

# Under Analyzed Components in Transportation and Economic Analysis

## The Fame Monster

Martin Weiss

### Abstract

Benefit-Cost Analysis and Economic Impact Analysis in Transportation have been used for decades. However, several components of benefits or aspects of economic impact analysis have not been fully explored or in some cases, have never been explored in any quantitative analysis. These include, for example, the benefit that arises when a high design highway is constructed next to a lower design highway resulting in large trucks being diverted to the new highway and consequently resulting in longer pavement life on the lower design highway. Another example is when the addition of buses result in employees with young children being better able to meet the schedules of child care providers. None of these components, by themselves, are likely to make a mega change in an overall analysis. However, incorporating them should have the effect of enriching the analysis (and probably increasing the predicted benefits more than the predicted costs).

### Introduction – Dance in the Dark

In some ways, one of the problems of transportation analysis today, especially economic (or economic impact) analysis, is the curse of the bottom line. When such an analysis is done, a lot of political capital, a lot of decision momentum is riding on whether, for example, the benefits exceed the cost or whether a new facility will make an area more economically competitive, etc. The attention given the bottom line takes away from the understanding of the components of the analysis that led to that outcome, like dancing in the dark<sup>i</sup>. My experience over several decades of reviewing hundreds of analysis (and in dozens of cases participating in analysis) has led me to two unhappy conclusions about the components of economic analysis in transportation.

- a. In most reports of analysis, a reviewer can't tell which components of the analysis contributed to the outcome.
- b. In most analyses, some components of the analysis are simply not done or wished away.

### A Good Advance – So Happy I could Die

In 2002, the author wrote a piece<sup>ii</sup> for an international conference predicting that one component of transportation economic analysis, specifically, the time value of freight, would be soon an enumerated piece of such project analysis<sup>iii</sup>. This has come to pass with the introduction of the TREDIS<sup>iv</sup> analysis system and just as I thought the world half empty the world bent my way. Unfortunately, some

components which could reasonably be addressed even before the introduction of this system still remain either undiscovered or blurred in such analysis.

### Specifics – Teeth

Below are some specific problems. Don't be scared we've done this before.

1. It should be well known that during the construction of transportation improvements there is some amount of construction related delay (and/or congestion) and some increment of a greater exposure to accidents during the construction. This is, of course, project related with projects on new alignment typically adding less delay and fewer accidents and projects improving existing facilities adding more delay and more accidents. The number of times I have seen an explicit acknowledgement, never mind an explicit quantification of this in a project report, was fewer than the number of fingers on one hand<sup>v</sup>.
2. Another example is the decrease in reconstruction, maintenance and operation that accrues to parallel highways when a new highway is constructed or when a major improvement takes place. In this case, some traffic, in particular large trucks which result in heavy pavement loads, are diverted from the parallel highway to the new (or improved) highway. This would certainly mean longer pavement life on those parallel highways. I have seen an acknowledgement of this in only a few cases and have never seen a quantification of it.
3. Still another example is the quantified benefit (I would call this a liveability or quality of life benefit) that comes to commuters with young children in commercial day care when highway or transit is improved. One of the facts of life of daycare is that there is typically an enormous increase in the cost of day care when it exceeds normal hours. I have never seen a quantification attempted of this component.
4. Similarly to the previous example is the quantified benefit (I would also call this a liveability or quality of life benefit) that comes to personnel and recreational travelers seeking to use public parks and similar facilities. This comes about with increased transit or highway supply. I have never seen a quantification attempted of this component.
5. In some cases, freight is a prisoner of congestion in commercial areas and when transit is improved, an analysis only includes the benefit to commuters when the benefits to truck crews and to shippers, etc. may be significant. I have seen some examples of this done but only as part of a larger study where the effect of the component was lost in the overall analysis.
6. If transit is made less expensive for low income people, it could expand the labor force by allowing those who would otherwise not look for work to reach employment (as this is written, there are almost no metropolitan markets with a labor supply problem but this will not always be the case). Since this potential labor supply consists of people who value time relatively less, increasing transit service is unlikely to have this effect. Since we are, as of this writing, in an era

of labor surplus overall, this may seem unimportant. However, someday there will be labor shortages again and it will not seem unimportant. I have never seen a project level quantification attempted of this component.

7. When major improvements are made in freight via rail or barge there will be some decrease in the truck traffic using parallel or nearly parallel highways. This will result in some increase in pavement life on those parallel facilities as well as a decrease in highway congestion near the landside terminals served by the improved rail or barge. I have seen some examples of this done but only as part of a larger study where the effect of the component was lost in the overall analysis.
8. When a two lane rural highway is reconstructed, there are typically improvements beyond the traveled surface, e.g., shoulders, safety barriers. This sometimes leads not only to fewer crashes but to decreased incident related delay (because delay on such highways is typically related to incidents rather than to systemic congestion). Thus there are three possible economic benefits to these types of projects, i.e., smoother pavement, fewer crashes and less delay.

#### Why Haven't These Components Been Done - Speechless

At least a few documents have noted within an analysis that the analysis does not include the reduction of pavement wear component and did so on the grounds that, therefore, the analysis was 'conservative' in calculating benefits. Similarly with respect to the transit projects that reduced freight congestion and the rail projects that reduced highway congestion. The analysts who realized that there was a component of analysis left undone may have decided that the cost of the analysis wouldn't justify the additional analysis since the project was justified without adding in the extra benefit. Or possibly, they decided that the added benefit would be offset by the unanalyzed congestion effect of construction. Or possibly, the contract language under which they were working didn't cover these components or possibly, they just didn't think of it, leaving me with bubble dreams. Obviously, not every parent has children in paid daycare. Many have other family members doing the care giving at a relative bargain. Also, not just children but some adults are in situations requiring paid for care and having similar, although typically even higher, values for time.

#### What Type of Analysis Should Be Done for Each Component – Bad Romance

Analyzing each of these components will require good traffic data and traffic modeling. In addition, it will require assumptions about the value of time. The time valuation that is most tricky is the time valuation of the parent of the child on the way to childcare. A good reference for this is the site of the National Association of Child Care Resources and Referral Agencies. The cost varies considerably by location and, as noted, whether the parent is late picking the child up. As noted above, the time value

of people who are only a potential part of the labor supply may also be tricky but clearly it should be on the low side, as in, “I want everything as long as its free”.

#### What can we expect to learn – Dance in the Dark

The fact that an analysis hasn't been done does not lead necessarily to the conclusion that an analysis should be done. However, I think the type of component analyses described above have merit for the following reasons:

Suppose all these components turn out to be minimal compared to the usual calculated benefits (saved time by drivers, passengers, and freight, as well as reduced fatalities and crashes). If this happens it would allow future analysis to reference the “Yes, all the components are minimal” research and provide more credibility to that analysis.

Similarly, suppose the construction related costs are substantial but the benefits of the other components add to about the same as those costs. As in the previous paragraph, future analysis could reference that research for additional credibility.

Suppose some of the components turn out to have substantial impact but others don't. In that case, future analysis could concentrate on only those components that had potential substantial impact. Doing the analysis of those components could add credibility.

I think it likely that some components have substantial impact in specific types of projects. They will not fall apart when we are looking. For example, a reconstruction of an urban freeway that requires a half dozen years will likely have substantial construction related negative consequences but not some other projects. Similarly, a transit project that reduces auto travel near a port area may substantially benefit freight movement while one that reduces auto travel in a district full of high rise offices is less likely to have substantial benefits.

There will be an evolution in making decisions on which components to include in few transportation economic impact (or transportation economic benefit/cost) analysis. The decision will have to be based on which components appear significant for the type of project to be analyzed as well as the potential to actually do an analysis (e.g., does the traffic data support an analysis).

#### Conclusion - Telephone Lyrics

The field of transportation economic analysis even while busy, kinda busy with deadline work has made some significant advances in the past 10 years, for example, the inclusion of the time value of freight in analysis. However, there are a few more reasonably doable advances to be made. For example, better enumeration of the cost of construction in delay and crash incident, the pavement preservation benefits of diverting heavy trucks to new highways and the quality of life benefits of providing more reliable trips

for child care and recreation seem reasonably easy to analyze. It simply requires a traffic data base, a traffic model and some work to develop reasonable assumptions on trip types and time values.

---

<sup>i</sup> Some of the subtitles and some phrases are from Lady Gaga's 2009 album "Monster". I have sometimes used the technique of organizing technical articles around musical albums as a mnemonic device. It seems to work and, yes, I like the music/rhythmic/choreographic component of Lady Gaga's work (which I think is underrated, not her public persona which I find icky nor most of the lyrics which are also icky nor parts of the videos which are also icky). For what it is worth, the lyrics to Lady Gaga's album "The Fame Monster" is at:

<http://www.metrolyrics.com/the-fame-monster-album-lady-gaga.html>

<sup>ii</sup> <http://www.fhwa.dot.gov/planning/econdev/edcostpol.htm>

<sup>iii</sup> Some system analysis had included this factor previously, specifically those that used the FHWA Highway Economic Requirements System.

<sup>iv</sup> TREDIS.COM; the system has enumerated time values for crew time (for each mode), commuter time (for auto and transit), on the clock travel (for auto travel), personnel recreation time (for auto and transit) and freight time (for truck, rail, barge and air).

<sup>v</sup> On system analysis, I have seen construction considered more frequently but never as a 'stand alone' component that could be compared to the overall effect.