

# The Macrologistics impact of Transnet on the economy

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#### Macrologistics impact of Transnet on the economy

- Introduction (Macrologistics, freight demand and supply)
- Rail's "original sin"
- Density, global benchmarking and performance
- Inserting rail into supply chains
- The port system
- Effect on the economy
- A road ahead



#### The objective of Macrologistics

- · Logistics is an integrated discipline
- Targeting the lowest cost of ownership for each customer
- In macroeconomics, society is the customer of logistics
- Macroeconomics objective:
  - Economic growth
  - Full employment
  - Price stability
- Macrologistics objective:
  - National lowest cost of ownership (and global)
  - o Improvement of societal well-being
  - Ecological sustainability



#### From micro to macrologistics

#### **MICROLOGISTICS Business inputs** Raw materials Capital • Labour **Transformation Profit** Assets **Business processes** Logistics services Calculation of total cost of ownership

# Production factors Natural resources Capital Labour Entrepreneurship Infrastructure Business processes Logistics services Calculation of total cost of ownership



#### Understanding freight movements

#### Tonnage

#### **TEUs**

Tonne-km

#### How much of what moved where and how and at what cost?

- Import/Export/Domestic
- **Commodities**

Origins & Destinations

Road/rail/pipeline/waterway

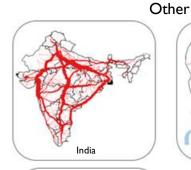
is comprised of

Containers/bulk

#### **Africa**



Western Cape







Uzbekistan



We include as many variables as possible:

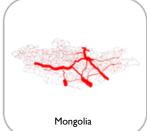
- Costs
- Other activities: cash to cash cycle / warehousing / administration
- Including all externalities: emissions / noise / congestion / policing / accidents / land use

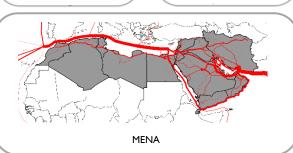


Ethiopia









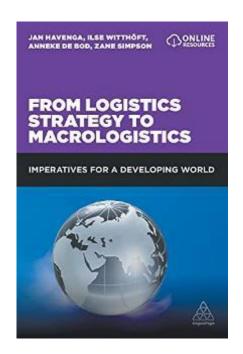
#### and considers 372 geographic origins

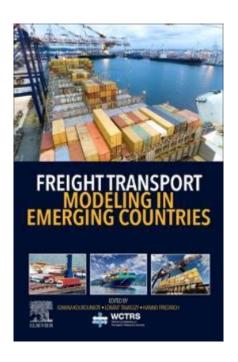
1.5 million unique data lines,

The **GAIN FDM**<sup>TM</sup>

- or destinations (O-D pairs),
- 83 commodities,
- 4 transport modes,
- 356 local districts.
- 7 sea ports,
- 8 land border posts, and
- an airport.

And disaggregated forecast for 5 consecutive years, year 10. 15 and 30











ransportation Research Part D.

Ensight logistics' contribution to sustainability. Systemic

measurement beditates behavioural charact Jan H. Harringal Charle Strepton

**37** peer reviewed articles

**60** international peer review conference papers

> 20 invited/key note presentations on all continents

2 books, 2 chapters in peer reviewed books

RSA and Transnet's effect on

Direct recommendations Including "father" of Freight Flow

#### Various reports

(latest 1st road to rail strategy for economy)

from the best in this field. modeling as well as the co-creator of the WB LPI



Macrologistics instrumentation: Integrated national freight-flow and logistics cost measurement

Inn H. Haveney, ", (Ise E. Withoft", Zane P. Simpson"

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The directive of this presents is to said macrologicals decision-making through the development and investthe material relate of the material beacht paratire land stage that is required as address legisters deallesses within to context of a country's acclusionable algorithm. The number highlight that booth Africa's macrologist note record that of trealing partiess, with real insequent the directional form multithalous browsing in conveni nemotic eletter will refore both recepted and retentify note. This, is born, will begin the compil trease of treasity and arrespond thright, and expert recoming and a single-difference objective. Let yeards has describeded will represe market across be read concerns and retires legisters near while ag-pring count development algorithm. These applications provide reasoning of data development of the concerns of the con and inharmore appropriate. The level of quantit and around diaggregation in the facility brings brought broad Bode<sup>100</sup>, and the forest well last unit a legislar risks made, within the recent of the national significant opper model, it to the fact of our bisoviados unique. This field to expected assessment in the South Addisor Bright Describ Mode<sup>44</sup> lapst data bridge lightles' analytical gap to contract committee to studies.

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#### National freight demand modelling: a tool for macrologistics management

Jan Hendrik Havenga

South Africa, and Zane Paul Simpson Salárebezok University, Sleženbouck, South Africa

Purpose: The purpose of this paper in to prepose the randor of foots Advant national length designs model and misted legisless cost makely, and in Charlesto the oppolation of the mistelling nations is inform

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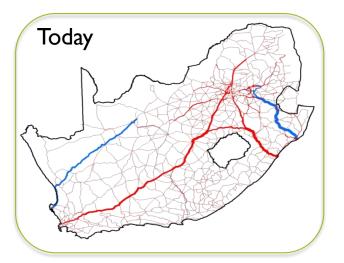
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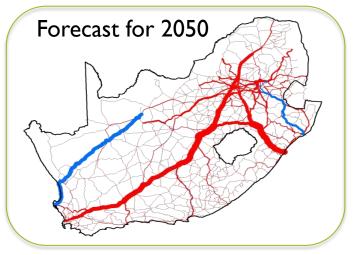
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## South Africa's freight demand is high



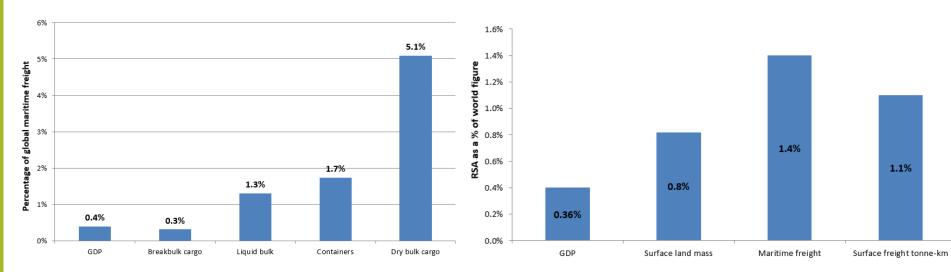




#### **GDP**

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

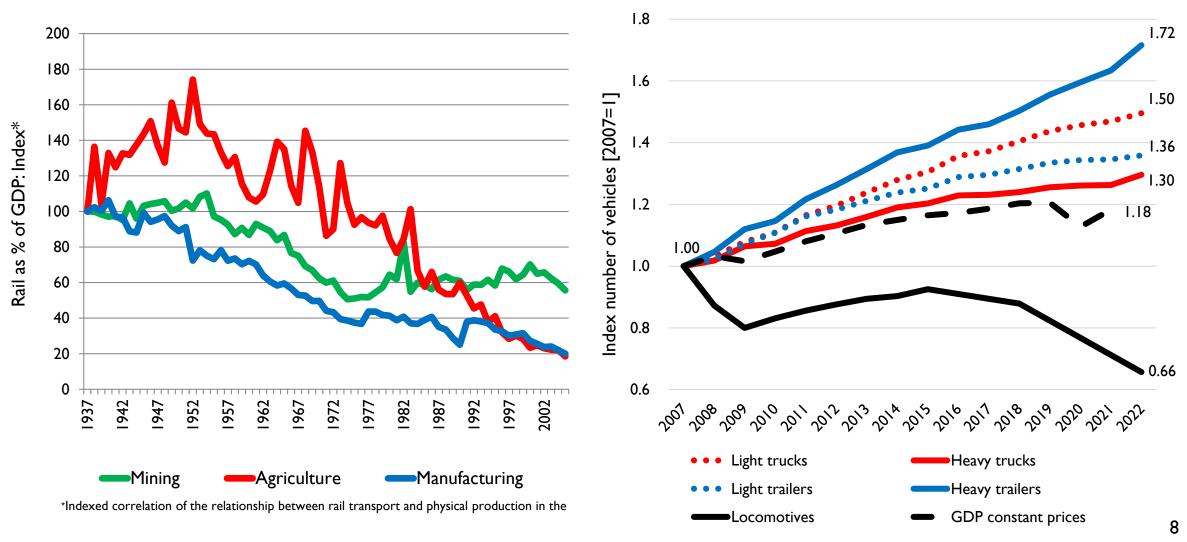
**Note**: In the maps above, the red lines indicate all freight flows and the blue lines indicate dedicated export line flows.



SA's landmass is about equal to Germany and France combined, while its GDP is nearly 18 times smaller

**Source**: GAIN Freight Demand Model™

#### With a slow and sometimes unnecessary move to road supply



Source: GAIN Freight Demand Model™; Havenga et al. (2021) with 2022 data for eNaTIS vehicles, Transnet locomotives and World Bank GDP



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## "Original sins" have a 150-year history

#### • Two major "sins" morphed into four

SIN	Cause	Symptom	Solution	
Narrow gauge (1870)	To reach gold and diamonds quickly	Lower yield	Continuous CBA of new developments to determine when to switch	
Political interference (1909 till present)	Political party constituents insisted on rail connectivity	Large network and cross subsidization	Restructuring	

SIN	Cause	Symptom	Solution
Network size too large	Political party constituents insisted on job and rural town preservation	Low density	Rationalization
Cross subsidization	The need to preserve inefficient freight	"Hidden" problems	Business strategy



#### Cross subsidization is rampant at Transnet

- Pre 1976: Cross subsidization of high value traffic to mining and agriculture
- Post 1976: Cross subsidization of export lines to GFB
- **Post deregulation**: Cross subsidization of port "ad valorem" (NPA) to Transnet and within rail continuing export lines to GFB

#### Sources:

- (1) Chasomeris, M. & Gumede, S. 2022. Regulation, Governance and Infrastructure Pricing in South Africa's Ports Sector, in C. Ferrari, H. Haralambides, S. Prete, and A. Tei (eds.). Regulation and Finance in the Port Industry. Palgrave Studies in Maritime Economics. Cham: Palgrave Macmillan, <a href="https://doi.org/10.1007/978-3-030-83985-7\_4">https://doi.org/10.1007/978-3-030-83985-7\_4</a>
- (2) Zulu, J.M. 2014. The Political Economy of Port Institutional and Pricing Reform in South Africa. Published master's thesis. Cape Town: University of Cape Town, School of Economics.

Exposure to two major vulnerabilities: Removal of NPA "tax" and continuing success of especially the coal line.

Future Transnet and TFR management are required to watch this closely.

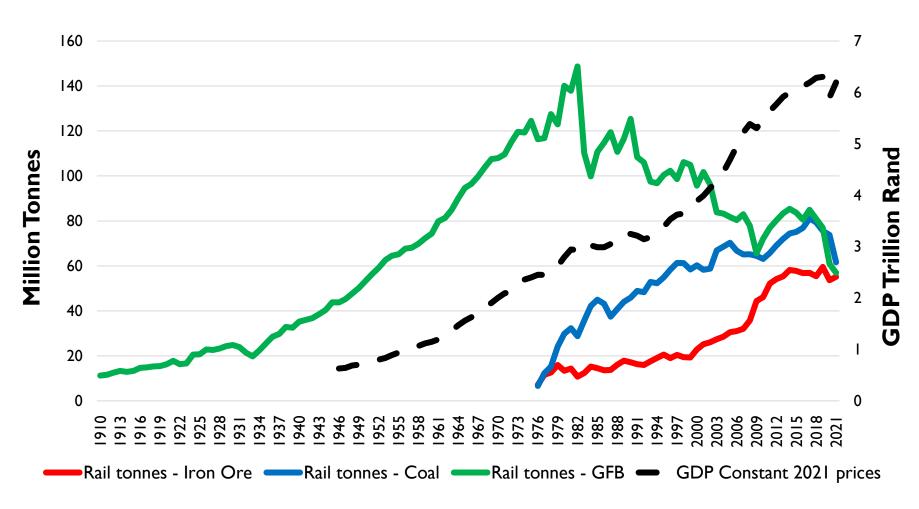


## Many mistakes were made over 160 years

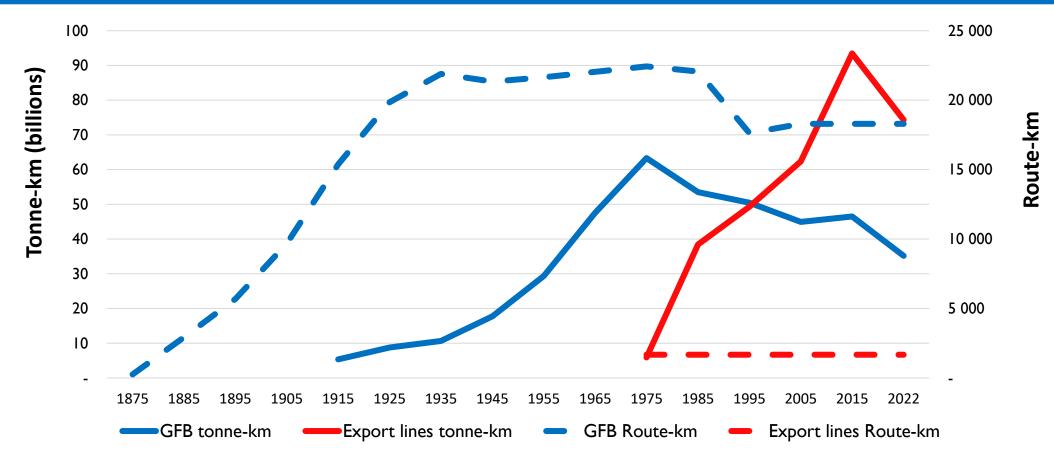
- Rail's economic life span averages 150 years
- Oldest "mistake" is 150 years (1870) gauge
- Act of the Union "business principles" II2 years (1909) not followed
- Commercialisation policy **47 years** (1975) export lines rather smokescreen
- De Villiers report **36 years** (1986) misunderstood rail's role
- Transport White Paper (RDP based) 26 years (1996) foundational, but never built on
- Moving South Africa 24 years (1998) sound strategy, but never executed
- Investments and policy mistakes of note 1990 2020
- Rail policy 2007 to 2022 (too long) will take minimum of 2/3 years to implement

Source: Havenga, J.H., De Bod, A., Simpson, Z.P., Swarts, S.J. & Witthöft, I.E. 2021. A proposed freight and passenger road-to-rail strategy for South Africa. Helsinki: UNU-WIDER, https://sa-tied.wider.unu.edu/article/proposedfreight-and-passenger-road-rail-strategy-south-africa

#### Comparison between South Africa's historic rail volumes and economic growth



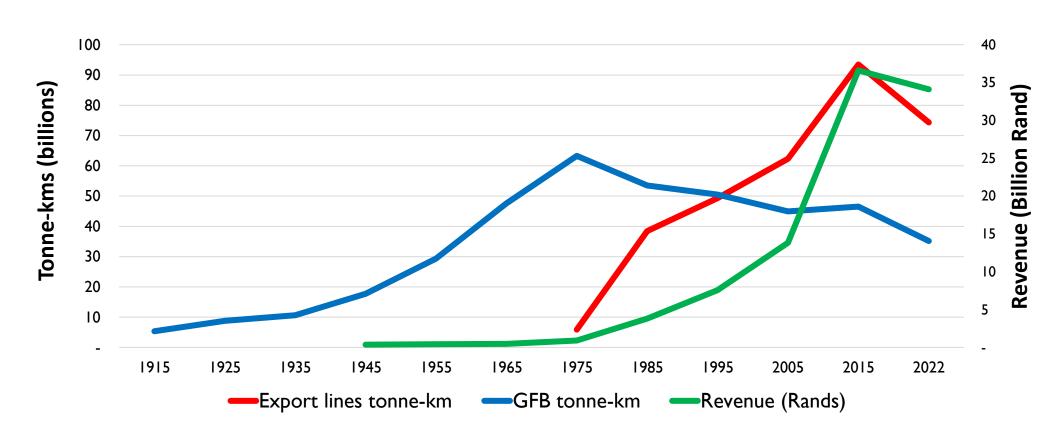
# Route kilometre and tonne-kilometre growth from 1875 to 2022



**Source**: GAIN Freight Demand Model™

General freight business (GFB) reached its peak in 1935 and remained largely unchanged. The dip in 1985 was mostly due to the Namibian rail - and metro networks' changeover (to SARCC). 14

# Tonne-kilometre and revenue growth from 1915 to 2022



**Source**: GAIN Freight Demand Model™

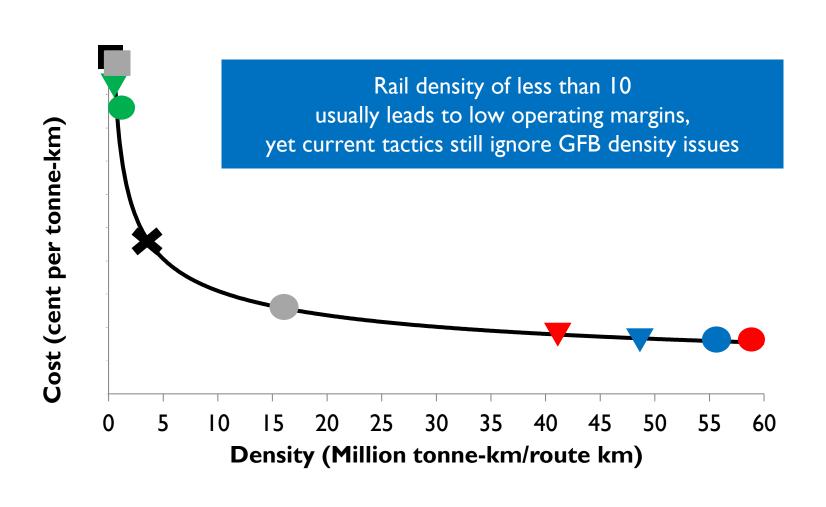
Although revenue split between export lines and GFB is not available, the fact that revenue was driven by the highly densified exports lines is undeniably visible.



#### Macrologistics impact of Transnet on the economy

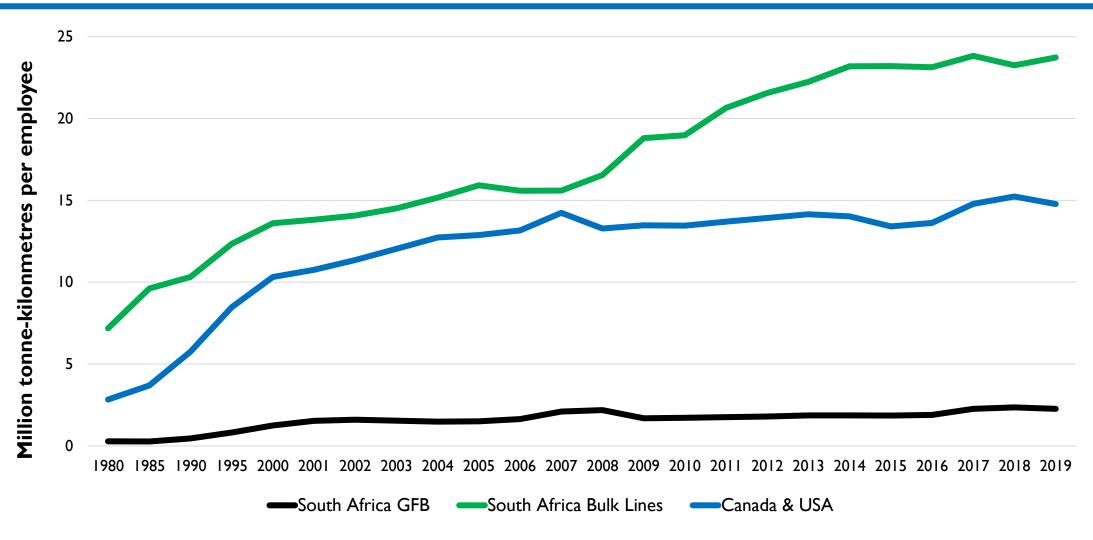
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#### GFB rail density loss

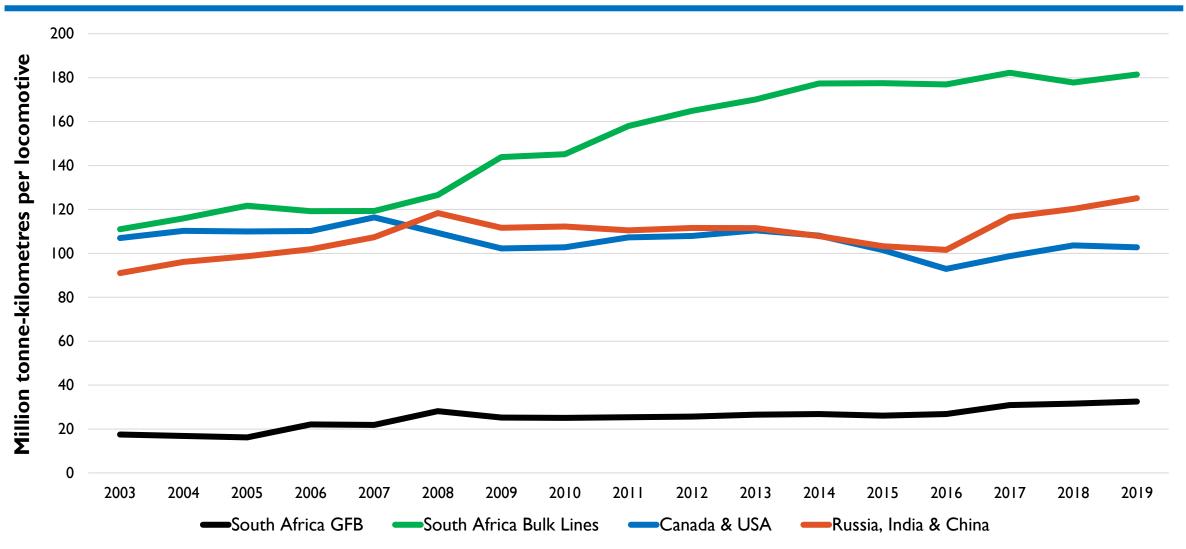


- SA 1928
- **SA** 1976
- GFB 2019
- **GFB** 2022
- Coal export line 2019
- Coal export line 2022
- Iron ore export line 2019
- ▼ Iron ore export line 2022
- USA 1928
- USA 2019

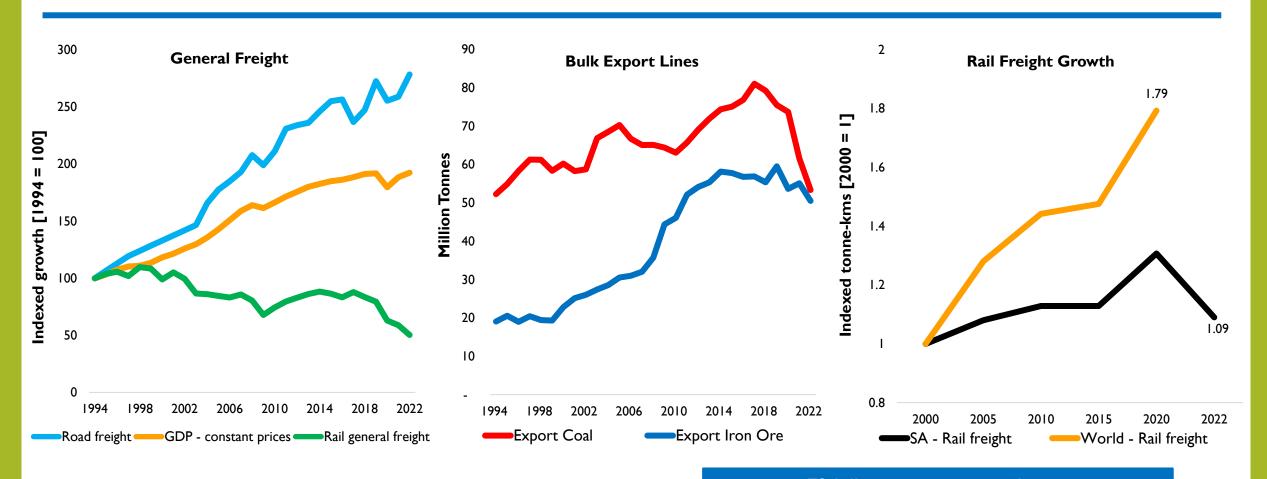
## Low employee productivity for GFB



### Low locomotive productivity for GFB as well



#### The last three decades saw the price of inefficiencies rise to 6% of GDP in 2022



**Source**: Havenga, J.H., Witthoft, I.E. & Simpson, Z.P.. 2022. Macrologistics Instrumentation: Integrated national freight-flow and logistics cost measurement. *Transport Policy*, 124: 106-118, <a href="https://doi.org/10.1016/j.tranpol.2019.10.014">https://doi.org/10.1016/j.tranpol.2019.10.014</a>

- Updated with 2022 data in the GAIN FDM™ and macroeconomic Statistics South Africa data

72 billion missing tonne-kms – meant 2% of GDP lost for GFB and 4% of GDP lost due to missed export opportunities for bulk exports

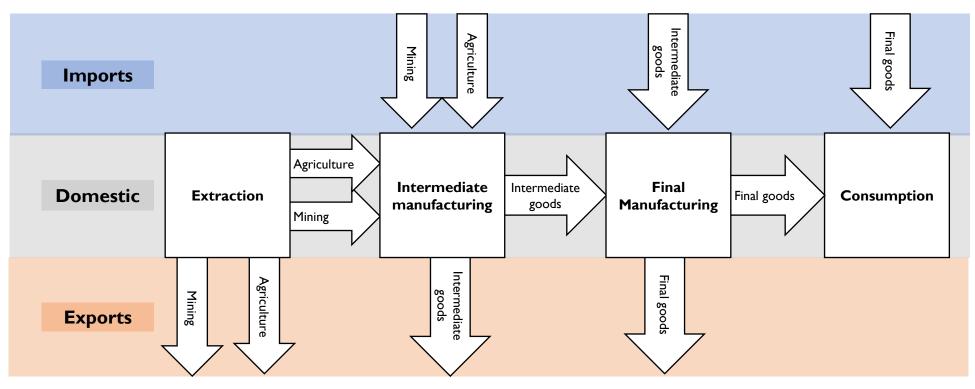


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# Rail market spaces are actually flow market spaces – requiring segmentation



**Source**: GAIN Freight Demand Model™



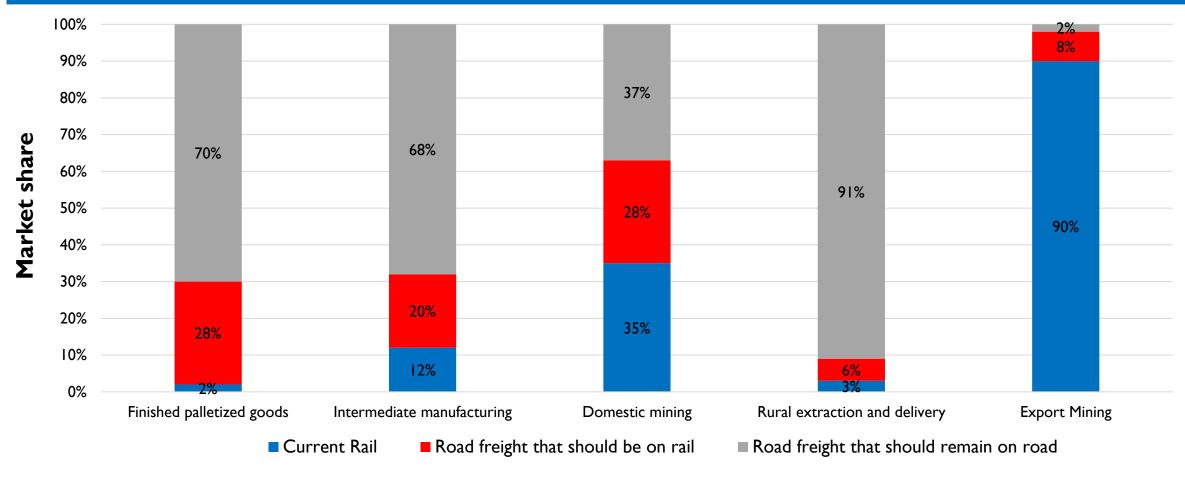
# Rail market spaces are actually flow market spaces – requiring segmentation

Flow typology	Typical South Africa	Rail market share	Rail success/competency	
Large volume export mining	Coal, iron ore and manganese exports	High	✓ ✓ ?	Export Machines
Domestic mining	Local minerals to domestic beneficiation centres	Medium	✓?	
Intermediate manufacturing	Semi-beneficiated commodities to processing	Low	?	
Finished palletized	FMCG and other to and between distribution centres	Non-existing	X	GFB
Rural	Agricultural bulk from rural areas to processing	Low	✓?	

Source: GAIN Freight Demand Model™



## The biggest market share gap is in palletized freight



**Source**: GAIN Freight Demand Model™

One third of palletized freight should be on rail (often dry food), but nothing is. The same is true for industrial commodities where only 10% remain. Domestic and export mining failures are killing our rural roads.



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## Ports is far less of a problem, but

- Certain industries has significant challenges
- Limited investment due to cross-subsidization
- Investment often lower than budget
- Critical project delays
- TPT terminal ownership
  - Car terminals 100%
  - Containers from 97% to 98% decline in efficiency
  - Breakbulk from 78% to 69%
  - Bulk terminals 50%



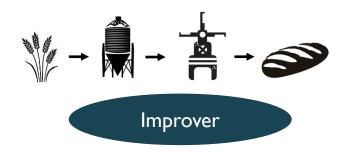
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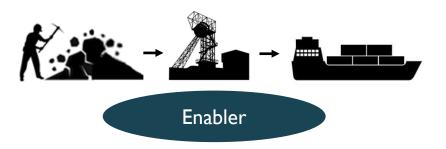


#### People don't want quarter-inch drills, they want quarter-inch holes

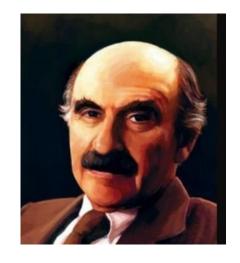
- We used to think the hole is transportation
- Transportation relates to value chains, in which rail can play one of two roles: It can either **improve** it or **enable** it



This value chain exists, but rail can be inserted in silo-to-miller and miller-to-baker flows. If not, it will go on, but rail could be more efficient.



Without efficient guided transport a mass export mining industry is not possible.





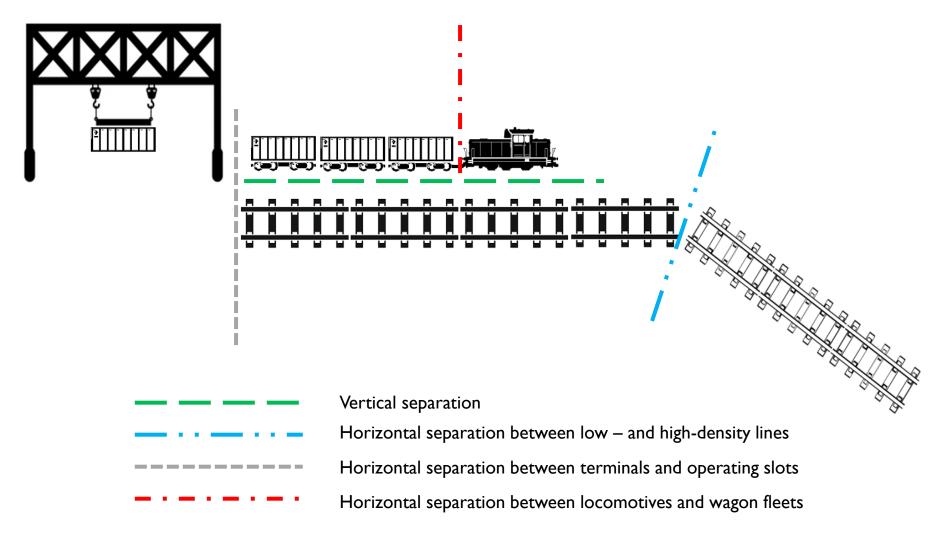


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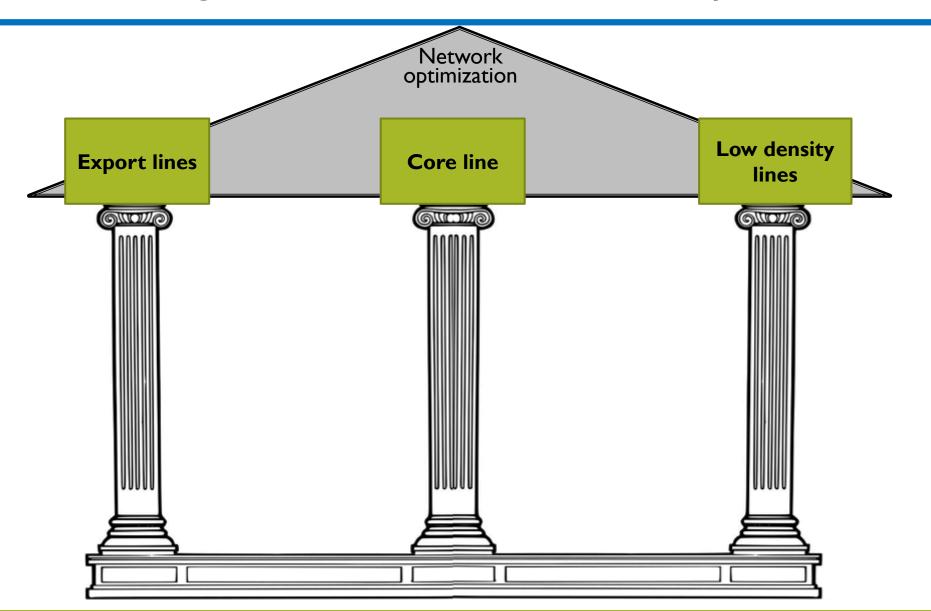


## Separation logic





## All agree that there are three components





# components must now be described in detail. This is an ongoing process in OV – results before the end of May

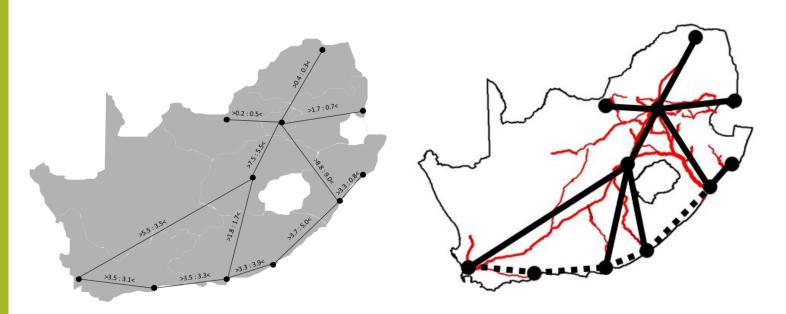
#### Network optimization Low density **Export lines Core line** lines • Low densities will require a • Completely different densities different approach · Often different technologies and Could be: operating philosophies Core network with reasonable Market access densities • Single commodity focus with single end-point – but not always Should be affordable • Socio-economic • Should always be profitable Must enable core flows Future economies Few clients SANRAL comparison Border connections etc Abandon what remains

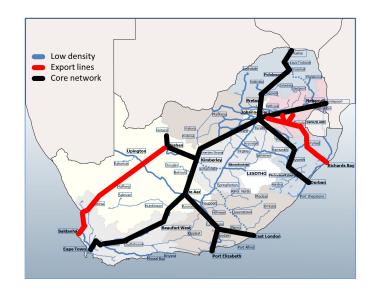
## Ideal network developments over the last few decades

2009 Design

2013 Design

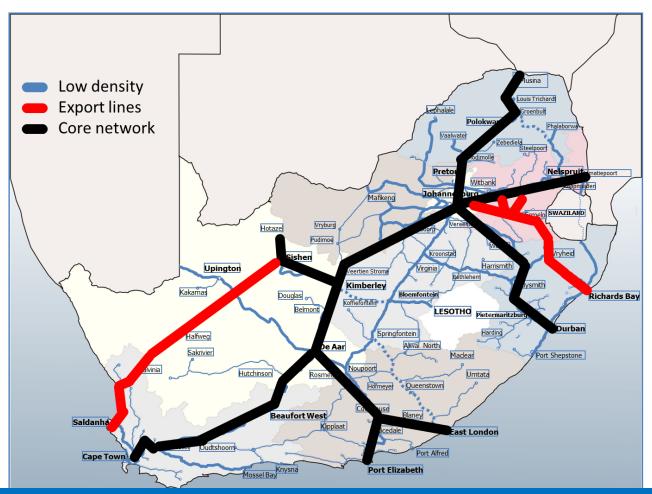
2023 Design





33

#### A possible description of the core network – for discussion purposes



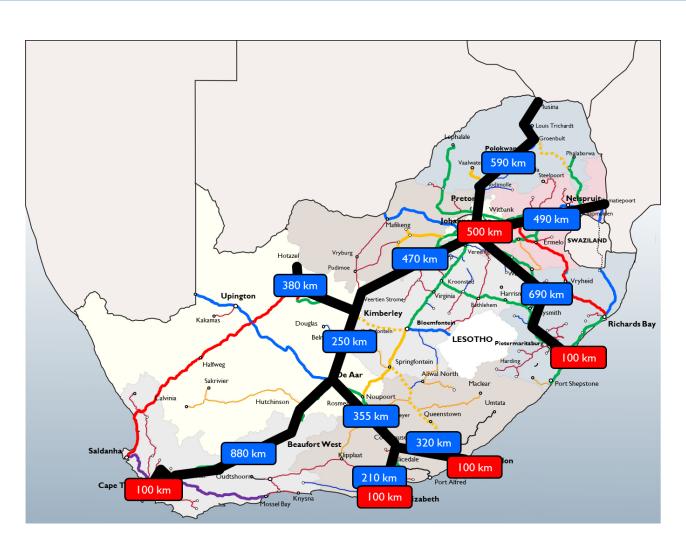
The 2023 example is just an example. There is an ongoing process, but it will probably not be smaller than 5 000 km or more than 7 000. The objective is to reach agreement this month.

#### An example of a reduced core network of just under 5 000 km

4 635 km line

900 km hub and yard

> 5 535 km Total



#### This example can increase freight from 14 to 80 billion tonne-kms

**8** terminals

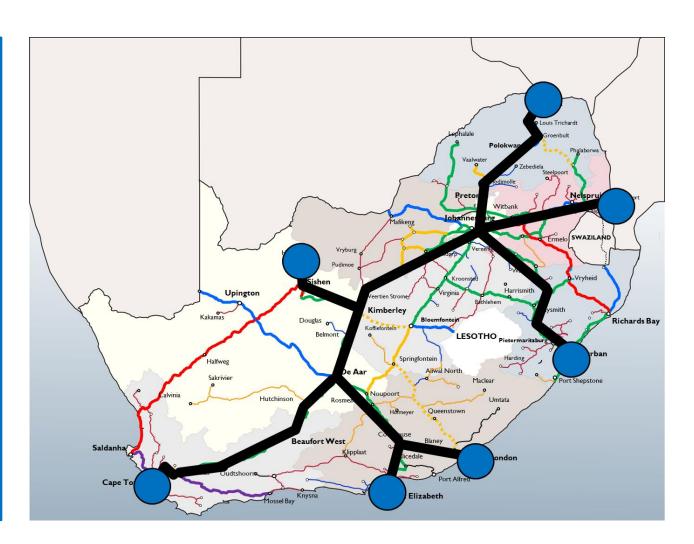
**5 535** kilometre network

13.8 billion current rail tonne-kms

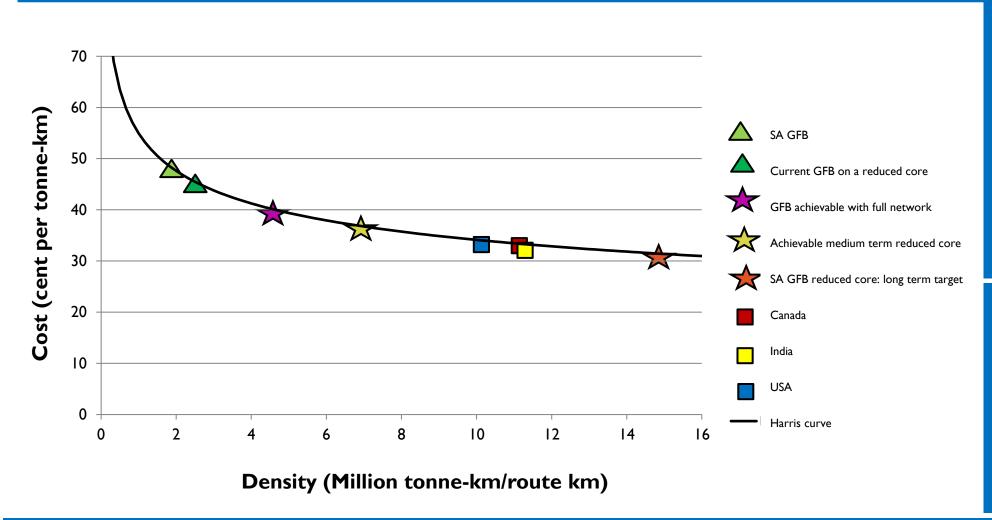
**23.7 billion** additional potential/ missing tonne-kms

37.5 billion tonne-kms

**81.2 billion** future tonne-km



# With respectable density achieved – pointing toward an operating ratio of better than 50%



The new build price tag could be between 0.5 and I trillion rand:

Rehabilitation around R60 billion

Source: F.Q. Callard (2023)

The last red star is the light at the end of the tunnel. We know how to get there

The important output here is to agree on a network and then have the next discussion

#### 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



# Thank you!