



New rail policy

Transport and logistics aspects

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4 July 2022

Modal Split and South African Freight Trends

- Methodology
- History
- Current position
- Way forward
- The new rail business



SA-TIED

Southern Africa – Towards Inclusive Economic Development

REPORT

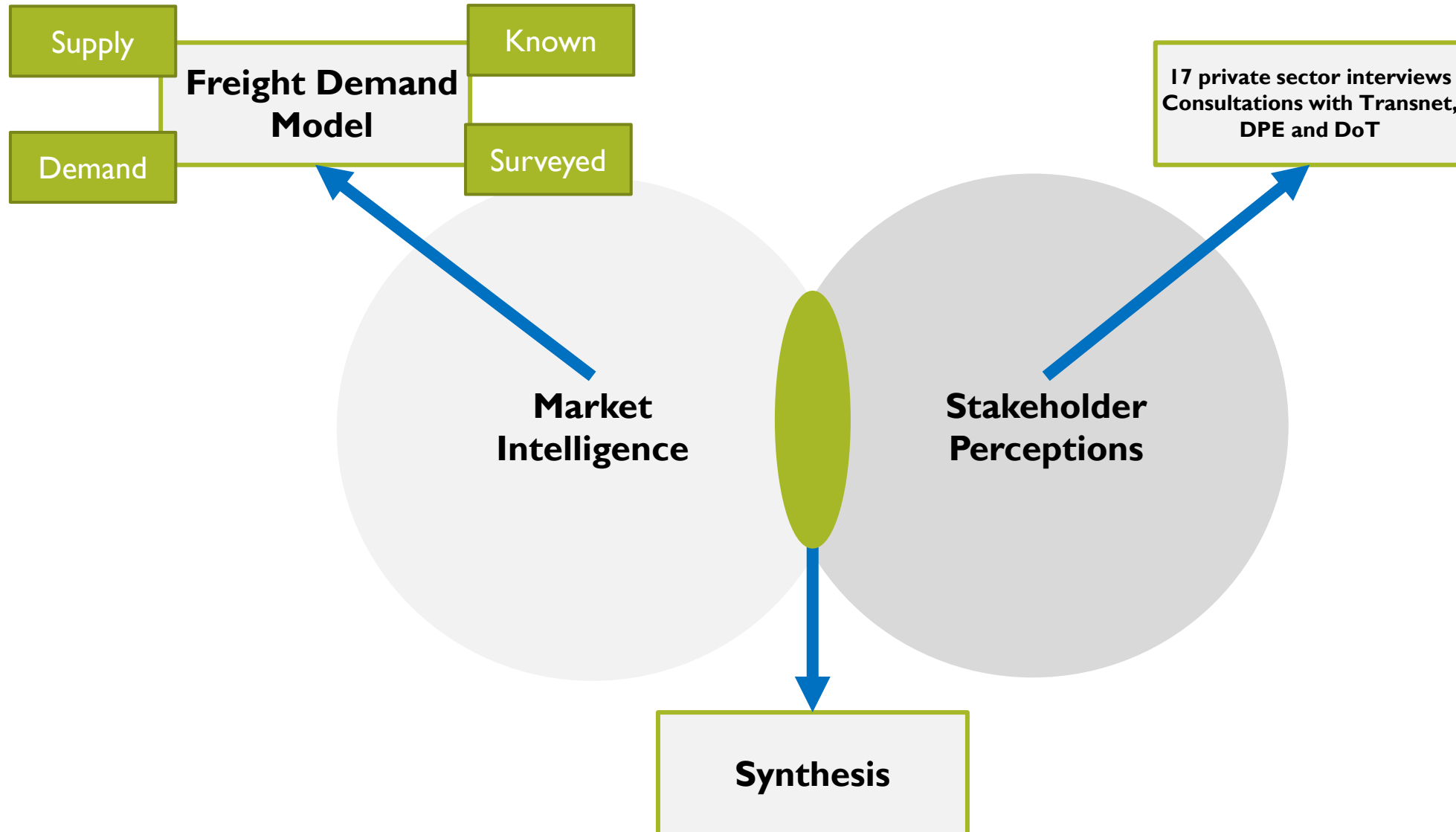
A proposed freight and passenger road-to-rail strategy for South Africa

J.H. Havenga, A. de Bod, Z.P. Simpson, S. Swarts, and I.E. Withöft

November 2021



Methodology for this analysis

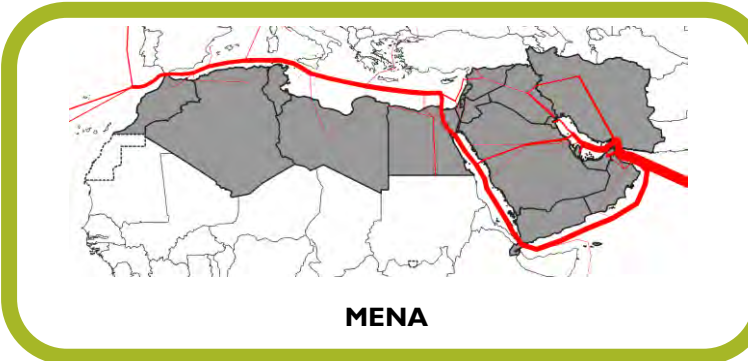


It is the same methodology we applied in other places around the world

Africa



Other



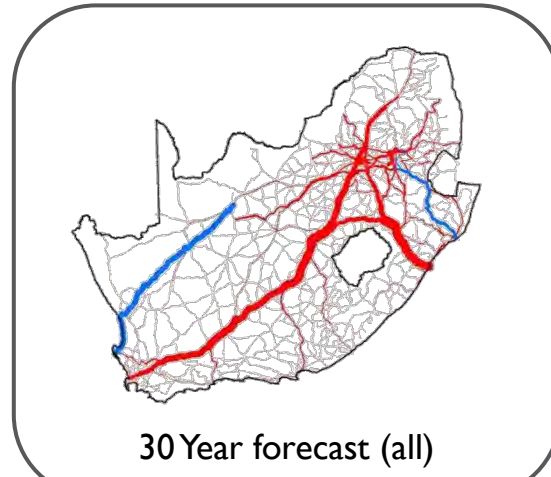
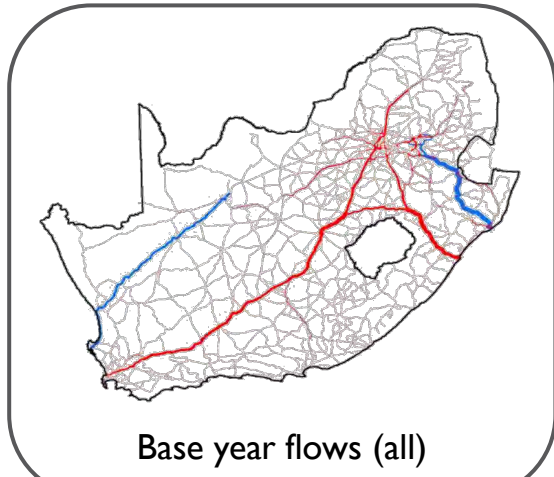
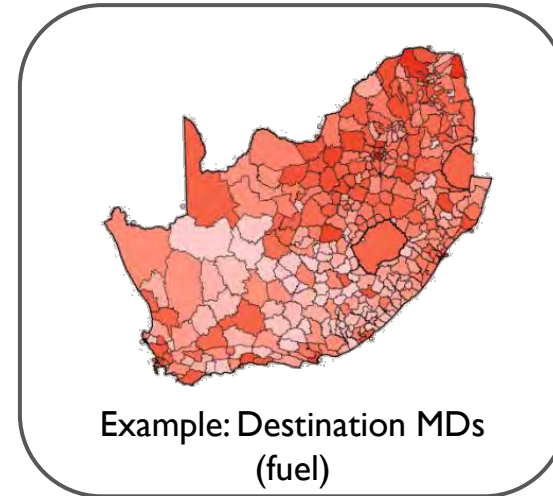
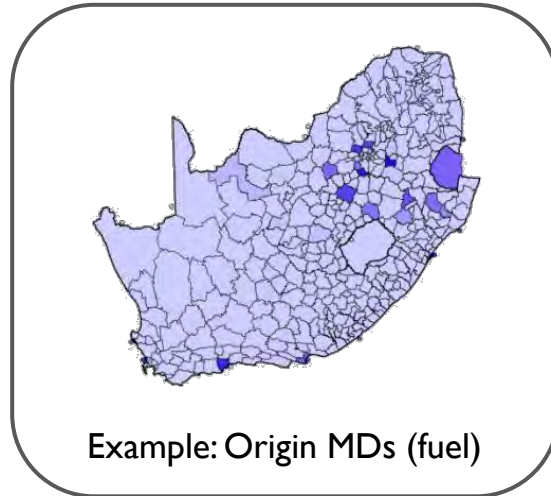
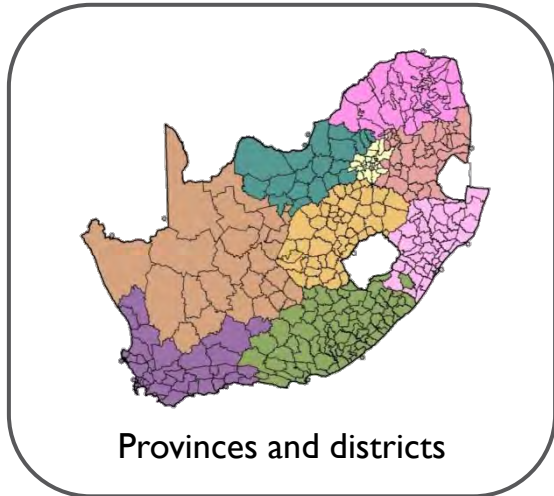
We include as many variables as possible:

- Costs
- Other activities: cash to cash cycle / warehousing / administration
- Including all externalities: emissions / noise / congestion / policing / accidents / land use

Logistics activities include a large array of intelligence on volumes, modes, forecasts.

Recorded in 35 papers and much more academic and invited presentations and first Macrologistics book

The South African model is detailed, with forecasts



- Ton/TEU/Tonne-km/Cost
 - Exim and domestic
 - 83 Commodities
 - All Origins/Destinations
 - 30-year forecast
 - 5 modes
 - Cost per flow/mode
- How much / what / where / when / how / price**

15 updates – > 150 000 hours.

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160 years – many mistakes

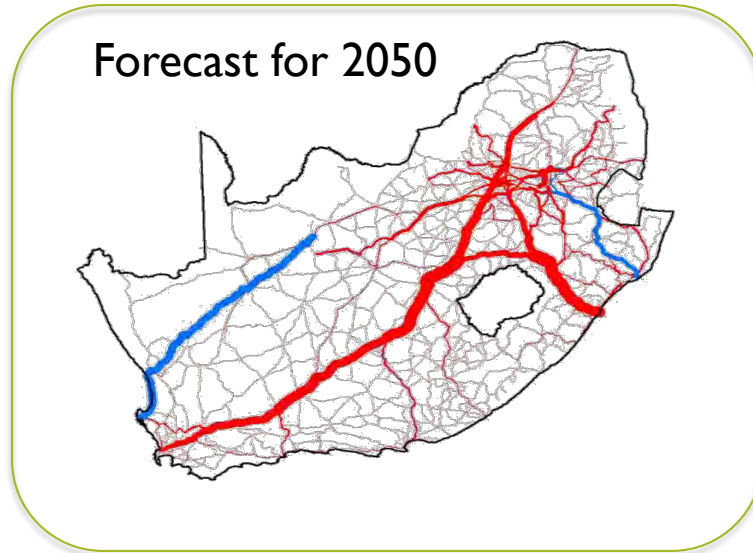
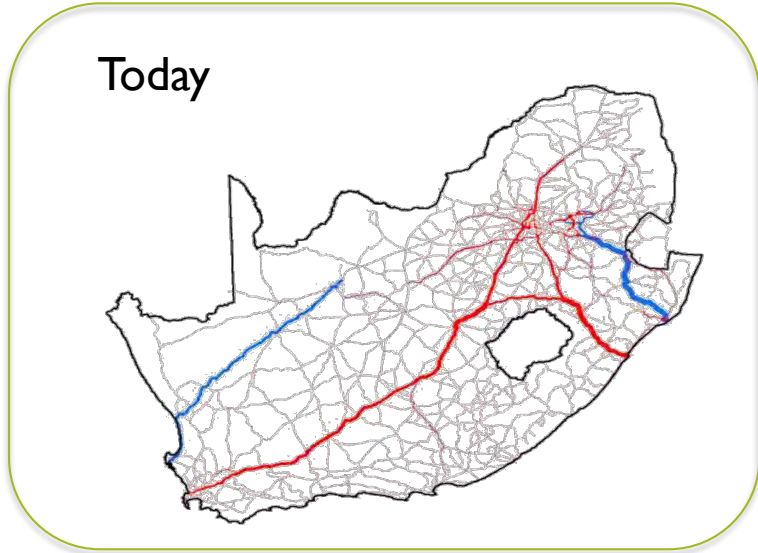
- Rail's economic life span averages **150 years**
- Oldest “mistake” is **150 years** (1870)
- Act of the Union – “business principles” – **112 years** (1909)
- Commercialisation policy – **47 years** (1975)
- De Villiers report – **36 years** (1986)
- Transport White Paper (RDP based) – **26 years** (1996)
- Moving South Africa – **24 years** (1998)
- Investments and policy mistakes of note – 1990 - 2020
- Rail policy – 2007 to 2022 (too long)

Everything happened 25 years too late
(and some things should never have happened).

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South Africa's freight demand is high



- Last mile tonne-km 132 billion
- Also:
 - 8 billion in pipelines
 - 1 billion on conveyor belts

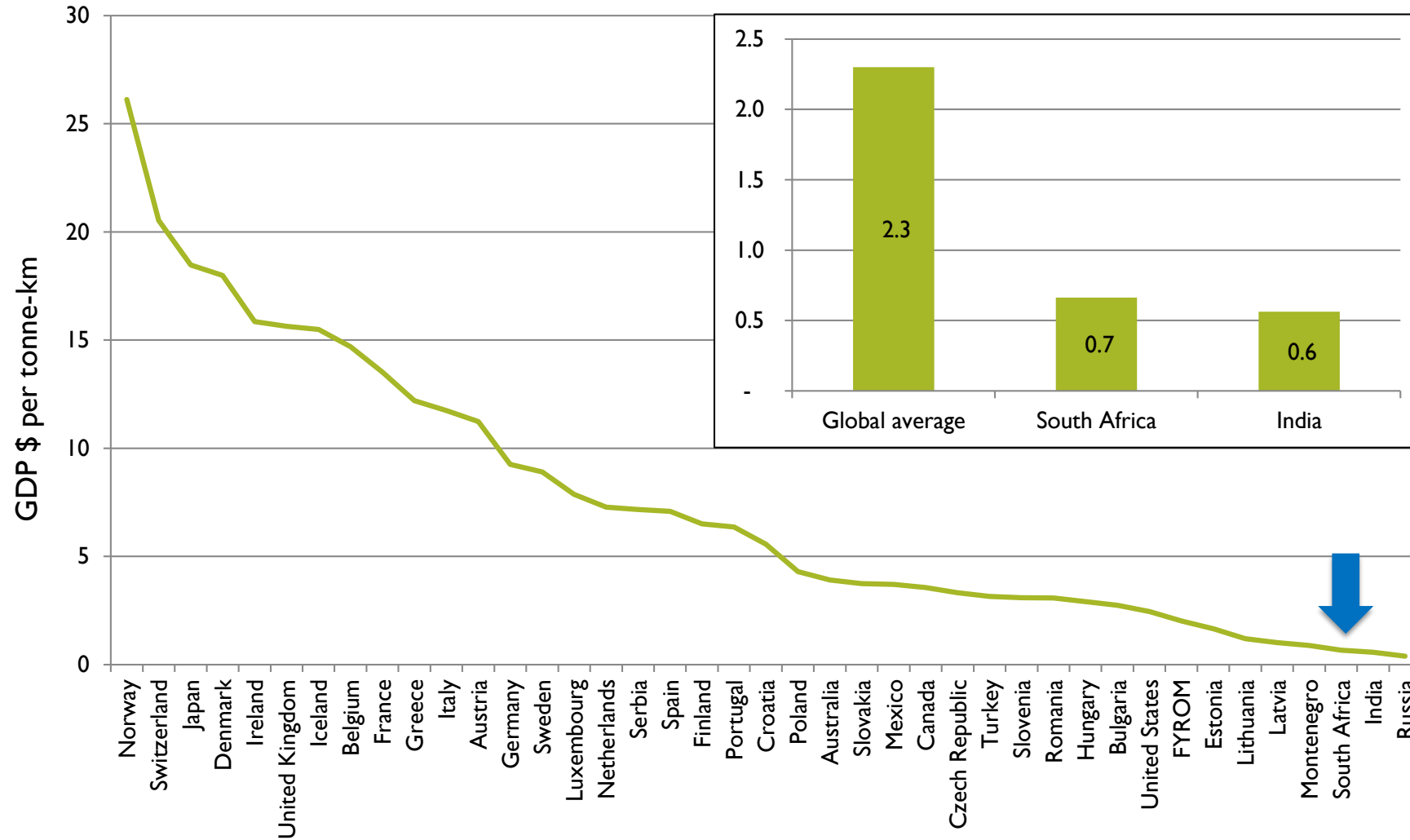
Line haul tonne-km (billion)

	Road	Rail
Current	164	149
Optimal split	134	179
10 year target	167	200

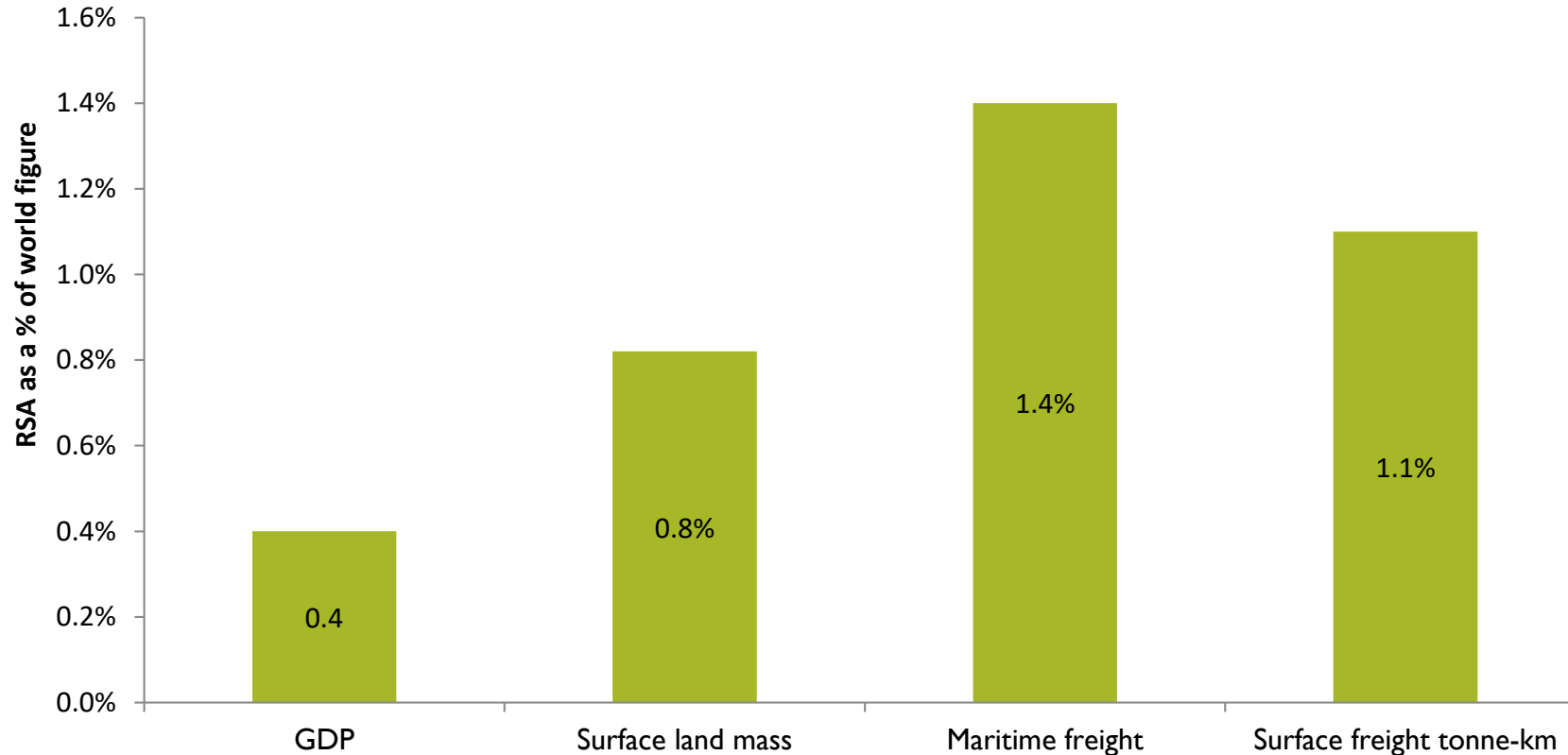
GDP

- South Africa \$0.35 trillion
- Europe \$19.70 trillion
- France/Germany \$6.26 trillion

This is because South Africa is a spatially-challenged country



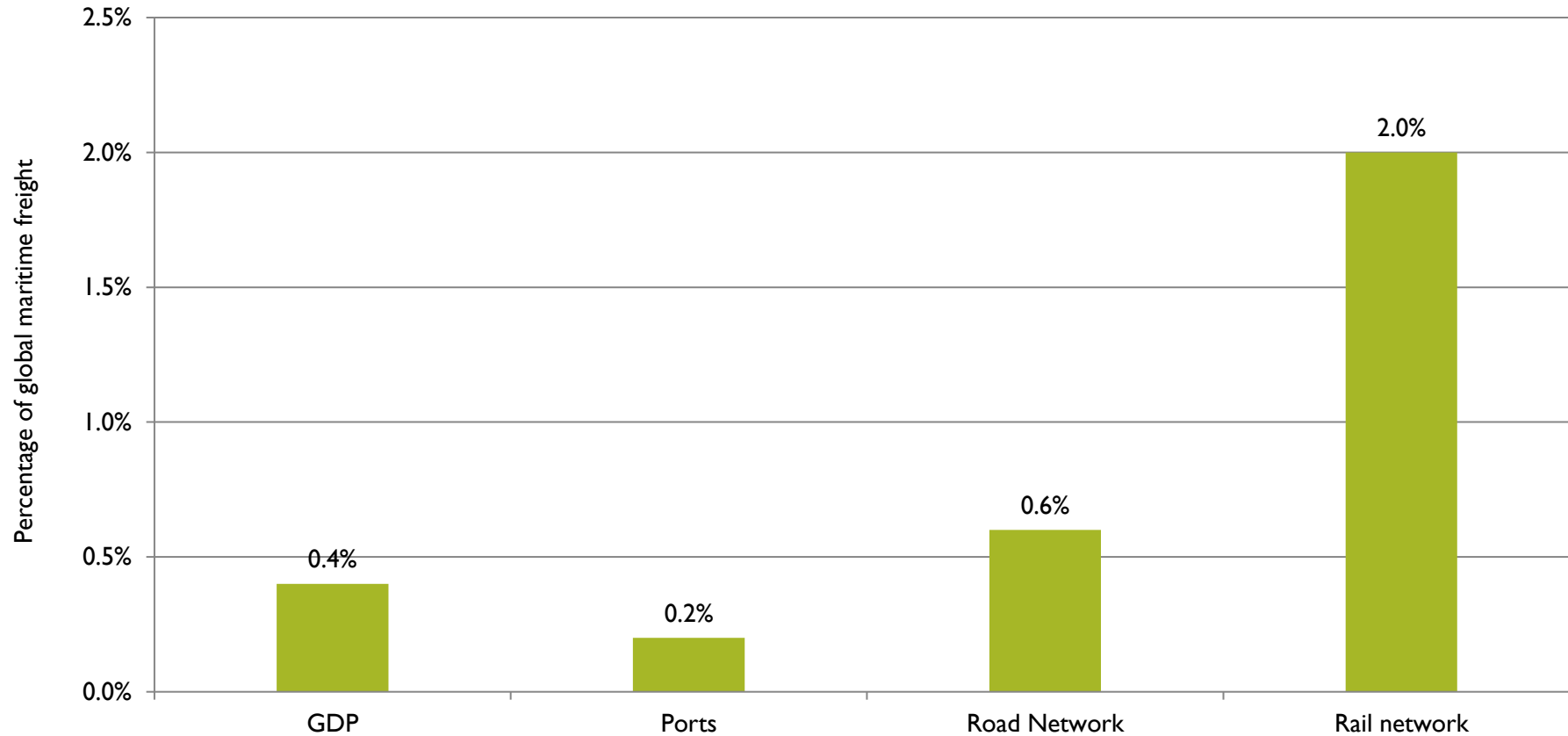
With a huge tonne-kilometre demand



Source: In 2004 the world produced about 49 000 Mt CO₂ - equivalent of which South Africa emitted 440 Mt CO₂ – equivalent roughly 1% -Scenario Building Team (SBT) 2007, Jones, T.Rodrigue, J.P., Gielen, D. – low calculation based on 2002 data / Comparison of Datamonitor 2009 (2008 data) and world GDP (2008) – high calculation

Global share of land mass, maritime freight and surface tonkilometres required to keep the economy going is larger than the share of global GDP.

And a sufficient transport network



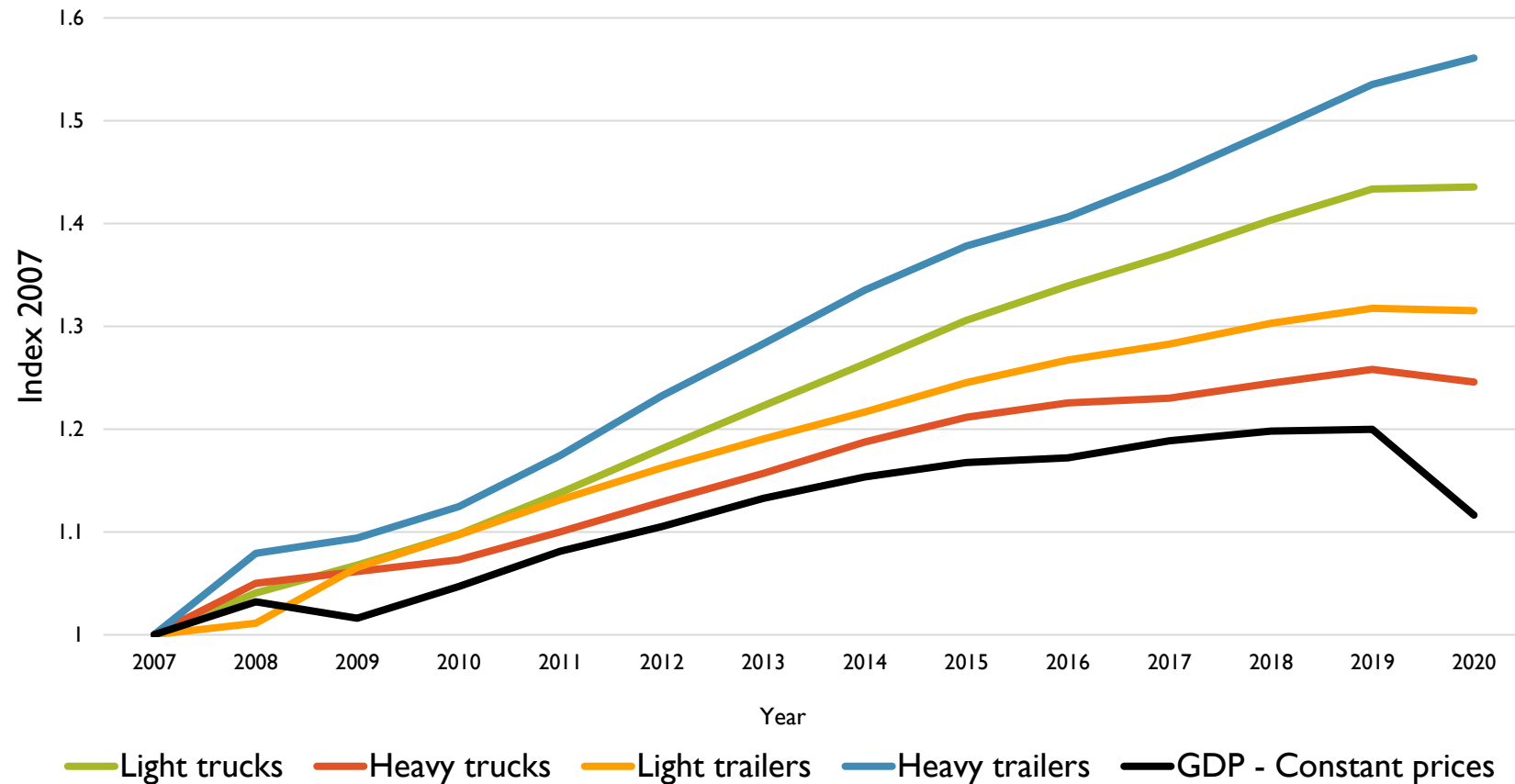
Source: Worldportsource.com. n.d [Online]. Available: <http://www.worldportsource.com/countries.php> [2018, June 20]. ; Logistics Barometer South Africa 2015

But large problems. Relative port numbers lower, but ports are well distributed and connected, however, inefficient.

Some rail infrastructure, rural and district roads are in a poor condition.

Spatial connection of the elements through intermodal hubs, economic zones and freight villages are practically non-existent.

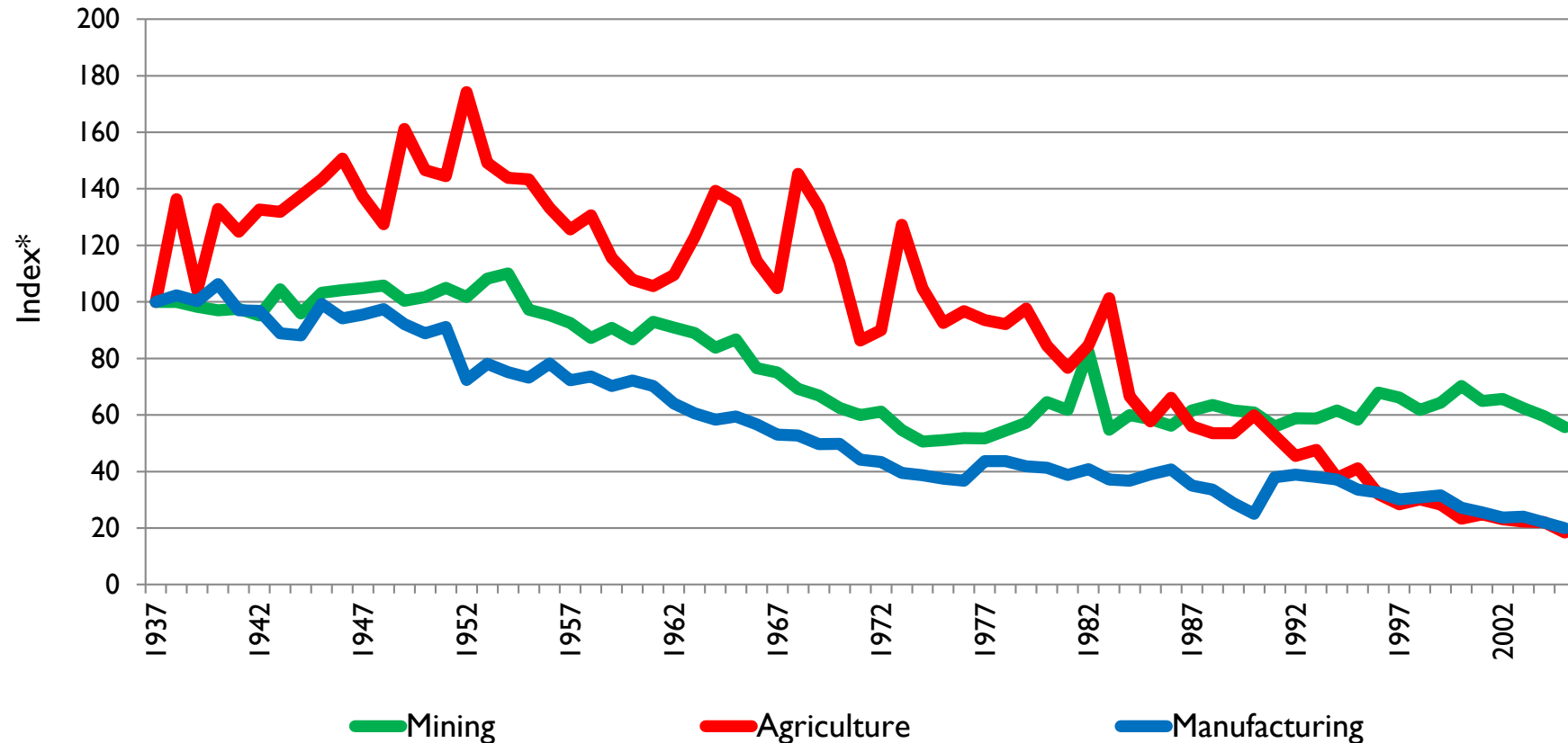
South Africa invested heavily in road transport relative to GDP growth, with fast heavy trailer growth



Transporters use multiple trailers to increase depot turnaround time of horses.

Rail market share declined since the early 20th century

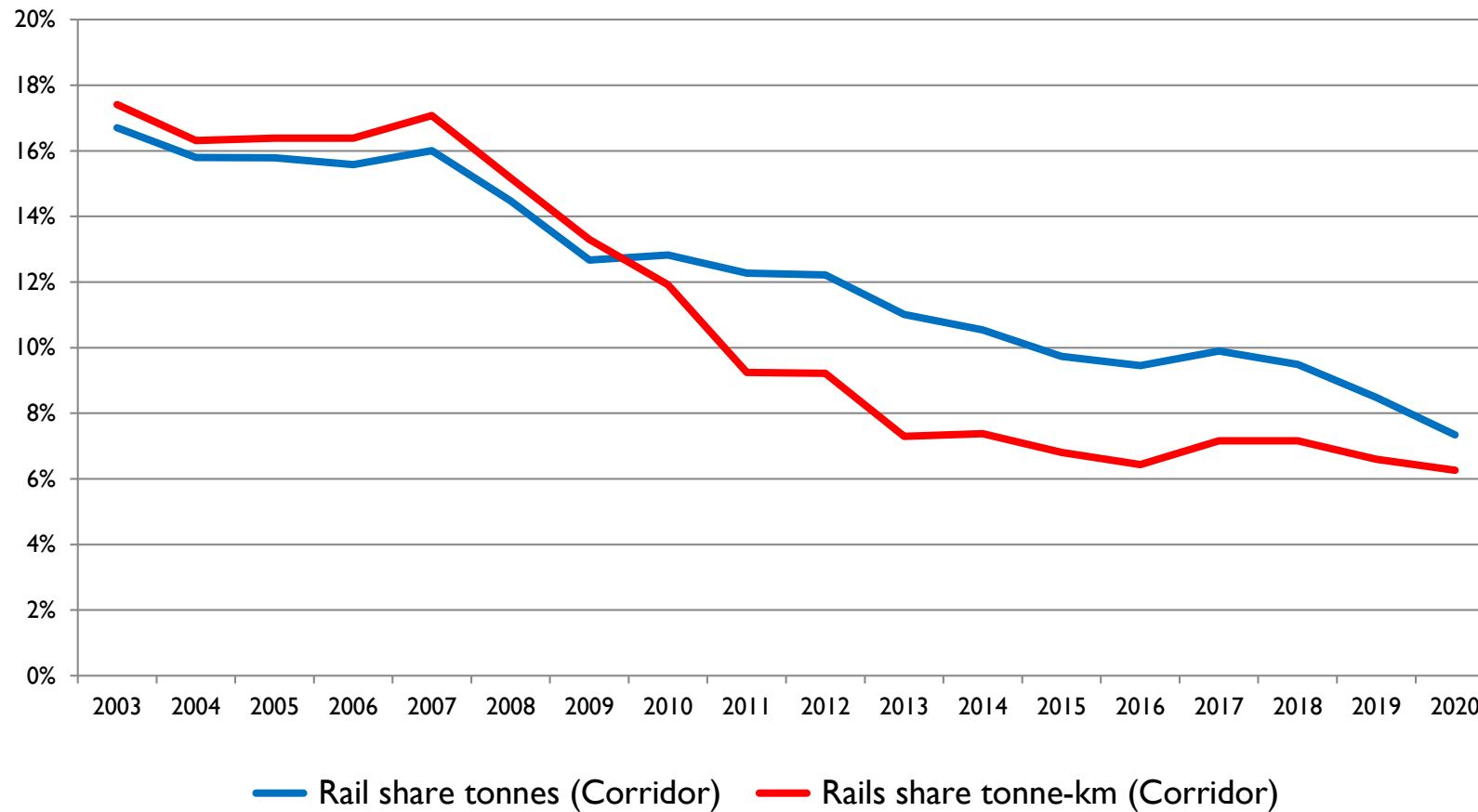
- Transnet's transported tonnes to GDP decreased between 1937 and 2007:
 - Mining: -40%
 - Agricultural & manufacturing: -80%



*Indexed correlation of the relationship between rail transport and physical production in the economy

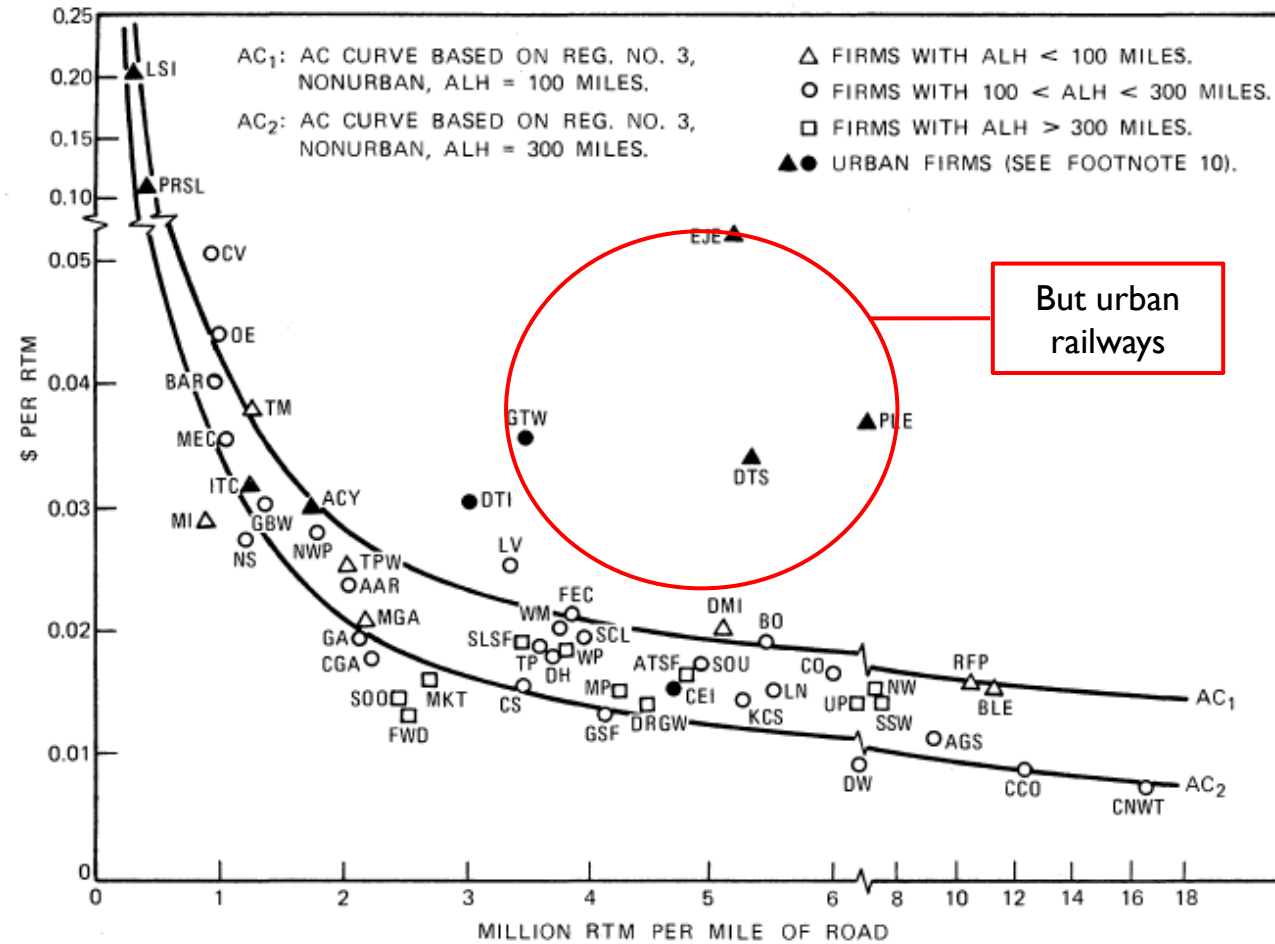
Renaissance in the beginning of the second millennial decade was short-lived

Rail market share trend since 2003



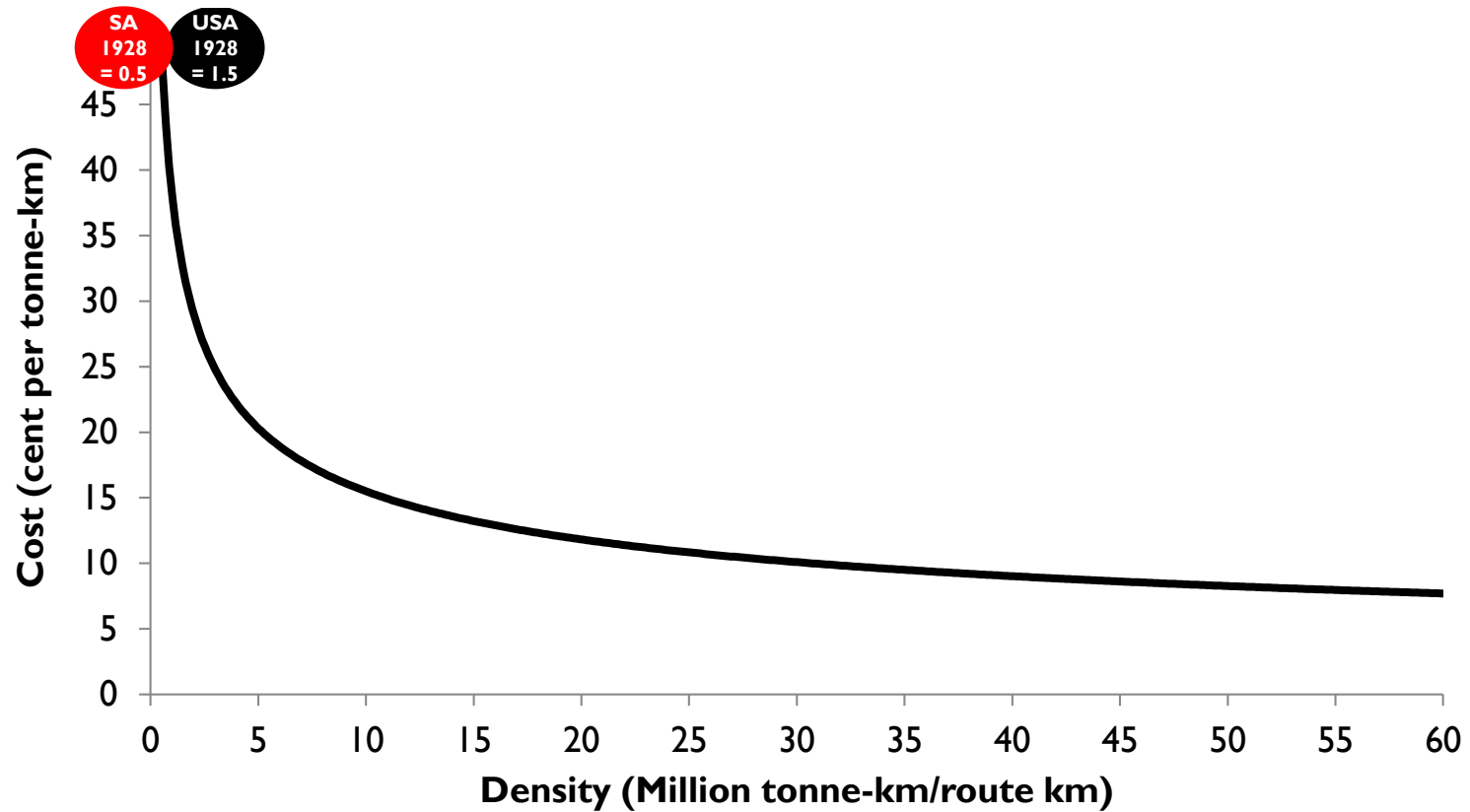
Source: GAIN Freight Demand Model

Rail density is the most important success indicator: Harris' seminal curve

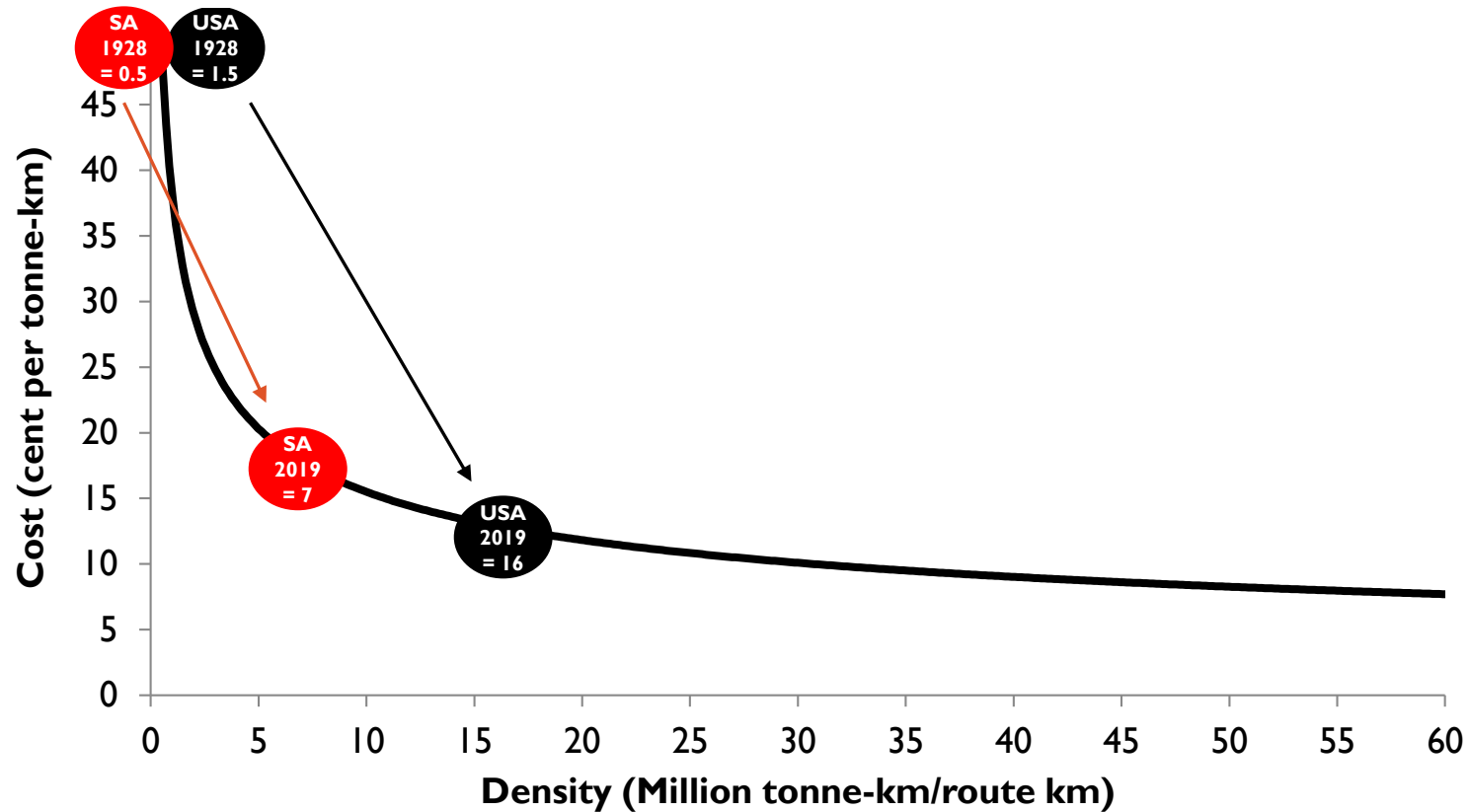


Source: Harris R.G. 1977. Economies of Traffic Density in the Rail Freight Industry, The Bell Journal of Economics

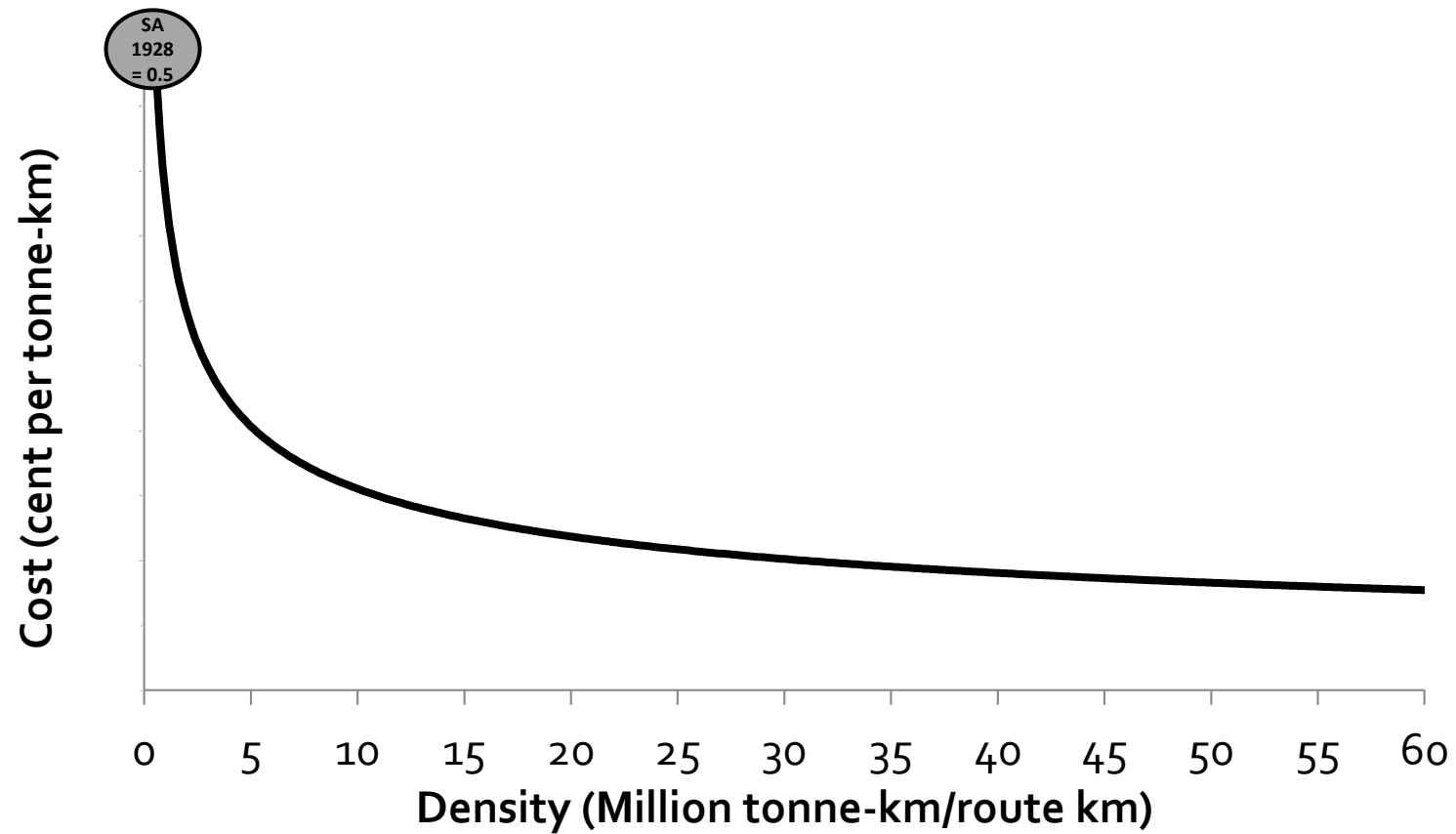
South Africa and USA rail density – 1928



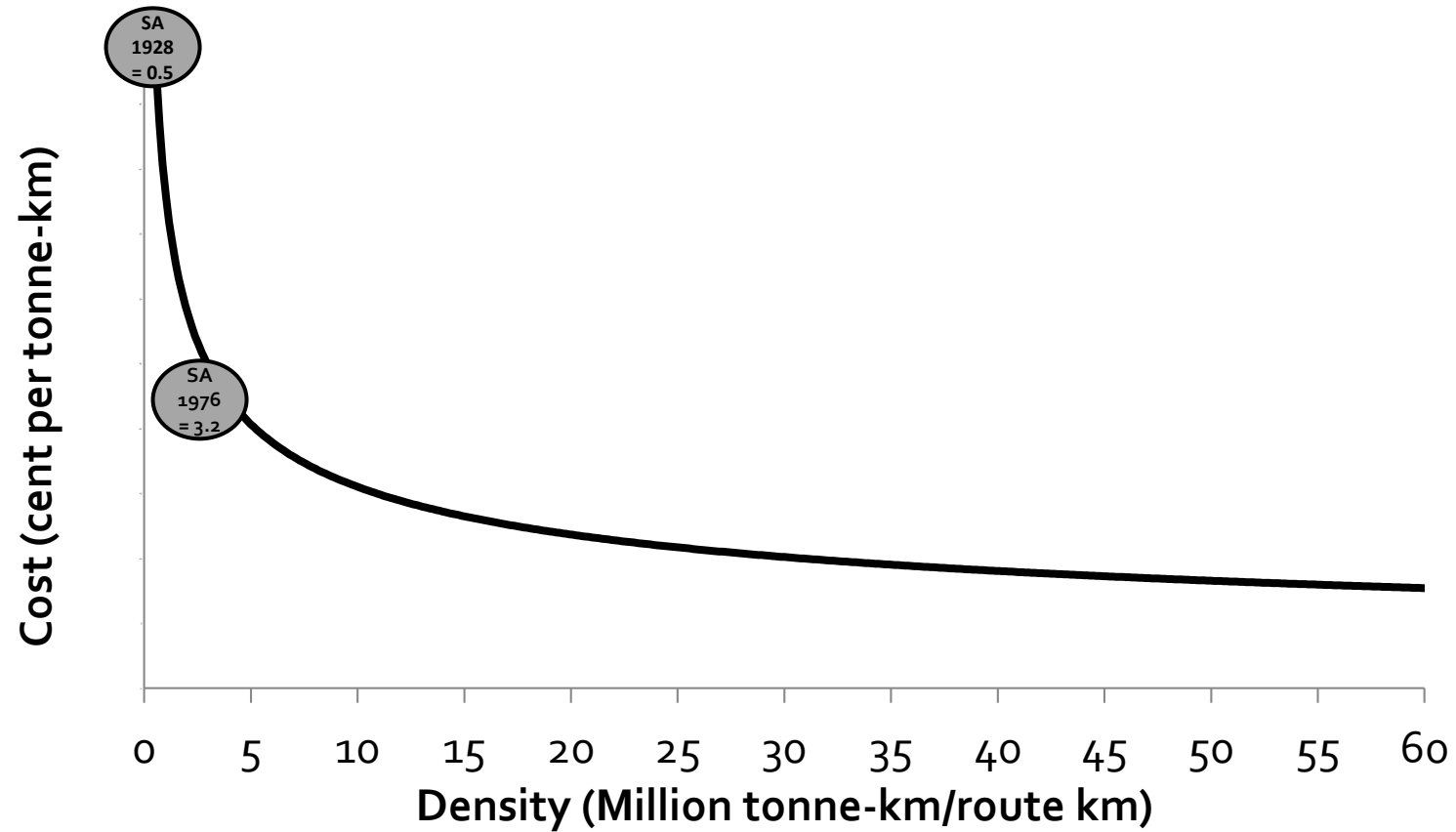
South Africa and USA rail density – 1928 and 2019: Great South African performance



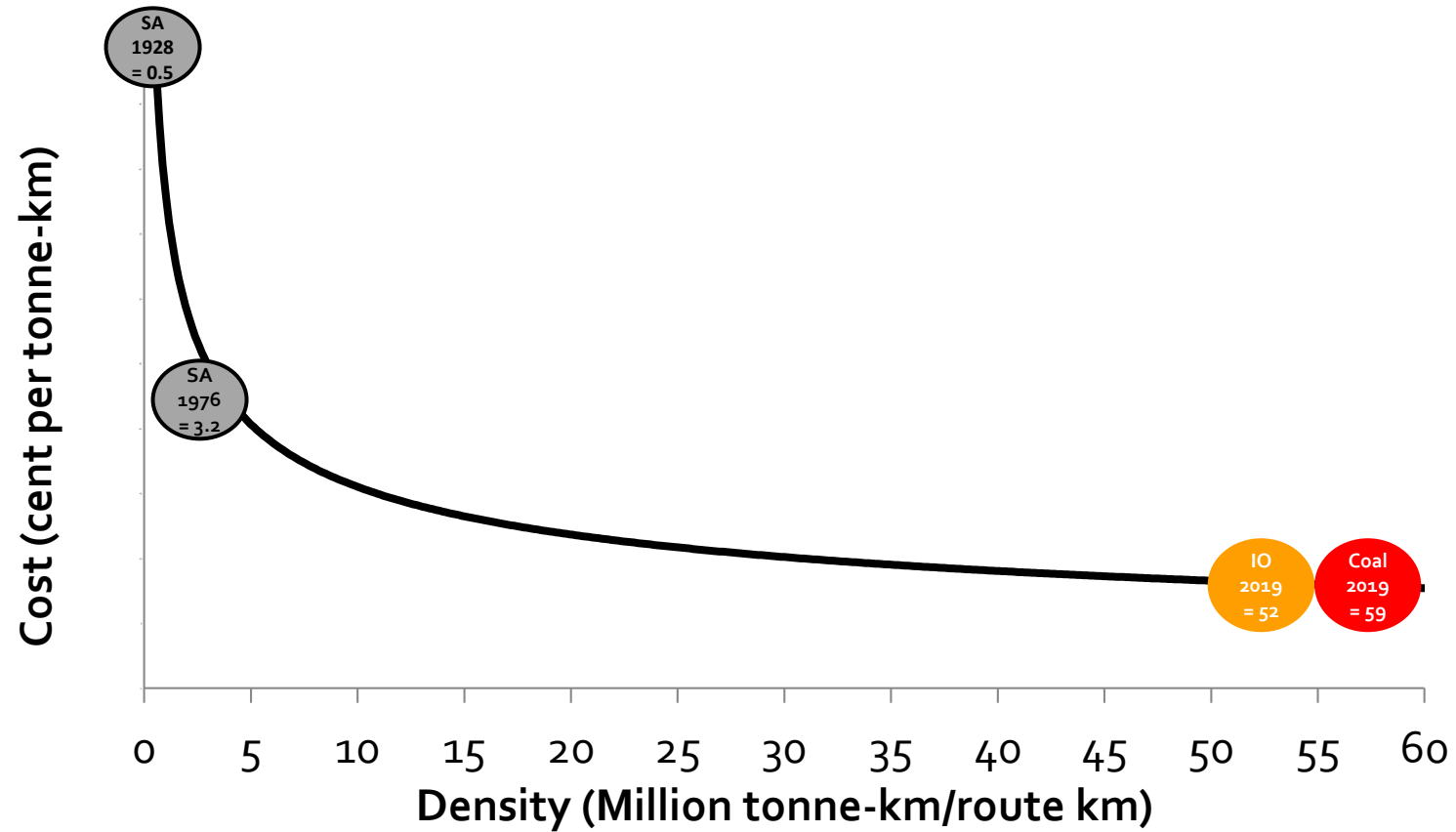
But simple segmentation suggest otherwise



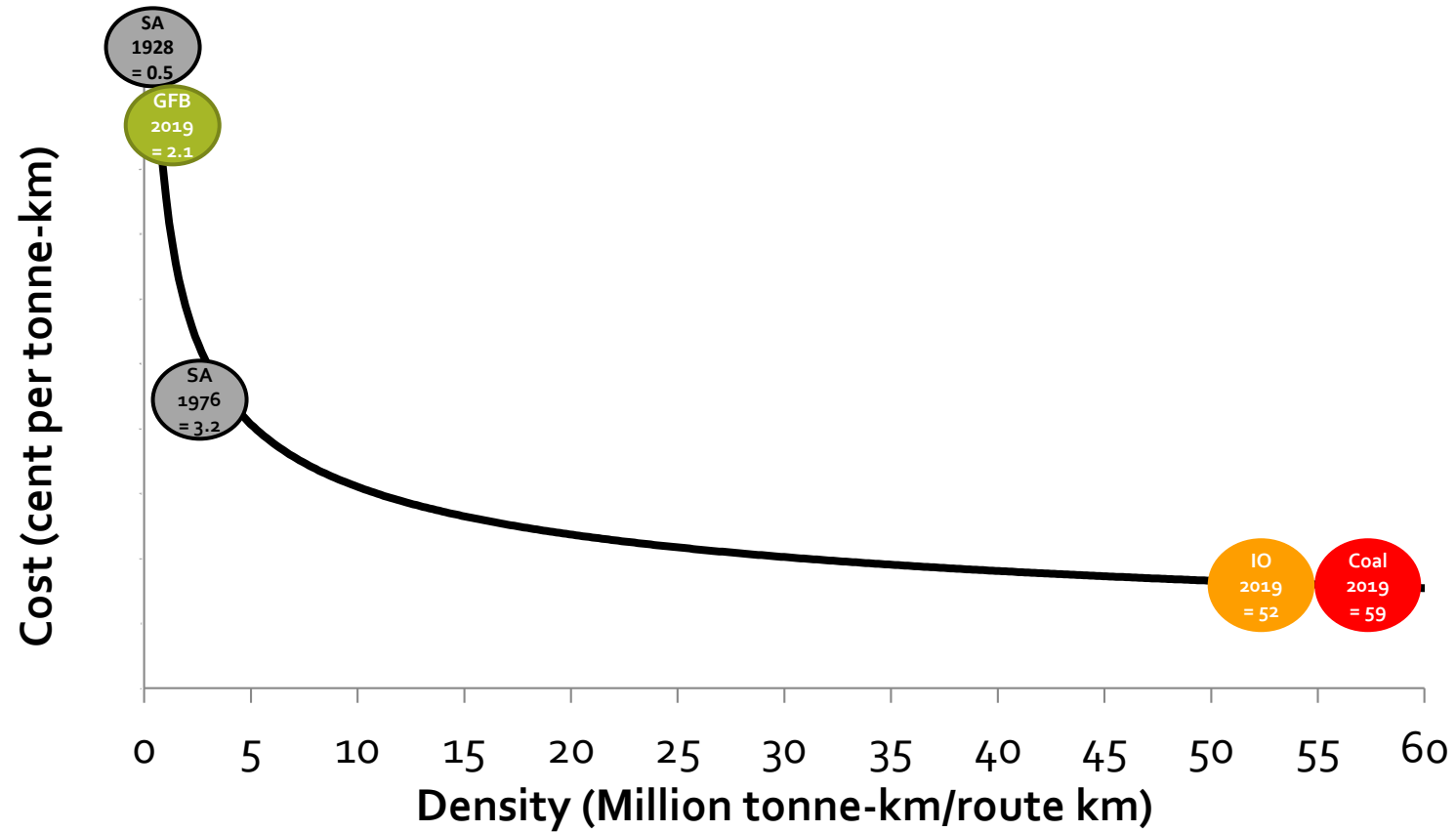
But simple segmentation suggest otherwise



But simple segmentation suggest otherwise



But simple segmentation suggest otherwise



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Rail market share is a difficult concept

- The level of insourcing is high
- Segmentation is difficult and very few people understand it
- Data is scarce and more or less never collected given the above mentioned fundamentals
- Important players seek “easy” to quote answer in order to create the illusion of managing the environment
 - Resultant answers are mostly gibberish
 - Resultant answers create even more confusion

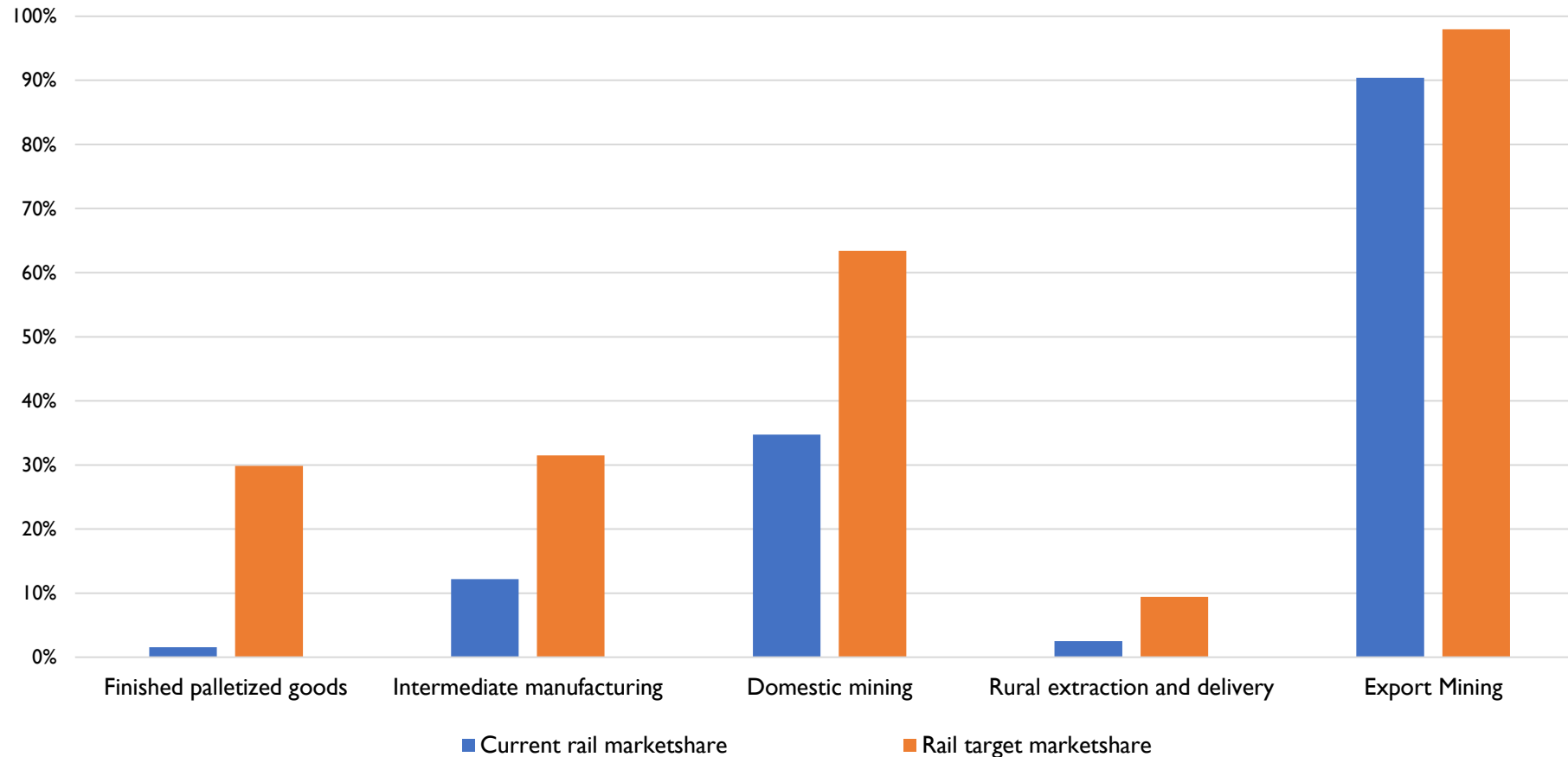
We use pure rail economic principles to classify 1.5 million freight flows in South Africa.
(per year for 5 years, year 10, 15 and 30)

What causes freight flows to be rail economical

- It firstly requires segmentation
- The rail market share should be calculated based on servicing ***rail-friendly freight***
- Rail-friendly freight is determined by:
 - Density of terminals
 - Density of lines
 - Uniformity of commodity/product
 - Distance (if all the above are met, rail can also provide services over shorter distances)
- Value trade-offs are between the cost of time vs. the lifecycle cost of transport – it is not true that rail is not suitable for any high value freight

If it complies it should be on 100% rail.

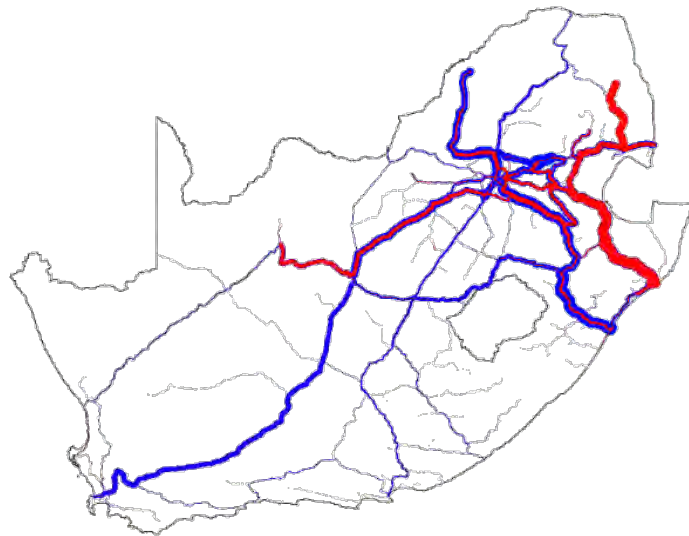
The biggest market share gap is in palletised freight



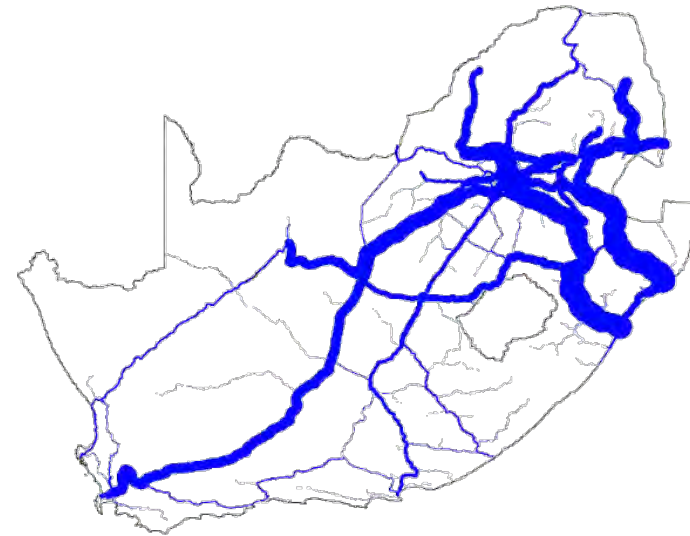
But the export mining gap is increasing (a tragedy)
and domestic mining gap is destroying our rural roads.

General freight performance is less than half of what it should be and must quadruple by 2050

Today
(**What it is** and **what it should be**)



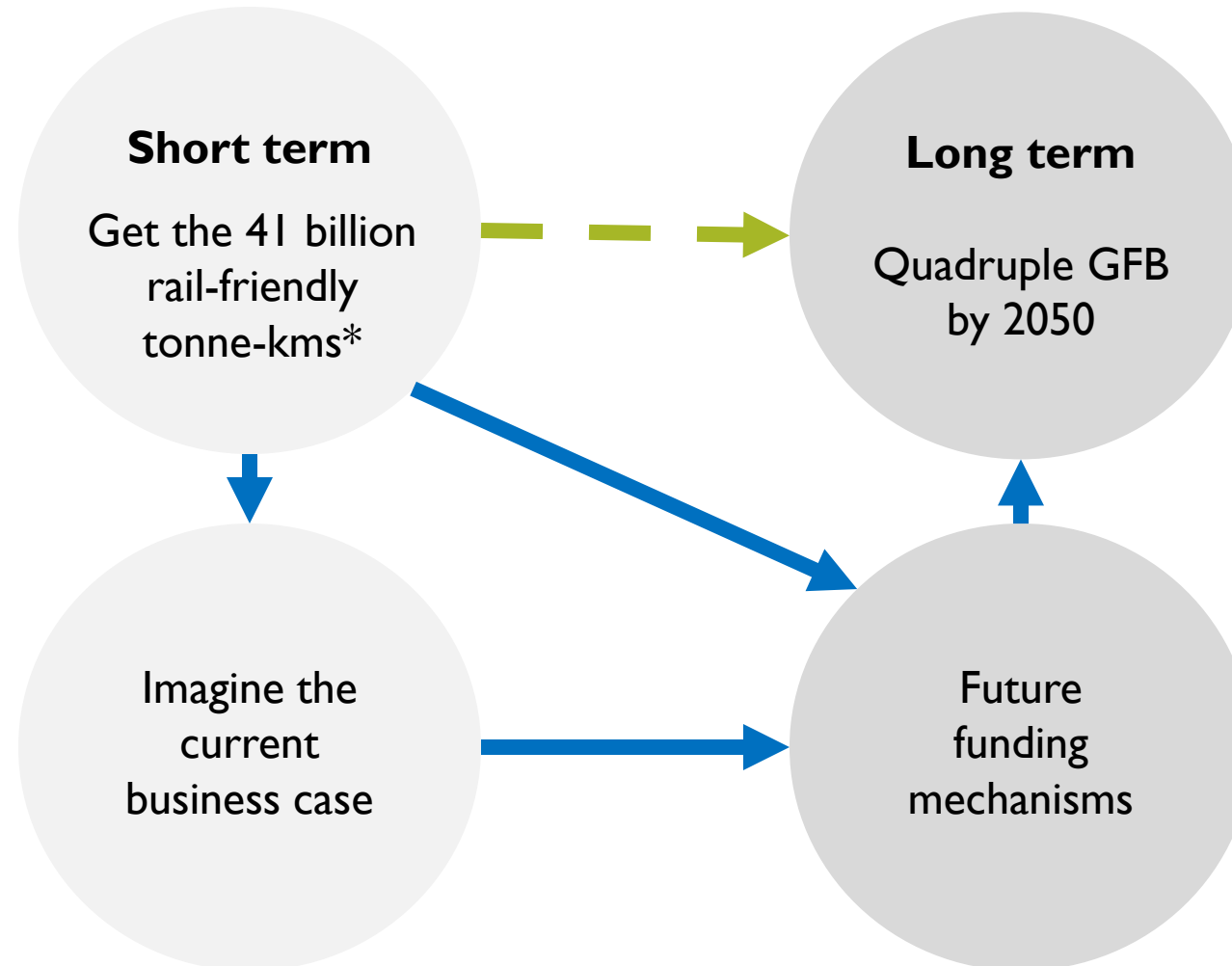
2050
(**What it should be**)



Source: GAIN South Africa Freight Demand Model™

Current tonne-kms of 18 billion should be 47 billion tonne-kms and should reach 77 billion tonne-kms by 2050.

Key strategic objectives can be considered short and long term

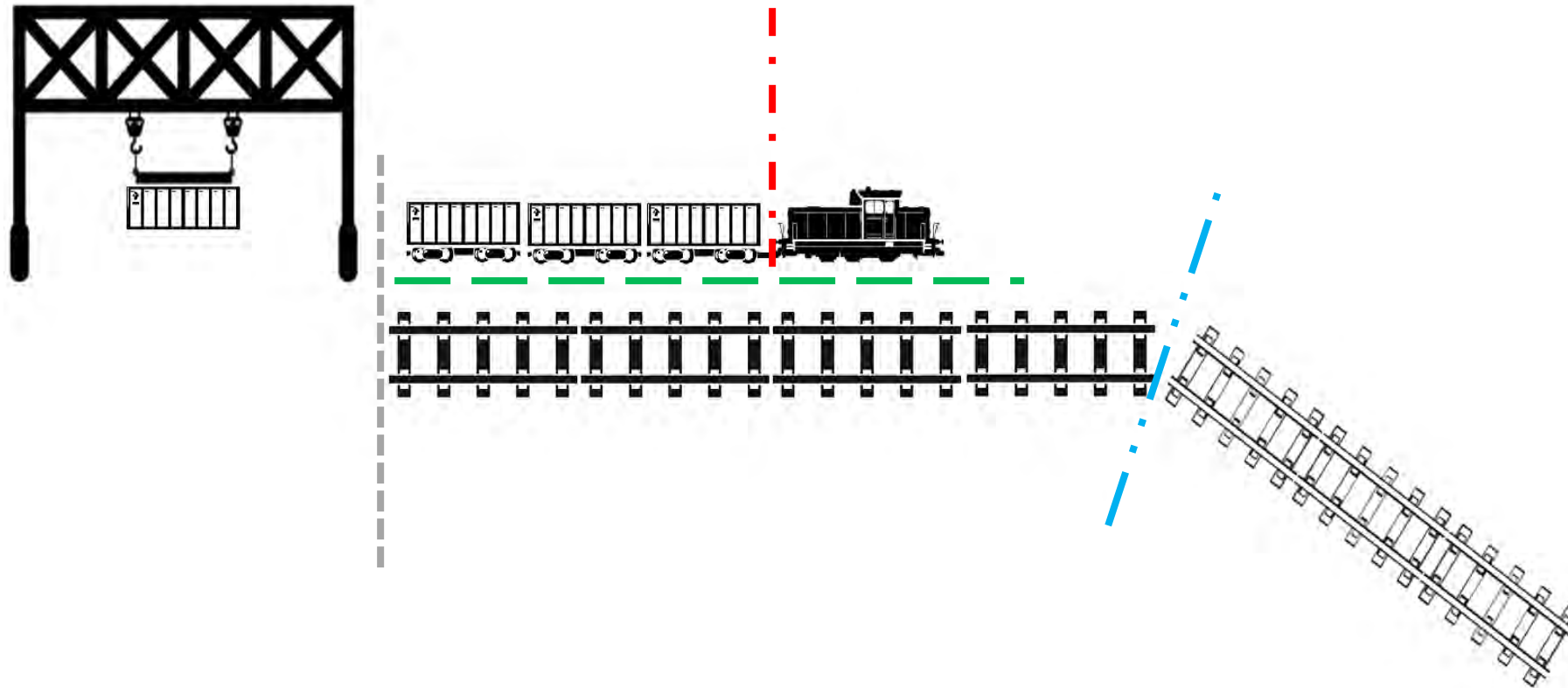


*11 billion tonne-kms export minerals and 30 billion tonne-kms general freight

The income statement impact is sizeable

- 11 billion tonne-km export minerals = R 3 billion at current tariffs
- 30 billion tonne-km general freight = R 18 billion at current tariffs
 - Assuming 20% discount on half of additional general freight = R 16 billion additional income
- Additional export minerals + general freight = increased revenue of **R 19 billion**
- Additional costs consider returns to density:
 - Even at current cost structure, given 20% loss assumption, but 70% returns to density = **R 7 billion** additional costs
- Net positive business case **R 12 billion** – requires 3 components to realise

The only solution is separation – pulling in private funds and competition



- Vertical separation
- Horizontal separation between low – and high-density lines
- Horizontal separation between terminals and operating slots
- Horizontal separation between locomotives and wagon fleets

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Consider only the “real” rail market

- Current rail income – 18 billion tonne-km = R10 billion
- The “missing” on rail – 30 billion tonne-km, transported on road for R30 billion
 - That is a R15 billion overcharge to the economy
 - Add R7 billion for externalities
 - Add R3 billion for returns to density
- The following needs attention as well:
 - Additional returns to density with network rationalisation – R5 billion*
 - Infrastructure saving of rail infrastructure cost vs road – R15 billion*
- South Africa incorporated overpays ~ R50 billion

* Requires focused study

That is approximately 17% of the national transport bill (9% of national logistics bill).
Exclude export line losses

Market economic figures

- Slot price limit 10c to 15c x 30 billion tkm = R3 billion to R5 billion – infrastructure cost for new players
- Operating cost at 20c – 30c x 30 billion = R6 billion to R9 billion – for operations and capital cost
- Sales at 60c x 30 billion = R18 billion
- R9 billion return

The real return is “capturing” supply chains and savings to the economy.

Conditions required to make this work

- Protect rail assets
- Fund infrastructure properly – road model
- Make third party access real:
 - Don't cherry pick
 - Don't overcharge
 - Don't sell voetstoets
 - Don't create unnecessary barriers to entry

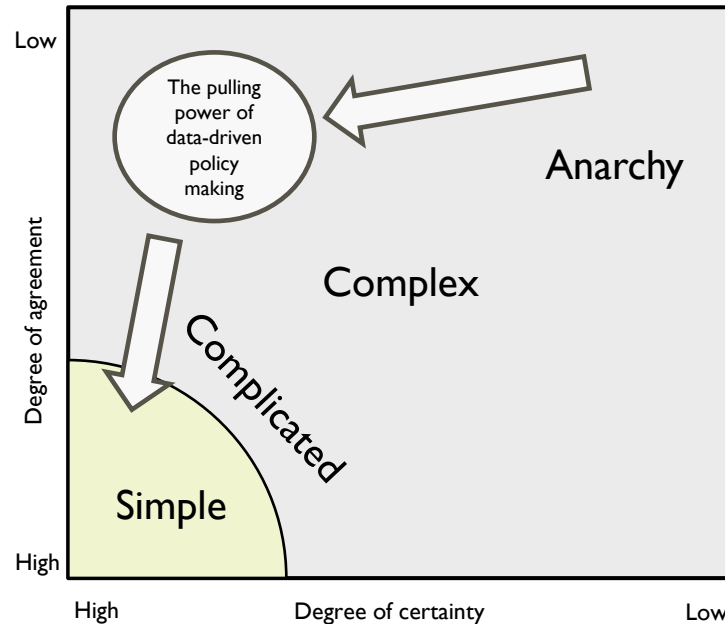
The new challenges could be

- Effective low density – high density split
- Sensible infrastructure provision and charges (all modes)
- Competitive slot pricing
- Real open access

The drive to success is now panrail

- A new rail policy seems to have finally succeeded
 - This opens the door for sustainable evidenced based planning
- Open access (with a dominant operator) is now a given
 - Financial separation should now be completed
 - The next move will be to full open access
- The solution will involve a much broader community

Our view, however, is that this will be enabled by evidenced based planning



Level of complexity

- **Anarchy** – Very little is known
- **Complex** – More is unknown than known
- **Complicated** - More is known than unknown
- **Simple** – Everything is known

Source: Stacey (1993) diagram as quoted on Ansell and Geyer (2017), adapted

The future of rail has a direct link to mankind's survival

- A world without mass guided transport will be a failed world
- The same is true of South Africa

An active and vibrant railway system confers many benefits on society.

Olumyemi Osinbajo

Let us imagine ourselves transferred to our old friend, the railway carriage...

Albert Einstein

A failed railway will be a nail in the coffin of a failed state.

Efficient and affordable mobility is a cornerstone of the development state



If God had intended us to fly, he would never have given us railways

Michael Flanders