Supply Chain Management: trends in logistics and transportation

P.P. Sengupta
Chief General Manager (MM)
Coal India Ltd
Evolution of Materials management

- 1960s- Stores and Purchase
- 1980s- Materials Management
- 1990s- Supply Chain Management
- 2000s- Collaborative SCM
Two classical questions

- When to order?
- How much to order?
A Chain Reaction
A Macdonald Burger

- Sesame seeds from Ghaziabad
- Buns from Ludhiana
- Vegetarian sauce from Phillaur
- Cheese from Baramati
- Lettuce from Ootacamund
- French fries imported from New Zealand.
A Modern US Car

- Designed and styled in Italy
- Engine from Japan
- Electrical system from Germany
- Wheels and tyres from Mexico
- Fasteners from India
Optimization

- Optimization in internal processes is Materials Management.
- Optimization of the entire supply chain from the supplier’s supplier to the customer’s customer is supply chain management.
Two Major Events That Shaped SCM

- Mind-blowing advancement in Information Technology and advent of Internet
- India’s economic reform rolled out in June 1991, followed by its membership of WTO in December 30, 1994
IT will change everything ...

“IT will transform every institution in the world. It will create winners and losers. It will change the way we do business, the way we teach our children, communicate and interact as individuals....”.—Lou Gerstner
Why IT is important?

Amazing speed of advancement of technology

- Computer technology: 5 GHz chips
- Telecommunication: 3.2 terabytes per second
Two Paradigms

- Death of Distance
- Anytime, Anywhere
Why IT is important?

Cost of technology falling down at a break-neck speed

- The “million” factor in every 20 years
Cost of technology falling down

- Cost of transmitting a “Bit” over a KM of fiber optic cable fell by one third in last 3 years
- Telecommunication, even across Atlantic will be almost free
Two Laws of IT

- Moore’s law: says that computing speed will double and prices will halve every 18 months.
- Golde’s law: says that bandwidth will triple every year for next 25 years.
If Automobile sector advanced as fast as the IT sector ....

A Rolls Royce car would probably be available to us at a cost of US $ 1.75 and it would have run nearly five million Kms per liter of petrol.
Irrefutable power of IT

- “I'm going to make you an offer you can't refuse” -- Marlon Brando as Don Vito Corleon in the film *Godfather*

- “Using technology or not will make a deadly difference to your organization, your business and your profession” -- Bill Gates
Supply Chain at HULL

- If a consumer buys a tube of toothpaste in a village in Orissa, within 24 hours, 10 gm of vegetable oil is added to the order basket of its supplier in Taiwan
Connected Supply Chain in Automobile Industry

As soon as a customer places an order for a leather seat cover, a cow somewhere becomes nervous!
Supply Chain Management in Amul

- Six million litres of milk per day from about 10,675 separate village co-operative societies
- Storing, processing and producing of milk products at the 12 district dairy societies
- 3,000 Automatic Milk Collection System Units (AMCUS) at village societies
"Amul is not a food company, it is an IT company in the food business"

- B M Vyas, Chief Executive Officer
Supply Chain Management in Amul

- 10 million payments daily
- Rs 17 crores paid in cash, everyday
- More than 5,000 trucks move the milk from the villages to 200 dairy processing plants twice a day
- “Just-in-Time” supply chain management with Six Sigma accuracy.
Trip of a Bottle of Listerine Through the Supply Chain

- Our journey begins in Australia where a farmer grows eucalyptus for eucalyptol, the oil found in its leaves.
- Warner-Lambert Co or WL, the manufacturer of Listerine, buy the oil from an Australian processing company.
Trip of a Bottle of Listerine Through the Supply Chain

- Natural gas produced in Saudi Arabia is converted to ethanol. The ethanol is transported to WL's plant at Pennsylvania.
- Ethanol, eucalyptol and other ingredients are blended to manufacture the Listerine, which flows through pipes, which dispense the product into bottles.
Trip of a Bottle of Listerine Through the Supply Chain

- The bottles are capped, labeled and placed in corrugated shipping boxes.
- Bottles travels on a conveyor belt to the palletizer, which organizes them into 100-case pallets. Drivers forklift the pallets to the distribution center located in Pennsylvania.
Trip of a Bottle of Listerine Through the Supply Chain

- WL receives an order from CVS, the drugstore chain major, for 20 pallets of 500-milliliter bottles of Listerine.
- The order is automatically screened and passed on to WL's SAP system.
- SAP determines how much of it is already in stock and how much needs to be manufactured.
Trip of a Bottle of Listerine Through the Supply Chain

- WL forklift operators use computers attached to their forklifts and handheld scanners, with instruction screens linked to computer system to learn what they need to pick up, where it's located and where to transport it.
Trip of a Bottle of Listerine Through the Supply Chain

- When the lift operators go to the appropriate pallet, they scan the bar code with the handheld device so that the software can confirm if it is the correct product.

- They next bring the pallet to the shipping floor and use the onboard computer system to inform the computer that the job has been finished.
The load appears at the CVS warehouse. As soon as the truck is unloaded, the CVS warehouse generates an electronic receiving notice.

CVS store managers represent the next piece of the supply chain. A manager walks up and down the aisles punches an order for three more into his handheld device.
Trip of a Bottle of Listerine Through the Supply Chain

- CVS has a wireless network and handheld computers to automate ordering.
- Store managers do not manually figure out how much of an item to restock because the handheld will do all the calculations.
Trip of a Bottle of Listerine Through the Supply Chain

- Each morning CVS warehouse employees receive computerized instructions about which pallets to bring to the picking line.
- Warehouse employees break apart the pallets, pick individual items and load them into totes destined for specific stores.
Trip of a Bottle of Listerine Through the Supply Chain

- CVS truck appears at the store with his shipment. The tote is unloaded and there is the bottle of Listerine that originated in the Australian eucalyptus grove.

- A man walks into the store to pick up a bottle of Listerine. His purchase is recorded by the cash register and sent to the system for future forecasting.
Why SCM is Important?

- India’s star performers like Century Enka, SKF bearings, Ballarpur Industries, GNFC, HDC, JK Synthetics, Bombay Dyeing, Crompton Greaves failed due to inability to change themselves on face of fast changing technology.
Inventory: A Malady

Materials Management tries to optimize the inventory holding by balancing the two costs namely

- (a) Cost of having an item when not required and
- (b) Cost of not having an item when required
Inventory: A Malady

- Supply Chain Management tries synchronizing the successive activities in the entire chain so that there is no inventory at all at any stage.
Inventory: A Malady

○ “All muscle, no fat”

- Slogan of today’s lean supply chain management.
Competition : New Look

- Coming from totally unrelated sectors.
- Aviation Industry is competing with the video conferencing industry.
- Insurance industry is competing with Banking industry.
Competition : New Look

- Competition is not between one company and another company.
- It is the supply chain of a company vs. the supply chain of another company
Key Trends for Future

- Artificial intelligence will play a central role in all supply chain activities.
- Supply chains will be branded and marketed.
- Logistics operations will be paperless and "near laborless."
What You Will Do in 2030

- Strategic, integrated supply chain management,
- "Virtual plant" management
- Continuous product and process improvement,
- Cost and profitability targeting,
- New product and supplier development
What You Will Not Do in 2030

- Routine purchases
- Signing purchase orders
- "Fire fighting,
- "Inputting data
- Dealing with small-value or repeat purchase
Two Things That are Sure to Happen

- Supply chain management will be a mission critical activity in your organisation
- Technology that will be used in SCM will make today's supply chain Management systems look like stone-age.
Logistics scenario : India

- Railways
- Ports
- Roadways
Indian Railways

Roles and Status
How railways stack up

- Extremely cost-effective for transporting large volumes over long distance.
- No delay at inter-state borders.
- Very reliable under a given set of conditions.

Handicaps:
- Incapacity in respect of small lot-sizes.
- Door-to-door service.
- Pre- and post-transport services.
- Relatively inflexible and impersonal service.
- Limited presence in the entire value chain.
## Railways at a Glance

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Route Kilometers</td>
<td>63327</td>
<td>Locomotives</td>
<td>8153</td>
</tr>
<tr>
<td>Track Kilometers</td>
<td>109,996</td>
<td>Coaching Vehicles</td>
<td>51355</td>
</tr>
<tr>
<td>Electrified Route Kilometres</td>
<td>17788</td>
<td>Wagons</td>
<td>207719</td>
</tr>
<tr>
<td>Stations</td>
<td>6909</td>
<td>Originating Freight</td>
<td>727.8 million</td>
</tr>
<tr>
<td>Staff</td>
<td>1.41 million</td>
<td>Tonne Kilometers</td>
<td>481.0 billion</td>
</tr>
<tr>
<td>Revenue</td>
<td>Rs62732 crores(14 billion US$)</td>
<td>Originating Passengers</td>
<td>6.22 billion</td>
</tr>
<tr>
<td>Operating Ratio</td>
<td>78.7 %</td>
<td>Passenger Kilometers</td>
<td>694.76 billion</td>
</tr>
</tbody>
</table>
- High Density Corridor (Golden Quadrilateral + Diagonals) 16% of route Km carries 52% of passenger & 58% of freight
Basic facts

- Predominantly 1676mm gauge (BG) - 78.7%
- 63,327 Route Km - 17351 km double/multiple track.
- 17,778 Electrified Route Km (27% of total route km).
- 2 Passenger Car Manufacturing Units, 2 Locomotive Manufacturing Units, 1 Wheel and Axle Plant and 1 Locomotive Rebuilding Plant
- 1.4 Million Employees.
- Intensive in both freight and passenger traffic.
- Common infrastructure for freight and passenger.
- Third largest in the world in terms of network and freight carried, largest in terms of passengers carried.
- High Density Corridor (Golden Quadrilateral + Diagonals) 16% of route Km carries 52% of passenger & 58% of freight.
Basic facts

- Lifeline of the national transport infrastructure along with ports and roads.
- Handles nearly 40% of the freight and 20% of passenger traffic.
- Share higher than 60% for most of the bulk movement for core sectors and long-distance passengers.
- Largest single employer (1.41 million) and even larger number of indirect jobs.
- Efficiency of rail transport a critical determinant of national competitiveness in the era of globalization.
How it is faring

![Bar chart showing annual percentage growth for passenger and freight transport from 1990-91 to 2003-04 and 2004-05 to 2007-08.](chart.png)

- **Passenger**:
  - 1990-91-2003-04: [Actual Value]
  - 2004-05-2007-08: [Actual Value]

- **Freight**:
  - 1990-91-2003-04: [Actual Value]
  - 2004-05-2007-08: [Actual Value]
Outlook for future

- Freight traffic projected to grow at 8-10% p.a.
- Passenger traffic to grow at 6-7% p.a.
- Projections for 2011-12:
  - 1100 million tonnes of Originating Freight.
  - 705 billion tonne kilometres.
  - 8400 million originating passengers.
  - 880 billion PKMs.
- Other important targets for 2011-12:
  - port traffic- 300MT.
  - steel traffic-200MT.
  - cement-200 MT.
  - container-100 MT.
What is needed

- Efficient Use of Assets necessary, but not enough.
- Capacity augmentation to stay ahead of requirement.
- Removal of Bottlenecks.
- Trunk routes, feeder routes and terminal capacity.
- Modernization and upgradation of equipment—both fixed infrastructure & rolling-stock, both hardware and software aspects
Need of the hour

- Doubling and Port Connectivity – 6000 Kms.
- Dedicated Freight Corridors-11,500 Kms.
- Feeder Routes of DFC- 15,000 Kms.
- Gauge Conversion- 12,000 Kms.
- Asset Renewal/Upgradation—all High-density Routes
- Modernization of Passenger & Freight Terminals
What has been done

- Axle Load increased from 20.3 T to 22.9 T on mineral routes in 2005.
- Universalisation of CC+6+2 tonnes (22.32t).
- 26000 route kms upgraded to CC+8+2 (23 tonne).
- 5000 route kms upgraded to 25 tonnes.
- Train loads increased to over 5000 T
- Planning for 25 Ton axle load on DFC and its feeder lines
- 32.5 tare axle load for future
Sea ports in Eastern India

Current scenario
Ports on the Eastern Seaboard

Major Ports
- Kolkata/Haldia
- Paradip
- Visakhapatnam
- Ennore
- Chennai
- Tuticorin

Large Non Major Ports
Gangavaram
Kakinada
Krishnapatnam
Ports in West Bengal

Major Ports
- Haldia - multi purpose
- Kolkata - multi purpose

Non Major Ports/Projects
- Kulpi,
- Deep water port in Hooghly river for Nayachar Refinery
## Ports in Orissa

### Major Ports
- **Paradip**: Ore, Coal

### Minor Ports
<table>
<thead>
<tr>
<th>Port</th>
<th>Developer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gopalpur</td>
<td>Orissa Stevedores</td>
</tr>
<tr>
<td>Dhamara</td>
<td>Tisco, L&amp;T</td>
</tr>
<tr>
<td>Kirtania</td>
<td>Chennai Port Development Ltd.</td>
</tr>
<tr>
<td>Inchuri</td>
<td>DRDO has objected to this site</td>
</tr>
<tr>
<td>Chudamani</td>
<td>Birla plans to develop this port</td>
</tr>
<tr>
<td>Astarang</td>
<td>Navayuga still interested</td>
</tr>
<tr>
<td>Bahuda</td>
<td>Goodearth Maritime</td>
</tr>
<tr>
<td>Jatadhari</td>
<td>POSCO</td>
</tr>
<tr>
<td>Bhabalpur</td>
<td>no development</td>
</tr>
<tr>
<td>Baiharchandi</td>
<td>no developments</td>
</tr>
<tr>
<td>Chandipur</td>
<td>awaiting investment</td>
</tr>
<tr>
<td>Palur</td>
<td>no proposal yet</td>
</tr>
<tr>
<td>Barunei Muhan</td>
<td>no proposal yet</td>
</tr>
</tbody>
</table>

P.P.Sengupta
Ports in Andhra Pradesh

Major and large volume ports

Visakhapatnam—multi-purpose
(equipped container terminal)

Gangavaram — coal, Iron Ore
Kakinada — multi-purpose berth
Krishnapatnam—Ore, coal handling

Other Ports Promoter

Machilipatnam — Maytas, Nagarjuna
Rawa — SBM of Cairn Energy
Vodarevu — Ship breaking industry

Bhavanapadu, Nizampatnam—fishing harbours
Kalingapatnam, Bhimunipatnam, Muralammnapalem, Narsapur — can be developed
### Ports in Tamilnadu

**Major Ports**
- Chennai – various
- Ennore - various
- Tuticorin – Various

**Minor Ports**

<table>
<thead>
<tr>
<th>Minor Port</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ennore Minor Port</td>
<td>Corommandel Fertilisers Ltd. For Liquid Ammonia</td>
</tr>
<tr>
<td>Cuddalore</td>
<td>lighterage port, used by Tamilnadu Petroproducts Ltd. For Propylene</td>
</tr>
<tr>
<td>Tiruchopuram</td>
<td>Nagarjuna Oil Corpn for Crude &amp; Product oils</td>
</tr>
<tr>
<td>PY-3 Oil Field</td>
<td>anchorage off Cuddalore major user Madras Refineries</td>
</tr>
<tr>
<td>Tirukkadaiyur</td>
<td>PPN Power Generating Co. For Naphtha, Natural Gas</td>
</tr>
<tr>
<td>Nagapattinam</td>
<td>anchorage port major user Fats, Foods &amp; Fertilisers Ltd. For Edible oil</td>
</tr>
<tr>
<td>Colachel</td>
<td>presently no activity</td>
</tr>
<tr>
<td>Punnakkayal</td>
<td>Dharangadhara Chemical Works – VC Monomer;LPG</td>
</tr>
<tr>
<td>Manappad</td>
<td>to be used for India Gas</td>
</tr>
<tr>
<td>Kudankulam</td>
<td>Nuclear Power Plant</td>
</tr>
</tbody>
</table>
Primary challenges

- Dredging to overcome draft limitations.
- Need to build additional capacity.
- Modernization of handling equipment.
- Hinterland Connectivity and integration
Inland Transportation – Positives

- Rail – wide network; dedicated freight corridors planned
- Roads – Golden Quadrilateral & NHDP
- Private rail operators - Entry into IR’s domain
Transportation – travails

- Directional Distribution and optimal use of available facilities – not happening.

- Road Transportation – antiquated regulations, controls and tax environment

- Railways – Private operators are forced to use IR infrastructure
Transportation - Lacunae

- A holistic view of development seems to be lacking.
- New rail corridors, rolling stock are used to funnel more movements through old and congested gateways.
WORLD GROWTH FORECAST

SOURCE: IMF

P.P. Sengupta
Supply chain management has been an integral area of focus for many companies as the cost of logistics could amount to a good 10% of their overall cost.
A Success Story

On one hand, due to the drop in volumes, shipping companies are trying to keep themselves afloat and do business with virtually no profits; on the other hand, there have been synergies amongst various carriers optimizing space and cost of operation. This has been the ‘take away’ point from this industry
A story on a parallel...
... the growth of ‘Containerization’

CAGR – 14.6%
Door to Door Concept

- Expedient deliveries and small parcels.
- Multimodal Transportation
- Inclusive Growth of region - MSMEs
Advantage West Coast

- The trade has favoured West Coast Ports like Nhava Sheva
- With time Shipping lines have established markets here.
- Deployment of large mother vessels providing low slot costs.
- Ports of Jebel Ali and Salalah become major hub ports.
- The Persian Gulf which forms a large import market.
Eastern Seaboard

- Bay of Bengal has limited Markets
- Kolkata pioneered Container business but lacks water depth & infrastructure.
- Chennai is far too South to cater to Hinterland traffic
- Vizag is primarily a Bulk Port.
- Local cargoes are heavy and limited exports to the East
Modes of cargo movement

- Rail
- Road
- Inland waterways
- Coastal Cargo
- Sea

[Map showing different modes of cargo movement in India]
ADVANTAGES OF COASTAL SHIPPING

Fuel consumption:

<table>
<thead>
<tr>
<th>Mode</th>
<th>Fuel consumption (gm/tkm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road</td>
<td>31.330</td>
</tr>
<tr>
<td>Rail</td>
<td>8.911</td>
</tr>
<tr>
<td>Coastal shipping</td>
<td>4.828</td>
</tr>
</tbody>
</table>

Environment friendly alternative to rail/road transportation.

External costs: Costs of accidents, noise pollution, infrastructure burden and congestion.

<table>
<thead>
<tr>
<th>Mode</th>
<th>Marginal External cost (euro/1000 tkm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road</td>
<td>24.12</td>
</tr>
<tr>
<td>Rail</td>
<td>12.55</td>
</tr>
<tr>
<td>Coastal shipping</td>
<td>5.00</td>
</tr>
</tbody>
</table>
GLOBAL PERSPECTIVE

<table>
<thead>
<tr>
<th>Mode</th>
<th>European Union</th>
<th>India</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road</td>
<td>42</td>
<td>54</td>
</tr>
<tr>
<td>Rail</td>
<td>10</td>
<td>34</td>
</tr>
<tr>
<td>Inland waterway</td>
<td>5</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Pipeline</td>
<td>--</td>
<td>4</td>
</tr>
<tr>
<td>Water</td>
<td>43</td>
<td>7</td>
</tr>
</tbody>
</table>

Modal share by tkm (%)

Coastal traffic comparison:

<table>
<thead>
<tr>
<th>Country</th>
<th>India</th>
<th>China</th>
<th>Japan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coastal Traffic (in mtpa)</td>
<td>120</td>
<td>870</td>
<td>549</td>
</tr>
</tbody>
</table>

Data for the year 2002.

- Coastal shipping accounts for more than 40% of trade volume in US, China and Europe.
- Over 13,000 coastal vessels registered in China.
Coastal traffic profile for 2001-02

Source: Basic Ports Statistics, 2001-02
<table>
<thead>
<tr>
<th>Issues</th>
<th>Problems/identified</th>
<th>Present Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manning</td>
<td>Relaxation of manning scales (NCV scales)</td>
<td>1. Some relaxation, particularly for smaller vessels, have been made.</td>
</tr>
<tr>
<td></td>
<td>Shortage of trained personnel</td>
<td>2. Training infrastructure to be created.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Training rules for availing tonnage tax formulated.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Rationalise IT rules for Indian seafarers.</td>
</tr>
<tr>
<td>Spares</td>
<td>High duty structure on imported Spares</td>
<td>Certain exemptions on import of spares made but needs to be rationalized.</td>
</tr>
<tr>
<td>Bunker</td>
<td>Duty on bunkers used for coastal vessels, resulting in significant increase in the cost of operations.</td>
<td>Bunker costs in India must be same for foreign and coastal vessels.</td>
</tr>
<tr>
<td>Tonnage tax</td>
<td>High incidence of tax vis a vis foreign shipowners</td>
<td>Tonnage tax recently implemented.</td>
</tr>
<tr>
<td>Cabotage Law</td>
<td>Protection of Indian Tonnage</td>
<td>Doesn’t allow development of market by creating artificial barriers in vessel availability.</td>
</tr>
</tbody>
</table>
Multimodal system:
1 – 2: Rail/road movement
2 – 3: Sea movement
3 – 4: Rail/Road movement

For coastal trade to be a viable alternative:
Sum of costs incurred at multiple points of multimodal system < Cost of direct transportation

1. Origin
2. Load port
3. Discharge port
4. Destination
## TRANSACTION COSTS - LOWER THEM

<table>
<thead>
<tr>
<th>Items</th>
<th>Present status</th>
<th>Needs implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port charges (Coastal Tariff)</td>
<td>Only major ports give rebate</td>
<td>Minor ports must also extend rebate</td>
</tr>
<tr>
<td>Port Regulations</td>
<td>No differentiation for coastal vessels other than rebate on tariff.</td>
<td>Separate rules for berthing, priorities, pilotage etc must govern coastal vessels.</td>
</tr>
<tr>
<td>Port Facilities</td>
<td>Both Coastal and ocean vessels use the same facilities</td>
<td>Special berths and cargo facilities for Coastal cargoes</td>
</tr>
<tr>
<td>Service Tax</td>
<td>Recently introduced</td>
<td>Contra-indicatory to promotion of the trade.</td>
</tr>
</tbody>
</table>
THE DAMAGES – SUSTAINABLE?

The Road Network

Rs 100 billion annual losses from accidents
MOST report

Rs 300 billion annual losses to industry from congestion delays
Rakesh Mohan Committee
Roadways in India

- Current status
- Outlook for future
INDIAN ROAD NETWORK

Total Length – 33 lakh km

<table>
<thead>
<tr>
<th>Type</th>
<th>Length (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Highways</td>
<td>66,590</td>
</tr>
<tr>
<td>Expressways</td>
<td>200</td>
</tr>
<tr>
<td>State Highways</td>
<td>1,31,899</td>
</tr>
<tr>
<td>Major District Roads</td>
<td>4,67,763</td>
</tr>
<tr>
<td>Rural Roads</td>
<td>26,50,000</td>
</tr>
</tbody>
</table>

- Roads carry 85% of passenger & 70% of freight traffic
- National Highways constitute only 2% of length, but carry 40% of the traffic on Indian Roads.
• Normal distance traveled by trucks in India is 250-300 km per day where as the international norm is 600-800 km per day

• Require immediate capacity augmentation and upgradation with enhanced safety features

• State Govt. are being persuaded to have integrated check posts on Highways.

• NHAI is modernizing the Toll Collection System to cut down waiting time at Toll Plazas.
## NHDP PHASE – I: PROGRESS SO FAR

(STATUS AS ON SEPTEMBER 30, 2006)

<table>
<thead>
<tr>
<th>Route Description</th>
<th>Total</th>
<th>Completed</th>
<th>Balance for Completion</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Golden Quadrilateral</strong></td>
<td>5846</td>
<td>5431</td>
<td>415</td>
</tr>
<tr>
<td>(Delhi-Mumbai-Chennai-Kolkata-Delhi)</td>
<td></td>
<td>(93%)</td>
<td></td>
</tr>
<tr>
<td><strong>NS &amp; EW Corridors</strong></td>
<td>981</td>
<td>840</td>
<td>141</td>
</tr>
<tr>
<td>North South: Srinagar to Kanniakumari</td>
<td></td>
<td>(86%)</td>
<td></td>
</tr>
<tr>
<td>East West: Silchar to Porbandar</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Port Connectivity &amp; Other NHs</strong></td>
<td>671</td>
<td>398</td>
<td>273</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(59%)</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>7498</td>
<td>6669 *</td>
<td>829</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(89%)</td>
<td></td>
</tr>
</tbody>
</table>

* Presently 4006 km of Highways are under Tolling. Average collection

---

P.P. Sengupta
## NHDP PHASE – II : PROGRESS SO FAR
(STATUS AS ON SEPTEMBER 30, 2006)

<table>
<thead>
<tr>
<th>Length in km</th>
<th>Total</th>
<th>Civil works Awarded</th>
<th>Balance for Award</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NS &amp; EW Corridors</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(North South : Srinagar to Kanniakumari)</td>
<td>6219 (151)</td>
<td>4913 (127)</td>
<td>1306 (24)</td>
</tr>
<tr>
<td>(East West : Silchar to Porbandar)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Other NHs</strong></td>
<td>486 (11)</td>
<td>466 (10)</td>
<td>20 (1)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>6705 (162)</td>
<td>5379 (137)</td>
<td>1326 (25)</td>
</tr>
</tbody>
</table>
Thank You