transport market. From operational and economical point of view, there are described some ways, how to make the railway passenger transport system more effective and make the entire transport system more attractive for traveling public.

Keywords - transport market; liberalization; railway transport; passenger transportation