Reading reflections

USP 570

Shen Qu

Week 8

- The 'Diamond of Assembly'

Levinson and Krizek (2018 Chapter.12) introduced some dynamic interaction mechanisms of transportation. This system is not static. From motivation to implementation, political factors features prominently but is hard to capture. Economic factors help us understand the dynamic process. The analyses based on supply and demand are classical approaches. The supply and demand curves of microeconomics illustrate that demand drops as the price increase. Elasticity, how steep or flat of the slope of the demand curve, decides the relationship between quantities and price such as auto trip is inelastic in the price of fuel, which means large changes in fuel prices have small effects on total driving. The existence of consumer surplus proves that the subsidies on transit are necessary for maximizing the overall social benefits.

Except moving along the demand curve, the curve itself could move too. Income level, service quality, or complement/substitute goods could shift the location. Any change in the demand and supply could induce traffic and development. As shown by the 'diamond of assembly,' The effects of transportation investment are cyclical. Building infrastructure improves accessibility by reducing travel times, that increase land value and economic productivity. It induces more travel demand and leads to congestion and the next round of investment.

- Metro Designing Guide

The Draft of "Designing Livable Streets & Trails" is a general guide, which covered all major points of street design: The expectations, functions, elements, integration, design decisions, and implementation strategies. It is interesting that the guide considers some emerging technologies like automated vehicles. The current draft mentioned that automated vehicles could provide a reliable level of mobility, and street designs should involve these technologies and changing demands. But the draft doesn't give more about the proposed solution or plan. The potential may include how to utilize the curve space, pick-up, and drop-off area, etc. Although automated vehicle still not be offered, it worth exploring now.

- Discussion: dynamics and causality

Chapter 12 (Levinson and Krizek 2018) involved two difficult concepts of dynamics and causality. As the author said, moving along or shifting a demand curve, we can calculate the change of quantity and price. The reality is the change only represents one moment of the whole process. For incomplete and asymmetric information, each moment has some residuals and unknown variables. When coming to the cycle of effects in the 'Diamond of Assembly,' the accumulated error make the precise prediction impossible. If the cycle keeps replicating,

we can keep observing and find the rule. However, there are always some new events happened or new variables added in each round. In many circumstances, even the direction of factor effects, positive or negative, is a question. In terms of automated/connected vehicles, we are interested in their potential impacts on the current transportation system. The change of the travel cost and demand made by these technologies could induce more traffic and development. They can increase the efficiency of the system while producing more VMT. They can save many parking lots but may lead to broader sprawl too. There are so many factors that change at the same time. It is even hard to say what will happen at the second step of the cycle.

Causality is a more challenging topic. John Stuart Mill gives the three conditions: "Concomitant variation is the extent to which a cause X and an effect Y occur together or vary together in the way predicted by the hypothesis under consideration; The time order of occurrence condition states that the causing event must occur either before or simultaneously with the effect; it cannot occur afterward; The absence of other possible causal factors means that the factor or variable being investigated should be the only possible causal explanation." The last condition represents the 'sufficiency' principle, which is the most difficult to satisfy and not feasible for most research on transportation. The second one only can reject the effects of Y on X but cannot prove the causality between them. The first condition reflects the equivariance principle, which includes 'measurement equivariance' and 'formal invariance'. For the first approach, the researchers often use existing models and modify some assumptions or parameters in a simulation like cheaper travel cost making longer VMT. The part of 'formal invariance' is critical for applicability but is harder to confirm. Many scholars still keen on the 'virtual' topics of AVs and ridesharing because they believe these could fill the gap between the 'Mount Transit' and 'Mount Auto.' (Levinson and Krizek 2018, 224) This phenomenon itself is a force for AVs' implementation. Deleuze said, "real without being actual, ideal without being abstract." (Deleuze 1994) The philosophy of transcendental empiricism might give us some inspiration.

References

Deleuze, Gilles. 1994. *Difference and Repetition.* Columbia University Press.

Levinson, David M, and Kevin J Krizek. 2018. *Metropolitan Land Use and Transport: Planning for Place and Plexus.* Routledge. https://doi.org/10.4324/9781315684482.