

ASSESSMENT OF PRC HVS PROGRAMME BENEFITS

Pilot study

HVSIA

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Presentation content

- Background
- General Concepts & Approach
- Progress

Background

- Increasing expectation to show benefits obtained from the HVS studies in the PPRC program
- Historic examples of have been shown benefit from HVS testing
- Need to be quantified for California

Project Overview

- A summary of historical information on Benefits derived from the SA HVS programme
- Review the latest study on impact assessment done for the Gautrans HVS in SA (Jooste and Sampson - 2005)
 - Final outcome
- Evaluate applicability in two PRC studies:
 - flexible pavement tests for I-710 project
 - rigid pavement long-life rehabilitation strategies tested at Palmdale
- Revise/adapt the method for California

Project Approach

- Define the benefits achieved from the two case studies (first priority the Palmdale study);
- Conduct a benefit/cost analysis based on standard Californian assumptions of economic factors;
- Define other assumptions required for the B/C study;
- To conduct a thorough B/C analysis of these two projects showing the economic benefit;
- Test the validity of the benefits and assumptions through a series of interviews in Caltrans;
- Analyze data, determine C/B ratios
 - (keeping Indirect benefits in mind)
- Refine the process based on the findings and plan for its replication across the PPRC program.

General Concepts:

Best Practice Elements

- Understand the Needs & Objectives of Caltrans
- Distinguish Between Direct and Indirect Benefits
- Gather Subjective Data by Surveying Users of the System (i.e. Users of Project Outcomes)

General Concepts:

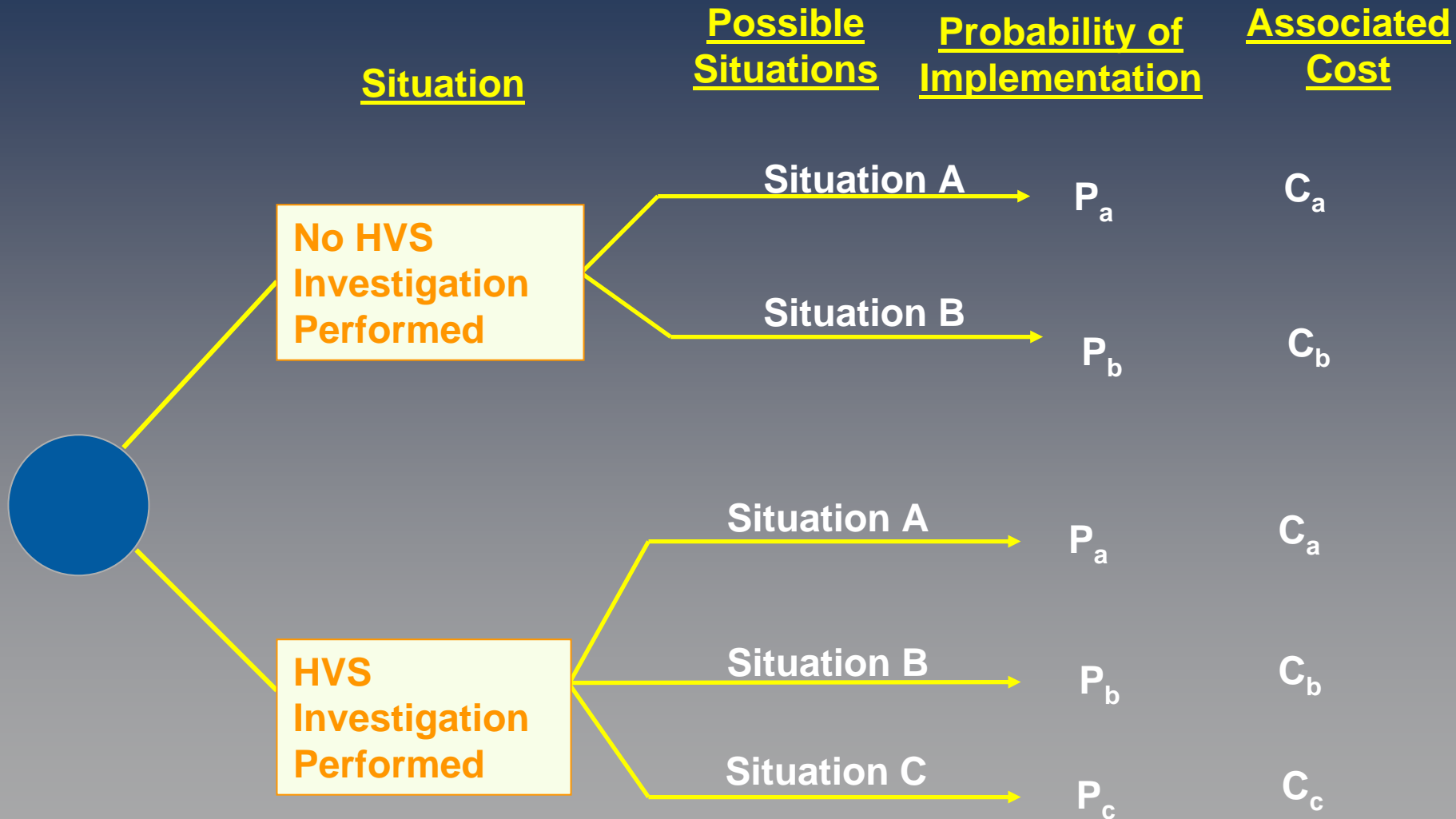
Benefits in 3 Categories

- Reduce the likelihood of Pre-mature failures
- Reduced Maintenance Costs
- More Cost-effective Designs
 - Reduced Construction & Life-cycle costs

General Concepts: Key Challenges

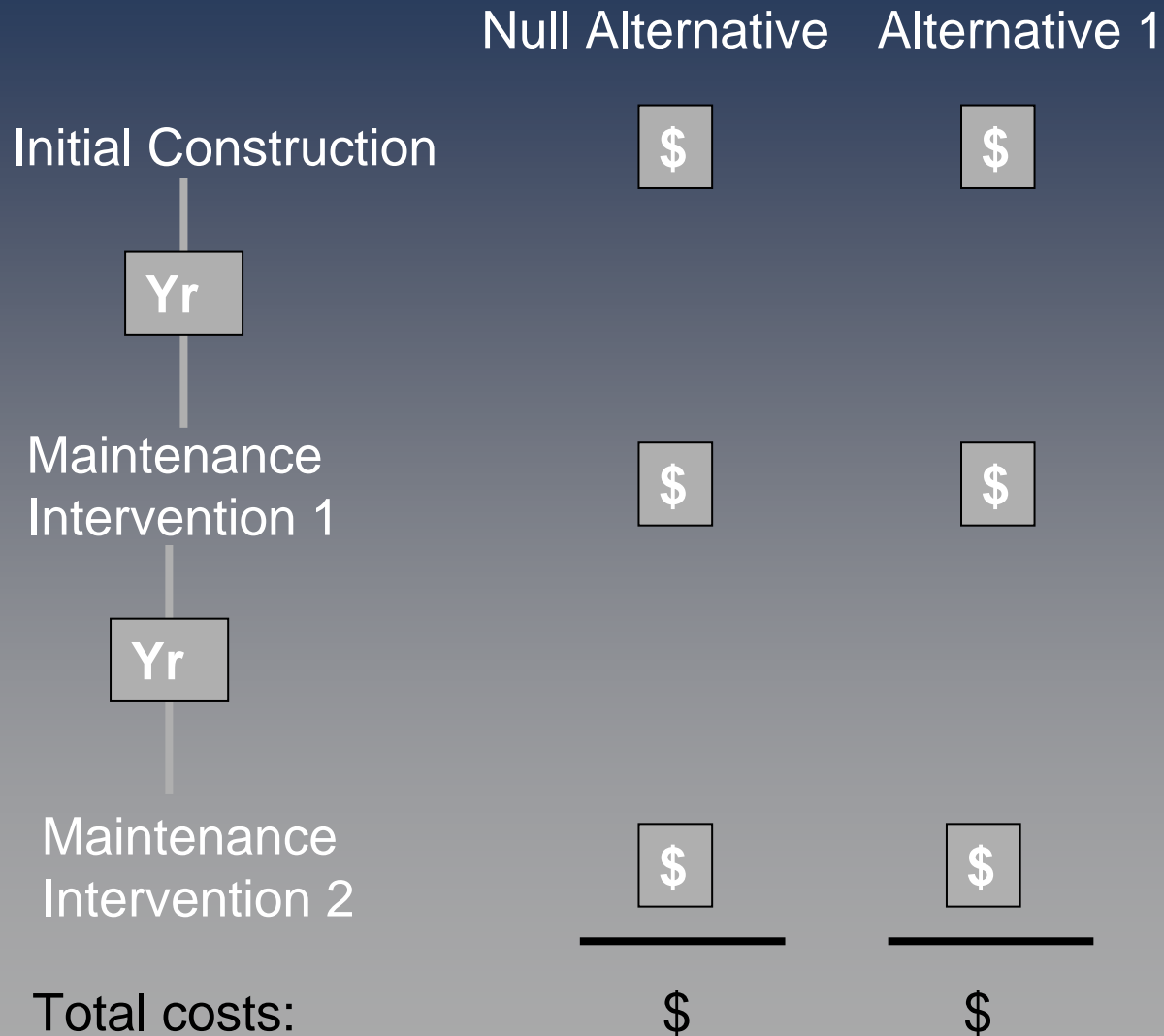
- Conceptual & Time Related Separation Between Project Impacts and Realized Benefits or Potential Benefits
- Several projects and processes contribute to Realized Benefits
- Assumptions are required and their validity needs to be tested

Methodology



Effective cost for situation i is: $(P_i) \times (C_i)$

Example



Scale costs up to appropriate network level size

California Road Building & User Unit Costs

CA Network:			Condition (1995)	lane km	Immediate action	lane km
	PCC	53040 lane km	30% Need Rehab	11232		3570
	AC	24960 lane km	52%	12168	49%	3430
	total	78000 lane km		23400		7000

Standard Construction Costs			Improved technology
	AC (New)	?	?
	AC (rehab)	?	?
	PCC	?	?
	Base Subbase	?	?
	SG Prep	?	?

History of rehab Costs	PCC	?
	AC	?

Road User Costs	\$7.42 / Veh-hr
Discount rate	5
Inflation	?

Time from Construction to 1st Maintenance	12 ?
Time from 1st Maint to 2nd Maint	12 ?

Traffic / lane	1500	25days/month, 8 months/year		
cost / accident				
1995	Rural	Rural Interstat	Urban	Urban Intestate
	111000	120000	42000	70000
Cost per Vehicle km of Travel	\$0.040 vkt		\$0.023 vkt	
National Accident Rate 1998	2.419 per million miles of travel			
	1.511875 per million km of travel			

Evaluation of Optimized Design Resulting in a 3 Per Cent Saving in Initial Construction Cost

Benchmark Scenario

Year	0	
Action: Initial Rehabilitation	R / m ²	R / lane-km
Heavy Rehabilitation	R 145.00	R 609,000
Ancillary Works & Contingencies (20%)		R 121,800
Total Cost of Construction		R 730,800
Discounted Cost per Lane-Km for Discount Rate of	4%	R 730,800
	8%	R 730,800
	12%	R 730,800

Scenario with Optimized Design

Year	0	
Action: Initial Rehabilitation	R / m ²	R / lane-km
Heavy Rehabilitation	R 140.65	R 590,730
Ancillary Works & Contingencies (20%)		R 118,146
Total Cost of Construction		R 708,876
Discounted Cost per Lane-Km for Discount Rate of	4%	R 708,876
	8%	R 708,876
	12%	R 708,876

Year	9	
Action: Surface Maintenance	R / m ²	R / lane-km
Surface Seal	R 25.00	R 105,000
Ancillary Works & Contingencies (20%)		R 21,000
Total Cost of Construction		R 126,000
Discounted Cost per Lane-Km for Discount Rate of	4%	R 88,526
	8%	R 63,031
	12%	R 45,437

Year	9	
Action: Surface Maintenance	R / m ²	R / lane-km
Surface Seal	R 25.00	R 105,000
Ancillary Works & Contingencies (20%)		R 21,000
Total Cost of Construction		R 126,000
Discounted Cost per Lane-Km for Discount Rate of	4%	R 88,526
	8%	R 63,031
	12%	R 45,437

Year	15	
Action: Light Rehabilitation	R / m ²	R / lane-km
Light Rehabilitation	R 70.00	R 294,000
Ancillary Works & Contingencies (20%)		R 58,800
Total Cost of Construction		R 352,800
Discounted Cost per Lane-Km for Discount Rate of	4%	R 195,897
	8%	R 111,217
	12%	R 64,455

Year	15	
Action: Light Rehabilitation	R / m ²	R / lane-km
Light Rehabilitation	R 70.00	R 294,000
Ancillary Works & Contingencies (20%)		R 58,800
Total Cost of Construction		R 352,800
Discounted Cost per Lane-Km for Discount Rate of	4%	R 195,897
	8%	R 111,217
	12%	R 64,455

Benchmark Scenario

Life Cycle Cost per Lane-Km for a Discount Rate of	4%	R 1,015,223
	8%	R 905,049
	12%	R 840,692

Scenario with Optimized Design

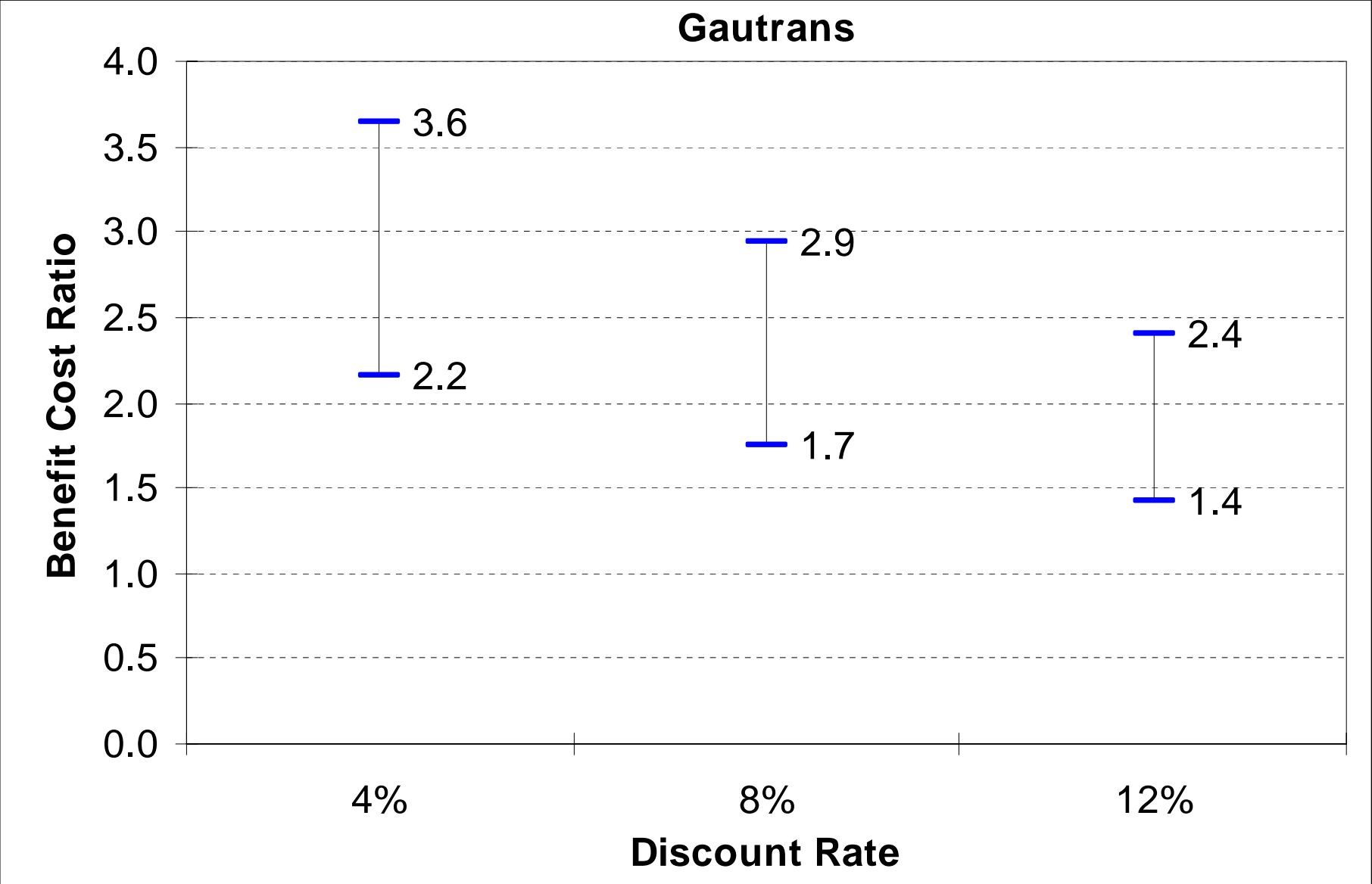
Life Cycle Cost per Lane-Km for a Discount Rate of	4%	R 993,299
	8%	R 883,125
	12%	R 818,768

Summary of Savings Per Lane-Km

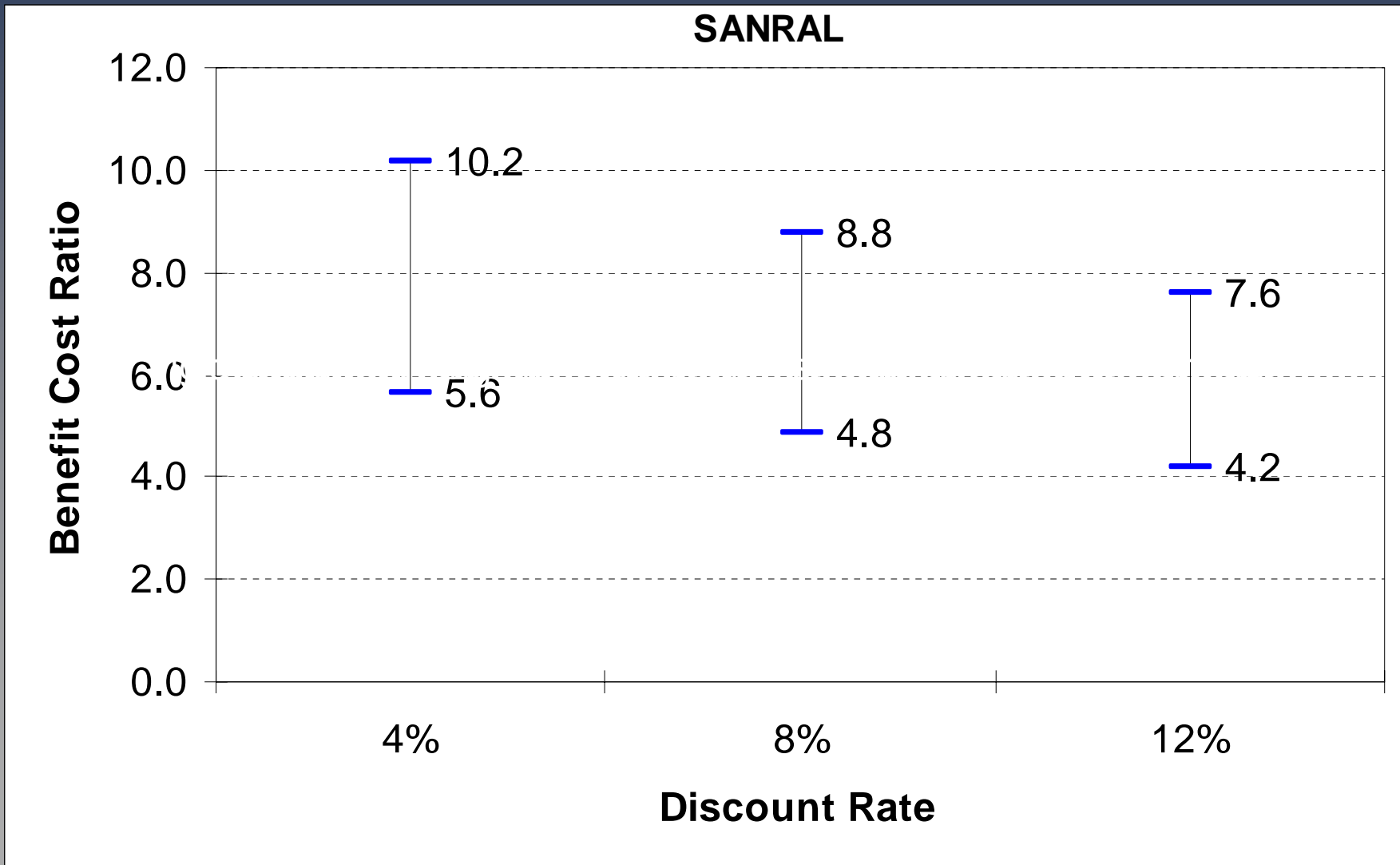
Lane-Km Saving for Optimized Design	4%	R 21,924
	8%	R 21,924
	12%	R 21,924

Note: A lane width of 3.7 m is assumed, plus an effective shoulder width of 0.5 m. This effective lane width is 4.2 metres.

Example of B/C ratios (Gautrans G1 study)



Example of B/C ratios (Gautrans G1 study)



INDIRECT BENEFITS

- Overview of Links between R&D and Economic Growth and Quality of Life
- Summary and Discussion of:
 1. Technical Publications
 2. International Alliances Formed
 3. International Exposure Achieved
 4. High Tech Developments and Exports
 5. SET Human Capital

FACILITATED DISCUSSION (LS)

- How can we maximize the Gautrans & PRC benefit studies to the broader HVSIA ?
- How can we quantify indirect benefits ?
 - Technical Publications
 - International Alliances Formed
 - International Exposure Achieved
 - High Tech Developments and Exports
 - SET Human Capital
- Action plans from the benefit study
- Other questions