Since Amtrak commenced operations in 1971, its existence has been marked by controversy. Aspirations toward creating a new role for intercity passenger rail service and anxieties over the apparent expansion of government have anchored a perennial debate over this mode of transportation. Amid the impassioned arguments over what Amtrak should be, the corporation has played a key role in creating a meaningful niche for short-distance intercity passenger rail service under the management of state and regional sponsors. However, questions still surround the form and function of Amtrak’s long-distance routes. With the Passenger Rail Investment and Improvement Act of 2008 (PRIIA), Congress mandated the creation of new tools to engage state and regional sponsors of intercity passenger rail service and to reexamine the form and function of long-distance routes.

As PRIIA’s term reaches expiration, there is an opportunity to consider the progress that has been made and to identify the potential for further change. This paper builds from the following question: Does the progress that intercity passenger rail has experienced under PRIIA make it feasible to consider redirecting Amtrak’s mission toward supporting the development of a competitive market for intercity passenger rail services? Amtrak’s ubiquitous role in providing intercity passenger rail is indispensable. In its current conception, Amtrak’s size, capabilities, and for-profit mission combine to make it a very effective monopoly – which is the role that Congress intended when it created the corporation in 1970. However, its mission is malleable. With a redefined mission, Amtrak could offer intercity passenger rail services to operators in a competitive marketplace.

14-0568  Travel Time Reliability: A Review Of Late Time Valuations, Elasticities and Demand Impacts In the Passenger Rail Market In Great Britain

This paper provides an extensive review and reconciliation of British evidence relating to the value of, and demand responses to, rail reliability. In particular, we compare the elasticities implied by Stated Preference valuations of late time with directly estimated lateness elasticities. We find that the implied lateness elasticities are substantially greater than those directly-estimated. A possible explanation for this is that lateness has been over-valued, but more sobering explanations would be to suggest that, whilst rail travellers dislike unreliability, they may be unwilling or unable to reduce their rail travel in response to experiences of poor performance or else conventional economic approaches to deducing elasticities are not appropriate. The findings have been used to update the recommendations of the UK rail industry’s Passenger Demand Forecasting Handbook.
The High Speed Rail (HSR) network in China has grown from zero to more than 13,000 kilometers within the past decade. The explosive growth of the HSR system has reconfigured Chinese geography in profound ways. It has not only propelled China into the leadership position in HSR development but has also attracted more scrutiny in terms of the role of the state, technological innovations, business development models, and investment returns.

This manuscript first provides an overview of the HSR development process in China. The next section documents the key factors that made Chinese HSR a success. The last section provides a summary analysis of HSR technology transfer in China and its comparison with practices of other industries or HSR in other countries.

The rewritten formulation and two modified local search heuristic algorithms for the single-line track train scheduling problem in the planning application are proposed. The local search heuristic (LSH) is modified such that when evaluating a neighbor of a resolved conflict currently being tested for improvement, the modified local search heuristics employ the depth-first search branch and bound algorithm with two possible branching rules. Given two trains with equal priority involved in a conflict, two branching rules are considered (least-lower-bound and least-delay-time), yielding two heuristics, namely MLSH-0 and MLSH-1, respectively. The detailed implementation of the modified local search heuristic algorithms are described, including the neighborhood definitions of overtaking conflicts and crossing conflicts, the procedure to detect overtaking and crossing conflicts, and a recursive procedure for depth-first search branch-and-bound algorithm. MLSH-0, MLSH-1, LSH and the equivalent manual solution method are compared on three test problems (26-train, 50-train and 76-train) on the Thailand Southern line railway network composed of 266 single-line segments, 15 double-line segments, 282 stations/sidings and total distance of 1,577 kilometers. MLSH-0 outperforms the other methods in terms of solution quality with up to 0.72% improvement over the equivalent manual solution method. MLSH-0 and MLSH-1 requires longer computational time and a greater number of iterations to terminate than LSH. MLSH-0 converges faster than MLSH-1 on all test problems.
The Korean high-speed rail (HSR) began its commercial service in 2004. This service has been created significant changes in the system of intercity passenger travels of Korea. However, the actual ridership was approximately half of the estimated one in the planning stage. In this background, this paper presents the differences between the stated preference (SP) before the HSR service and the revealed preference (RP) after it based on the intercity travel mode choice model. Several meaningful differences are found in terms of the factors affecting the travel mode choice, the estimation results of model, the monetary value of time, and elasticities. While the access/egress travel time of high-speed rail is less important than in-vehicle travel time in the SP sample, they have same weights in the RP sample. Also the RP models show that the probability of choosing HSR can be decreased by the increase of the number of vehicles in household contrary to the SP models. The monetary values of travel time are relatively high and the direct and cross elasticities in response to changes in level-of-service of HSR are relatively low in the RP sample comparing with the results from the SP sample. This Korean case is expected to offer referable material for preparing high-speed rail services in other countries by showing the difference between SP and RP sample, identifying the importance of access/egress travel time and lower elasticities of HSR demand.

The 457-mile Northeast Corridor (735 km), anchored by Boston’s South Station in the north, New York’s Pennsylvania Station in the center, and Washington, D.C.’s Union Station in the south, is one of the most heavily traveled rail corridors in the world. Shared by intercity, commuter, and freight operations, the Northeast Corridor (NEC) moves more than 259 million passengers and 14 million car-miles of freight per year. While transportation infrastructure improvements continue to be made, the Northeast Corridor (NEC) faces serious challenges, with century-old infrastructure, outdated technology, and inadequate capacity to meet current or projected demand. With similar capacity issues on the region’s highways, and some of the most congested airports in the nation, the Northeast’s economic future is in jeopardy. Responding to these pressing issues, in February 2012, the Federal Railroad Administration initiated the NEC FUTURE program, a comprehensive planning effort to define, evaluate, and prioritize future transportation investments in the NEC. Technical work includes an analysis of market conditions in the corridor, development of reasonable program alternatives, and an evaluation of the environmental impacts of those alternatives, resulting in a recommended approach that balances the needs of various users of the corridor in a manner that ensures safe and efficient travel throughout the Northeast. Specifically, this paper describes the alternative development process, a market-driven approach that emphasizes service. As the NEC FUTURE program continues through 2014, this approach will create a framework for investment leading to the NEC of tomorrow.
This study aims to explain the trend and factors affecting ridership changes on new high speed rail in Taiwan. Time-series methodology is used to specify the adaptation effects behind social economics, and competitive modes regarding with time events. The analysis is based on Taiwan High Speed Rail (THSR) monthly ridership data for period January 2007 to December 2012. A seasonal autoregressive integrated moving average (SARIMA) model was applied; showing that the ridership thrives but slightly underestimated from the trend prediction after 2012. Regarding with the impact from social economic factors, adaptation effects and time series parameters; a first ordered moving average model was therefore fitted for this paper to describe a detailed analysis on the potential user adaptation on THSR. The results specified that population, Chinese New Year, summer vacation, fuel price, has a positive effect while gross domestic product (GDP), unemployment, and car ownership could reduce the THSR ridership, a positive trend (adaptation effects) was therefore identified behind THSR ridership.

Passenger flow forecast is of essentially importance to the organization of high-speed railway, and is one of the most important basics for the decision-making on transportation pattern and train operation planning. Passenger flow of high-speed railway features the quasi-periodic variations in a short time, and also complex nonlinear characteristics because of existence of many influencing factors. In this study, a fuzzy k-nearest neighbor passenger flow forecast model (FKNNPFFM) is presented based on fuzzy logic relationship recognition techniques that predicts the short-term passenger flow for high-speed railway, and the forecast accuracy is also significantly improved. An applied case that uses the real-world data illustrates the precision and accuracy of FKNNPFFM. For this applied case, the proposed model performs better than the k-nearest neighbor (KNN) and autoregressive integrated moving average (ARIMA) models.
With increasing demand and rising fuel costs, both travel time and cost of current intercity passenger transportation modes are becoming increasingly relevant. Around the world, high-speed rail (HSR) is seen as a way to mitigate the risk of volatile petroleum prices while alleviating demand on highways and at airports. Ridership is the critical element in determining the viability of a large capital, long-term transportation investment. This paper provides a systematic, consistent methodology for analyzing systemwide modal ridership with and without a proposed HSR network and analyzes the potential for high-speed rail as part of the existing multimodal transportation system in a region in terms of ridership. Although capital costs are not explicitly accounted for in this study, considerations of capital investment (e.g., network design and HSR speed), along with exogenous demographic, technological, economic, and policy trends, are used to project ridership over time. Population, fuel efficiency, HSR speed, and fuel price trends are the important variables considered for this study. Although the methodology is extendable and modular to incorporate any mode in any region, experiments are conducted for the Midwest corridor in the United States. Average HSR speed is tested to demonstrate the model’s ability to capture the sensitivity of ridership to a specific design consideration. By estimating ridership in a systematic framework which considers design along with various exogenous factors trends over the long-term, this study represents an important step toward a consistent, comprehensive economic analysis of HSR in the United States.

This study intends to contribute new insights in the debate over the viability of high-speed rail (HSR) in the United States and the value proposition for government investment. The modeling focus of this study is two-fold, and the modeling approach makes a case for a fundamental shift from the current perspective of HSR viability. First, the user and community impact assessment of HSR is conducted in the same manner as traditional transportation system evaluation to provide comparative conclusions regarding intercity transportation alternatives. Emissions and energy consumption impacts are also considered due to the increasing national relevance of environmental sustainability and energy security. Second, the model presented in this study analyzes both ridership and impacts within the same systematic framework to assess the long-term impacts on the individual transportation modes, total system metrics, and efficacy of alternate policies. Based on previously published system-wide ridership estimates from this model, this study evaluates user and community impacts (i.e., vehicle operating costs (VOC), travel time, safety, emissions, and energy consumption) over the long-term and determines the potential aggregate impacts over time. Experiments are conducted to compare no-build and HSR scenarios in the Midwest corridor. Results show that while travel time, safety, and VOC savings are significant and warrant further investigation, fuel consumption and emissions reductions are less significant. Using this model, decision-makers have a tool which introduces various externalities to determine both the ideal and problematic conditions for the viability of
HSR in the United States from a holistic perspective.

14-1824  **Life Cycle Cost Estimation of High-Speed Rail: Model Development and Case Analysis**  Le Maout, Etienne

This paper develops a cost estimation model for building, operating, and maintaining a high-speed rail (HSR) system. The model introduces a macroscopic life cycle cost approach that encompasses HSR systems as a whole, the interactions between the subsystems, and the variability of the systems. For this reason, costs associated with HSR systems are categorized into operation, infrastructure, maintenance, and external costs, and their relationships and behaviors are modeled over their lifetime. A hypothetical line is assumed to illustrate how the model behaves with respect to demand, speed, length, and the infrastructure and rolling stock types. The results show that articulated train sets provide a lower life cycle cost than non-articulated sets, ceteris paribus. The results also indicate that the designs proposed by most of the manufacturers are less interesting from a life cycle cost perspective.

14-2009  **High-Speed Railways and Local Growth: An Exploratory Assessment Based on the French Experience**  Martin, Koning

While the virtuous relationship between transport infrastructures and development remains one the most believed myths, the empirical studies looking at the effects of high-speed rail services show mitigated results. This article takes advantage of the French experience to assess the economic benefits brought to the cities served by High Speed Trains (HST), partly or completely placed on a High Speed Line (HSL). The sample is composed of 492 urban units (UU) for which the evolution of employment, notably of executives, is studied over 1982-2006. As the choice of the territories served by HSL/HST is not random, we use a selection model to obtain more accurate estimates.

Empirical assessments of railway services cannot neglect endogeneity issues between infrastructures and local development. The selection model shows results with an opposite sign to the ones based on the Ordinary Least Squares method. Our estimates particularly emphasize the differences between the UU served by HSL or simply by HST. The UU served by HSL have faced a lower rate of jobs (executives) creation but the effects of infrastructures on the annual growth rate are about +1.3% (+3.7%) once corrected from the selection bias. The UU only served by HST have certainly experienced better average performances but the effect directly due to infrastructures is negative: respectively -1.1 % and -3.0 %. These results could be useful to complete the traditional socio-economical assessments of infrastructure projects.
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<tr>
<th>14-2023</th>
<th><strong>Quantifying the Economic Development Impacts of Major Transport Infrastructure Projects: a Case Study of High-Speed Rail in Spain</strong></th>
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During the period between 2000 and 2010 the Spanish Government carried out the largest high-speed rail construction programme in Europe. Consequently, by 2011 the Spanish HSR network had become the largest in Europe, exceeding France and Germany. By 2020, it is planned that 90% of the country population will live within a 50km radius to the nearest high-speed rail station. Investments in high-speed rail projects are frequently justified on the basis of projected positive effects on regional and national economic growth. Whether such benefits actually materialize is unclear and is the subject of this paper, focusing in particular on the economic impact of the Madrid-Barcelona corridor. We conduct an ex-post analysis to estimate how the high-speed rail corridor has influenced economic output at the regional level. Our results conclude that the Madrid-Barcelona corridor has not produced any discernible significant positive effects on the output growth of the Spanish provinces, at least in the short to medium term.

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<th>14-2057</th>
<th><strong>A Cellular Agent-based Approach Incorporating Spatial Discrete Choice Methods: A Simulation of Future Land-use Impacts of High-speed Rail on Aveiro, Portugal</strong></th>
<th>Shen, Yu</th>
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This paper presents a cellular agent-based model to simulate the potential land use impacts of the future Portuguese High-speed Rail (HSR) on the city of Aveiro and its neighboring municipalities. The model incorporates a spatial discrete choice method as a sub-model, which estimates land use evolution behavior based on the growth of socioeconomic variables and the increase of road and railway accessibility. For validation purposes, the model is firstly run to test the historical land use change in the study area from 1991 to 2011. After, based on the validated model, an analysis of three scenarios with different HSR station location hypotheses is implemented to estimate the future land use impacts of HSR between 2011 and 2031. The simulation reveals that the introduction of HSR service is able to offer great opportunities for land use development in this area, whereas the station location within the city of Aveiro shows a relatively better attractiveness to the development of new urban fabric and commercial/industrial land covers.

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<th>14-2297</th>
<th><strong>Uncertainty and Inter-jurisdictional High-speed Rail Planning: Insights from Portugal and the United Kingdom</strong></th>
<th>Stein, Naomi</th>
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Within public policy and academic discourses, HSR is presented as a way of achieving “smarter” or more sustainable forms of growth. Realizing this promise requires coordinated policy efforts across levels of government and at different moments along a project’s timeline. The research presented here makes use of a systems perspective to study the barriers to- and opportunities
of inter-jurisdictional HSR planning. This paper makes use of interview material with officials involved in the Portuguese and United Kingdom HSR planning processes. Case studies of five different proposed HSR stops in two countries—three in Portugal and two in the UK—reveal a number of insights:

Uncertainty is found to be of significant relevance to the manner in which national and local or regional governments interact. Those interactions in turn affect the realized physical reality of the HSR network and its integration into existing land use and transport systems. In particular, this paper examines two sources of uncertainty—uncertainty of outcomes and the uncertainty of a multi-actor inter-jurisdictional system of control. The case studies explore how existing processes and evaluations mechanisms affect the level to which local knowledge and initiatives are incorporated into HSR system design. They additionally reveal how initial conditions can act as important determinants of HSR success by shaping a system’s ability to adapt to realizations of currently uncertain futures.

14-3082  A new approach for the estimation of railway services reliability
Longo, Giovanni

The importance of railway services reliability is growing from both passengers’ perspective and infrastructure’s management point of view. In the former, it seems to be one of the key factors in modal choice, especially for commuters; while in the latter, a trade off exists among capacity, reliability, and punctuality increase, which may lead to better rail network utilization, even without significant infrastructure improvements.

Existing methods for reliability estimation are currently not able to adequately represent system behavior; that is mainly because they simply consider the number of trains with a delay lower/higher than given thresholds, and completely neglect delay distribution, which, on the contrary, plays an important role for both passengers’ quality perception and line capacity estimations. Moreover, these estimations are often carried out with respect to trains’ arrival time at terminal stations only.

This paper showcases a new reliability index, which allows to explicitly consider the shape of trains’ delay distribution, and leads to results which better represent the real effects of punctuality on railway traffic, when compared to the ones of existing approaches. Moreover, the proposed reliability indexes can be utilized for either a line or a railway node capacity analysis.

The proposed reliability index has been applied and analyzed to two different case studies, a railway node in Italy and a commuter line in the US.
Technological changes, investment, organizational reforms, and external factors can impact railway productivity. Using non-parametric single-factor and multifactor productivity (SFP and MFP) Törnqvist trans-log index approaches, we evaluated the performance of high-speed rail (HSR) lines in the US, Japan and Europe. This paper focuses on the Northeast Corridor (NEC). The Japan and Europe analysis are performed to give insight into how international-quality HSR could be deployed in the NEC.

Intercity rail transportation in the NEC experienced highly volatile, but considerable productivity growth in FY 2002-2012 (in the range of ~1-3% per year). Amtrak increased its ability to economically exploit the available capacity, but did not perform equally well on the supply side. Service changes, technical problems with train sets, targeted capital investments, and economic recession and recovery were the main drivers of productivity change. Train services, the Acela Express and Northeast Regional, were very sensitive to external events, had large economies of scale, and implemented slow adjustment of capacity via rolling stock and infrastructure improvements, which varied depending on the service.

Privatization of the Japan National Railway (JNR) in 1987 increased the MFP for the most profitable HSR, the Tokaido Shinkansen line between Tokyo and Osaka. This suggests that private sector ownership and operation of HSR may create an advantage in the right circumstances. In Europe, vertical separation improved productivity in Germany and Sweden but in France results were ambiguous. Further, vertical separation enables the introduction of competition. Vertical separation may provide productivity advantages in the right circumstances.

Who Supports High-Speed Passenger Rail? The Characteristics and Attitudes of Supporters

Research on potential users of high-speed passenger rail (HSR) captures a segment of the population that supports HSR because they plan to use it. This paper seeks to describe the population that supports HSR, regardless of whether they plan to use the service or not. Specifically, this research seeks to discover the characteristics and attitudes of those that agree HSR should be implemented within the I-35 corridor of Texas. Knowing who supports HSR can help advocates identify potential supporters and can help policymakers assess the potential level of support from their constituency. Using an ordered logit regression model with data from a random sample survey of Texas residents, the variables of public involvement preferences, opinions regarding expansion of passenger rail between cities, traffic congestion in the past five years, and lack of travel options between cities, residence location, political leanings, and level of education, all significantly influence a respondent’s level of agreement
that HSR should be implemented as a long-term solution for Texas’ I-35 corridor.

Planners and designers are interested in understanding place cognition, meaning how does one know where they are in the environment? For example this is true upon arrival at a train station, where the visitor has never been to that specific train stop before. In this study, the recognition of place is studied for a train station location in East Lansing, Michigan. In this investigation, five design treatments (k=5) for East the Lansing Train Station are explored. Twelve pictures for each treatment (b=12) were developed from the windows of the train looking into the train station. Forty-five respondents separated the pictures into groups associated with the cognition of the place. Through Friedman’s Two-Way Analysis of Variance, the results indicated that at least one treatment was different than another treatment (p<0.005). The Friedman’s Multiple Comparison test revealed that all of the treatments were significantly different from each other (p<0.05). Treatments with strong symbolism associated with place were more readily identified with a specific setting, the East Lansing train station. For users with no cognition map for a setting or place, a high degree of spatial identity may be useful in way-finding. In addition, the general methodology employed in this study may be useful for other investigators to study design treatments in transportation settings.

Demand Analysis of Beijng-Shanghai High-Speed Rail in China

China’s high-speed rail (HSR) network has rapidly increased over the past few years. As of July 1, 2013, China has the longest HSR network with 9505 km (5906 mi) of routes in service around the world. Further, the long-term railway development by the government aims to achieve a total length of 16000 km HSR network by 2020. For the HSR lines that are already in service, Beijing-Shanghai high-speed railway (abbr. as Jinghu HSR) is a representative one since it connects China’s capital and the economic center of the country. In this paper, to have an understanding of the operation performance of China’s HSR, passenger volume of this representative HSR line, Jinghu HSR, is analyzed at different aggregate level since its operation. Additionally, considering the effects of capacity on passenger volume, neural network is used to train the relationship between passenger volume and other factors including train capacity and temporal features. The estimated underlying demand shows that Jinghu HSR has a huge potential market demand and the future of it should be promising.
The European Railway Reform separated and established financial relationships between Infrastructure Managers (IMs) and Railway Undertakings (RUs) using the directive 2001/14/EC and its amendments (adopted in most countries by 2004). These relationships were concretized as infrastructure charging systems, where IMs provide nondiscriminatory access to capacity. Numerous studies have discussed resulting practices, revealing great differences in implemented charging systems’ philosophy, methodology, structure, and charging levels. Most systems kept evolving and many were significantly changed. In 2005-2012, the disparity continued to increase, with some systems maintaining low charges and simple structure, while others increased charges and complicated the calculation methodology by adding new variables.

This paper assesses the state of the practice in 2012 and evolution for 2007-2012, focusing on high-speed and intercity services. It also looks at the significance of charges for two main players: RUs and IMs.

An assessment of the significance of infrastructure charges shows that they are significant for RUs, making up between 10-50% of estimated revenues. Looking at the profitability of IMs for a subset of evaluated high-speed lines, infrastructure charges cover line maintenance costs and generate net positive revenues, contributing (in some cases significantly) to initial investment cost recovery.

Comparing initial investment costs to IM net revenue, large differences are noted in charging levels between IMs, and between IM net revenue for cross-border lines. As the single European high-speed market continues to mature, a question is raised of how important such differences are for the players and the European Commission, in establishing a common railway market.
Simulating the impact of the high-speed network on the performance of other transport operators: the HSR on the Lisbon-Oporto link

High Speed Rail (HSR) is part of the Trans-European Transport Network and, as such, large investments have been made in Europe since the late 1980’s, and are expected to continue. Despite the current economic crisis, it is foreseeable that Portugal will pursue its HSR project in the medium to long term. The main objective of the present research is to model the strategic behavior of passenger transport operators that compete with HSR in a multi-modal corridor. As such, we analyze the potential changes in the strategies of existing operators after the (hypothetical) entry of HSR, applying our methodology to the case study of the link between Lisbon and Oporto, in Portugal.

Our results indicate that the game theoretical approach using the optimization algorithm proposed is appropriate to simulate the operators’ strategic behavior in the face of new competition in a multimodal corridor. After the optimization and according to our assumptions, the HSR operator could potentially double the currently estimated profits, while the airline could try to minimize losses, possibly by collaborating with the HSR and avoiding costly connecting flights between Lisbon and Oporto. The HSR can become a threat to conventional rail if the current operator is not allowed to bid for the concession of HSR. Alternatively, it can collaborate with the HSR as a feeder and try to explore new market segments in the currently over-saturated link. Buses are the main winners as operators could potentially increase ticket prices, while increasing headways, and still increase their profits, despite some loss in modal share.

Bicycle Network Connectivity For Passenger Rail Stations

Interest in improving and adding intercity passenger rail service is growing in the United States and the rest of the world. Passenger rail development is complex and includes many factors including how well it is integrated into cities. Transportation trends in the United States are showing that more people are choosing alternative transportation options and that auto ownership is declining. The development of new rail systems and improvements of existing systems need to consider all users, including those that access stations with alternative transportation, such as bicycles. This paper proposes an analysis approach that compares how well rail stations allow access to bicycles by studying their connectivity to low-stress bicycle links and how well they allow access to workplaces and residences. The approach is demonstrated using as a case study Salem, Oregon. This city is on Amtrak’s Cascades corridor and is currently undergoing an Environmental Impact Study for improved service. The paper analyzes the existing station and two alternative station locations. The results indicate that the two stations located adjacent to downtown provide superior bicycle connectivity to workplaces and residences compared to the station located near the airport.
Transforming Guangzhou’s Principal Train Station

Heller, Jeffrey

Guangzhou East Rail Station is the main link between Guangzhou, Hong Kong, Shenzhen, the Pearl River Delta and China. The station and service transportation center were connected by a heavy, elevated concrete plaza. The experience of entering Guangzhou at its main arrival point by rail was dark, smelly, oppressive and choked with vehicle fumes. The plaza above significantly contributed to local heat island effect.

In our master plan for the Guangzhou North Axis and the Asia games we proposed transforming the arrival experience into an open, naturally ventilated, light and airy space combined with a green roof on top of the transportation center. The station has been revised per our design and is remarkably transformed.

Short-term Forecasting of High-Speed Rail Passenger Travel Demand in China: A New Approach based on Ensemble Empirical Mode Decomposition and Grey Support Vector Machine

Jiang, Xiushan

Short-term forecasting of High-Speed Rail (HSR) passenger travel demand provides daily ridership estimates accounting for day-to-day demand variation in the near future (e.g., next month, next season). It is one of the most critical tasks in high-speed passenger rail planning and operational decision-making. In addition, accurate short-term demand estimates provide the basis for effective railway revenue management. In this paper, a hybrid short-term demand forecasting approach is developed, which combines ensemble empirical mode decomposition (EEMD) and grey support vector machine (GSVM) methods. There are three steps in this hybrid EEMD-GSVM forecasting approach. The first step decomposes short-term passenger flow data with added white noises into a number of different Intrinsic Mode Functions (IMF) and a trend term. The second step includes the development of a GSVM model, and the parameter calibration. The third step reconstructs and refines the IMF components to produce the final predicted daily HSR travel demand. This innovative approach is demonstrated with data collected from the newly-opened 1069-km long Wuhan-Guangzhou HSR in China. Model application results indicate that the proposed hybrid EEMD-GSVM approach performs well in terms of predictive accuracy and is especially suitable for short-term HSR demand forecasting. The mean absolute percentage error between predicted and observed day-to-day passenger flows over a 120-day period is 6.24%, and much lower than that from traditional methods such as support vector machine, grey prediction, and neural network methods.
Site Selection Of High-speed Railway Station And Travel Efficiency--case Study Of Shanghai Hongqiao Station

High-speed railway construction is rapidly advancing in China to improve the railway competitiveness in the passenger market and facilitate rapid contact between different areas of China. However, in order to ensure the process of high-speed railway construction in relatively short time and to reduce the cost related with removal of building for housing or industry, many High-speed railway stations are located in the suburban or exurb, which are far away from the city center. But the city center is still the main origin or destination of the high-speed rail passengers. The practice of establishing large-scale high-speed railway stations in the suburbs will reduce the travel efficiency even up to a distance of 500km, especially for the passenger from city centers where there is great potential for people to travel by high-speed rail for business, due to the longer access time to the station. It is suggested that instead of construction one costly huge high speed railway station in suburban of a mega city, multi-station close to city centers will greatly reduce the connecting time from the origin to take high speed train, and hence greatly improving the travel efficiency, making high speed railway more competitive in inter-city transport market.

Financing High Speed Rail in China

This paper intends to introduce the financing models used in China’s HSR construction. The HSR financing experiences and lessons in China show that the more desirable HSR financing model is to further improve the PPP model. Together with China's current urbanization process, it forms an Infrastructure-Urbanization Co-development Model. Central government, the local governments, and private capital all participate actively. The central government invests in the HSR route construction. Local governments lead the HSR station construction and related urban development, with private capital an important participant. Local governments and private capital gain returns from the appreciation of land values due to the construction of HSR stations and new towns. This diversified HSR financing model will become an inevitable trend in the future.
Research and practices suggest that construction of high-speed rail (HSR) could contribute to city decentralization. In today’s China, the large-scale construction of the HSR network, along with the rapid urbanization, makes this effect more complex and profound. The shortened time-space relation between cities brought by the HSR is changing the traditional hierarchical urban system in China. Regions with large-scale networks of cities are forming. HSR will further enhance territorial accessibility and regional economic development. In the meantime, cities are transitioning from the monocentric spatial structure to polycentric spatial structure. Through two case studies, we found HSR tends to function as a double-edged sword to cities. In large cities, their decentralization is usually actively driven by HSR since they are able to carefully choose the location of their HSR stations. HSR serves as a catalyst to sustainable urban growth. For medium to smaller cities, decentralization is often passively driven by HSR as the locations of their HSR stations are beyond their control. The long distance between the HSR new town and its existent central city weakens the economic strength of the existent urban core. The HSR new town will presumably function as a distraction, rather than an attraction, to the economic growth of the city as a whole. The leapfrog type of development will induce a wasteful use of land and other resources, and further increase the living costs of its people and the operation costs of its firms. Forcing farmers to relocate to the HSR new towns will cause poverty and social disturbance. Given the worldwide recession, local policies that encourage the development of industrial parks through massive infrastructure investment and construction are likely to make the situation worse.