Transforming Transit in South Africa

- How formalizing informal transit operations can support
- sector decarbonization

WORLD BANK GROUP

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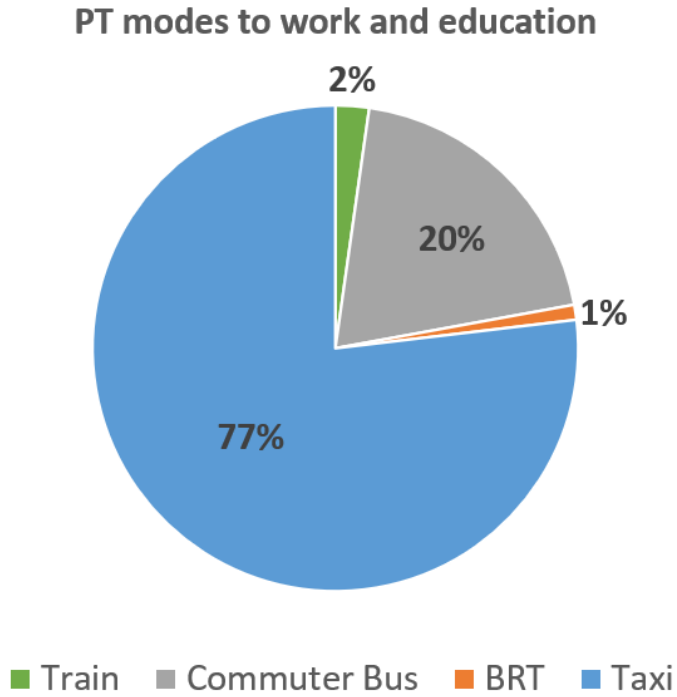
BACKGROUND

- Informal Transit is ubiquitous in Africa
- The “minibus taxi” has a modal share of more than 75% of public transport trips in South Africa. Elsewhere in Africa the number is much higher.
- It is likely that informal transport will continue to play a major role in the public transport market in Africa for the foreseeable future.
- While significant effort has been put towards introducing BRT, there is still much that can be done to improve the quality of transport offered by informal transit services.
- Key to this must be efforts to professionalize the informal transit sector.



2020 South African NHTS: Work and Educational Morning Trips

Project Objective

•The World Bank and the DBSA have partnered on an exercise in South Africa to understand what professionalizing the industry outside of the scope of a BRT project could look like.

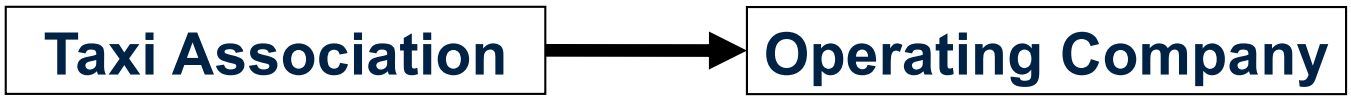
•The project aims to support Minibus Taxi associations to transform their operations to:

1. Provide improved quality of service to passengers.

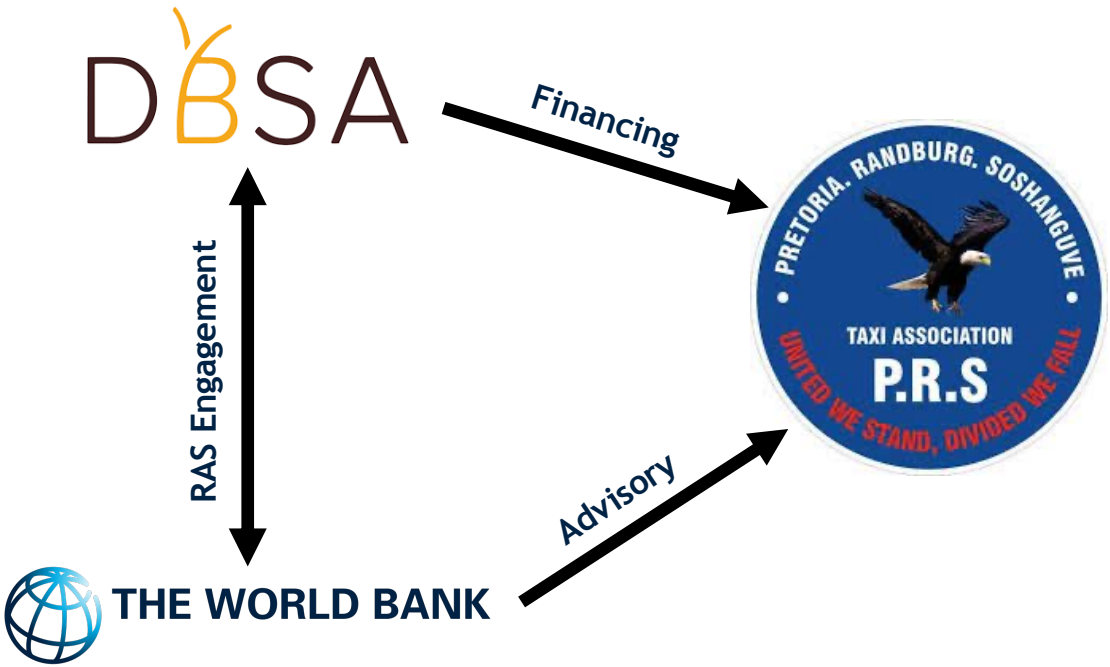
2. Improve working conditions in the industry.

3. Enable modernization and development of the industry.

To achieve this sustainably requires collectivizing and corporatizing the association.



How is the project supporting this transformation?



From a bus operations perspective, the informal transport sector is grossly inefficient

Many routes are heavily oversupplied.

- In some instances, up to half the fleet on a corridor can be removed through optimizing operations.
- Competition within taxi associations leads to oversupply at peak times and undersupply during off-peak.

The size of the vehicle is often completely unsuitable for the route.

- Deploying a fleet of 16-seat busses on very long route lengths (sometimes as much as 50km one way) drives a high fleet requirement and high operating costs.

Bad driver behaviour increases maintenance costs, breakdown rates and accident rates

- Destructive competition and poorly aligned incentives drives bad driver behaviour.

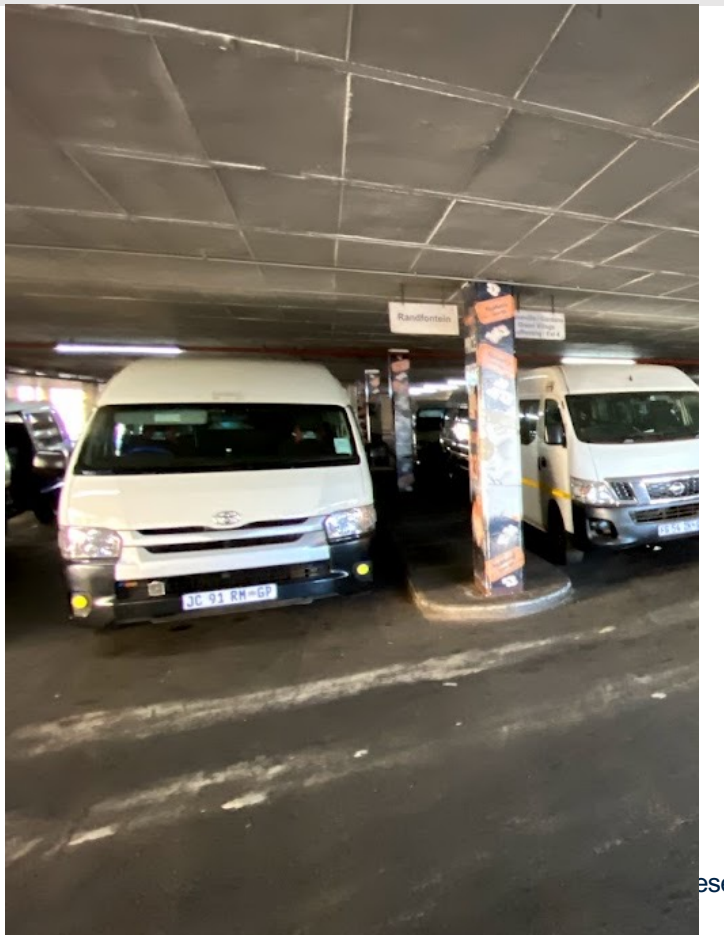
High levels of dead (unproductive) mileage.

- Drivers taking vehicles home, touting for passengers with no consideration of the cost of operation.

Individualized small business cannot leverage scale to lower input costs.

- Bargaining power on fuel and consumables, financing and insurance is not exploited.

Conditions are bad for passengers and drivers



Drivers work excessive hours (>14hours) to make money, speed frequently and drive recklessly.

Passengers are forced into overcrowded vehicles that are unsafe

There are long waiting times and poor trip time predictability, especially during off-peak periods.

During peak periods, passengers often need to board at the rank, since vehicles depart full, leaving no opportunity to catch a taxi along the route.

Safety is a challenge – vehicles are driven hard and poorly maintained.

Sexual harassment and GBV is an ongoing issue.

Business Improvement Approach

Analyze existing business

- Collect detailed information on business fundamentals
- Model current operation and business processes

Develop new business plans

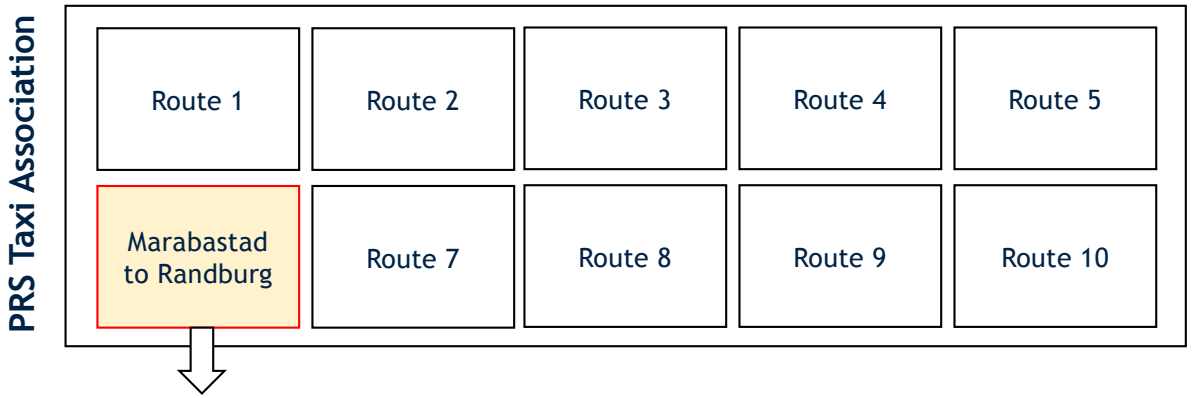
- Optimized operations plan
- New business plan and financial model
- Startup support and capacity building

Test improvements

- Support the association to pilot new operations and business model
- Make required adjustments and identify investments to support further.

Scope of engagement with PRS

- Pretoria Randburg Soshanguve Taxi Association (PRS)
  - Multiple passenger services between Pretoria and Johannesburg.
  - More than 550 vehicles owned by 268-member active members.



- Project is limited to **Marabastad -> Randburg** route = 54km one way
  - 15 owners operating 29 vehicles:

Mercedes Sprinter
14 X diesel 22 seats

Toyota Quantum
9 X petrol 16 seats
6 X diesel 16 seats

The PRS project started in July 2022 and has culminated in the DBSA approving its first loan for fleet directly to a paratransit organization in Pretoria.

Engage and agree with association – July 2022 → Data collection – August / September 2022 → Analytics – October / December 2022 → Business plan (PIM) completed – March 2023 → WB QER – May 2023 → DBSA Due Diligence June – August 2023 → Loan Approval September 2023 → First disbursement November 2023

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The operational changes introduced lead to a 21% decrease in emissions.

Current Scenario

Fleet Parameters	22-seat diesel	15-seat petrol	15-seat diesel	Totals
Fleet share	48%	38%	14%	100%
Weekly Distance Traveled (km)	10569	8304	3019	21,893
Fuel Consumption (L/100km)	11.27	13.58	10.95	
Emissions Factor (kg CO2/L)	2.6	2.6	2.6	
Weekly Projected GhG emissions (CO2eq)	3098	2933	859	6891

Future Scenario

Fleet Parameters	22-seat diesel
Fleet share	100%
Weekly Distance Traveled (km)	18624
Fuel Consumption (L/100km)	11.27
Emissions Factor (kg CO2/L)	2.6
Weekly Projected GhG emissions (CO2eq)	5457

EV Scenarios and costing

ESTIMATED CAPITAL COSTS[6]							
	GENERAL DESCRIPTION	22-seaters (200 kWh), 200 kW chargers			65-seaters (300 kWh), 22 kW chargers		
	DESCRIPTION	EST. UNIT RATE	Qty	ESTIMATED COST	EST. UNIT RATE	Qty	ESTIMATED COST
1	Rolling fleet[7]	$175,000	21	$3.68 million	$230,000	9	$2.07 million
2	Charging and electrical infrastructure	2 x 200 kW DC chargers with infrastructure		$184,004	6 x 22 kW AC chargers with infrastructure		$145,390
3.1	Grid-tied solar PV	PV: 550 kWp (2,500 m^2)		$473,000	PV: 300 kWp (1,364 m^2)		$258,000
3.2	Off-grid solar PV with battery storage (98% availability)	PV: 2,000 kWp (9,091 m^2) Storage: 1.898 MWh		$2.264 million	PV: 1,000 kWp (4,545 m^2) Storage: 1.456 MWh		$1.277 million
3.3	Off-grid solar PV with battery storage (100% availability)	PV: 2,000 kWp (9,091 m^2) Storage: 4.072 MWh		$2.887 million	PV: 1,000 kWp (4,545 m^2) Storage: 2.584 MWh		$1.601 million

- Existing local grid capacity was insufficient to provide the charging power required.
- As a result, electricity supply via a dedicated MV feeder was required.
- The potential for local generation to reduce reliance on the electrical grid was also assessed.

Conclusions

Scenario	22-seaters with DC fast chargers	65-seaters with AC chargers
Grid tied solar PV	$ 4,337,004.00	$ 2,473,390.00
Off-grid solar with battery (98% availability)	$ 6,128,004.00	$ 3,492,390.00
Off-grid solar with battery (100% availability)	$ 6,751,004.00	$ 3,816,390.00

1. Significant GHG emissions reductions are possible through the introduction of basic bus operations optimizations, although these require collectivization and a change in the business model.
2. The costs of an EV solution exceeds what can be carried by a typical informal transport service from within its own revenue envelope.
3. There may be potential to lower the marginal costs with scale – this is still to be tested