Freight Logistics Flow Analysis
SACN Urban Conference
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Presented by
Mr. Bongisizwe Mpondo
Managing Director:
SAFIRI (Pty) Ltd
Content Outline

✓ About SAFIRI
✓ Freight Planning in South Africa
✓ NLTA, 2009
✓ SACN Freight Planning Guide
✓ Freight Flow Analysis
✓ Freight Data Challenges
A dynamic, black owned and managed Transport & Sustainable Development Professional Services company.
Freight Planning in South Africa
Freight Planning in South Africa

- In the past, Transport Planning has been biased towards:
  - Public Transport Planning,
  - Infrastructure Planning,
  - Road Traffic Management,
- More evidence of this in that:
  - Organisational structures of Transport Departments in the Provinces and Local Authorities lack a Freight focus,
  - Absence of Freight issues in the ITP’s,
  - Logistics courses focus mostly on supply chain issues,
  - Transport consulting companies generally do not focus on Freight Planning.
Freight Planning in South Africa

Recent Positive Developments:
• Moving South Africa Strategy, 1999
• National Freight Logistics Strategy, 2005
• Provincial Freight Frameworks, Strategies & Plans
  – Gauteng
  – Kwa Zulu Natal
  – Free State
  – Western Cape
  – Eastern Cape
• Soon to be developed…

The National Freight Master Plan
Freight transport

37. (1) Subject to requirements prescribed by the Minister under section 36(2), planning authorities must develop a freight transport strategy, with due regard to national and provincial policy, covering the transporting of goods to, from and through the area by road, taking into account—

(a) the movement of goods to, from, and through the area by rail or pipeline; and

(b) the movement of goods to and from ports or airports.

(2) The strategy contemplated in subsection (1) must identify routes for moving goods so as to promote their seamless movement and to avoid conflict with road traffic.

(3) The strategy must also include a plan for the movement of dangerous substances contemplated in section 2(1) of the Hazardous Substances Act, 1973 (Act No. 15 of 1973), by road along designated routes in accordance with the general strategy or plan provided for in the relevant Provincial Land Transport Framework.

(4) A person must not transport dangerous substances in the area of a planning authority except on a route so designated and indicated in an integrated transport plan, where such a route has been determined and published.

(5) Any person who contravenes or fails to comply with subsection (4) is guilty of an offence.

(6) By virtue of the deregulation of the road freight industry effected by the Transport Deregulation Act, 1988 (Act No. 80 of 1988), planning authorities must collaborate with the MEC and registering authorities contemplated in the National Road Traffic Act, to promote effective regulation of freight operations by means of the operator card system provided for in Chapter VI of the National Road Traffic Act, to prevent damage to the road system and to achieve the other objects of this Act.
Framework Inputs

- Space Economy
- National Freight Strategy
- Urban Development Plans
- Other Initiatives – ASGISA, GEAR, MSA, etc.
SACN CDS Framework

Productivity

Good Governance

Inclusivity

Sustainability
STRATEGIC ELEMENTS

Productivity
- Provide lasting returns on public investment;
- Support economic development initiatives;
- Develop inclusive and efficient Transportation Management Systems, etc.-Job creation & competitiveness of economy;
- Excellent Service Delivery
- Eliminate Poverty

Inclusivity
- Institutional Support; Interjurisdictional Advocacy & Planning;
  - Integrative Community Planning and Advocacy
- Funding Matrix (Well-established Financial resources and access to freight infrastructure development);
- Data Repository and Information Sharing; etc.

Sustainability
- Developments aligned to social and economic requirements and equity;
- Preservation of Environment via responsible development management Policies and Design principles;
- Sustain Safety and Security Measures;
  - Preserve Communities & Culture;
  - Promote Public Education (perception)

Good Governance
- Encourage integrated, secure IT platforms;
  - Promote quality infrastructure by balancing equitable distribution to inform "performance based land uses"
- Develop and Maintain Terms of Reference for Freight Logistics Committee/Forums
# Freight Typology Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Primary</th>
<th>Corridor</th>
<th>Rural</th>
<th>Metropolitan</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Traffic type</strong></td>
<td>Bulk (rail only, mainly export coal &amp; iron ore)</td>
<td>Mostly manufacturing, some agriculture</td>
<td>Mostly agriculture</td>
<td>Mostly final delivery</td>
</tr>
<tr>
<td><strong>Distance</strong></td>
<td>Long</td>
<td>Long &amp; short</td>
<td>Medium &amp; short</td>
<td>Short</td>
</tr>
<tr>
<td><strong>OD’s</strong></td>
<td>Few, one-directional</td>
<td>Long distance, few OD’s; short distance: many OD’s</td>
<td>Many</td>
<td>Many</td>
</tr>
<tr>
<td><strong>Major challenge</strong></td>
<td>Global competitiveness</td>
<td>Spatial organisation, efficiency</td>
<td>Development</td>
<td>Congestion alleviation</td>
</tr>
<tr>
<td><strong>Possible logistics approach</strong></td>
<td>Ring-fenced, bulk rail systems</td>
<td>Intermodal solutions</td>
<td>Effective road feeder system</td>
<td>World-class commuter systems amidst effective freight delivery</td>
</tr>
</tbody>
</table>

Source: Havenga (2007)
# Freight Logistics Planning Process

<table>
<thead>
<tr>
<th>Phases</th>
<th>Process Methodology</th>
<th>Activity</th>
</tr>
</thead>
</table>
| **Phase I** | Vision and Mission | • Define and set up the following:  
  - Define and appoint a freight champion or sponsor  
  - Freight Vision and Mission based on the National Freight Logistics Strategy (NFLS)  
  - Freight Goals and Objectives  
  - Establish Technical Project Team to assist in data sourcing and Technical Reviews, etc.  
  - Establish a Freight Planning Focus Group to guide and review data and reports during project process  
  - Define a Regional and City Freight Profile |
| **Phase II** | Assessment and Approach | • Define project approach and commodities:  
  - Freight Generation Factors (Is there a freight planning typology aligned to commodities?)  
  - Freight “push”- “pull” factors (What spatial interaction modeling can be determined by existing or projected “surplus & deficits” per commodity?)  
  - Define Transportation Elements as influenced by existing Policies (such as the City Development Strategy, etc.)  
  - Existing literature (policies, strategies, legislation, studies, etc.)  
  - Develop a Detailed Project Work Plan based on the discussions created by previous activities |
| **Phase III** | Data Collection and Analysis | • Develop freight system needs & weaknesses:  
  - Identity via stakeholder engagements “weaknesses and needs”  
  - Analyse local Socio-economic Data (these variables include population data, employment data trends in freight-related activities and opportunities, etc.)  
  - Quantify Logistics Industries and Operational requirements  
  - Define commodity flows and O-D trends  
  - Identify existing freight system and forecast of specific commodities (flow) moving along system  
  - ID specific problems and opportunities along freight network and operations. Etc.  
  - Analyse all data and present conclusions for review to the Freight project Technical Review Team & Freight Forum and Focus groups |
| **Phase IV** | Plan Preparation | • Identify and prioritize initiatives:  
  - Provide Analytical and negative impacts of interventions, their sustainability, etc  
  - Establish performance measures; project evaluation criteria, etc.  
  - Funding Models & Mechanisms, Structures and Accountability.  
  - Prioritize Initiatives.  
  - Perform cost benefit analysis-economic impact analysis to list and define a 5-10-20 development plan |
| **Phase V** | Implementation and Evaluation | • Define performance indicators:  
  - Develop freight-specific project evaluation criteria  
  - Integrate Transportation (Freight Logistics Planning) into Spatial and Urban / Development Plans (TPPs & IDPs)  
  - Develop project delivery platforms through freight policy and planning activities that support execution (administrative, financial, political, etc.)  
  - Promote comprehensive freight policies, planning and programming and integrate into “overall transportation program capital investment strategy”  
  - Ensure implementation of Funding Mechanism for all critical projects  
  - Perform overall project evaluation as part of Program implementation |
| **Phase VI** | Monitoring and Evaluation | • Interrogate performance measures & assumptions:  
  - Post-auditing of project/initiatives, (Intra and Inter-Audits)  
  - Develop a continuous loop for updating, amending, upgrading.  
  - Perform and publish a Project Impact Assessment Report  
  - Conduct & Publish Stakeholder feedback and performance measure assessment Reports.  
  - Present and Publish Final Project Analysis Report |
Freight Flow Analysis
Freight Data Uses

- Statistics in Transport Planning are an absolute necessity!!!
- Recent developments in the Freight arena highlight the importance of the National Freight Databank exercise
- Freight Databank could be utilised for….
  - Freight Movement Trends Assessment
    - Constraint Mapping
    - Forward Planning
  - Infrastructure Planning
  - Infrastructure Maintenance Planning
  - Informing Policy choices
  - Regulation of operators
  - Improving Supply Chain Efficiencies (Industry and firm level)
Location of Economic Zones
## Surface Freight Data

<table>
<thead>
<tr>
<th>Year</th>
<th>Road Total</th>
<th>Rail (excluding export machines)</th>
<th>Rail (export machines)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993</td>
<td>692</td>
<td>107</td>
<td>72</td>
<td>870</td>
</tr>
<tr>
<td>1997</td>
<td>848</td>
<td>120</td>
<td>85</td>
<td>1053</td>
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<tr>
<td>2003</td>
<td>1026</td>
<td>105</td>
<td>94</td>
<td>1225</td>
</tr>
<tr>
<td>2004</td>
<td>1105</td>
<td>106</td>
<td>96</td>
<td>1307</td>
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</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>Road Total</th>
<th>Rail (excluding export machines)</th>
<th>Rail (export machines)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993</td>
<td>79%</td>
<td>12%</td>
<td>8%</td>
</tr>
<tr>
<td>1997</td>
<td>81%</td>
<td>11%</td>
<td>8%</td>
</tr>
<tr>
<td>2003</td>
<td>84%</td>
<td>9%</td>
<td>8%</td>
</tr>
<tr>
<td>2004</td>
<td>85%</td>
<td>8%</td>
<td>7%</td>
</tr>
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### Surface Freight Data (Cont...)

<table>
<thead>
<tr>
<th>Year</th>
<th>Rail</th>
<th>Road</th>
</tr>
</thead>
<tbody>
<tr>
<td>1957-Verburg</td>
<td>29%</td>
<td>71%</td>
</tr>
<tr>
<td>1971-Smith</td>
<td>16%</td>
<td>84%</td>
</tr>
<tr>
<td>1985-Hamilton</td>
<td>25%</td>
<td>75%</td>
</tr>
<tr>
<td>1985-Pretorius</td>
<td>21%</td>
<td>79%</td>
</tr>
<tr>
<td>1986-Pretorius</td>
<td>20%</td>
<td>80%</td>
</tr>
<tr>
<td>1987-Pretorius</td>
<td>21%</td>
<td>79%</td>
</tr>
<tr>
<td>1988-Pretorius</td>
<td>22%</td>
<td>78%</td>
</tr>
<tr>
<td>1989-Pretorius</td>
<td>23%</td>
<td>77%</td>
</tr>
<tr>
<td>1990-Pretorius</td>
<td>25%</td>
<td>75%</td>
</tr>
<tr>
<td>1993-NFFM</td>
<td>20%</td>
<td>80%</td>
</tr>
<tr>
<td>1997-NFFM</td>
<td>19%</td>
<td>81%</td>
</tr>
<tr>
<td>2003-NFFM</td>
<td>16%</td>
<td>84%</td>
</tr>
<tr>
<td>2004-NFFM</td>
<td>15%</td>
<td>85%</td>
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</table>
Distribution of Freight

Freight typologies (ton-kilometres and percentage share)

- **Corridor** – Mostly manufacturing, some agriculture
  - Long & Short - ODs
- **Primary** – Bulk (Rail only, mainly export coal & iron ore)
  - Long - ODs
- **Rural** – Mostly agriculture
  - Medium & Short - Many ODs
- **Metropolitan** – Mostly final delivery
  - Short – Many ODs
EC National Road Freight Volumes

Road Freight Flow Analysis

Freight Corridor | Total Tonnage
--- | ---
N2 | 17449650
N6 | 5376930
N9 | 605625
N10 | 5312160

Legend:
- National Roads
- Provincial Roads
- National Freight
- Intermodal Point
- Special Development Initiative (SDI)
- Fish River SDI
- Wild Coast Initiative

Scale: 20 km
Rail Freight Volumes
Maritime Cargo

183.3 million tons of cargo handled in 2007
Maritime Cargo (Cont...)

TEU's HANDLED PER PORT: 2007

- Richards Bay
- Durban
- East London
- Port Elizabeth
- Cape Town

- Imports
- Exports
- Transhipments
- Coastwise
Air Cargo, 2006

(Source: IATA World Air Transport Statistics)

Note: Intra-region flow percentages given in brackets next to region name
Air Cargo, 2006

South Africa, 26%

Egypt, 15%

Algeria, 9%

Nigeria, 7%

Morocco, 6%

Tunisia, 4%

Other, 23%

$682 billion, 1996 U.S. dollars
To determine market share and demand it is important to understand the existing airfreight throughput by various airports in the country. Predictably, most air logistics markets have developed primarily around airports with OR Tambo having the biggest concentration. This is based on the fact that it is an area where the highest carrying long-haul belly-hold capacity is offered; economies of scale are best achieved.
Air Cargo

- O.R. Tambo airport handles 7 times more air cargo than Cape Town International Airport
- Cape Town International Airport and Durban follow ORTIA in terms of cargo handled
Freight Databank Shortcomings

• No single comprehensive database that incorporates information from all available sources
• Data collected at different times
• Where data exists outside of the Freight Data Bank, the format used to compile the data is different
• Commodity classifications of different data sources are different
• Limitations of the road surveys as demonstrated by the high component of Sail/Tarpaulin & other classification
• No available and reliable freight flow forecasts
Freight Databank Shortcomings

• Inconsistency with the formatting and content in the different transport modes,
• Maps not clearly presented,
• Forecasting method did not take into account trends within the weeks and months,
• In some provinces there were no 24hr surveys,
• Packaging and presentation of information not easy to navigate,
  – Headings not clearly structured
  – Location of statistics information as a stand alone posed a challenge
  – Some sections have no statistics
• No distinction between provincial and national flows,
• Integrity of information sources used e.g. Wikipedia
Questions & Discussions?