

Applying a Sustainable Asset Valuation (SAVi) to the Bus Rapid Transit Project in Senegal:

A focus on transportation infrastructure

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The Scope of This SAVi Assessment

The Bureau Opérationnel du Suivi (BOS), the executive agency responsible for the monitoring of the Plan Senegal Emergent, requested a SAVi assessment on the Bus Rapid Transit (BRT) project. The BRT is a new public transportation project that is set up to improve mobility in and around Dakar. The Conseil Exécutif des Transports Urbains de Dakar (CETUD) manages the project.

Upon project completion in 2023, it is expected that the BRT will be able to transfer 300,000 passengers per day. The total cost of the project is estimated at EUR 369,490,000 and is financed by the World Bank, the European Bank, the Senegalese Government and the Green Climate Fund. The financing of the project was approved in 2017. The project is currently in the procurement phase.

The SAVi assessment provides BOS with information on the added value of the BRT compared to a scenario where the BRT would not be implemented. Because demand for new public transportation projects is difficult to forecast, the SAVi assessment also includes two scenarios to calculate the financial impact of overestimating and underestimating demand, respectively. The SAVi assessment includes the valuation of six externalities related to the project. It also includes projections for employment.

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: iisd.org/savi

Externalities

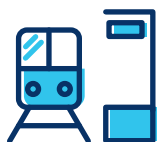
The analysis takes the following externalities into account:



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.



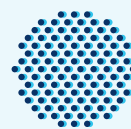
Value of time saved: Valuation of time saved thanks to the improved mobility of the BRT.



Avoided cost of transportation: Valuation of the cost of all modes of transportation for society.



Avoided cost of pollution: Valuation of $pm_{2.5}$, SO_2 and NO_x emissions related to burning fossil fuels.



Avoided cost of GHG emissions: Valuation of avoided CO_2 emissions.

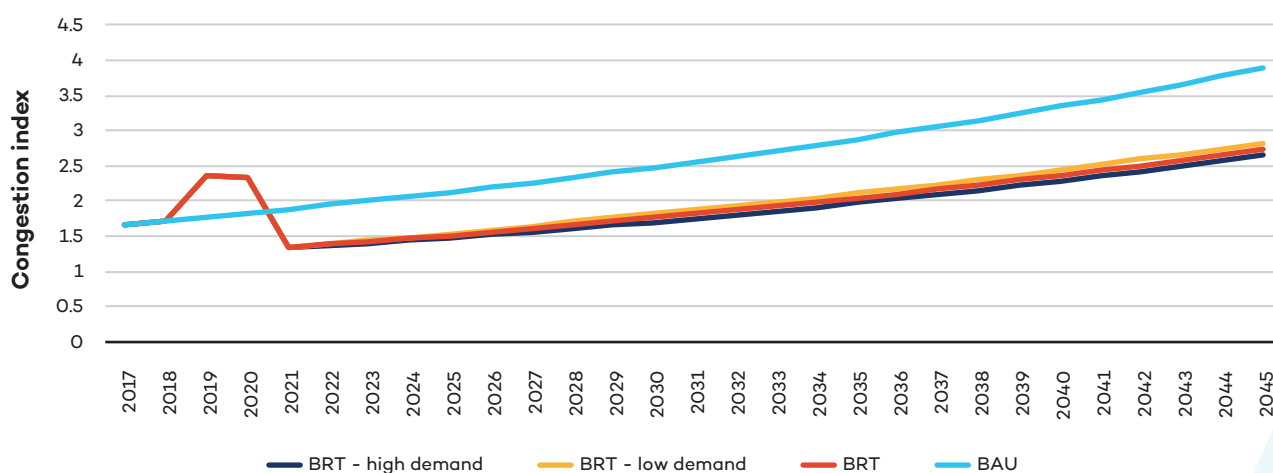


Avoided cost of accidents: Valuation of avoided fatal, medium and light accidents.

Risk Scenarios

The Scenarios

Scenario 0	no BRT
Scenario 1	BRT
Scenario 2	BRT with lower demand than forecast
Scenario 3	BRT with higher demand than forecast



With implementation of the BRT project congestion drops significantly.

Employment in 2043 (full-time equivalent [FTE])

Mode of transport	Unit	BAU	BRT	% difference
Bus DDD	FTE	4,184.6	3,766.1	-10%
Bus AFTU	FTE	6,165.8	3,021.2	-51%
Taxi	FTE	2,331.6	1,958.5	-16%
Private vehicles	FTE	0.0	0.0	N/A
BRT	FTE	0.0	2,171.4	N/A
Total	FTE	12,682.0	10,917.3	-14%

The implementation of the BRT will affect employment in the transportation sector. The SAVi assessment shows that the BRT will cause a job loss under different modes of transportation that will not be fully compensated by the job creation resulting from the project. The net job loss is estimated at 14 per cent. However, when looking at the economy overall, discretionary spending increases with 15.6 per cent thanks to the BRT project. This is due to job creation in other sectors from improved mobility.

SAVi's integrated cost benefit analysis (in million CFA)

		Scenario 1 BRT	Scenario 2 BRT - Low demand	Scenario 3 BRT - High demand
INVESTMENT				
Investment in BRT infrastructure	mn CFA	103,624	103,624	103,624
Investment in rolling stock	mn CFA	54,218	45,879	62,931
O&M cost rolling stock	mn CFA	332,361	282,629	463,825
ADDITIONAL PROJECT-RELATED COSTS				
Cost of financing	mn CFA	58,975	58,975	58,975
Compensation payments	mn CFA	3,152	3,152	3,152
Reinstallation payments	mn CFA	1,213	1,213	1,213
Subtotal (1) – Sum of investments & additional costs	mn CFA	553,543	495,472	693,720
Revenues	mn CFA	565,537	448,833	682,243
Subtotal (2) – net profits	mn CFA	11,994	(46,639)	(11,477)
EXTERNALITIES				
Discretionary spending	mn CFA	95,737	70,160	121,313
Value of time saved	mn CFA	541,065	424,614	657,517
Avoided cost of transportation	mn CFA	1,455,114	1,146,107	1,764,121
Avoided cost of pollution	mn CFA	38,769	30,012	47,504
Avoided cost of GHG emissions	mn CFA	17,751	13,020	22,430
Avoided costs of accidents	mn CFA	31,226	24,682	37,771
Subtotal (3) - Sum of added benefits	mn CFA	2,179,662	1,708,595	2,650,656
Total net benefits	mn CFA	2,191,656	1,661,956	2,639,179

The integrated CBA shows that the implementation of the BRT project generates net benefits across all three scenarios. Under the BRT scenario, the net profit amounts to CFA 11,99 billion (USD 20,5 million).

The integrated CBA also shows that the value of externalities is significant. The “value of time saved,” “avoided cost of transportation” and “discretionary spending” are considerably high. This demonstrates the importance of integrating externalities into the assessment to reveal the true value of the BRT project to the Senegalese society. Total net benefits for each of the scenarios are ranging from CFA 1.7 trillion to almost CFA 2.7 trillion (USD 2.94 billion to USD 4.61 billion).



SAVi analysis on financial indicators

For the analysis of financial indicators, we simulated scenarios without and with incorporating the valuation of the externalities. The results are displayed in the table below.

The financial indicators for scenarios 1, 2 and 3 present the results under a traditional financial assessment with different demand forecasts. The indicators suggest that the BRT project is financially not viable irrespective of the assumed passenger demand. Incorporating the value of the externalities (Scenarios 1E, 2E, 3E) significantly enhances the financial performance indicators of the project. We thus see the positive economic spillovers enabled by better mobility. We are also able to appreciate the value of time saved from faster commutes.

Scenario	IRR (%)	NPV (USD mn)	Min. DSCR (x)	Min. LLCR (x)
Scenario 1: BRT	2.17%	(51)	(1.80x)	0.48x
Scenario 1E: BRT + externalities	37.69%	1,522	7.92x	10.30x
Scenario 2: BRT with low demand	0.72%	(72)	(1.36x)	0.36x
Scenario 2E: BRT with low demand + externalities	35.30%	1,188	6.14x	8.35x
Scenario 3: BRT with high demand	3.38%	(31)	(2.25x)	0.60x
Scenario 3E: BRT with high demand + externalities	39.72%	1,856	8.13x	12.23x

About SAVi

SAVi is a simulation service that helps governments and investors value the 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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