



20th Transport Sector Coordinating Committee Meeting

24–25 May 2023 • Tbilisi, Georgia

20-е заседание Координационного комитета по транспортному сектору

24–25 мая 2023 года • Тбилиси, Грузия



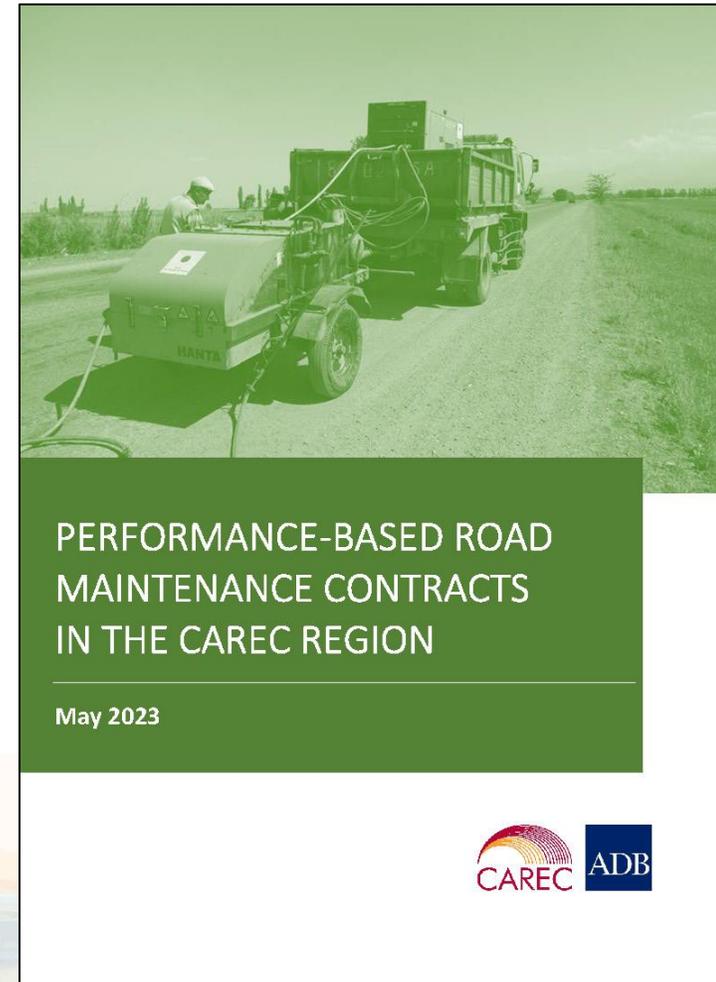
Performance-Based Road Maintenance Contracts in the CAREC Region

Serge Cartier van Dissel
Consultant
ADB



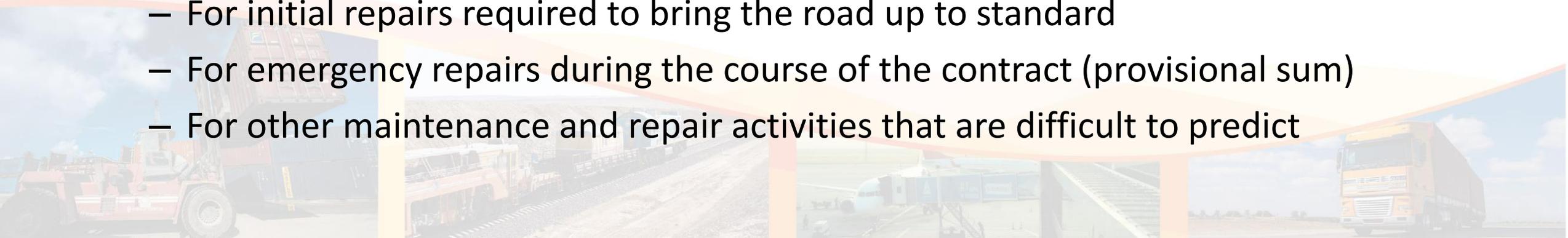
Study carried out by ADB

- Performance-based road maintenance contracts in the CAREC region
- 6 countries
 - Azerbaijan
 - People's Republic of China
 - Georgia
 - Kyrgyz Republic
 - Mongolia
 - Tajikistan
- 13 projects
- 24 contracts
- 2,900 km



Performance-based road maintenance

- Payments are made on the basis of performance
 - Payment is not dependent on inputs or volumes of work completed
 - Performance standards (e.g. maximum number of potholes per kilometre)
 - Fixed (monthly) payments against compliance with the performance standards
 - Deductions if the performance standards are not fully complied with
 - Generally applied to routine maintenance (current repair) and winter maintenance
- Often combined with volume-based payments (hybrid contract)
 - For initial repairs required to bring the road up to standard
 - For emergency repairs during the course of the contract (provisional sum)
 - For other maintenance and repair activities that are difficult to predict

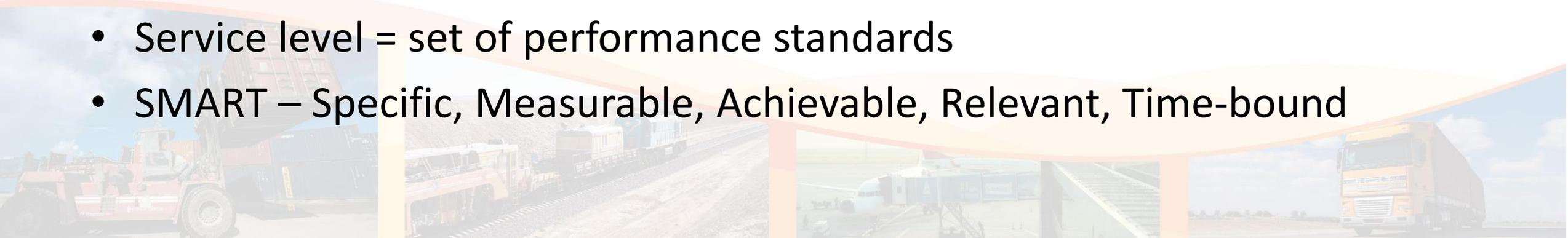


Performance standards

- Performance standard = indicator + threshold
 - Generally maximum allowable defect
 - Sometimes reaction time to correct the defect

Road element	Indicator	Threshold
Pavement – potholes	Maximum diameter of any pothole	20 cm
Pavement – potholes	Maximum number of potholes per 1 km of road	5 potholes
Right-of-way – Vegetation	Maximum height of vegetation within 3 metres of pavement edge	30 cm
Right-of-way – Landslide	Maximum reaction time to remove landslide <200 m ³	2 days
Pavement – Snow	Maximum reaction time to remove snow >2 cm	4 hours

- Service level = set of performance standards
- SMART – Specific, Measurable, Achievable, Relevant, Time-bound



Performance-Based Maintenance Contracts (PBMC)

- Performance-based maintenance services
 - Lumpsum payment (monthly)
 - Multiple years (generally 3-5 years)
- Volume-based provisional sum
 - Emergency maintenance, periodic maintenance, (winter maintenance)
 - Unit rates, with payment against work order
 - Main function is to reduce risk for contractor and thus reduce costs

	Year 1	Year 2	Year 3
Maintenance Services			
Provisional Sum			

Output- and Performance-based Road Contract (OPRC)

- Volume-based initial repairs
 - Rehabilitation or periodic maintenance of (part of) the road
 - Unit rates or lumpsum
- Performance-based maintenance services
 - Lumpsum payment (monthly)
 - Multiple years, often longer than PBMC (5-10 years)
- Volume-based provisional sum
 - Emergency maintenance, periodic maintenance, (winter maintenance)
 - Unit rates, with payment against work order

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Initial Repairs	█					
Maintenance Services		█	█	█	█	█
Provisional Sum			█		█	

Service Level Agreement (SLA)

- Performance-based contract with state-owned maintenance enterprise
 - Generally PBMC because enterprises lack capacity for large initial repairs
 - Summer/winter maintenance + current repairs
 - Directly awarded without competition
 - Possibly separate allocations for salaries, equipment, materials

	Year 1	Year 2	Year 3
Maintenance Services			
Provisional Sum			

Contract Scope

- Initial repairs: volume-based – unit rates/lumpsum (known volume)
- Maintenance Services: performance-based (unknown volume)
- Provisional sum: volume-based – unit rates (unknown volume)

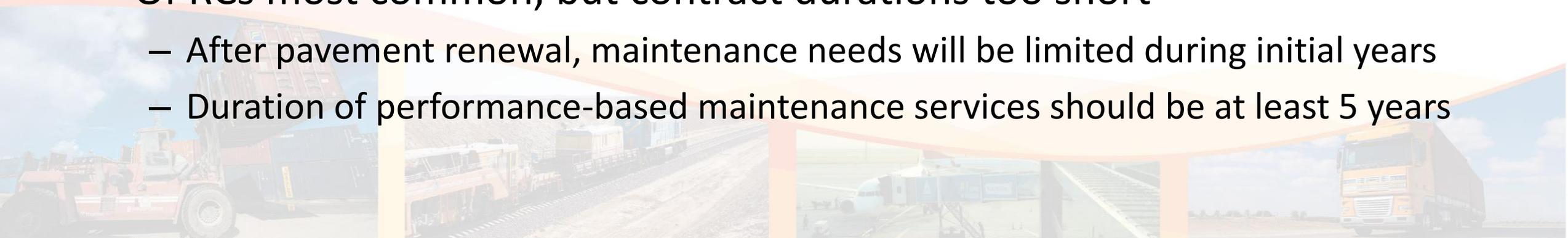
	Initial Repairs	Maintenance Services	Provisional sum
Rehabilitation (capital repairs)	At start		
Periodic maintenance (mid-term repairs)	At start	During contract	During contract
Management activities		During contract	
Routine maintenance		During contract	
Current repairs		During contract	During contract
Winter maintenance		Up to threshold	Above threshold
Emergency repairs		Up to threshold	Above threshold
	Volume-based (unit rates or lumpsum)	Performance-based (lumpsum)	Volume-based (unit rates)

Country	Pilot section	Length	Years	# years	Type	RH	PM	RM	WM	EM	Status
KGZ	Osh-Batken-Isfana	407 km	2014-2015	1	SLA	-	-	MS	MS	PS	Completed
AZE	M2 Baku-Yevlach	264 km	2019-2021	2	SLA	-	-	MS	MS	PS	Completed
AZE	M2 Yevlach-Georgia	229 km	2019-2021	2	SLA	-	-	MS	MS	PS	Completed
AZE	M4 Baku-Yevlach	253 km	2019-2021	2	SLA	-	-	MS	MS	PS	Completed
PRC	Yunnan G320, S324	107 km	2016-2020	3	SLA	-	-	MS	-	PS	Completed
TAJ	Sayron - Karamyk	89 km	2018-2021	4	PBMC	-	-	MS	PS	PS	Completed
TAJ	Vose - Khovaling	87 km	2018-2021	4	PBMC	-	-	MS	PS	PS	Completed
TAJ	Khovaling-Kangurt	43 km	2020-2023	3	PBMC	-	-	MS	PS	PS	Ongoing
TAJ	Vahdat - Obigarm	76 km	2013-2016	3	OPRC	IR	IR	MS	PS	PS	Completed
TAJ	Nurobod - Nimich	73 km	2013-2016	3	OPRC	IR	IR	MS	PS	PS	Completed
KGZ	Karabalta-Sussamy	69 km	2018-2020	3	OPRC	IR	IR	MS/PS	MS/PS	PS	Completed
MON	Ulaanbaatar-Arvaikheer	58 km	2021-2026	2+3	OPRC	IR	-	MS	MS	PS	Completed
PRC	Yunnan G323	57 km	2015-2020	5	OPRC	IR	IR	MS	-	PS	Completed
PRC	Anhui G205	89 km	2020-2025	5	OPRC	IR	-	MS	PS	PS	Ongoing
PRC	Anhui S215, G233	65 km	2021-2026	5	OPRC	IR	-	MS	PS	PS	Ongoing
PRC	Anhui S303, S229	81 km	2021-2026	5	OPRC	IR	-	MS	PS	PS	Ongoing
PRC	Anhui G206, S233, S246	63 km	2021-2026	5	OPRC	IR	-	MS	PS	PS	Ongoing
PRC	Anhui G312, S210, S213	65 km	2021-2026	5	OPRC	IR	-	MS	PS	PS	Ongoing
PRC	Anhui S601	125 km	2021-2026	5	OPRC	IR	-	MS	PS	PS	Ongoing
GEO	Kakheti	117 km	2016-2021	5	OPRC	IR	(MS)	MS	MS	PS	Completed
GEO	Guria	240 km	2020-2026	5	OPRC	IR	IR	MS	MS	PS	Cancelled
GEO	Mtskheta–Mtianeti	142 km	2020-2026	5	OPRC	IR	-	MS	MS	PS	Cancelled
KGZ	Balykchy-Kochkor	43 km	2020-2027	2+5	OPRC	IR	MS	MS	PS	PS	Ongoing
KGZ	Kochkor-Epkin	27 km	2020-2027	2+5	OPRC	IR	MS	MS	PS	PS	Ongoing

IR: Initial Repairs (volume-based), MS: Maintenance Services (performance-based), PS: Provisional Sum (volume-based)

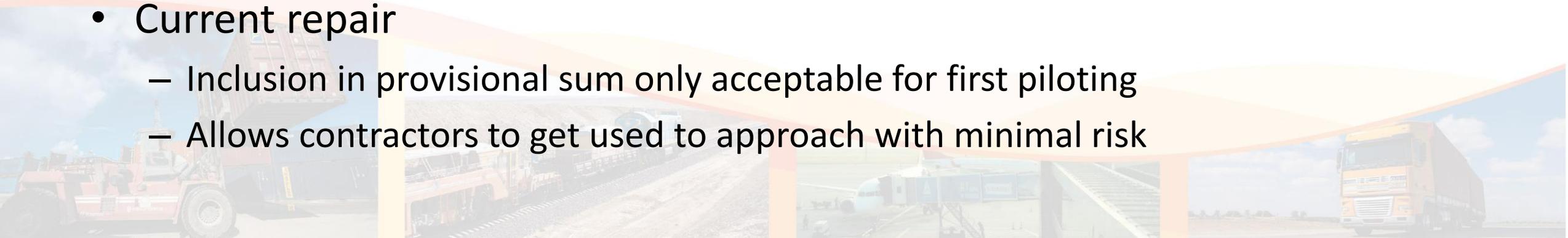
Findings - Contract Scope

- Very few PBMCs – only Tajikistan
 - Possibly due to difficulties using development partner funding for maintenance
 - Need for more PBMC pilots, as these are most needed
- SLAs applied in three countries, but not replicated
 - Experiences are not well documented
 - Important in CAREC where most countries have state-owned maintenance enterprises
- OPRCs most common, but contract durations too short
 - After pavement renewal, maintenance needs will be limited during initial years
 - Duration of performance-based maintenance services should be at least 5 years



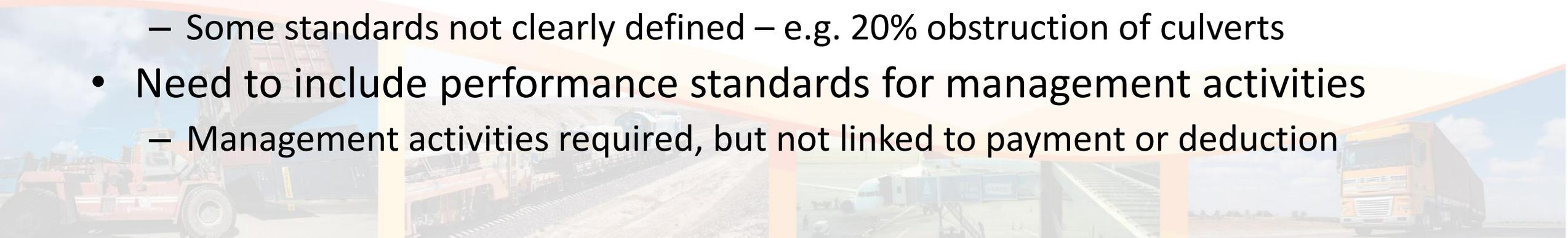
Findings - Contract Scope

- Periodic maintenance
 - Inclusion in performance-based maintenance services increases risk
 - Risk (and costs) reduced if included in provisional sum
- Winter maintenance
 - High risk if contract duration is short and historical data is limited
 - Risk (and costs) reduced if extreme events are included in provisional sum
- Current repair
 - Inclusion in provisional sum only acceptable for first piloting
 - Allows contractors to get used to approach with minimal risk



Findings - Performance Standards

- Wide variety of performance standards used
 - Almost each project uses different performance standards
 - Standards appear to depend on experience of consultants
 - Only Tajikistan used the same standards in all 5 contracts and 2 projects
 - More consistent use of standards in each country required
- Several cases of inappropriate standards
 - Maximum pothole size of 0.5 m², equivalent to 80 cm diameter
 - Performance standards for winter maintenance where this is volume-based
 - Zero tolerance standards widely used, increasing risk – e.g. shoulder free of trash
 - Some standards not clearly defined – e.g. 20% obstruction of culverts
- Need to include performance standards for management activities
 - Management activities required, but not linked to payment or deduction



Findings - Response times vs Reaction times

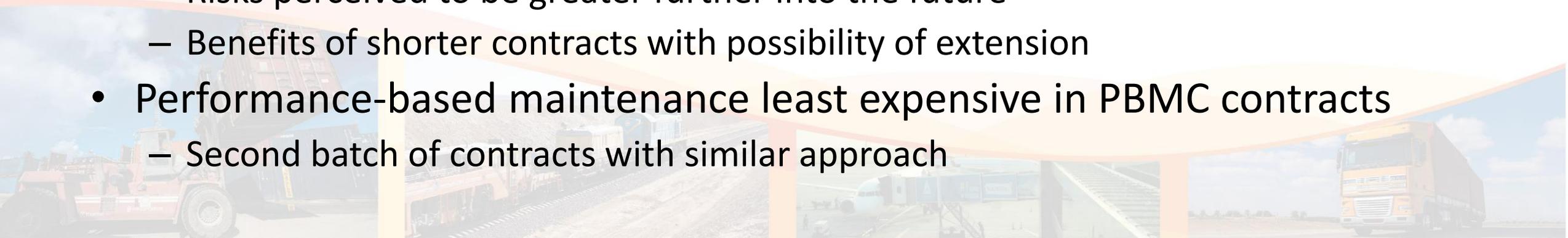
- Almost all contracts involve response times
 - Confused with reaction times
 - Varying response times require multiple follow-up inspections
 - Only one contract without response times, but was not awarded
- Response times also applied to defects that occur suddenly
 - Only some contracts include reaction times as part of performance standard
 - More often defined as response times, requiring a formal inspection
 - Sometimes reaction times combined with response times
 - E.g. removal of snow within 1 day, response time of 2 days
- Need to distinguish between reaction times and response times
 - Remove response times and keep reaction times

Findings - Payments and deductions

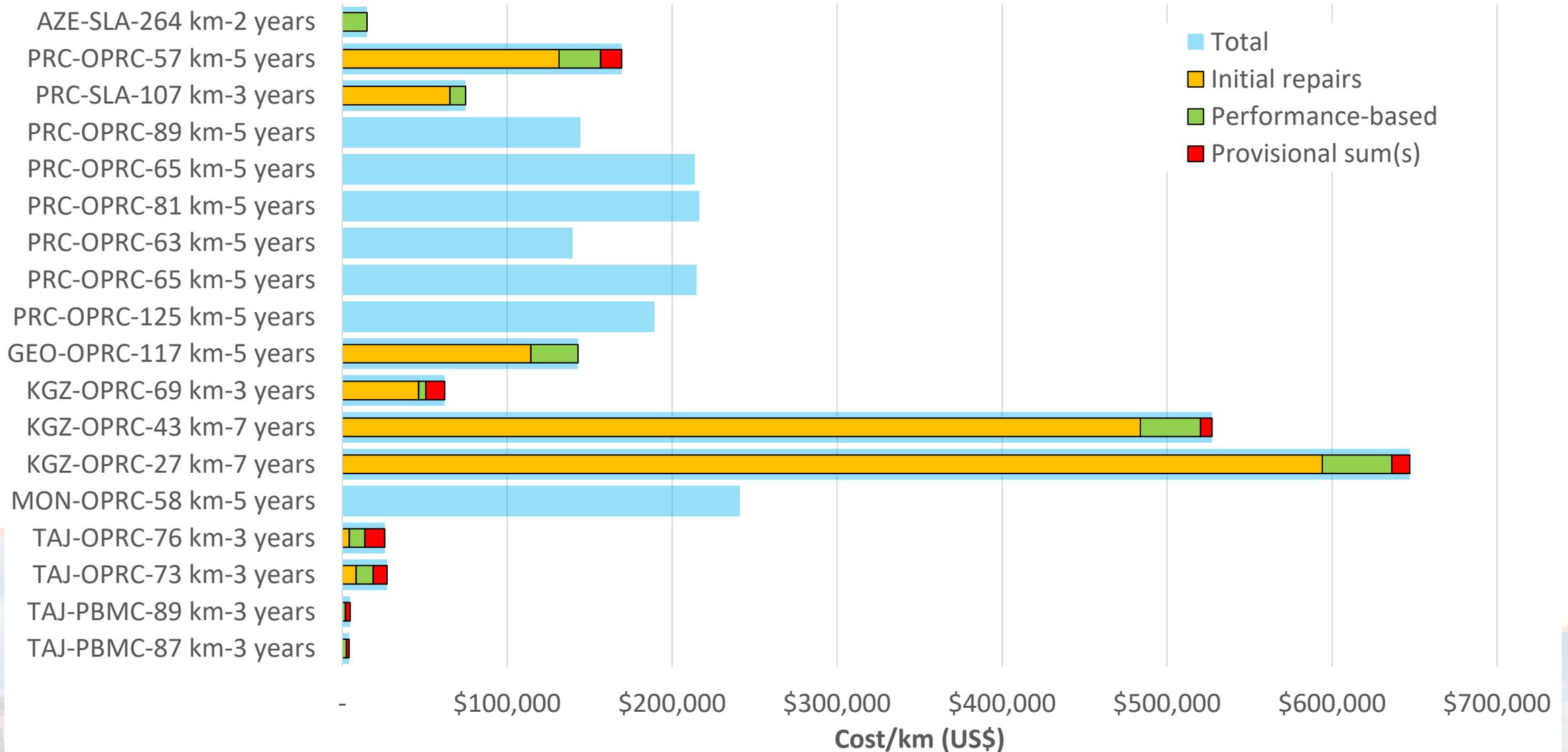
- Most contracts apply basic system for deductions
 - Fixed deduction percentages applied to 1-km segments
 - Some contracts apply more complicated systems that are harder to understand
- Deduction percentages often very low
 - Deduction percentages often add up to 100% in total
 - Resulting deduction only \$10-\$20 for non-compliant 1-km segment
 - Even if contractor does nothing, he would still be eligible to partial payment
 - Each deduction percentage should each be in order of 10%-50% or even higher
- Not all performance standards are applicable to 1-km segments
 - Some deductions applied to full contracted road length
 - Small percentages applied to full road length can result in large deductions
- We should consider using monetary deductions involving fixed amounts
 - Easier to understand and apply, both for 1-km segment and for total length

Findings - Procurement and contract costs

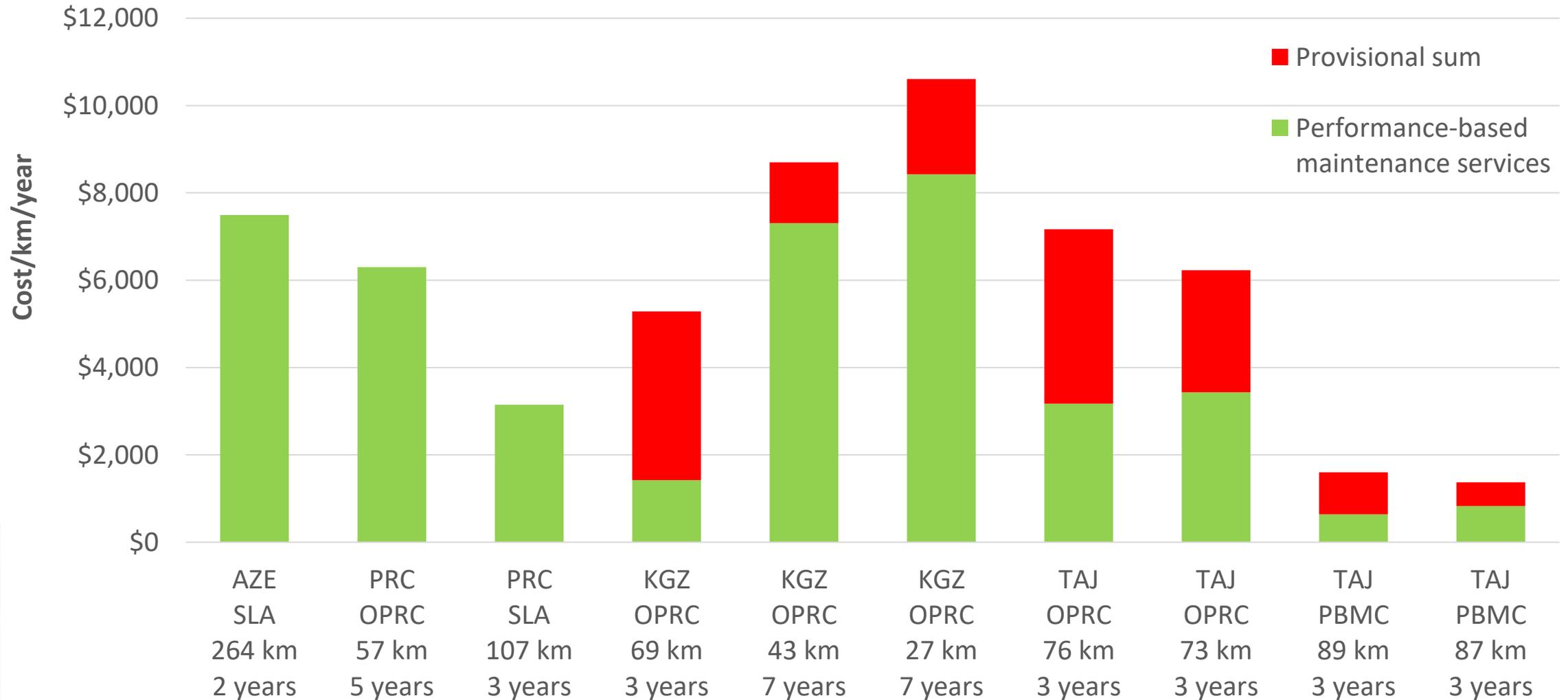
- Most contracts awarded to domestic contractors
 - Domestic contractors generally capable of carrying out maintenance services
 - Exceptions involved large contracts with significant initial repairs
- Wide range in contract costs
 - Only partially explained by type of road and contract scope
 - Appears to be determined to large extent by applied systems and perceived risks
- Initial repairs form very large part of contract amount (>75%)
- Longer contracts have higher annual costs for maintenance services
 - Risks perceived to be greater further into the future
 - Benefits of shorter contracts with possibility of extension
- Performance-based maintenance least expensive in PBMC contracts
 - Second batch of contracts with similar approach



Findings - Procurement and contract costs



Findings - Procurement and contract costs



Replication under government systems

- No country in the CAREC region has moved beyond pilot stage
 - All experiences so far have been carried out under development partner projects
 - Despite some pilots having been fully funded by governments
- Legislation often forms an obstacle
 - Legislation regarding procurement and multiannual contracting
 - Also norms and standards regarding maintenance implementation
- Need for legal assessments on a country-by-country basis
 - Identify legal amendments required or desired
- Prepare a Performance-Based Road Maintenance Action Program
 - Initial introduction, piloting, training, etc.
 - Replication, legislative amendments, contracting procedures, evaluations, etc.



Thank You

