

Chapter 9 of The Geography of Urban Transportation focuses on the impacts of transportation development on land use? Defining land use itself can be more complicated than it seems -- while we often refer to simply-colored shapefiles defining land use, the reality is much more complicated. The authors lay out several questions to define the land use:

1. Can the cause of land use change be traced back to transportation?
2. How large and important is this change?
3. How do we define the scale of our area of interest?
4. How does this interact with existing construction, and what time scale will be examined?

Land use and transportation are closely linked, so defining a causal relationship is complex. New transportation infrastructure can create induced demand for new drivers or passengers, but city planners must also reactively install new infrastructure to meet demand and ease congestion.

This chapter introduces a new aspect to our previous study of graph theory; that interconnectivity depends not only on links between different nodes, but also on the time required to travel between them. For example, decreasing the travel distance between already-existing nodes would affect the accessibility of the network, and therefore the land use. Whether these phenomena are related depends on one's theory of land use, which are explained as such:

1. **Standard Urban Economic Theory**, in which one's choice of residence is based on maximizing utility, where more interconnected land has higher value, and that individuals would choose to live in places where the combined cost of transportation and land is the least.
2. **Employment Location Theory**, which builds on the previous one and doesn't assume that all jobs would be located in city centers. Under this idea, commuters would choose to live in areas where their total transportation costs might be lower. I would be one of these commuters; I go to school in Gongguan but live in Guting because I value access to the city center.
3. **More complex theories**, which assume that there is more to the equation than simple commuting distance. Multiple city centers and real-world deviation from these models indicate that we might not make the most economically rational decisions when it comes to housing. We have household preferences that are largely individual, don't always work in the same location, and are subject to the larger whims of economics.

Under these divergent methods, it is difficult to create studies that examine the effects of transport on land use. Longitudinal studies will examine a single place over a period of time, while cross-sectional studies will compare different locations, controlling for differences between them. Common subjects of these studies are highway investments and rail projects. The authors conclude that "the link between transportation and land use ... is complex and difficult to verify."

The United States is a particularly good place to view cross-sectional effects of urban transport, as so many of the cities are so similar; development in large regions occurred around the same time, with many of the same theories, and often under the guise of the same urban planners. Extrapolating these ideas to the rest of the world is much more complicated, as many countries have a much longer urban history to contend with and many more factors to deal with. For example, Scotland had a period of post-war highway-led urbanism similar to the United States, but the topography and history of the region prevented the same level of widespread demolitions as the US. Scottish cities, while in some ways similar to American ones, have much more individual histories, urban layouts, and transportation networks. Cross-sectional studies will therefore be less apt there.

The context of many of the definitions used in this book is likewise centered in the United States, and is not universally applicable. While this book, like much of urban planning literature, advocates for higher-density mixed-use zoning, this has some limits. For this book, I suspect that a 5 storey building would be considered high-density, but in a place like Taipei these are quickly being replaced by 15-20 storey high rises.

In general, I'm suspicious of the idea that humans make rational decisions many of the things we do are motivated more by an emotional or societal context than by the maximum economic output. I am a believer in the power of behavioral economics and the tendency of humans to make decisions that are not in their best economic interest. This can be for historical, cultural, or emotional reasons. For example, many "new city" greenfield developments around the world have shown that just because people logically *should* live somewhere doesn't mean that they *will*, or that it will work out the way that it should. For example, several commuter rail suburbs of Yangon, Myanmar were abandoned shortly after they were founded<sup>1</sup>, despite access to cheap land and access to the inner city. Other times, areas become successful to the point where it is a problem; the overcrowded districts of Yonghe, Zhonghe, and Sanchaung<sup>2</sup> were conceptualized as commuter areas for Taipei, but have become some of the most densely-populated areas of the country, with a transport system that can hardly keep up with their population. In short, predicting human behavior is a messy business, and examining the link between land use and transportation is no exception.

The purpose of conducting studies into transportation and urban theory must always be examined. Reducing human thought to a series of rational decisions is necessary to produce scientific results, and results are often simplified to provide evidence in support or against the high-stakes capital projects involved in transportation development -- no city would agree to a multi-billion dollar metro system if there weren't some evidence to back it up. The authors of this paper were extremely careful not to state outright what should be obvious; that people are drawn to accessible places. However, acknowledging complexity doesn't get train lines built, and rigorous complexity theory doesn't always make for good urban planning.

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<sup>1</sup> <https://journals.openedition.org/moussons/4892>

<sup>2</sup> Planning Asian Cities: Risks and Resilience, by Hamnett and Forbes p. 140