



Transport infrastructure and systems in a changing world: towards sustainable mobility planning

Matteo Ignaccolo^{1*}, Michela Tiboni²

¹ *AIIT President, Full Professor of Transport Planning, University of Catania*

² *AIIT Director of Studies and Research Center, Full Professor of Town and Regional Planning, University of Brescia*

Editorial

The special issue “*Transport infrastructure and systems in a changing world: towards sustainable mobility planning*” stems from the AIIT 2nd International Congress on Transport Infrastructure and Systems in a changing world (TIS ROMA 2019), which was held in Rome on 23rd-24th September 2019 (<https://tisroma.aiit.it/>). It was organized by AIIT, the Italian Association for Traffic and Transport Engineering, and hosted by ACI, Automobile Club d’Italia. The aim of the conference was to promote the knowledge of new trends of development of mobility systems and transport infrastructures “towards a more sustainable, reliable and smarter mobility”.

TIS Roma 2019 aimed at providing a forum for discussion, interactions and exchange among researchers, scientists and engineers whose fields of interest concern transport and infrastructure engineering.

The opening ceremony of the congress, introduced by Matteo Ignaccolo, Chairman of the Conference and AIIT President, Full Professor of transport planning at the University of Catania (Italy), was characterized by a very interesting Opening Lecture by Christopher Zegras, Professor of Mobility and Urban Planning, MIT Boston (USA).

How can we enhance mobility’s contribution to human development while reducing or eliminating the negative impacts that modern mobility systems impose on us, our ecosystems, and future generations? That is, how can we design and develop mobility systems that contribute to sustainable places?

Christopher Zegras’s work focuses on three broad, inter-related areas critical to answering the previous question:

- 1) improving our understanding of the dynamic relationships between human behavior and the built, social, and natural environments;
- 2) devising and demonstrating new planning approaches, with the goal of producing more robust strategies for sustainability in the face of uncertainty; and

* Corresponding author: Matteo Ignaccolo (matteo.ignaccolo@unict.it)

- 3) identifying viable pathways, through the complex institutional settings of the modern metropolis, to implement change.

He also explores the role of mobile communication and computation technologies as a new data source for estimating and validating models, as a tool for changing behaviors within the mobility system itself, and as a way to improve citizen engagement in planning processes.

Indeed his lecture for TIS Rome 2019 was about “*Digitalization and the Future of Mobility*”.

The discussion of the lesson was made by Maurizio Tira, SIU President, Rector of the University of Brescia and Full Professor of Town and Regional Planning. Expert Member of the European Transport Safety Council since 1999, where he chaired two working parties on “Evaluation of road safety policies” and “Road safety policy integration”, Maurizio Tira is an Expert member in two working parties of OECD-International Transport Forum about “Pedestrian safety, Urban space and health” and “Cycling safety”.

Then the congress focused on important research topics related both to Transport Systems and Infrastructure. 135 papers were presented in 24 parallel sessions with participants from 33 countries.

All the papers were peer-reviewed before being approved for presentation at the conference. The majority of them was published in the volume “*Transport Infrastructure and systems in a changing world. Towards a more sustainable, reliable and smarter mobility. TIS Roma 2019 Conference Proceedings*”, Edited by Matteo Ignaccolo and Michela Tiboni, Transportation Research Procedia, Elsevier, 2020”, and 19 papers were selected to be part of two special issues of “European Transport \ Trasporti Europei”.

This special issue focuses on new researches on transport systems towards sustainable mobility. Achieving sustainable mobility is possible through the combination of clear planning strategies to allow both high-quality accessibility and a high-quality environment. Adequate policies and sound evaluation tools and methods able to assess them are necessary to aid decision-making towards a more sustainable mobility.

Based on this premise, 9 papers compose the volume, with studies on sustainable urban mobility planning.

Stefanos Tsigdinos, Yannis Paraskevopoulos, Maria Latinopoulou and Maria Andrakakou, with their paper “*What about a different road network hierarchy? New perspectives towards sustainable mobility: the case of Thessaloniki, Greece*”, aim at creating, working on the case study of Thessaloniki in Greece, a methodological framework for re-organizing the main road network hierarchy of a metropolitan city, classifying the road network into categories based on position in the network, their topology, their connectivity, their urban characteristics and the existence of bus lines or cycling routes along with their current classification.

We find this approach based on a different road network hierarchy in the paper “*Sustainable Urban Mobility Plans (SUMPs) and Urban Sustainable Islands (USIs)*” Enrico Pagliari and Lucio Quaglia illustrate a Proposal for legislation to enhance the mobility of vulnerable users (pedestrians and cyclists) by improving the SUMPs through the implementation of USIs on the local road network of cities.

The paper describes a possible ideal solution to the problem of high accident rates involving soft mobility (pedestrians and cyclists) in urban areas. A solution based on the reorganization/reclassification of urban roads in two levels: a main urban road network for motor vehicles and a local urban road network for vulnerable users.

The authors propose to organize the local urban road network in a number of USIs, with pedestrians coming first and motor vehicles being ‘unwelcome guests’. On the other hand, the main urban road network is to be used by motor vehicles to move from one side of the city to another, whereas pedestrians and cyclists can travel only on protected and reserved paths.

With the paper “***Measuring Pedestrian Accessibility to Public Transport in Urban Areas: a GIS-based Discretisation Approach***”, Barbara Caselli, Silvia Rossetti, Michela Tiboni, David Vetturi and Michele Zazzi submit a GIS-based approach in assessing pedestrian accessibility in urban areas, with a focus on accessibility to public transport stops and stations (nodes).

A methodology which provides a support in the decision-making process, with the dual aim of encouraging sustainable and non-motorised mobility and of improving public transport attractiveness, and represents an attempt to set up integrated approaches to urban planning and mobility planning.

The approach is applied to the case study of some metro stations in the city of Brescia, focusing on the different results obtained for the different urban forms that constitute the city (the modern city with open urban forms, the historical city centre and a residential neighbourhood), and a first comparison with similar results that can be obtained through vector-based tools that create isochrones from the road graph is provided.

We can find the topic of public transport service quality in different cities (Bristol, Brescia and Madrid) in two papers.

The first is “***Travel experience on board urban buses: a comparison between Bristol and Brescia***” by Michela Bonera, Giulio Maternini, Graham Parkhurst, Daniela Paddeu, William Clayton and David Vetturi.

The paper deals with a comparative investigation of two different contexts, Bristol (UK) and Brescia (IT), by analyzing the quality of time spent on board urban buses. The aim is to identify relationships between objective factors and users’ perceptions, and to pinpoint similarities and differences between the two contexts. Furthermore, Travel Experience Indices have been developed to provide a quantitative evaluation of the travel experience.

We can find a similar goal in the work “***Capturing the differences in perceiving service quality of metro passengers of Madrid***” by Laura Eboli, Carmen Forciniti and Gabriella Mazzulla, where the authors try to verify the suitability of a particular and not common kind of survey performed for assessing the service quality levels of the metro system of Madrid (Spain), and characterized by the subdivision of a list of service attributes among sub-samples of users, in order to save time and fatigue in compiling the questionnaire.

Other topics are microsimulation and evaluation frameworks for port sustainable planning and improved operations.

The terminal operating system (TOS) used in container terminals and its improvement with better functionalities and their optimization, in order to increase the efficiency of a

port, is the topic of the paper “**Modelling the performance of port terminals using microsimulation**”. Miguel Hervás-Peralta, Tomislav Rožić, Sara Poveda-Reyes, Francisco Enrique Santarremigia, Juan-Pascual Pastor-Ferrando and Gemma Dolores Molero analyse by simulation how the improvement of the most influential TOS functionalities affects the operational and the environmental performance of a container terminal, showing that modifications to the TOS can improve certain operational aspects, such as the number of containers handled, the occupation of the storage yard, and the dwell times, but with not significant improvements in energy consumption and carbon footprint. So further developments should address this issue by modifying other TOS functionalities in order to obtain both operational and environmental improvements at the terminal.

In the same thematic area, Gianfranco Fancello, Patrizia Serra, Alessandra Schintu and Andrea Zoratti, with their paper “**Performance evaluation of a tracking system for intermodal traffic: an experimentation in the Tyrrhenian area**”, describe the results of a real-life tracking experimentation (using the GSM network for data connection and geographical position detection) carried out in the Tyrrhenian area in order to evaluate the performance of a state-of-art tracking system to effectively monitor Ro-Ro freight units moving along intermodal chains, and to get an objective view of the intermodal chains currently connecting the two main Italian islands to the mainland. The paper provides a discussion of the main detected limitations, along with some possible solutions to overcome them.

Matteo Ignaccolo, Giuseppe Inturri, Nadia Giuffrida, Michela Le Pira, Vincenza Torrisi and Giovanni Calabrò, with their work “**A step towards walkable environments: spatial analysis of pedestrian compatibility in an urban context**”, present a procedure based on a spatial analysis to assess the pedestrian compatibility of streets in an urban area. The aim is to provide decision-makers with a planning-support method that can aid them to decide the priority of investments, based on street pedestrian compatibility. With a GIS-based vector-model they worked on the case study of Acireale, a small town of 50,000 inhabitants in Sicily (Italy), characterized by a high touristic vocation and a predominant use of private vehicles for daily urban trips.

“**Evaluation Tools for Transport Infrastructures: Social Return On Investments**” is the topic of the paper proposed by Elisabetta Venezia and Fabio Pizzutilo, where the authors analyse the Social Return On Investment (SROI) as a form of evaluation that contributes to a wider analysis of investments. The method uses monetary values to represent the social and economic results of infrastructure investments, by calculating the impact created for each euro invested in the project and expressing this impact in the form of a ratio. However, the emphasis is more on creating economic and environmentally sustainable values than on the financial aspect and the authors verified the empirical applicability of SROI for the evaluation of projects in the transport sector, discussing a case study related to the evaluation of a rail services renovation plan aimed at modernizing a local rolling stock.

By presenting either new methods or proofs of concept via relevant case studies, the papers intend to increase the knowledge pave the way for further research on planning and designing sustainable transport systems.

Acknowledgements

TIS ROMA 2019 chairs and the organizing committee would like to take this opportunity and express their gratitude to the scientific committee, to the contributors for their papers and presentations at the event, to the chairs of the sessions, and to the reviewers for their efforts and hard work for making the conference successful and for making possible the edition of these two special issues.

References

Ignaccolo, M., Tiboni, M., 2020. Transport Infrastructure and systems in a changing world. Towards a more sustainable, reliable and smarter mobility. TIS Roma 2019 Conference Proceedings, Transportation Research Procedia, Volume 45, <https://doi.org/10.1016/j.trpro.2020.02.055>

Tira, M., 2018. A safer mobility for a better town: The need of new concepts to promote walking and cycling. Town and Infrastructure Planning for Safety and Urban Quality - Proceedings of the 23rd International Conference on Living and Walking in Cities, LWC 2017

Rossetti, S., Tiboni, M., Tira, M., 2014. Road safety in Italy: An assessment of the current situation and the priorities of intervention, Periodica Polytechnica Transportation Engineering

Yun, H.Y., Zegras, C., Palencia Arreola, D.H., 2019. "Digitalizing Walkability": Comparing Smartphone-Based and Web-Based Approaches to Measuring Neighborhood Walkability in Singapore. Journal of Urban Technology, <https://doi.org/10.1080/10630732.2019.1625016>

Zhao, F., Ghorpade, A., Pereira, F. C., Zegras, C., Ben-akiva, M., "Stop detection in smartphone based travel surveys", Transportation Research Procedia, Special issue on Transport Survey Methods: Embracing Behavioural and Technological Changes, Vol. 11, pages 218-226.