Research project summary

R. ROSSETTI*

*Department of Economics, University of Bologna, Piazza Scaravilli 2, 40126 Bologna, Italy

My project "Smart Mobility Hubs: for sustainable and integrated mobility" is part of a research framework already initiated by my supervisor, Professor Roberto Patuelli of the University of Bologna, and a European team of researchers working on the SMARTHUBS project, which is an example of the development and application of methods and tools for mobility hubs, dedicated places on the road where citizens can choose between different shared and sustainable mobility options. Smart Mobility Hubs (SMHs) are central components of transport networks, particularly multilayer and multimodal. As a result, the resilience of the entire network increases, as users can complete their journey even in the event of disruptions, hazardous circumstances, or extreme conditions. In this regard, SMHs enable the creation of and transition to more resilient, accessible, and sustainable transport networks. By combining different modes, particularly those of public transport and shared mobility, SMHs reduce the environmental impact of the transport sector and help create sustainable, smart, and more liveable cities. They also represent an opportunity to reduce social inequalities, distribute resources and services more evenly, and support public policies aimed at accelerating the transition to sustainable urban development. Research on SMHs and their implementation is interdisciplinary, involving topics from different fields (economic, environmental, social, engineering and policy). The project aims to contribute to the specific objectives of PON R&I 2014-2021, by offering a Sustainable Mobility, more competitive and cost-effective for the community, stakeholders, and businesses.

The development of my research will result in a first review paper that aims: to collect and discuss the existing methods for measuring the resilience of the transport network in case of disruptions; to give a systematic overview of transport network resilience indicators, which are classified according to the evaluation method used (topological models, recovery ability approaches, optimization models, data-driven approaches, numerical simulation); to propose a focus on the multilayer and multimodal context typical of urban transport, where significant emphasis is given to the focal element of this kind of transport network, the mobility hub. In the last part, I lay the groundwork for a more in-depth resilience analysis in the multimodal and multilayer perspective, with the inclusion of a resilient mobility hub, and open the discussion about possible future research on the subject.

Furthermore, I am working with GTFS data, GPS data, and origin-destination data to simulate multimodal transport networks combining public transport and bike-sharing services in specific case studies. This ongoing work also needs to be implemented with input from other scientific fields, because of the many software and datasets I am managing.

My PhD programme includes also a 6-month period in a company in order to apply scientific research in a practical and real context, in this case that of the city of Rimini (Italy). In fact, the collaboration takes place with the promoter of sustainable mobility in the province of Rimini, *Patrimonio per la Mobilità di Rimini* (PMR), and aims to make the transport network more integrated and sustainable thanks to the implementation and/or creation of smart mobility hubs.