Efficiency Assessment of Urban Public Transport Systems in China

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Background and Research Purposes

Transportation, representing the fastest growing source of greenhouse gas (GHG) emissions. Thus, the improvement of transport efficiency to reach an environmentally sustainable development has been taken as a strategic issue world widely.

Studies on efficiency of urban public transport systems in China is seldom found. Reason may in part due to the data limitation on fuel consumption of urban public transport, which is usually used as a necessary input for efficiency analysis.

This paper aims to propose a method for estimating the energy consumption of urban public transport sector and adopt a DEA approach assessing the system performance.

DEA Approach

Define the DMUs
Set criteria
Classify criteria to inputs and outputs
Input factors
• Labor
• Capital
• Energy
Output factors
• Passenger transported

Execute DEA approach
(CRS model, VRS model, MPI model)

Analyze the relative efficiency of DMUs

Model Results

Average efficiency and efficiency change of public transport systems

Note: the shadow in the left figure denotes the efficiency is below the national average. The shadow in the right one represents the degradation of system efficiency.

Influences of investment and rail transport on system efficiency

Conclusions and Discussions

The systems in most provinces have a relative low efficiencies, with national average CRS value around 0.65.

Although the overall efficiency of urban public transport systems in China is still low, most of the provinces, except for Beijing, Xinjiang and Qinghai, have registered an improvement with national average CRS value around 0.65.

Policy implications from this study are the increase of investment on public transport especially in the less developed areas, together with the development of urban rail transport mode would be effective ways enhancing the efficiencies of urban public transport systems.

• This study only considers three basic inputs and one output based on literature review and the data availability, those factors such as system accessibility, user’s satisfaction level, and travel time, etc. which may also influence urban public transport system’s performance are not yet considered at this stage.