

Infrastructure



Releasing the pressure on road agencies

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Contents

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Introduction	1
Bumpy roads	1
The road ahead	2
Standardizing design and investment decision making	2
Optimizing decisions for total cost of ownership	2
Developing a segmentation	3
Conducting cost-benefit analysis	4
Applying other levers	4

Releasing the pressure on road agencies

Introduction

The combination of strained budgets, a growing need to maintain existing roads, and the need—once again—to add capacity is presenting unprecedented challenges to road agencies around the globe. Many agencies are responding by delaying investments and even routine maintenance work, leading road quality to deteriorate and congestion to grow. The problems are many, the solutions elusive. Given the importance of well-performing highway systems to economic growth and quality of life, finding sustainable solutions is imperative.

Unfortunately, the typical state of road agencies worldwide positions them poorly to meet the challenge. Most agencies operate as natural monopolies without external competitive pressure—and, until the recent recession, there was no economic pressure to innovate. Few agencies interact directly with their customers, and they thus lack direct feedback on their performance. And governments have traditionally been only minimally or ineffectively involved with road agencies, because the work is technically complex and they possess a limited understanding of the cost-benefit trade-offs involved in the choices road agencies face.

The consequence is that the governance models used to run many road agencies and the performance metrics by which they measure themselves are not equal to today's rising demand. Nor have road agencies generally adopted the kinds of tools and techniques necessary to improve performance. Nevertheless, we believe (and experience shows) that these organizations can address all these challenges by redesigning their governance, establishing a culture of continuous improvement, and bringing in a new set of tools and techniques to reduce road-construction cost and maintenance and to deliver projects more quickly. The first step should be to adopt new tools and techniques that, taken together, can produce improvements equivalent to a 15 to 20 percent reduction in a road agency's total capital and operating cost base. Solutions to cultural challenges and available governance options are unique to each road agency, and so it is hard to make useful generalizations. It should be noted, however, that adopting the tools and techniques discussed in this paper can help an agency begin to change its culture and the way it is governed.

Bumpy roads

Current weaknesses in **governance** become apparent when looking at typical areas of activity. A lack of transparency into drivers of cost and risk in large-scale investment

projects frequently leads to time and budget overruns. Sometimes, these overruns come as a surprise, even in the late stages of projects—and they can blindside not only the politicians and funding agencies that approve the projects, but also top management at the road agencies themselves. As for maintenance of existing roads, the absence of a good analytical fact base to defend prioritization decisions means that political determinations often drive limited resources toward lower-return investments. A vicious cycle can then quickly emerge, as budgetary pressures force a kind of crisis-management approach to highway spending, in which resources are used to address issues at the most expensive time possible—that is, after the issues have already developed into serious problems. This situation is exacerbated when operations funds are depleted to make up for overruns in the maintenance budget due to responses to exogenous events, such as servicing roads in the face of bitter winter weather. Unmaintained asphalt ultimately cracks and loses its sealing effect, leading to destruction of the subsurface and significantly higher replacement expenses. Costs spiral out of control.

As noted, many road agencies interact in only a limited fashion with their customers. As a consequence, most agencies have not developed the **culture of continuous improvement** that is the healthy response to regular end-user feedback. Unanchored to customer needs, ambitious architects and engineers often design solutions that exceed what is required and that are often well beyond the reach of available resources. During the procurement phases of a project, the focus of the agency tends to be on compliance with complicated tender regulations, which can crowd out the kinds of innovative strategies that might increase competitive pressure among suppliers. Only rarely are best practices shared across departments or regions.

Finally, **tools and techniques** commonly used in other industries to improve the quality and productivity of new builds and refurbishments are not widely applied by road agencies. For example, in new-road investments, agencies have applied cost-benefit analysis inconsistently. Price discipline is often imposed too late in the project, just when the pressure to proceed is strongest. Many road agencies find it difficult to determine necessary levels of maintenance, because they are unable to track the technical condition of their assets and to predict how assets will deteriorate over time. Nor do they have models that link technical condition with total economic costs (that is, operational costs and reinvestment costs). As regards their operations generally, many agencies can develop only a limited sense of the relative economic value of different activities. And rather than

considering procurement from a total-cost-of-ownership perspective, the tendency is to select the cheapest solution in the short term, pushing longer-term costs into maintenance budgets that become ever larger.

The road ahead

Despite the myriad challenges these organizations face, there are some extremely positive developments in the sector. A number of Northern European road agencies, for instance, are successfully applying cutting-edge management tools and techniques borrowed from leading industries. Driven by increasing funding pressure, they have been forced to rethink the way they do business. The Trafikverket, the Swedish transportation authority, appointed a new CEO, who took his mandate to transform the organization and pushed an aggressive agenda. At the Vejdirektoratet, the Danish road agency, there was pressure from funding authorities, who demanded that an external auditor assess agency practices and make recommendations. In response, the agency showed significant improvements in all major categories relatively quickly: new-build costs were reduced by more than 5 percent, maintenance costs by 15 percent, operations costs by 10 percent, and procurement of direct goods by 5 to 15 percent. Beyond these two examples, we have seen large savings in administrative spend as well—differences of up to 30 percent for direct staff costs and 20 to 40 percent for indirect spend.

Road agencies need not look only to other road agencies to find useful approaches. A range of solutions used in the management of large infrastructure and fixed-asset projects worldwide can be studied and adapted. Road agencies generally have not pursued such solutions because there has not been enough economic pressure in the last several decades to make them change their ways. Only now, with pressure intensifying because funding has fallen just as demands for infrastructure have increased, is the energy for change emerging.

A number of practices shared by industries that build and maintain large capital projects could be (and in limited cases have been) easily adapted to the needs of road agencies. Six practices stand out: (1) standardizing design and investment decision making, (2) optimizing investments, maintenance, and procurement decisions for total cost of ownership, (3) developing a segmentation of classes of roads as the basis for prioritizing activities, (4) conducting cost-benefit analysis, (5) managing the R&D pipeline, and (6) incorporating elements of lean administration.

Standardizing design and investment decision making

Several road agencies are improving investment decisions both by standardizing them and by embedding sound business analysis into processes that originally emphasized engineering and design. These agencies are also introducing risk management as an explicit component of the project.

One road agency has implemented a standard framework for prioritizing projects (Exhibit 1) and set a minimum road standard as a reference against which all designs and budgets are evaluated. Defining this kind of reference standard provides a yardstick against which the agency can measure the costs and benefits of any design choice. The minimum standard also works against a tendency to overdesign because it typically becomes *the* standard: the architects and engineers do not want to come in too high against the reference minimum.

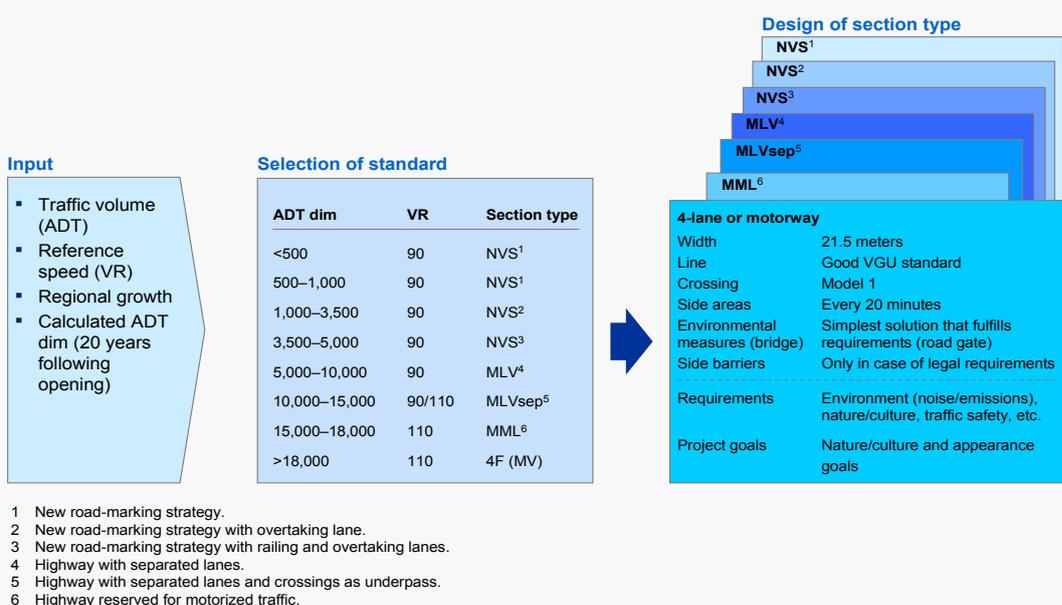
For large projects, the same agency has established a cross-functional review board on which all relevant skills are represented. The board conducts monthly progress reviews to identify issues early and ensure that critical decisions are made at the right level, at the right time, and from a comprehensive perspective. Finally, the agency has increased the flexibility of its specifications model. This allows for a dialogue with contractors that can identify cost-saving opportunities during execution. Now, more than 20 design choices that would be best made on-site, once ground conditions are known, are actually made there, which has allowed the agency to avoid the high construction costs that come from making decisions before the relevant data are available.

Optimizing decisions for total cost of ownership

With regard to procurement, some road agencies are shifting aggressively from decision making based on the lowest procurement cost to a model that bases choices on total cost of ownership (TCO). Agencies are geared toward selecting the least-expensive long-term outcome rather than the one that minimizes expenses against single-year budgets, which necessarily requires pushing all other costs into the future. By considering the lifetime cost of any procurement decision, a TCO methodology makes visible lower-cost items that look good at the time of purchase but that will incur high maintenance costs later. It rapidly becomes clear when it is better to pay more at the beginning in order to spend less later.

Exhibit 1

A standard investment-assessment template supports an even-handed evaluation of all alternatives.



TCO, which is obviously relevant for new investments, is equally important as regards maintenance of capital assets. To take a simple example, TCO analyses have proved that proactively sealing and drainage at regular intervals saves money.

Exhibit 2 illustrates a simple model for using TCO to maintain an existing road network. An agency identifies the optimal level of maintenance by calculating how the combined running and renewal costs of any given road in any condition develop as a function of the condition of the road. This makes it easy to determine the lowest-cost moments for different maintenance interventions. Optimization of this kind can cut maintenance costs by 10 or 20 percent.

In one case, TCO analysis helped convince one ministry of finance that additional maintenance funding was required to avoid a cost explosion. The agency had developed a large maintenance backlog because its 2008 budget was too small to keep up the national road network. Because the agency lacked the fact base to document the optimal use of maintenance and operations funds, the tools to ensure optimal maintenance, or even the ability to monitor the use of its funds generally, it was impossible to make a credible case to increase spending. Only after data were gathered and

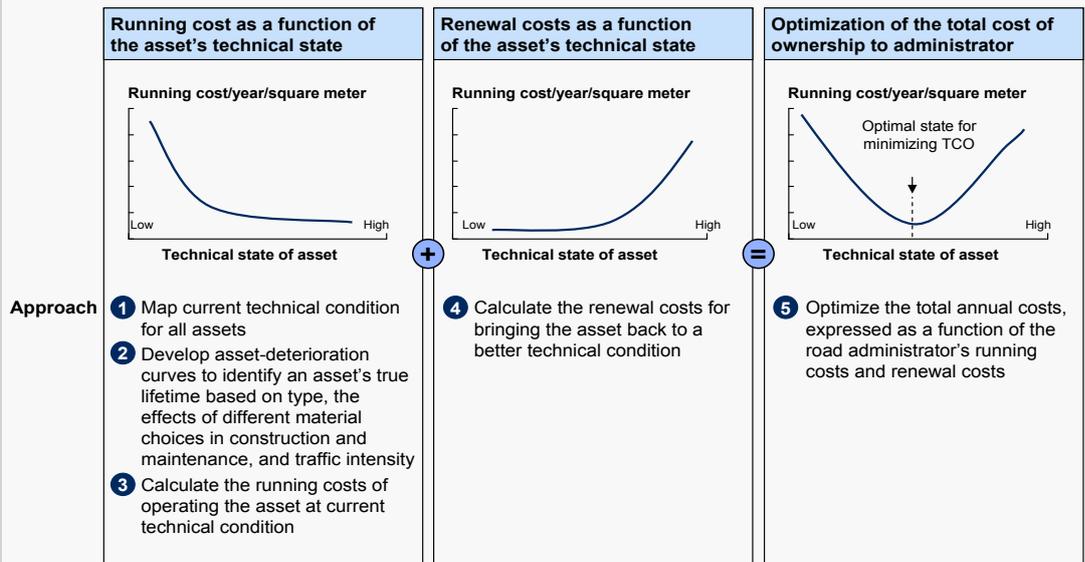
appropriate tools put in place was the agency able to persuade the government to increase its allocation, which should allow the organization to eliminate 70 percent of the maintenance backlog by 2013. To support this radical improvement, the agency will implement new practices to realize the lowest possible TCO for capital assets, put in place documentation and models to optimize the maintenance budget, and establish a new budgeting and reporting system to provide transparency into the agency's finances and its progress toward operational targets.

Developing a segmentation

Marketers divide their customer bases into segments in many different ways. Road agencies should consider doing the same with their road networks. Those that do so use segmentation tools to increase the granularity at which road-network servicing decisions are made, because not all elements of the network need the same level of maintenance. Granular segmentations lead to lower operational costs for roads with low traffic intensity. Roads with high traffic intensity are often maintained more aggressively (and thus more expensively) in a segmentation-driven model than in a one-size-fits-all model. But a finer segmentation still leads to a lower average cost (and better results along the way).

Exhibit 2

A total-cost-of-ownership methodology can be applied to road upkeep.



This kind of segmentation also improves decision making in other ways. For instance, for roads with average daily traffic below 5,000 units (sometimes calculated as the number of vehicles or, for greater precision, as the number of axle pairs), ground movements, rather than traffic intensity, limit the lifetime of the road. This fact drives a completely different rhythm and protocol for maintenance.

Conducting cost-benefit analysis

This is a time-honored tool, but because of policy considerations, it has not been routinely or rigorously implemented by many road agencies. When used, cost-benefit analysis allows an agency to understand where the benefits of a project in areas such as safety, comfort, and aesthetic value genuinely exceed the costs. Such an analysis typically leads road agencies to strip back plans to the elements that really matter. Cost-benefit analyses also help standardize and simplify operations, which can in turn drive lower costs with no negative impact for users.

Not surprisingly, road agencies are under growing pressure to apply cost-benefit analysis. However, many organizations have not used the approach in decades and thus lack the

experience to apply it in a sophisticated fashion, to integrate it into decision-making and project-planning processes, and to present it convincingly to the public. We have found that, unless all of this is done well, costs tend to balloon, public pressure builds to go ahead with a cost benefit–negative project, or both.

Applying other levers

Addressing other areas can yield significant improvements, and we see two areas in particular that offer opportunities to increase the efficiency and effectiveness of large road projects. The first is **R&D pipeline management**, which can guide investments in projects with unclear outcomes (of which road-safety improvements are an example). Under a typical R&D pipeline-management model, best known from the pharmaceutical industry, projects must pass through certain gateways—design, prototype, live tests, rollout—to move forward. Dubious projects can be killed early, and money can be reallocated to ideas with a more promising cost-benefit profile. In one country, applying such a “stage gate” model led to an aggressive rollout of “2+1 roads” (that is, roads with two lanes in one direction and one in the other, alternating which direction gets two lanes and which just

one every kilometer or two); speed cameras were also used to improve an already-impressive safety record.

Finally, tools for **lean administration** are being tested by a number of road agencies. Experience from other government agencies shows that as little as 20 to 30 percent of the time of the personnel responsible for planning, contractor management, finance, and so on—that is, the tasks that ultimately add value to customers—is actually spent on those tasks. By using proven lean interventions to reduce internal complexity, refocus time on value-added activity, and influence the ways people think and behave at work, one

road agency is currently driving a program aimed at reducing administrative costs by 30 to 40 percent across the board.

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While the way in which these tools should be applied, and the impact they will have, will vary by situation and region, road agencies everywhere can draw inspiration from these examples, in which some road agencies have achieved significant performance improvements by pulling levers and adopting practices that they too can pull and adopt.

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