



# Developing Seamless Connections in the Urban Transit Network: A Look toward High-Speed Rail Interconnectivity

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In the past, US studies on high-speed rail (HSR) have focused primarily on the economic implications of high-speed rail development. Recently, however, studies have begun evaluating multimodal connectivity of HSR stations. As the development of the US HSR system has reached the design and construction stage, guidelines on multimodal connectivity are necessary to help maximize ridership.

## Study Methods

This study quantified multimodal connectivity of HSR stations and its impact on ridership in four countries where HSR has been established, setting the basis for future rail interconnectivity. In this study, multimodal connectivity is measured by the number of different modes of transportation connected to HSR stations, the number of installed arrival and departure facilities for each mode, the transfer time from connecting modes to boarding platforms at HSR stations, and the arrival time intervals of public transportation modes. Data were collected from HSR systems of France, Spain, Japan and China. Various characteristics of the connecting modes were observed and compared. The relationship between ridership and the characteristics of multimodal connectivity was identified using regression models developed in this study.

## Findings

It was observed from the analysis that the multimodal connectivity at HSR stations in the four studied countries presents different profiles. For example, HSR stations in China connect with more bus lines than do those in the three other countries. Relatively, there are more bus stops/terminals provided in France than in the others. Transfer times in Japan and China are significantly longer than those in France and Spain. The average bus arrival interval in France is the longest of the four, at more than double that of China.

All the connectivity variables considered in this study influence ridership in these four countries in different ways. On the whole, bus, subway, and regional railroad service influence ridership significantly. For instance, the more bus services connected to the station, the higher the HSR ridership. This trend is apparent in three of the four countries, France being the exception. Also, subway, light rail, and traditional rail are modes of high-capacity transportation. Their connection to HSR stations always implies high ridership for high-speed rail. The number of facilities also shows significant impacts on HSR ridership. For instance, the more bus and subway stops, and the more bicycle parking and taxi stands, the higher the ridership. Transfer time also has a significant positive influence.

## Connectivity Influencing Factors

	Number of Services	Number of facilities	Intervals	Transfer times
France	RER services		RER	RER and bike
Spain	Bus services	Bicycle parking stations, bus stops, taxi stands		
Japan	Bus and railway services	Taxi stands and railroad stops	N/A	
China	Bus lines	Taxi stands		Taxi

### Policy Recommendations

These findings have important implications for the proposed California and Nevada HSR stations. For California HSR stations, it is recommended that special attention be given to bicycle and pedestrian accommodations. When weighing the tradeoff between building a new station and adapting an existing one, transfer time for all connections should be taken into account. A more convenient fare payment system should be used to facilitate transfer between high-speed rail and other transportation modes. Coordinating the arrivals and departures of different transportation modes at high-speed rail stations should be given appropriate consideration.

For Nevada HSR, it is recommended that the station provide access and accommodations for passengers generated from residents near the station who access the station by walking or biking. In addition, light rail type of transportation is recommended to accommodate peak arrival periods of high speed trains.

### About the Authors

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For more details about the study, download the full report at [transweb.sjsu.edu/project/1148.html](https://transweb.sjsu.edu/project/1148.html)