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INFRASTRUCTURE MANAGEMENT: ARE WE MAKING THINGS BETTER OR WORSE?

Measuring Social Costs

All asset management activities – construction, maintenance, repair, rehabilitation, renewal – cause disruption, inconvenience and other social costs to the general public.

The optimum infrastructure decision is therefore one that minimises these costs for any given benefit and maximises benefits for any given cost.

But how can we do this, if we cannot – or do not – *measure the costs?*

Sure, it is difficult to measure many of these social costs, so I was interested to receive a new survey report from Dana Vanier of the National Research Council of Canada, presenting an overview of existing research in this area.

In this issue :

We explore the nature of social costs for asset managers, how they can be measured, and how they can be mitigated,

- "Social Costs, what are they and how can they be measured?" pp 960-962
- "Mitigating Social Costs" p.963

We also present a series of case studies on different aspects of social costs on infrastructure management.

Do Enjoy!

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WHAT ARE SOCIAL COSTS AND HOW DO YOU MEASURE THEM?

What are social costs?

In the most inclusive sense, one could say that all costs are social costs since some section of society must bear them. But this is not that helpful as an operational or 'working definition'.

More commonly we distinguish between those costs that are borne by the agency making the infrastructure decision – both direct and indirect – and those that are borne by others (individuals, groups, the general public, taxpayers, future generations)

This is a useful breakdown because the more of the total costs that are borne by the agency making the decision, the more that is potentially taken into account. Why only potentially? This is because there is another breakdown that we need to consider and that is the time frame; the more immediately the costs are felt, the greater the chance that we will be able to measure them within a reasonable level of confidence.

How are they measured?

That rather depends on where they sit in the structure. See the following

1. AGENCY COSTS

Direct Construction costs such as materials, labour, equipment and energy for alternative services and emergency repairs including temporary services

Indirect Overheads such as planning, design, legal and administration fees
Loss of service fees (e.g. parking meter revenues)
Reinstatement of property damage, litigation and legal fees
Provision of emergency services (drinking water, detours)

Measurement

All of the above can be measured, at least after the event, and can be directly attributable to the infrastructure project. Overheads can and should be included in the initial cost evaluation, based on past experience. If you have activity based costing, this is easy. If not, you can identify the functions and speak to the personnel involved to determine the time spent on each. If this is periodically done, estimates can be kept updated over time. *The last three items will be conditional but a probabilistic element can be included in the cost analysis.*

2. Costs to Other Agencies

Immediate — Service disruptions, for example where water agencies need to access the road for repairs to water pipes.
Repair/Renewal, for example where two services share an asset and a change is needed to one of them requiring action also to be taken by the other. (eg road/rail crossing)

Delayed — Reduction to service life of the road caused by poor repair
Asset renewal brought forward – eg for power poles or telecommunications when roads are re-aligned.

Measurement:

It is worth separating these out from the costs incurred by the public more generally. This is for two reasons:

1. The other agencies are in a good position to give you their estimates of the costs!
2. Cross-charging between agencies can 'internalise' this element of social cost (ie to turn non-agency costs into agency costs so that they may the better be managed. Lane rentals for example can be applied to water agencies for road access.) Both the estimates and the cross charging may need to be subject to independent third party assessment, eg calculation of the service life reduction caused to one agency by another!

3. Costs to the General Public

Immediate

1. Traffic disruptions (delay costs for vehicles, pedestrians and vehicle operating costs, impact of diversions on local residents and possible damage to the diversion roads themselves;)
2. Repair costs (damages to vehicles, public and private properties)
3. Business loss (loss of revenue – this includes private businesses but also public businesses to the extent that it is not taken into account above)
4. Noise disturbance (avoiding or mitigating noise disturbance is a cost to the agency, eg reduced work hours; to the extent the noise disturbance is not mitigated it is a cost to the public)
5. Dirt and Dust (cleaning, inconvenience)

Measurement:

Although these costs are a bit trickier to calculate and usually require a special exercise – e.g. surveys; questionnaires; research – they are generally possible to identify and measure (after the event) with a reasonable degree of accuracy – see some of the case studies in this issue and some of the follow up references. You may also wish to refer to the work by Ken Harlow in SAM Issue 159 (February 4 2005), where he reported on a survey to measure how much the community thought it was worth to reduce sewer spills. (What the community is willing to pay to avoid a social cost is an estimate of the cost itself.)

Other sources of information are available; e.g. insurance payouts may be a good indication of costs for some activities – flood damage for example. And traffic disruption is one of the most researched and quantified of all costs in this category.

3. Costs to the General Public (cont.)

Social Destruction of societies (see Case Study 4 Urban Renewal in Pittsburgh)
Environmental damage, e.g. river pollution, soil salination, land degradation, and contributions to bigger environmental issues, e.g. global warming

Measurement:

These costs may be the highest of all – but they are also almost impossible to measure. This is because

1. They take place over such a long time frame that it is difficult to be able to attribute damage to a single causes or set of causes.
2. There is considerable dispute in the community over what constitutes damage (some may see a benefit where others see damage)
3. It is generally not possible to put a price on the damage as a whole, let alone on the individual contributions to it.

Long Term Social Costs Cannot be Ignored

While difficult to deal with these costs cannot be ignored. These are issues and costs that need to be dealt with at a *political*, rather than an *economic cost-benefit level*.

Advising on such issues is where the ability to consider the longer-term future consequences of today's actions becomes really important. The results of such 'what if' thinking will not be a measurement – it will be a set of possible future scenarios, anecdotes of possible futures if you will, with our best probability estimates attached to each.

Case Studies

This is where case studies, anecdotes, and general experience count.

We have included a number of case studies in this issue

And we would invite you to share your experience and case studies with others. If you have or know of case studies on the measurement of social costs—and, particularly the longer term outcome social costs, and you are prepared to share them, we can arrange for them to be collected as a public reference set for infrastructure managers.

If you would like to discuss this, please write to me at sam@amqi.com

MITIGATION OF SOCIAL COSTS

"Identifying and classifying social costs enables an organisation to mitigate these costs and reduce the LCC of the infrastructure. Many methods exist that can be used to mitigate social costs. These methods typically fall into one of the four categories:

- Reducing the duration of work
- Timing work for off-peak hours
- Coordinating with other work in close proximity
- Using alternative rehabilitation technology"

MIIP Report: Social Cost Considerations for Municipal Infrastructure Management, National Research Council of Canada, May 2005.

Reducing the Duration of Work

"The United Kingdom's New Roads and Street Works Act of 1991 was designed to encourage utilities to choose construction methods that minimize disruption to traffic and communities… the government proposed charging utilities a lane rental fee for the occupation of a highway during construction. Ideally, a lane rental charge should reflect the type of road, the number of lanes affected and the length of the repair time." MIIP op cit, p12

"Reducing the duration of work can be accomplished through technical advancements in materials such as faster curing times and more efficient soil stabilization techniques. Continuous or sequential working may also be a solution for some projects; however, there is a cost trade-off for both of these methods."

But mitigating social costs does not have to be at the expense of agency costs (see Case Study 1)

Timing work for off-peak hours

A common example nowadays is road repair work carried out at night. This involves higher labour costs per hour, but reduced traffic often means that the work goes faster and is safer for workmen.

Coordinating Work

Coordinating repair or renewal of underground activity has not so far been very effective because of the different lives and needs of the assets involved. However timing routine inspection or maintenance with repair work may take little longer than the repairs themselves and reduce the number of interruptions to service.

Using Alternative Rehabilitation Technology,

Trenchless Technology One of the most common mitigation measures for buried utilities involves the use of trenchless technologies (no-dig and low-dig).

"Social costs were estimated for 14 construction projects (10 open-cut and 4 trenchless methods).. The findings for this small sample indicated that social costs from conventional open-cut methods ranged from 44% to 492% of construction costs, whereas social costs from trenchless methods ranged from 0% to 11% of construction costs. The estimated average social cost as a percent of construction costs is approximately 78% for conventional methods and only 4% for trenchless methods." (MIIP, op cit, p.15)

This technology is discussed in greater detail in the MIIP Report which you can access at

http://irc.nrc-cnrc.gc.ca/fulltext/b5123.8/

Case Study 1: Mitigating Social Costs does not have to be at the expense of Agency Costs

"In Ontario, the Ministry of Transportation recently replaced a failing 20 year old corrugated steel pipe culvert on Highway 403 within a 12 hours period overnight. [By allowing] complete closure of the highway for the removal of the existing culvert, the installation of a new one and reinstatement of the road surface within the allotted time. Traditional construction methods would have required the preparation of a detour route to allow continous flow of traffic, successive lane closures and an imposed slower speed limit for a period of approximately one week. The estimated cost of the detour alone was $200,000, which was more than double the actual overnight replacement cost of $75,000. By expediting construction,[the Ministry] saved on construction costs but also the social costs due to traffic disruption were minimized." *MIIP op cit*

In Tasmania, the Transport Department reduced the period of road closures and delays by lengthening the working day in summer time when the weather is good for road sealing. This minimised the time wasted in getting to and from the job, setting up and closing down each day. Again, both construction and social costs were saved. *AMQ Issue 1 1994*

Case Study 2: The Costs of the Adelaide Grand Prix

Direct Costs

In calculating the net position of the Government as a result of the Grand Prix in 1985, we took account of the costs incurred for such things as administration, advertising, publicity, staging expenditures and the construction of stands and safety barriers, etc. These were all the "Direct Costs"

Indirect Costs

But not all of the Government's costs for the Grand Prix were incurred by the Grand Prix Office; some were 'indirect costs' incurred by other State Government agencies: for example, the State Transport Authority incurred extra costs (net of revenues) as a result of the Grand Prix for route changes, detours, extra services, etc. The net cost has been estimated at approximately $64,000. Estimates by the State Treasury for other public service facilities (i.e. police, administrators, etc) diverted to the 1985 Grand Prix from other activities was $192,000. These costs amount to $316,000 (out of a measured social cost of between $9.4m and $12m to put things in perspective.) They were the ones we were able to measure.

This figure understates total indirect costs as all Hospitals were on standby and many government departments and agencies were involved in some way, from advice and consultation to physical involvement such as the resiting of fire service outlets as a result of the changing road levels occasioned by the Special Grand Prix track; not all of these charges were charged to the Grand Prix Office or taken into account by the State Treasury.

Costs to Other Agencies

In this case the 'other agencies' are non-State Government agencies: for example, the Adelaide City Council and two neighbouring councils, the City of Kensington and Norwood and the City of Burnside were reported to have had non-compensated costs associated with the 1985 Grand Prix of around $60,000.

Costs to the General Public

The Adelaide Grand Prix used the city roads for part of the Grand Prix track. For weeks before the race, special diversions were in place, during the week itself traffic disruptions rose to a peak, people lost time at work, or income, or simply took longer to go where they wanted to go. There were parking problems, noise problems, property damage (although slight) and, sadly, an increase in traffic accidents that represented a social cost of between $3.2m and $5.8m. (see case study 3)

And then there were the costs we could not put a value on!

"Lobster exports to the lucrative United States' market have been cut to ensure visitors to the Australian Grand Prix won't go short. Normally at this time of the year lobsters are hard to come by because of the heavy demand from the U.S. market. However, because thousands of overseas and interstate visitors are expected to flock to Adelaide for the Australian Grand Prix, Safcol has held back on exports. Safcol's general manager, group marketing, Bob Bastian, said yesterday that Beachport lobster was so keenly sought in the U.S. there usually was little left for local consumption. "This season, however, Safcol is making a determined effort to supply the local market, even t the detriment of the export market, simply because South Australia has an excellent chance to gain an international reputation through the Grand Prix, he said." Sunday Mail, 13-10-85 *Source: The Adelaide Grand Prix – the impact of a special event Ed: JPA Burns, JH Hatch and TJ Mules. The Centre for South Australian Economic Studies, 1986.*

Case Study 3: The Cost of Road Accidents Attributable to the Grand Prix

The social costs of increased road accidents due to the Grand Prix were estimated at between $3.2m and $5.8m.

Cost estimation

This estimate required (1) estimating the share of the increased road accidents that could be attributed to the Grand Prix - *and would not have been offset by reduced accidents elsewhere because of the traffic now congregating around the Grand Prix.* And (2) putting a value on that increase.

The full costs of a road accident are difficult to measure, particularly where a fatality occurs. Many people baulk at the idea of trying to place a dollar value on a human life. Nevertheless they can accept the notion of placing a dollar value on the amount that the person would earn over his or her expected lifetime. This is the value which is forfeited by society should the person die in a road accident. This is what was calculated in the Grand Prix study. Future earnings were discounted, but given that these lost earners would likely have become more productive with experience, these figures may well be understated. To this was added family and community losses, the cost of hospitalisation, property damage (mainly to vehicles) legal and police costs, and miscellaneous expenses such as ambulance, towing, insurance administration, and the cost of having to pay for a funeral now rather than in some years' time. Numerous studies have looked at these measures.

Finding the data

What data was available? There is no perfect measure of road accidents, but three measures appealed as being broadly indicative of accidents. The first were the blood samples routinely collected from vehicle accident casualties for blood alcohol testing. This was collected for the ten-week period just before, during, and just after the Grand Prix and for comparable periods for the previous five years. The second set of data related to St John Ambulance (the sole ambulance service in South Australia) 'carries' for the metropolitan area, divided into so-called 'sitters' and 'stretchers'. This series was collected for the four-week period 23/10/85 to 19/11/85 (the Grand Prix was on November 3). This, as would be expected, correlated highly with the 'bloods' data. The third measure of accidents was the number of calls for registered tow operators in the Adelaide Metropolitan area. However, because of changes to the system, this was only available for 19 months before the race, not the five years that had been used with the other data and so was not strictly comparable. These measures were chosen because they were available and because they were more likely to be reliable that data of accidents reportable to the police. *Source: The Adelaide Grand Prix – the impact of a special event. Op cit.*

Case Study 2: Longer-term outcomes and Social Costs

Housing authorities and councils, I have noticed, like urban renewal projects with their opportunities for 'photo opportunities' and the possibilities of external funding. Do we ask ourselves what are the social costs of allowing an area to become so run-down that urban renewal appears the only solution? Do we query whether the 'renewal' is really a social benefit?

In the following case study, condensed from an article in the New York Times (my favourite late evening reading) John Tierney reports on the outcome of a decision to 'renew' a section of Pittsburgh .

"Pittsburgh has been the great pioneer in eminent domain [the right of government to seize private property for public use] ever since its leaders razed 80 buildings in the 1950s near the riverfront park downtown. They replaced a bustling business district with Gateway Center, an array of bland corporate towers surrounded by the sort of empty plazas that are now considered hopelessly retrograde by urban planners trying to create street life.

At the time, though, the towers and plazas seemed wonderfully modern. Viewed from across the river, the new skyline was a panoramic advertisement for the Pittsburgh Renaissance and became a national model inspiring Pittsburgh's leaders to go on finding better uses for private land, especially land occupied by blacks.

Bulldozers razed the Lower Hill District, the black neighbourhood next to downtown tht was famous for is jazz scene … The city built a domed arena that was supposed to be part of a cultural "acropolis", but he rest of the project died. Today, having belatedly realised that downtown would benefit from people living nearby, the city is trying to entice them back to the Hill by building homes there.

In the 1960s, the bulldozers moved into East Liberty, until then the busiest shopping district outside downtown. Some of the leading businessmen there wanted to upgrade the neighbourhood, so hundreds of small businesses and thousands of people were moved to make room for upscale apartment buildings, parking lots, housing projects, roads and a pedestrian mall.

I was working there in a drugstore shoe owners cursed the project and, at first, I thought they were just behind the times. But their worst fears were confirmed. The shopping district was destroyed. The drugstore closed, along with the department stores, movie theatres, office buildings and most other businesses.

You'd think a fiasco like that would have humbled Pittsburgh's planners, but they just went on. … The city managed to clear out shops and an office building to make room for a new Lazarus department store, built with $50 milllion in public funds, but Lazarus did not live up to its name. It has shut down and left a vacant building. *Meanwhile, the city's finances are in ruins, and businesses and residents have been fleeing the high taxes required to pay off decades of urban renewal projects and corporate subsidies."*

Source: New York Times, July 5, 2005. "Your Land is My Land" by John Tierney

Footnote for Northern Hemisphere readers: in Australia the cane toad is synonymous with good intentions gone awry. The species was introduced to eat the beetles that were attacking the sugar cane but they left the beetles alone—and ate everything else. The poison sacs on their backs poison animals that try to eat them. So from 30 individuals introduced into Queensland in 1933 they are now in their millions spreading across the country and threatening our domestic animals and native wild life.