COMPETITIVENESS AND SUSTAINABILITY: FOUR SCENARIOS FOR LINE HAUL RAIL IN SOUTH AFRICA

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INTRODUCTION
The Role of Scenarios

- Develop views on significant future outcomes that may fundamentally change an industry
- Enable stakeholders to identify interactions among forces and the outcomes of such interactions
- Reduce the number of forces to those that materially contribute to significant scenarios
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DRIVERS OF SCENARIOS
Research on global data* identified three factors relevant to railway Competitiveness and Sustainability:

- The factor *Positioning Passenger Rail* speaks to high-tech railway solutions.
- The factor *Positioning Freight Rail* speaks to heavy axle load, heavy intermodal, heavy haul, private infrastructure ownership, and competing infrastructure routes.
- Standard gauge track and private ownership underpin both factors.

*Van der Meulen & Möller, World Congress on Railway Research, 2008
The factor *Pursuing Competition*

speaks to infrastructure-operations separation,
train operator diversity, private rolling stock

Private ownership plays a positive role
in facilitating contestable markets

*NB Sustainability in the present context*

is the ability to self-fund asset renewal—
it follows from competitiveness
**Drivers of Scenarios**

*Forces Affecting Competitiveness and Sustainability*

- Two fundamental forces drive SA railway scenarios—
  - First, narrow track gauge impedes inherent railway competitiveness
    - Colonial-standard sunk investments have been expended but self-sustaining asset renewal seems beyond reach
    - Many assets are antiquated and obsolete—some mistakenly believe them to be *underutilized*
  - Second, state ownership impedes private participation, intra-industry competition and industry vitality
Competitiveness: Standard Gauging

- Standard gauge outclasses narrow gauge in supporting railway competitiveness
- South Africa has stretched the Bearing and Guiding genetic technologies to their narrow gauge limits
- Yet it is unable to enter naturally competitive container double stacking (32.4 tonnes/axle) and very high speed intercity (350-380km/h)
- Its railways are relegated to competitive disadvantage until it implements a sufficient standard gauge network
DRIVERS OF SCENARIOS

Competitiveness: Standard Gauging

- The competitive disadvantage is escalating—narrow gauge undertakes insignificant R&D
- South African freight rail is outclassed by heavy axle load standard gauge railways—
  - in domestic market against trucks bred to compete against standard gauge rail
  - in export markets against standard gauge heavy haul railways
Competitiveness: Standard Gauging—a Measuring Scale

- Pushback against standard gauging exists—converting the entire SA network seems unaffordable
- Is it really necessary to convert the entire network—a standard gauge network of \( \leq 6000 \text{km} \) should suffice*
- The critical amount of standard gauging is that which is sufficient to build an aggressively competitive core network
- A simple dichotomous scale will differentiate scenarios—
  
<table>
<thead>
<tr>
<th>None</th>
<th>Sufficient</th>
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EXTENT OF STANDARD GAUGING

*Van der Meulen, SATC, 2010
DRIVERS OF SCENARIOS

Competitiveness: Extent of Standard Gauging
DRIVERS OF SCENARIOS

Competition: Private Participation

- The first scenario driving force, track gauge, relates to railway competitiveness
- Does the second force relate to competition in the market in which railways exercise their competitiveness?
- Even where intra-industry competition is well developed, railways typically face a small number of competitors
- Hence railway customers and prospective customers seek contestability as a proxy for competition, to assure fair pricing
- Competition associates with private participation
Competition: Private Participation—a Measuring Scale

- Private participation can range from 0% (e.g. a state owned railway) to 100% (e.g. a mine-to-port heavy haul railway)
- The critical amount of private participation is that which is sufficient to influence strategic direction
- Once again, a simple dichotomous scale will differentiate scenarios—
  
  None  Sufficient

EXTENT OF PRIVATE PARTICIPATION
Railway privatization has generally improved business efficiency, service performance and markets*

Freight transport is ruthless, low margin, very competitive and not well suited to a government player*

It is difficult to see why some governments continue to see freight transport as a core government function*

Private participation gives greatest benefit to the community when it is accompanied by competition (freight) or periodic contestability (passenger)**

Competition: Private Participation Examples

- Rail originated in the Industrial Revolution by private enterprise

**DRIVERS OF SCENARIOS**

- Single
- Multiple

**NETWORK OPTIONS**

- Parallel Competition

**MARKET STRUCTURE**

- Monopolistic
- Contestable

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Puffing Billy, 1813
**DRIVERS OF SCENARIOS**

**Competition: Private Participation Examples**

- **Multiple**
  - **Parallel Competition**
  - **Monopolistic**
  - **Contestable**

- **Single**

- **Network Options**
  - Forced amalgamation in 1923

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DRIVERS OF SCENARIOS

Competition: Private Participation Examples

NETWORK OPTIONS

Multiple

Single

State intervention

MARKET STRUCTURE

Monopolistic

Contestable

1948 Nationalization, 1963 Beeching Reshaping
**DRIVERS OF SCENARIOS**

**Competition: Private Participation Examples**

- **NETWORK OPTIONS**
  - Multiple
  - Single

- **MARKET STRUCTURE**
  - Monopolistic
  - Contestable

- 1948 Nationalization, 1963 Beeching Reshaping
  - Parallel Competition

- Vertical Integration

- Post 1948—take it or leave it
Competition: Private Participation Examples

Drivers of Scenarios

Market Structure

- Monopolistic
- Contestable

Network Options

- Single
- Multiple

- Mid 1990s—partial competition re-introduced

1948 Nationalization, 1963 Beeching Reshaping
Competition: Private Participation Examples

Drivers of Scenarios

Network Options

- Multiple
- Single

- Reintroduction of parallel competition mooted

Market Structure

- Monopolistic
- Contestable

Re-open Great Central (closed '67)

1948 Nationalization,
1963 Beaching Reshaping

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CILT World, December 2003/January 2004
Competition: Private Participation Examples

**DRIVERS OF SCENARIOS**

**NETWORK OPTIONS**

- Multiple
- Single

- Parallel competition is the rule in North America

**MARKET STRUCTURE**

- Monopolistic
- Contestable

Canadian National and Canadian Pacific, British Columbia, Canada
Cross-breaking the Two Forces Yields Four Scenarios …

**Drivers of Scenarios**

- Sufficient
- None

**Extent of Private Participation**

- Unstable
- Moribund

**Extent of Standard Gauging**

- Renascent
- Pedestrian

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SCENARIO 1: MORIBUND RAILWAYS
SCENARIO 1: MORIBUND RAILWAYS

Description

EXTENT OF PRIVATE PARTICIPATION

None

Sufficient

EXTENT OF STANDARD GAUGING

None

Sufficient
SCENARIO 1: MORIBUND RAILWAYS

Description

- The *do nothing* scenario—present line haul railways in South Africa
- No standard gauge infrastructure, no private participation
- Ermelo-Richards Bay and Sishen-Saldanha heavy hauls have slipped from world leadership, the rest is moribund
- Consider Gautrain the first fruit of SA’s railway renaissance in the present context
**SCENARIO 1: MORIBUND RAILWAYS**

**Constraints—Fundamental**

- Absence of standard gauge prevents SA entering railway market spaces that are renascent in other countries.
- Narrow gauge track is not industry standard—SA cannot access state-of-the-art technology at competitive prices and short lead times.
**SCENARIO 1: MORIBUND RAILWAYS**

**Constraints—Rolling Stock**

- Narrow gauge locomotives attract a price premium and haul smaller loads than standard gauge.
- NG wagon load-to-tare ratios lag standard gauge industry leaders.
- Performing a given task on NG requires more resources than on standard gauge.
- More resources drive up both capital costs and operating costs.

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*Load/Tare 5.86:1*

*TFR Jumbo 4.15:1*
SCENARIO 1: MORIBUND RAILWAYS

Constraints—National Competitiveness

- Narrow-gauge state-owned railways cannot compete on a level playing field against trucks bred to compete with standard gauge railways
- Restricting the axle load of trucks in South Africa so that inherently uncompetitive railways can survive is perverse in extremis
- Narrow gauge railways have done more than enough damage to the South African economy—exacerbating that damage by making trucks less efficient is unconscionable
**SCENARIO 1: MORIBUND RAILWAYS**

**Constraints—High Price, Low Quality**

- Absence of private participation means that railway service cannot admit intra-modal competition.
- Competition reduces price and raises quality.
- The consequences in South Africa of high-priced and low-quality line haul railway service are self-evident.
- Absent intra-modal competition, railway customers and prospective customers have no trustworthy proof that they are not being gouged.
SCENARIO 2: UNSTABLE RAILWAYS
SCENARIO 2: UNSTABLE RAILWAYS

EXTENT OF PRIVATE PARTICIPATION
- Sufficient
- None

EXTENT OF STANDARD GAUGING
- None
- Sufficient
SCENARIO 2: UNSTABLE RAILWAYS

Description 1 of 2

- Liberalized railways allow sufficient private participation to determine strategic direction
- However, absence of standard gauge infrastructure renders them inherently uncompetitive
- Strategy can be viewed ex ante or ex post—actual outcome may differ from initial intent
- The outcome may miss objectives and the process may prove irreversible—hence the name Unstable
SCENARIO 2: UNSTABLE RAILWAYS

Description 2 of 2

- Liberalized narrow gauge railways typically concession existing assets
- A railway concession is a form of PPP—a concessionaire operates the railway while the state retains infrastructure ownership*
- The assets already exist because few new narrow gauge railways have been built for several decades
- They now seek sustaining intervention in the face of aggressive competition from other modes

*World Bank, 2003
**SCENARIO 2: UNSTABLE RAILWAYS**

**Challenges**

- Railway privatization is accepted as the way to go, but substantial evidence suggests that efforts to revitalize narrow gauge railways through concessioning have frequently been less than successful.

- By contrast, several successful concessions over standard- or broad gauge railways in South America have advanced remarkably since the 1990s.
SCENARIO 2: UNSTABLE RAILWAYS

Challenges

❖ Privatization is not a financing solution to investment in low-density freight lines or in most passenger networks*

❖ Only the very busiest railway networks generate sufficient financial returns to attract risk capital in long-term railway infrastructure*

❖ Few private entities have succeeded in making sustainable narrow gauge railways formerly operated by a state—i.e. renewing assets as a going concern from self-generated funds

*World Bank 2006 [1]
**SCENARIO 2: UNSTABLE RAILWAYS**

*Examples and Illustrations—South Africa*

- Orange River Rail Company and Alfred County Railway are South African case studies on operating concessions.
- Revenue underperformance shortened their operating distances salami-style, until revenue ultimately failed to cover unavoidable operating costs.
**SCENARIO 2: UNSTABLE RAILWAYS**

Examples and Illustrations—Kei Rail

- Kei Rail in operation since 2008
- A project of the Eastern Cape Provincial Government
- Passenger traffic is rising
- Stakeholders seem happy
- Does the subsidized operation support long-term stability?

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Examples and Illustrations—Africa

- Vertically integrated concessions are in place in the following countries ...

- Côte d’Ivoire + Burkina Faso
- Cameroon
- Madagascar
- Senegal
- Mali
- Zambia
- Malawi
- Mozambique
- Tanzania
- Kenya
Examples and Illustrations—Africa

- Productive efficiency improved, freight service improved, traffic attracted, passenger service obligations met, but substantial investments in infrastructure were almost fully funded by donors, little private network investment—unsustainable without public capital*

- Challenges in some areas—declining performance and infrastructure, retrenchments; business cooperation, service frequency, and capacity were reduced**

The problem of investment in low density lines remains—Governments will need to be the investor of last resort*

The railway ownership process in New Zealand went full circle, from privatization in 1995 to renationalization in 2008

Maintenance had been deferred for the duration

Renationalization required major new government funding commitment*
SCENARIOS 1 and 2: MORIBUND AND UNSTABLE

From Research*, they Align with the Insecure Railways Cluster

*Van der Meulen & Möller, World Congress on Railway Research, 2008
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SCENARIO 3: PEDESTRIAN RAILWAYS
SCENARIO 3: PEDESTRIAN RAILWAYS

Description

EXTENT OF PRIVATE PARTICIPATION

Sufficient

EXTENT OF STANDARD GAUGING

Pedestrian

None

Sufficient

None

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SCENARIO 3: PEDESTRIAN RAILWAYS

Description

- Sufficient standard gauge infrastructure to support inherently competitive railways, but no private participation.
- A potentially competitive scenario, but the ability of state-owned enterprise to exploit that potential is questionable.
- In South Africa this would be state-funded standard gauging with institutional arrangements intact.
- Absent private sector allocative- and productive efficiency, the business approach is pedestrian rather than vibrant.
SCENARIO 3: PEDESTRIAN RAILWAYS

Examples and Illustrations

- From research*, the Fortuitous Railways cluster identified standard- or broad gauge state-owned railways whose redeeming quality was sufficiently high axle load to support mild competitiveness

- Notwithstanding their fortuitous positioning, and despite their potential to become highly competitive, state ownership desensitized them to opportunities to position themselves competitively

*Van der Meulen & Möller, World Congress on Railway Research, 2008
SCENARIO 3: PEDESTRIAN RAILWAYS

From Research*, they Align with the Fortuitous Railways Cluster

*Van der Meulen & Möller, World Congress on Railway Research, 2008
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SCENARIO 4: RENASCENT RAILWAYS
SCENARIO 4: RENASCENT RAILWAYS

Description

EXTENT OF PRIVATE PARTICIPATION

Sufficient
None

EXTENT OF STANDARD GAUGING

None
Sufficient

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SCENARIO 4: RENASCENT RAILWAYS

Description

- This scenario depicts sufficient standard gauge infrastructure and sufficient private participation to realize rail’s full potential.

- It positions railways to exploit all the competitive strengths that their genetic technologies can leverage from standard gauge track.

- Private participation allows strategic freedom to pursue entrepreneurial objectives.
SCENARIO 4: RENASCENT RAILWAYS

Description

- In developed and developing countries, renascent railways are clawing back market share lost to competitive modes during decades of state ownership.
- They have become respected corporate citizens in the societies they serve.
- The cost to government should be no more than the cost of regulation in return for a tax on the profits.
SCENARIO 4: RENASCENT RAILWAYS

The Railway Renaissance Timeline
SCENARIO 4: RENASCENT RAILWAYS

The Railway Renaissance Timeline

[Diagram showing a timeline from 1800 to 2050 with key milestones and phases labeled as Early Adoption and Maturity.]
SCENARIO 4: RENASCENT RAILWAYS

The Railway Renaissance Timeline—Near Death after WWII
The Railway Renaissance Timeline

SCENARIO 4: RENASCENT RAILWAYS

Terminal Decline
The Railway Renaissance Timeline

**SCENARIO 4: RENASCENT RAILWAYS**

1964: Hi-speed Intercity
1972: Heavy Haul
1980: Heavy Intermodal
Global Spread of the Railway Renaissance

- High-speed Intercity spread from Japan to France, then the rest of western Europe, China, Korea, Taiwan, Turkey, the US, Russia, and now developing countries, including South Africa’s economic peers

- Heavy haul—the International Heavy Haul Association now has nine member countries

- Heavy Intermodal has spread from the US to the NAFTA bloc, then Australia, the Middle East, China, and India
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BRIEF DISCUSSION
This presentation has applied scenario methodology to propose four railway scenarios for South Africa. They provide a framework within which railway stakeholders may contemplate their future. Stakeholders have been sensitized to desirable and undesirable outcomes. They can now adapt their perspectives and behaviour to pursue desirable outcomes and avoid undesirable outcomes.
The Role of Scenarios—Driving Future Investment

- State railways are a state creation—only the state can reposition railways for competitiveness and sustainability.
- When fundamental railway industry reform is indicated, and investment backlog must concurrently catch up the state dare not abdicate its responsibilities to the private sector.
- Abdication will play into the Unstable Scenario, rather than address competitiveness and sustainability.
- Careful integration, sequencing of interventions is important.
Moving directly from Moribund to Renascent requires linking standard gauging to liberalization.

A precedent exists—Spain* and Portugal are now using infrastructure PPPs to design, build and fund new standard gauge high speed lines.

*Spain is converting its railway network from broad gauge to standard gauge.
South Africa’s High Challenge

- Some countries have changed track gauge while others have liberalized their railways
- Spain appears to be the only country to date that changed track gauge and liberalized concurrently
- The railways of Southeast Asia seem set to follow a similar development trajectory
- If and when Kenya’s standard gauge railway takes off it is set to combine gauge change and liberalization
- Standard gauge liberalized railways are the way to go—is South Africa ready to rise to the challenge?
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CONCLUSIONS
Integration and Sequencing are Critical

- Even if a minimum rail network were standard gauged, substantial capital investment would be required.
- If privatization leads, reluctance to invest in inherently uncompetitive assets could stall standard gauging and drive the end state into the Unstable Scenario.
- If standard gauging leads, dependence on public funding could mire the reform process in the Pedestrian Scenario.
Getting Traction

- South Africa needs a process to engage all railway stakeholders on standard gauging and liberalization.
- Some stakeholders prefer the Moribund Scenario—privatization of any stripe seems anathema to organized labour.
- They fear job losses—that might happen within affected unions.
- However, continued railway decline could in aggregate destroy more jobs at national level.
Support for Economic Growth

- South Africa has begun to appreciate that its economic growth rate is lower than many other developing countries.
- Many of its income-per-capita peers are stimulating railway renaissance.
- They deploy inherently competitive railways to support their high economic growth.
- South Africa will fall behind its present economic peers if it procrastinates on raising railway competitiveness and on liberalizing its railway ownership.
**Challenge and Opportunity**

- Narrow gauge railways around the world are not inherently competitive.

- South Africa should therefore contemplate the Unstable Scenario with caution—it can miss expectations and prove irreversible.

- It should also be wary of the Pedestrian Scenario—railways may fail before the intervention is complete.

- SA faces its biggest railway opportunity since inception—will it make the call to reform its railway industry to be competitive and sustainable?
Compelling insight from original research
REFERENCES


