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Benefit-Cost Analysis of Road Maintenance

Or A Dollar in Time Saves Nine

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Background on MCC

- Competitive country selection process
- Country-led aid
- Large compacts (\$60 – \$700 million)
- Infrastructure intensive investments
- Policy and sustainability focus
- Five-year clock
- Evidence-based
- Results focused

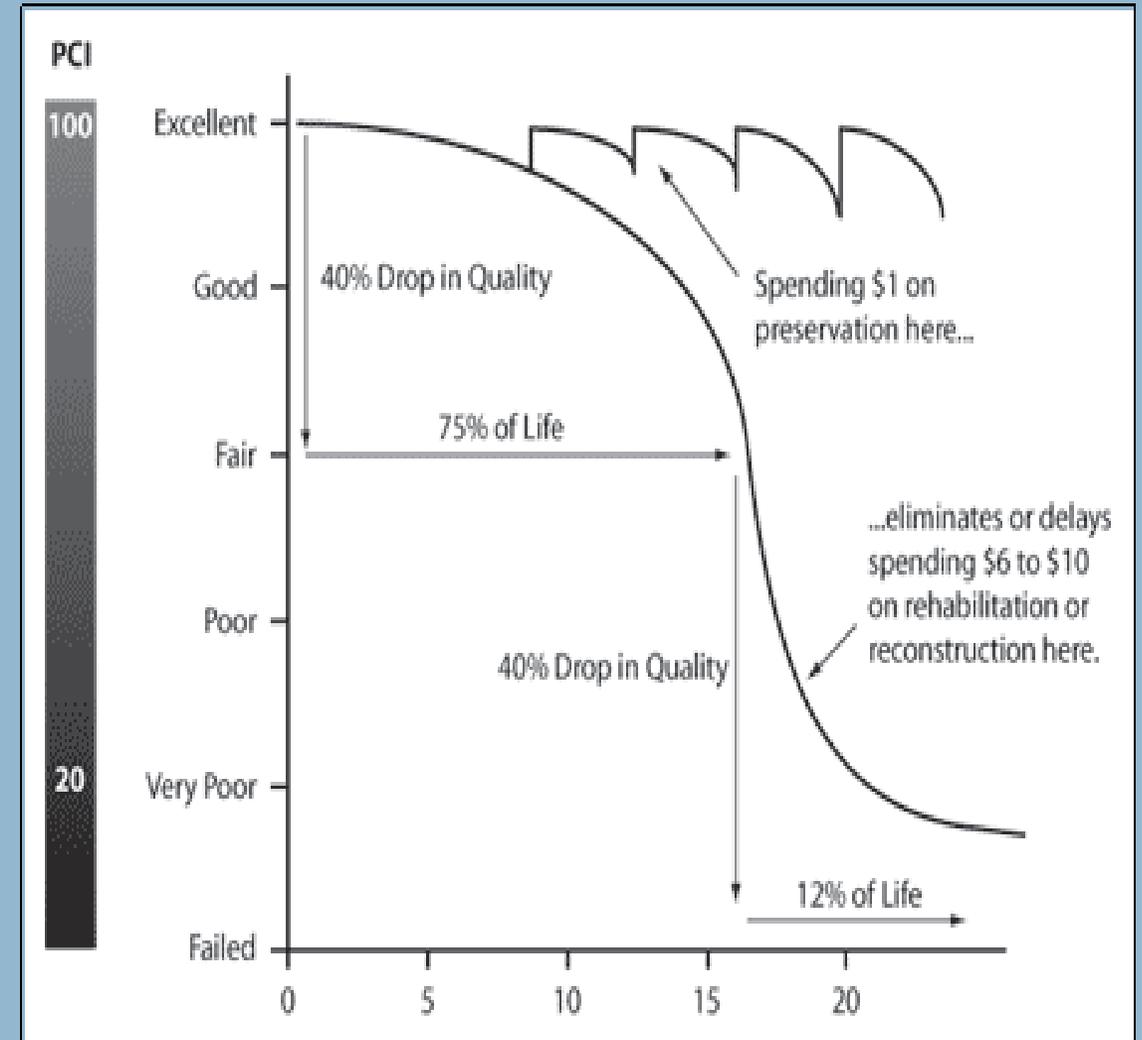


MCC has conducted road projects in 18 compacts

- MCC has primarily done paved roads
 - Of 3652 kilometers improved, 2072 have been paved
 - Over 80% of MCC transportation funds have been spent on paved roads
- Previous attempts at road maintenance at MCC have been dominated by:
 - Conditions precedent (requiring the government to improve maintenance funding)
 - Light technical assistance, including network analysis training, to government staff.
 - Maintenance matching funds
- Based on experience to date, we're turning more attention to maintenance
 - First maintenance-only investment in Liberia

Maintenance is important, and there's some optimal allocation

- As roads deteriorate, speeds on the roads decrease and vehicle damage per kilometer increases
- Regular road maintenance is the most efficient method of maintaining a smooth road
- AASHTO pavement services estimates every \$1 of preventative maintenance avoids \$6-10 of rehabilitation



Road works decisions sometimes based on public spectacle rather than cost effectiveness

- When turning to donors, many countries focus on big renovation and paving, rather than periodic maintenance.
 - Thinking is: In resource constrained environment, paved roads won't need so much maintenance
 - These large investments don't last, due to lack of maintenance and weight limits
- Maintenance is not sexy, can be difficult to have long-term vision
 - Quite common to go with a 'worse first' strategy, where the poorest roads receive the highest budget for repair.
 - Senegal Experience: There was an expectation that roads, once failed, would be renovated by donors. Therefore maintenance was less important.
 - This has been EU's experience all over Africa, recently announced no longer funding major roads projects

Renovation over maintenance: you're doing it wrong



- Status quo of paving large stretches of road and then just handing them over to government clearly not functional
- Some possible alternatives:
 - Performance-based contracts that include maintenance
 - Actually build maintenance capacity (maybe instead of large infra)
- While renovation can be important, if funds are limited the priority should be maintaining those roads already in good condition before renovating failed roads. (AASHTO, 2013)



MCC generally uses HDM-4 for modeling

- Roads cost-benefit analysis at MCC utilizes road network software, Highway Development Model (HDM-4).
- HDM-4 is an engineering model that calculates the damage vehicles do to a road along with how fast a road degrades.
- This program predicts road performance as a function of:
 - traffic volumes and congestion
 - road pavement type and strength
 - maintenance standards
 - environment and climate
- NOTE: HDM-4 is very data intensive and can be expensive to use for low-resource countries. RED can be adjusted to work as well.



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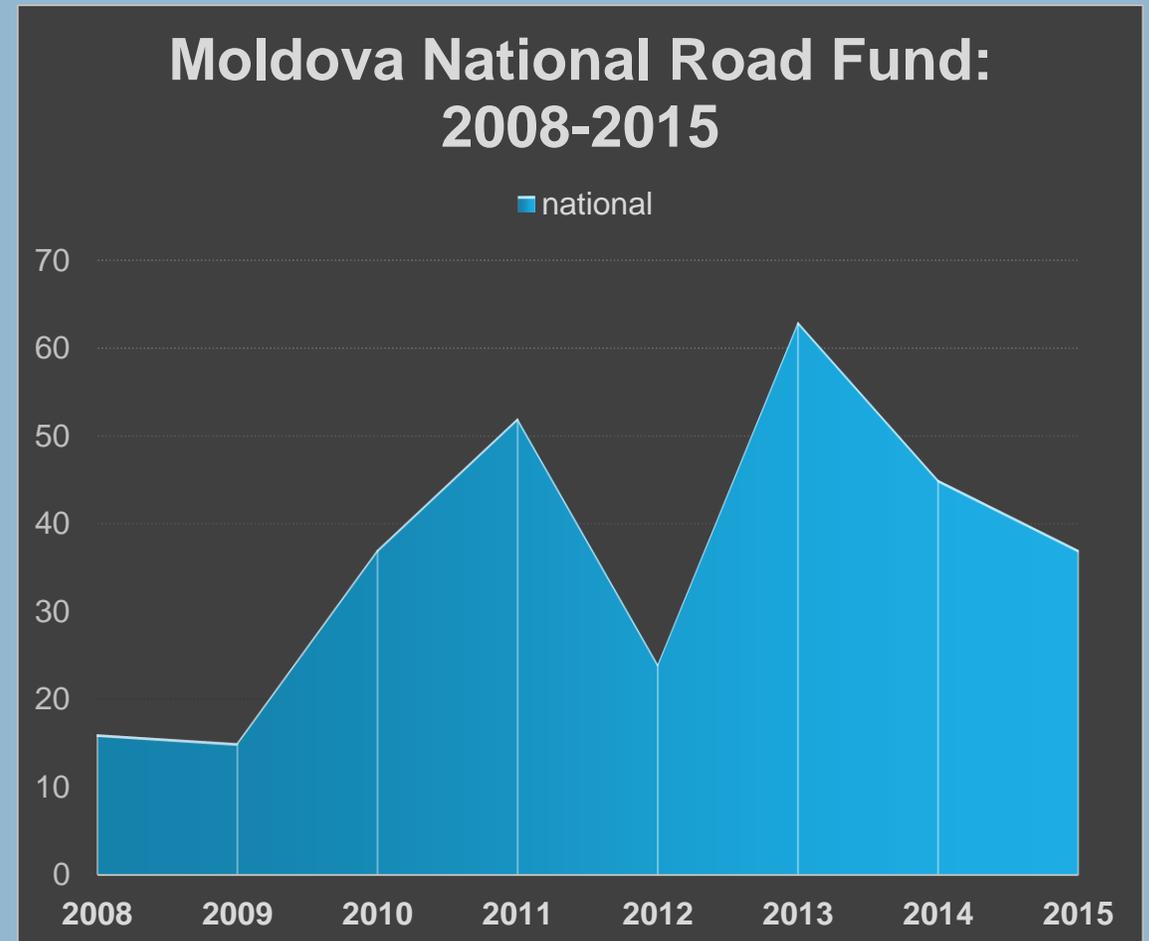
The Case of Moldova's disappearing Road Fund

- MCC reconstructed and widened 77 km of highway in central Moldova.
- Due to an MCC requirement that maintenance spending increase, MCC assumed proper maintenance would be done.
- Maintenance spending (nationally) has decreased post compact to pre compact levels.
- As a result, the CBA has been revised from a \$32 million NPV (ex ante) to a -\$6 million NPV (ex post).



The Road Fund that wasn't

- The World Bank estimated \$110 million would be needed for national roads
- Roads Fund peaked at \$60 million in 2013, dropping to \$38 million in 2015
 - Not all money was used as intended
- Past practices in Moldova have emphasized low routine maintenance, with an emphasis on renovation.



The case of Liberia's budget constraint

- Pre-war, Liberia kept all of its roads in all-weather condition (if unpaved) through an effective maintenance system
- In 2014 Liberia's budget was ~\$559M, with MOPW budget ~\$27M
 - 35/30/25% breakdown primary/secondary/tertiary
 - Recurrent costs average ~ 5,560 \$/km/yr for unpaved and 13,766 \$/km/yr for paved for only a ~10 – 20 kph improvement
- MCC working with Liberia to stand up Road Fund and begin executing their master plan
 - In steady state, cost for whole network maintenance should be ~\$18M



Policy is important

- Assuming perfect maintenance in our BCA overestimates benefits
 - The difference between perfect maintenance and what happens in reality is the risk of unsustainability
 - If sustainability is important, then might want to consider technical assistance or policy reform as an integral part of the project
- Need to change the dialog for policy-makers
 - Impact of maintenance over rehabilitation is far larger in resource constrained environments
 - More people can benefit per dollar spent on maintenance than rehabilitation