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Preface

In times of lingering economic recession, major transport infrastructure projects tend to be deemed as catalysts for revival, where investments are expected to provide positive effects on the economy starting from the job market, or else they undergo severe review processes for budget constraints and assessing their feasibility and effectiveness in providing anticipated results becomes paramount.

This study enters a complex field on the evaluation of high-speed rail (HSR) systems, growingly dominated by a culture of skepticism and cynicism. Once considered one of the safest and most efficient transport modes, HSR has gained a bad reputation, especially in Europe due to a number of drawbacks. Criticism is foremost a comprehensible reaction to a great deal of political buoyancy for easily embarking on monumental projects, wasting public funds and rarely answering on consequences. For instance in Italy, the Ministry of Transport has just recently set up an archive to monitor incomplete infrastructures and understand whether possible actions could turn them useful.

Certainly, HSR does have many criticalities, ranging from high capital costs to important territorial impacts. However, it might still offer a wealth of untapped opportunities to revive and innovate railways as a backbone for sustainable transport and mobility. Starting from this viewpoint, some issues pertaining to HSR could be tackled to find a suitable solution and progress toward a greater knowledge on modalities and approaches for deploying HSR systems that could actually invert the trend and restore a good name.

The seed idea for the present study was conceived back in 2005 after observing news of aggravated protests against works on the Turin–Lyon HSR line to connect Italy to France. Protesters were claiming little participation in the decisional process and feared high external costs in terms of noise and landscape deprivation, along with limited prospects of enjoying the positive outcomes deriving from the new infrastructure. The marginalization risk for areas in the vicinity of HSR corridors has stirred this study to explore what could facilitate the exchange of benefits and provide adequate answers to HSR accessibility issues at the regional geographical scale. Experience on this further matured investigating cross-border sections of HSR infrastructure and its impacts on sensible areas during collaboration on the

POLY5 project (2011–2015) within the European Alpine Space Program. For this, thanks go to Sandro Fabbro at the University of Udine.

Talking about accessibility deals with an equity aspect of sustainable mobility, which stems from the desire of taking advantage of opportunities and resources by seamless travel with least impacts on society, economy and the environment. This interpretation integrates the notions of area coverage (e.g. potential users), convenience (e.g. service quality) and option value (e.g. service availability). In this sense, accessibility allows to reflect on different aspects of the relation between transport and land use and thus provide tools for planning purposes. However, it is important to define the scale of intervention.

Unlike other infrastructure, HSR lines exploit their full potential when integrated into a countrywide or even international network. At this geographical scale, decisions are necessarily made at strategic administrative levels with consequent top-down implementation approaches. In so doing, difficulties of consensus are often encountered. At an intermediate scale, it becomes evident that HSR projects need territorial contextualization. Accurate planning is essential to accommodate into local territories what has been mapped out at strategic levels, although not sufficient. There is also need for communication, public participation and adaptation to develop appropriate regional policies.

This study devised a method to aid decision-making and planning of HSR links into a regional context by comparing alternative transit strategies for their ability to work as interfaces, and in some cases even as substitutes, of HSR. Usually, substitution to HSR is known to bring adverse implications for the conventional rail, especially in terms of reduced investments. If HSR tends to better serve only large cities, the vast majority of areas outside the HSR network can only resort to car and low-cost air mobility. On the contrary, planning for the development of access transit options and regional networks might positively impact on the competitiveness of regions.

Examples of high-quality transit options can be found from a wide range of specific advantages in cadenced, express, frequent or non-stopping service. Regional metro rail (RMR) systems operate in Austria, Germany and Switzerland serving both metropolitan and regional traffic. These systems are characterized by high efficiency and synchronized timetables. RMR could be upgraded to regional high-speed rail (RHSR) by increasing operating speeds as in the case of regional high-speed trains (HSTs) in the French region Hauts-de-France. Even light rail transit (LRT) could overlap with high-performance systems through shared use of railway lines. This integration of urban transit with regional rail is exemplified by the tram-train in use in the Karlsruhe, Kassel and Saarbrucken regions in Germany.

A further system was considered for comparison, i.e. continuous railway systems (CRS). Although currently not in use, CRS were selected for the potential of combining long-distance travel with local transit, still saving travel time. The choice to describe and evaluate an unconventional rail system was dictated by the determination to extend study limits, as it should be for any research effort. In this case, expert-based surveys were designed to obtain essential missing data to describe and evaluate CRS. Anonymous respondents should be thanked for taking the time to

inform this study. Their knowledge has been an incommensurable wealth. Many thanks also to the translating volunteers, essential in opening the survey to the world and unlocking important non-English resources. A special thanks goes to Hans Voerknecht at the Dutch Knowledge Center on Traffic and Transport (KpVV) for providing a focus group in which to discuss critical CRS details.

The very same corpus of the present book derives from the revised, updated and integrated PhD thesis written during a doctoral course of studies undertaken at the Queensland University of Technology (Australia). For this, thanks go to all those who lead me on the path of research, in particular Luis Ferreira and Jonathan Bunker. Also, thanks go to Agostino Cappelli at the IUAV University of Venice for initiating me on this long journey. Further, thanks go to companies/institutions for their help in providing support and materials, such as Rete Ferroviaria Italiana (RFI), in the persons of Antonio Basili, Renzo Ferrara and Antonio Perrone; Cooprogetti; NET Engineering; Veneto Region, in the persons of Stefano Angelini and Franco Migliorini; and all those who collaborated to the realization of this book, not least those who granted permission to use their images.

Assessment outcomes indicate that transit options, planned and deployed in a comprehensive manner along with HSR as access strategies, might eventually form a synergic system capable to favorably work toward accessibility and sustainability. Therefore, far from utopian dreaming of bullet trains, potentially followed by insurgent protests, it is due time for soft and cautious approaches toward spatial planning and territorial integration of infrastructures to accommodate high-quality transport improvements into regional networks and for regional areas to enjoy greater accessibility gains. The scope of this study could thus be far reaching and relevant to those countries in the process of planning or developing HSR networks to better understand possible interactions and implications with regional areas and networks.

San Giorgio della Richinvelda, Pordenone, Italy Lara Rita Brunello
May 2017

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Dr. Lara Rita Brunello is an independent scholar with a PhD awarded by the Queensland University of Technology in Australia and an honorary research fellow at the University of Udine in Italy. Her research focus is on Urban and Regional Transport Systems. She has published her research in the area of High Speed Rail in both books and international scientific journals. As a registered architect, she also runs her own private practice.

Abbreviations

AGT	Automatically Guided Transport
ARAMIS	Agencement en Rames Automatisées de Modules Indépendants dans les Stations
ASC	Automatic Split-Combine
BBSR	Federal Institute for Research on Building, Urban Affairs and Spatial Development
BRT	Bus Rapid Transit
CBD	Central Business District
CEF	Connecting Europe Facility
CO-DIREP	Communication, Détection et Identification des Rames En Panne
CRC	Cooperative Research Centre
CRS	Continuous Railway System
DEA	Data Envelopment Analysis
DMA	Designated Market Area
DUP	Declaration of Public Utility
EC	European Commission
EMU	Electric Multiple Unit
ERTMS	European Railway Traffic Management System
ESA	European Space Agency
ESPON	European Spatial Planning Observation Network
EU	European Union
FINEST	Società Finanziaria per l'Internazionalizzazione delle Imprese del Nord-Est
FRA	Federal Railroad Administration
FUA	Functional Urban Area
FUR	Functional Urban Region
GAO	Government Accountability Office
GDP	Gross Domestic Product

GEMACA	Group for the European Metropolitan Areas Comparative Analysis
GJT	Generalized Journey Time
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GSA	European GNSS Agency
GSM-R	Global System for Mobile communication in Railways
GTC	Generalized Travel Costs
HSR	High-Speed Rail
HST	High Speed Train
ICE	Inter City Express
IISD	International Institute of Sustainable Development
INRETS	Institut National de Recherche sur les Transports et leur Sécurité
ISTAT	Italian Institute of Statistics
IUAV	Istituto Universitario di Architettura di Venezia
KVV	Karlsruher Verkehrsverbund
KpVV	Kennisplatform Verkeer en Vervoer
LAU	Local Administrative Unit
LRT	Light Rail Transit
LUZ	Larger Urban Zones
MA	Metropolitan Area
MAGLEV	Magnetic Levitation
MAUP	Modifiable Areal Unit Problem
MBWSV	Ministerium für Bauen, Wohnen, Stadtentwicklung und Verkehr des Landes Nordrhein-Westfalen
MEGA	Metropolitan European Growth Areas
MEP	Mandats d'Etudes Parallèles
MSA	Metro Area System
NAPA	North Adriatic Ports Association
NE	Network Effect
NEA	Network Efficiency Accessibility
NEAQI	Network Efficiency Accessibility Quality Index
NEI	Northeastern Italy
NUTS	Nomenclature of Units for Territorial Statistics
O–D	Origin–Destination
OECD	Organization for Economic Co-operation and Development
PCA	Principal Component Analysis
POLY5	Polycentric Planning Models for Local Development in Territories interested by Corridor 5 and its TEN-T ramifications
PRT	Personal Rapid Transit
PUR	Polycentric Urban Region
QUT	Queensland University of Technology
RATP	Régie Autonome des Transports Parisiennes

RB	Regional Bahn
RE	Regional Express
RFI	Rete Ferroviaria Italiana
RGR	Regional Rail
RHSR	Regional High-Speed Rail
RMR	Regional Metro Rail
ROW	Right of Way
RRT	Rail Rapid Transit
RRX	Rhein-Ruhr Express
RTRI	Railway Technical Research Institute
SDG	Steer Davies Gleave
SFMR	Sistema Ferroviario Metropolitano Regionale
SNCF	Société Nationale des Chemins de fer Français
TCS	Train-Coupling and Sharing
TEN-T	Trans-European Transport Network
TER	Train Express Régional
TERGV	Train Express Régional à Grande Vitesse
TGV	Train à Grande Vitesse
U-S-Bahn	Unterirdische Stadtschnell bahn
UIC	International Union of Railways
UNESCAP	United Nations Economic and Social Commision for Asia and the Pacific
USAID	United States Agency for International Development
VC	Vicenza Centrale
VRR	Verkehrsvernbund Rhein-Ruhr