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### Title

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### Permalink

<https://escholarship.org/uc/item/0gp195fb>

### Journal

National Research Conference on Business Management, 1(1)

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### Publication Date

2016-03-07

Peer reviewed

# **Operating Expenses and Time Consumption Modeling for HSR**

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## **Abstract**

Transportation segment plays a significant role in each country's economy system and it is critically important to ensure its dynamic harmonious development. Many countries in the world have built relatively comprehensive high-speed railway networks. As the social and economic benefits are one of the important attributes of high-speed railways beside many others like, high-speed, large passing capacity, high efficiency and less pollution, therefore, many studies in metro and rail transit systems have been carried out to ensure the efficient energy management.

High-speed trains are also seen as one of the vital objectives for the development of sustainable mobility for the reduction of energy consumption. High-speed railway station is also one joint point between urban external communication and intra-city traffic systems. Operating expenses and time consumption are important indicators for planning vertical profile of high-speed railway line. This research includes two studies, first study is to assess the effect of stations spacing on operating expenses, and second study is to measure the effect of maximum gradient on time consumption. In this regard, six standard vertical profiles of high-speed railway line have been studied.

The results reported that operating expenses model is a third-degree function of station spacing, whereas time consumption model is a quadratic function of maximum gradient. These models have applied to a case study. It was found that when station spacing is small like in mountain areas, operating expenses will be small and time consumption will be larger, and vice versa. Future studies can be concentrated on extending the operating expenses model, time consumption models and including other indicators.

**Keywords:** operating expenses, time consumption, high-speed railway, vertical profile, station spacing.