

Applying a Sustainable Asset Valuation (SAVi) to the Contournement De Rabat, Morocco:

A focus on road
infrastructure

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The Scope of This SAVi Assessment

The International Road Federation and Autoroute du Maroc (ADM) asked IISD to use SAVi on the Contournement de Rabat (or Rabat bypass) road project, which was officially inaugurated in August 2017. It has a length of 41.1 km and includes the Mohammed VI Bridge, an important landmark. The toll road was built to improve mobility around the city and reroute traffic not destined for Rabat.

SAVi was applied to the Rabat bypass to inform the ADM on the costs of operational risks and their impact on the overall financial viability of the project. We also used SAVi to value four externalities and demonstrate their impact on the cost, revenues and financial viability of the project.

This was the first time ADM valued risks in financial terms, and identified and assessed externalities related to a project.

Why Use SAVi?

SAVi calculates the environmental, social and economic risks and externalities that impact the financial performance of infrastructure projects. These variables are typically ignored in traditional financial analyses.

SAVi is a simulation tool that is customized to individual infrastructure projects. It is built on project finance and systems dynamics simulation.

Visit the SAVi webpage:
<https://www.iisd.org/project/SAVi-sustainable-asset-valuation-tool>

Externalities

The analysis takes the following externalities into account:



Discretionary spending of labour income: Valuation of the additional income spent in the domestic economy as a result of the employment created by the project.



Cost of Accidents: Economic valuation of accidents on the bypass road.



CO₂ emissions: Valuation of CO₂ emissions based on the social cost of carbon.



Value of time saved: Valuation of time that is saved as a result of the bypass road. This improves economic productivity.



Risk Scenarios

The Scenarios

The risk scenarios included in the assessment are described in the table below. They all present risks to the management and operation of the bypass. ADM identified these risks in their risk matrix, and they were selected through in-depth discussion between IISD, ADM and the International Road Federation.

Indicator	Unit
Scenario 1: Business as usual	Capital and operational expenditure as budgeted by ADM over the lifetime of the road
Scenario 2: Reduced Maintenance Expenditure	5% reduction in maintenance expenditure due to the budgeted cuts
Scenario 3: Increase in Road Works	200 metres of road is closed for reconstruction, every year from 2018 to 2060
Scenario 4: Short-term Traffic Increase	200% traffic increase in the short term
Scenario 5: Increase in Heavy Vehicle traffic	30% increase in heavy vehicles from 2018 to 2030
Scenario 6: Road Damage Due to Climate Change	2 km of road is damaged as a direct result of climate change, every 10 years



SAVi's Integrated Cost Benefit Analysis (in EUR millions)

	Unit	Scenario 1: BAU	Scenario 2: Reduced Maintenance Expenditure	Scenario 3: Increase in Road Works	Scenario 4: Short-Term Traffic Increase	Scenario 5: Increase in Heavy Vehicle Traffic	Scenario 6: Road Damage Due to Climate Change
EXPENDITURE(S)							
Capital investment ¹	mn EUR	329.79	329.79	406.97	329.79	329.79	337.12
O&M expenditure	mn EUR	73.64	65.34	73.64	73.90	80.84	73.66
Total investment and O&M	mn EUR	403.4	395.1	480.6	403.7	410.6	410.8
EXTERNALITIES							
Total cost of accidents	mn EUR	212.2	236.0	212.2	212.5	226.8	211.4
Social cost of carbon	mn EUR	4.61	4.58	5.64	4.61	4.63	4.71
Discretionary spending from labour income	mn EUR	1.26	1.12	1.34	1.26	1.37	1.27
Value of time saved	mn EUR	162.6	162.6	147.1	148.0	159.5	162.2
Total value of externalities	mn EUR	-52.9	-76.8	-69.4	-67.9	-70.5	-52.7
REVENUES							
Total revenues	mn EUR	456.10	456.10	456.10	456.03	464.89	454.68
Conventional CBA (revenues less cost)	mn EUR	52.7	61.0	-24.5	52.3	54.3	43.9
Integrated CBA (incl. externalities)	mn EUR	-0.2	-15.9	-93.9	-15.6	-16.3	-8.8

¹ This includes the capital expenditures (CAPEX) and the cost of financing.



As demonstrated in the integrated CBA, the value of externalities is significant. The value of time saved and the total cost of accidents across the different scenarios are particularly high. For example, in Scenario 2, we observe that a reduction in maintenance expenditure from 73.64 million EUR to 65.34 million EUR will lead to an increase in costs of accidents from EUR 212 million to EUR 236 million.

In Scenario 5, we observe that the increase in revenue from EUR 456.10 million to EUR 464.89 million generated by increased heavy vehicle traffic. This does not, however, offset the increase in costs when the externalities are considered: the integrated CBA leads to a net loss of EUR 16.3 million.

SAVi analysis on financial indicators

Scenario	IRR (%)	NPV (EUR million)	Min. DSCR (ratio)	Ave. DSCR (ratio)	Min. LLCR (ratio)
Scenario 0: BAU Without Externalities	1.63%	(103)	(0.08x)	0.67x	0.48x
Scenario 1: BAU with Externalities	3.39%	(29)	0.21x	1.04x	0.82x
Scenario 2: Reduced Maintenance Expenditure	3.14%	(41)	0.17x	0.98x	0.76x
Scenario 3: Increase in Road Works	1.63%	(132)	0.05x	0.66x	0.51x
Scenario 4: Short-Term Traffic Increase	3.25%	(36)	0.19x	1.00x	0.79x
Scenario 5: Increase in Heavy Vehicle Traffic	3.34%	(32)	0.20x	1.03x	0.81x
Scenario 6: Road Damage Due to Climate Change	3.25%	(37)	0.20x	1.00x	0.79x

The negative net present value (NPV) means that the discounted cash flows of the project cannot cover the capital and operating expenditures. In other words, the project is not a sound investment for either debt or equity investors.

Under Scenario 6 the traffic decreases due to frequent climate-related disruptions. This also results in an additional operational CAPEX (EUR +7.3 million) as major reconstruction works are needed to fix the damage done due to climate events. The cumulative negative effects of climate change are well demonstrated in the worsening of all financial indicators compared to Scenario 0.

About SAVi

SAVi is a simulation service that helps governments and investors value the many risks and externalities that affect the performance of infrastructure projects.

The distinctive features of SAVi are:

- **Valuation:** SAVi values, in financial terms, the material environmental, social and economic risks and externalities of infrastructure projects. These variables are ignored in traditional financial analyses.
- **Simulation:** SAVi combines the results of systems thinking and system dynamics simulation with project finance modelling. We engage with asset owners to identify the risks material to their infrastructure projects and then design appropriate simulation scenarios.
- **Customization:** SAVi is customized to individual infrastructure projects.

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