



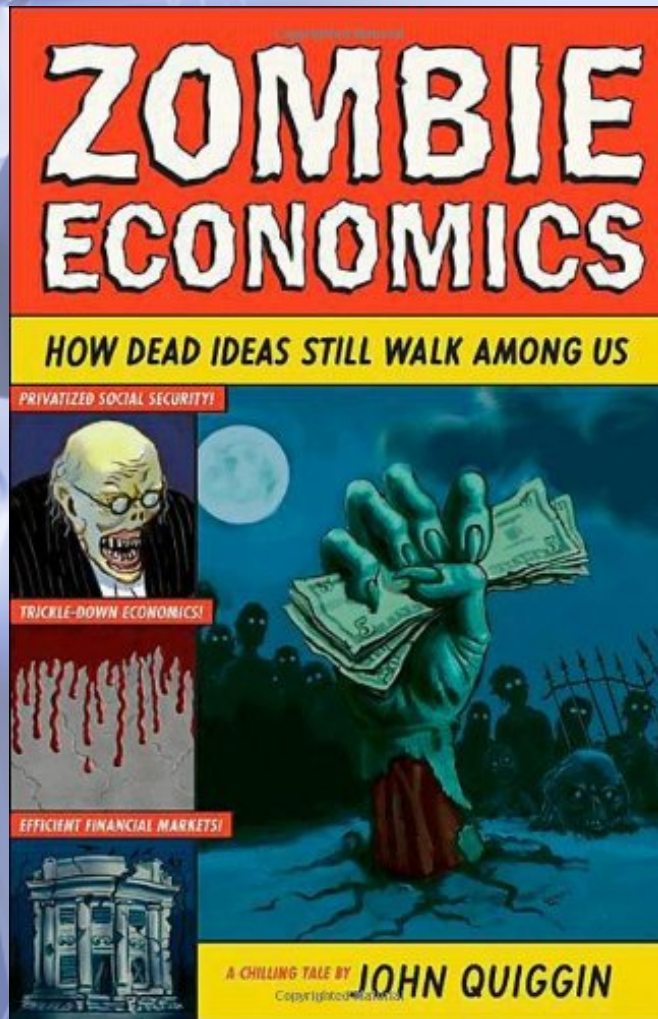
**Measuring Transport
Logistics Chain
Performance and the
Importance of Efficiency:
Why Corridors Should
Lead to Open Doors**

Paul E. Kent, Ph.D. , Vice President and Port Specialist, Nathan Associates Inc., PKent@nathaninc.com

An Economics Primer: Port and Transport Logistics Chain Efficiency

- Recent growing (research) interest has gravitated from port performance to transport logistics performance
 - Clark, Dollar, Micco (2001) – port inefficiency increases distance by 60%
 - Hummels (2001): Inventory costs due to transport delays equivalent to 0.8 %/day of delay of the value of the goods being delivered
 - Wilson, Mann, Otsuki (2003) – efficiency improvement in ports has greater impact than Customs improvements and use of e-commerce
 - Kent, Fox (2004) – assess impact of port inefficiency on welfare – port inefficiency, when mitigated, induces GDP growth by 0.47 percent
 - Djankov, Freund, and Pham (2006) -- each additional day required for a shipment imposes “extra” economic distance of 70 km per day

Changing Economic Thinking



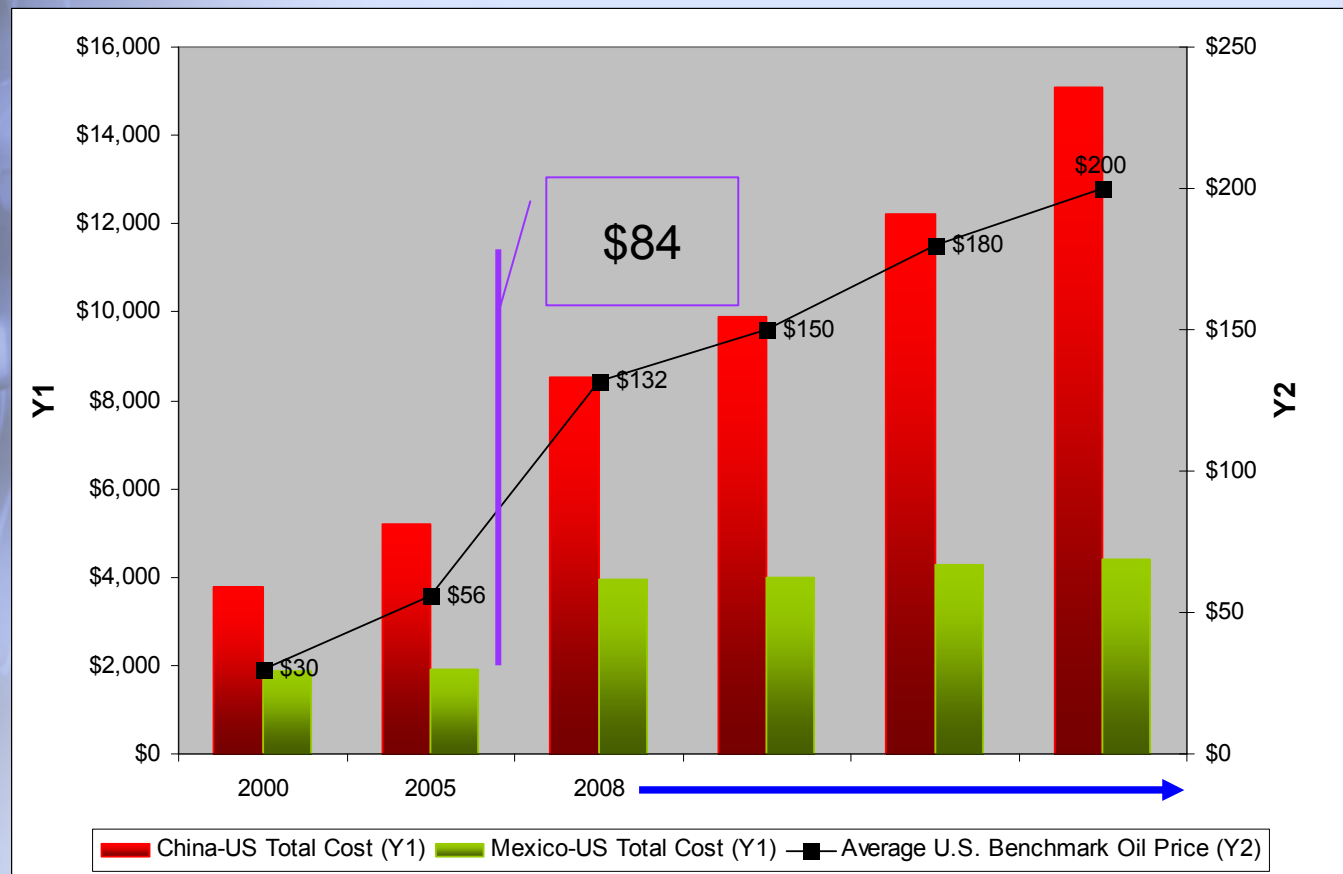
- Ports are so important that even the word im**port**ant has one
- Notion of port competitiveness not dead but transport logistics chain performance has become paramount to trade competitiveness
- Increasing interest in transport logistics chain performance
 - *Logistics Performance Index*
 - *Doing Business Report*
- Emergence of inter-corridor competition
- “Port-centric” thinking is still key -- factors outside the gate can impede port performance



Emerging Trends will Challenge Ability to be Efficient and Competitive

- Port operations performance being constrained by factors outside port gate
- Inter-port competition is evolving towards inter-corridor competition
- Canal expansion combined with high fuel prices will have an effect on deployment practices, leading to vessel service rationalization
- Implementation of regional and WCO security protocols
- Port expansion and access being constrained by urban congestion
- Potential monopolistic or oligopolistic abuses by terminal operators

Changing Economics from High Fuel Costs



Source: U.S. Crude Benchmark Prices, U.S. Department of Energy; Shipping Costs – estimated averages from sample data from shipper manifests/carriers and phone quotes from freightforwarders; projected costs calculated by Nathan Associates Inc.



Importance of Transport Corridors

- Ports represent only a relatively small share of total transport cost
- Shippers are increasingly interested in total transport cost, time, and reliability
- With improvements in hinterland routes, inter-port competition has evolved to inter-corridor competition
- Shippers now have more options for getting merchandise to final destination
- Constraints to corridor efficiency drives cargo to other options



Logistics costs and fuel prices

- Soaring transport costs, not tariff barriers, pose the greatest challenge to trade today
- Using GTAP model, early results indicate:
 - At \$20/barrel, transport costs equivalent to 3% tariff rate
 - **At \$80/barrel, transport costs equivalent to tariff rate of 9%**
 - At \$150/barrel, transport costs equivalent to tariff rate of 11% (same as tariff rates in 1970)
- Long-distance routes especially vulnerable
 - Every 10% increase in distance = 4.5% increase in total transport cost



Drilling down in analysis

Entre, entre, por favor, toma un asiento

Between, between, please, drink a chair

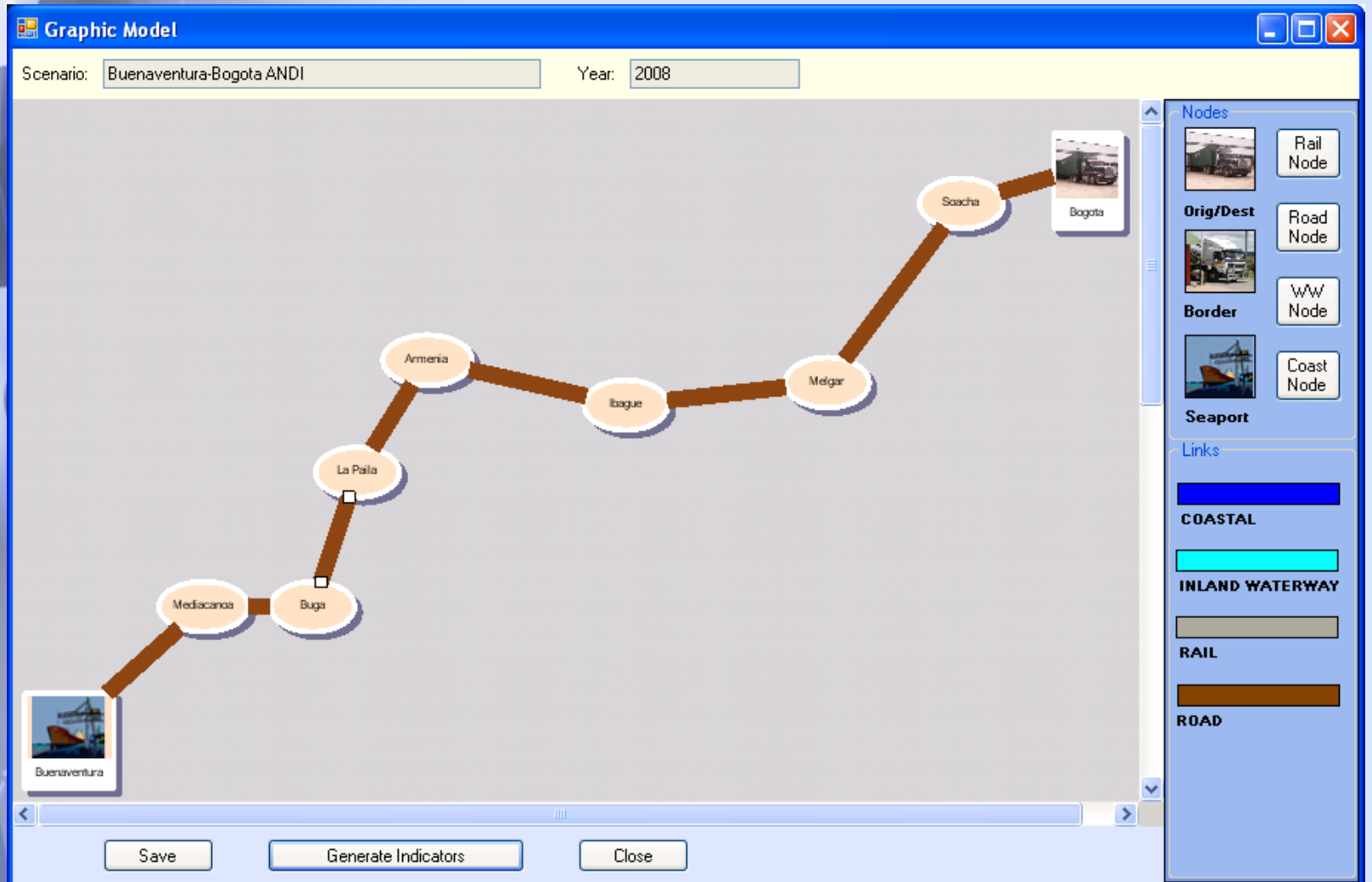
Come in, come in, please, have a seat



Analytical “Holistics” Approach Needed for Performance Analysis

- Considers performance terms used by the industry: time, cost, reliability
- Performance comparisons need consistency
- Solutions relative to impact on performance need to be defined
- Impact of proposed solutions needs to be assessed
- Impact of interventions need to be reviewed
- Benchmarking against performance of corridors in other countries needed to monitor and improve competitiveness

FastPath Schematic of Buenaventura-Bogotá Corridor



Data Input Screen for Yard Operation (Time and Cost)

SEAPORT

General Characteristics

Name:
 Terminal:
 Number of Berths:
 Ratio TEU/Cont:

Vessel Size

	%
< 1,000 TEU	<input type="text" value="3"/>
1,000-2,500 TEU	<input type="text" value="32"/>
2,500-4,000 TEU	<input type="text" value="63"/>
> 4,000 TEU	<input type="text" value="2"/>
Total	<input type="text" value="100"/>

Components

Exists	Select	Exists	Select
<input checked="" type="checkbox"/> Channel	<input type="radio"/>	<input type="checkbox"/> Consolidation	<input type="radio"/>
<input checked="" type="checkbox"/> Berth	<input type="radio"/>	<input type="checkbox"/> Intermodal Transfer	<input type="radio"/>
<input checked="" type="checkbox"/> Yard	<input checked="" type="radio"/>	<input checked="" type="checkbox"/> Gate	<input type="radio"/>
<input checked="" type="checkbox"/> Customs	<input type="radio"/>	Port Price Model	<input type="radio"/>

Data Input Methods

Yard Operations

Norms Benchmarks

	Good	Fair	Poor	VeryPoor
Handling-Transfer Fee/TEU	5-15	15-25	25-35	40-50
Storage Fee / TEU	5-15	15-25	25-35	40-50
Dwell Time	5-15	15-25	25-35	40-40
Reliability % Dwell Time	5-40	40-80	90-150	160-400

US\$/TEU
US\$/TEU
hours
%

FastPath Price Data Entry Screen for Buenaventura-Mediacaño Road Link

ROAD

General Characteristics

Name:

Start Point:

End Point:

Length - km:

Ratio TEU/Cont:

Terrain

Flat

Flat-Hilly

Hilly

Hilly-Mountainous

Mountainous

Surface Conditions

Good

Fair

Poor

Very Poor

Congestion

Light

Heavy

Factor:

Data Input Methods

Enter Subjective Ratings | Enter Data Directly | **Enter Unit Values** | Enter General Function

Price Data | **Transit Time Data**

Norms | Benchmarks

	Good	Fair	Poor	VeryPoor
40-60	40-60	30-40	20-30	5-20
0-3	0-3	3-8	8-12	12-24
5-100	5-100	100-200	200-300	300-500

Maximum Speed Value: km/hr OR %

Minimum Speed Value: km/hr OR %

Maximum Waiting Time: hours OR %

Minimum Waiting Time: hours OR %

Average Trip Time: hours

Average Speed: km/hr

Average Waiting Time: hours

Calculate Reliability %

Time, Cost, Reliability and Logistics Scores for Export Containers

Summary Results by Logistics SubChain

Scenario: 2008

	TEUYear	Avg Price	Avg Time	Avg Reliability	Logistics Score
Total Logistic Chain	83,228	\$826	160.0 hrs	118 %	55

Logistics SubChains

Choose	Name	TEUYear	Price	Time	Reliability	Logistics Score
<input type="checkbox"/>	Bogota-Soacha-Melgar-Ibague-Ar...	83,228	\$826	159.5 hrs	118 %	55

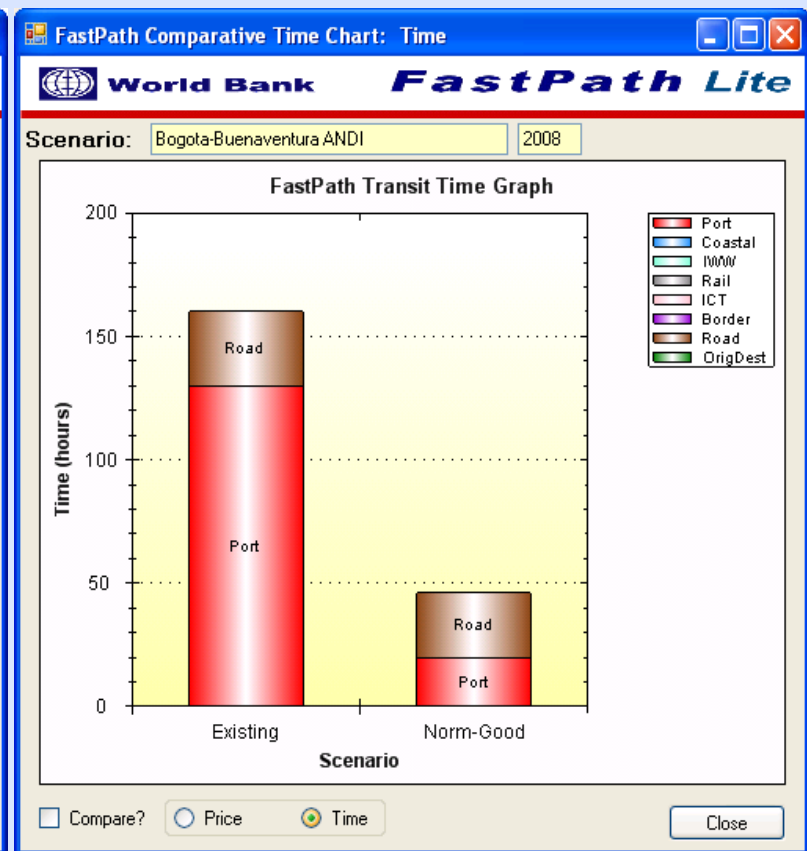
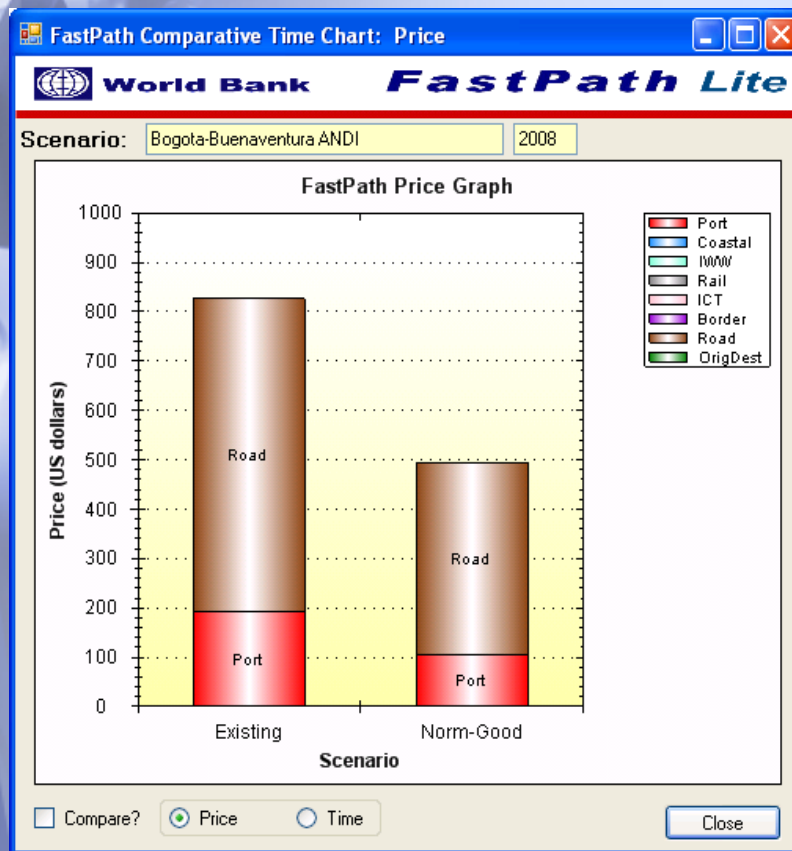
Nodes

Details	Name	Logistics Score
<input type="checkbox"/>	Bogota	N/A
<input type="checkbox"/>	Soacha	N/A
<input type="checkbox"/>	Melgar	N/A
<input type="checkbox"/>	Ibague	N/A
<input type="checkbox"/>	Armenia	53
<input type="checkbox"/>	La Paila	N/A
<input type="checkbox"/>	Buga	N/A
<input type="checkbox"/>	Mediacanoa	N/A
<input type="checkbox"/>	Buenaventura	65

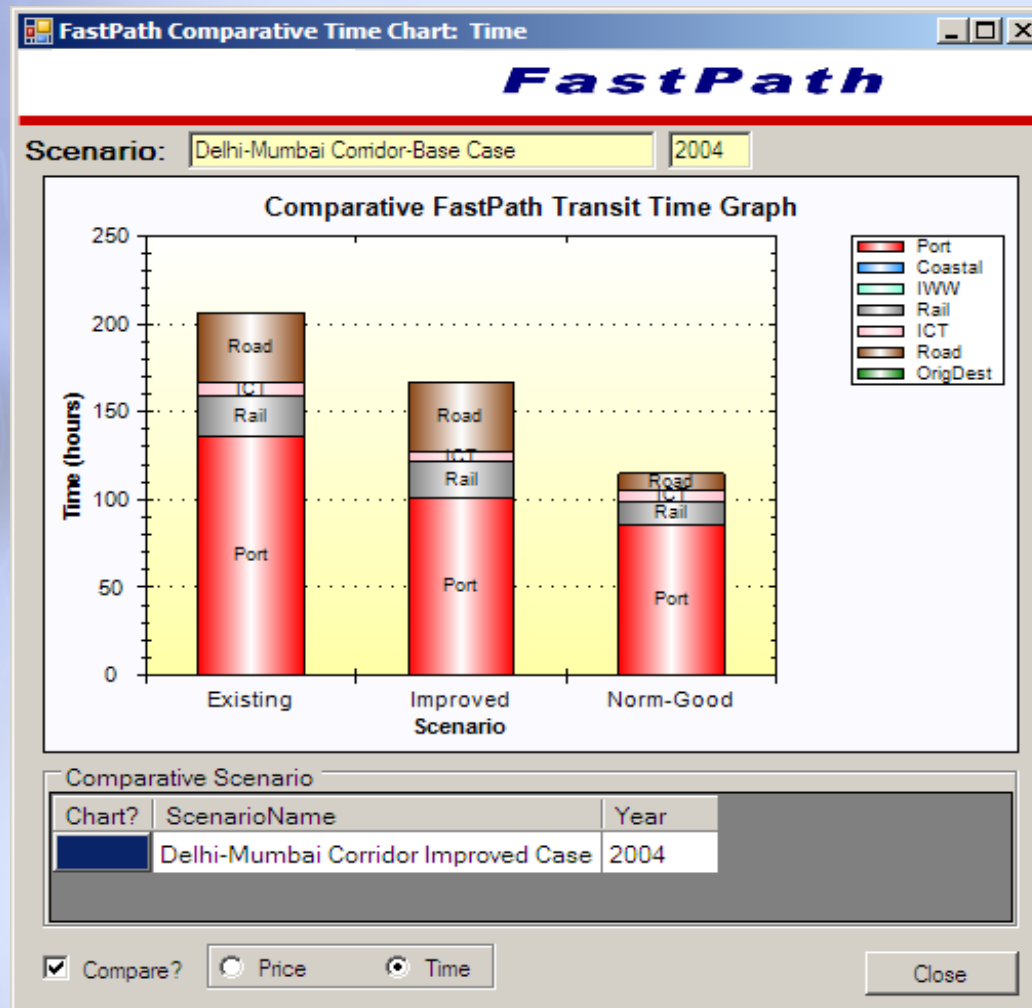
Links

Details	Name	Logistics Score
<input type="checkbox"/>	Road Soacha-Bogota	50
<input type="checkbox"/>	Road Melgar-Soacha	60
<input type="checkbox"/>	Road Ibague-Melgar	60
<input type="checkbox"/>	Road Armenia-Ibague	53
<input type="checkbox"/>	Road La Paila-Armenia	53
<input type="checkbox"/>	Road Buga-La Paila	67
<input type="checkbox"/>	Road Mediacanoa-Buga	43
<input type="checkbox"/>	Road Buenaventura-Medi...	47

Existing Conditions and Norms Export Containers



Impact of Different Solutions



Comparing Results with Other Corridors

Logistics Component	Tema-Ouagadougou	Laem Chabang-Vientiane	Dacca-Chittagong (a)	Durban-Nelspruit (a),(b)	Maputo-Nelspruit
INBOUND					
Overall logistics chain	51	64	59	63	62
Port	55	55	49	60	51
Road transport	55	70	58	65	51
Border post 1	73 (Ghana)	67 (Thailand)	n/a	n/a	73 (Mozambique)
Border post 2	20 (Burkina Faso ¹)	63 (Laos)	n/a	n/a	73 (South Africa)
OUTBOUND					
Overall logistics chain	62	66	54	68	60
Port	72	65	52	70	57
Road transport	70	70	58	65	51
Border post 1	53 (Ghana)	67 (Thailand)	n/a	n/a	67 (Mozambique)
Border post 2	53 (Burkina Faso)	63 (Laos)	n/a	n/a	63 (South Africa)


Impact of Reducing Congestion Delay by 30 Minutes at Each Point

- 6 road bottlenecks
- Bogota-Buenaventura Route
 - **Total truck trips in both directions: 206,285**
- **Reducing congestion delay by 30 minutes at each bottleneck: total potential saving time is 3 hours.** Current travel time between Buenaventura and Bogota = 30.5 hours, assuming 10 hour rest time
- With travel truck reduction and resulting truck productivity improvement, **same volume of containers could be handled using only 185,995 truck trips (vs 206,285)**
- If original number of trucks remains constant, **number of additional cargo volume that could be transported is thus about 34,500 TEUs**
- **Assuming a 100 truck company, operating costs reduced by 8 percent**

Smart Thinking – Intelligent Logistics System



Source: STLC concept developed by Paul E. Kent, Ph.D., Nathan Associates Inc., PKent@nathaninc.com



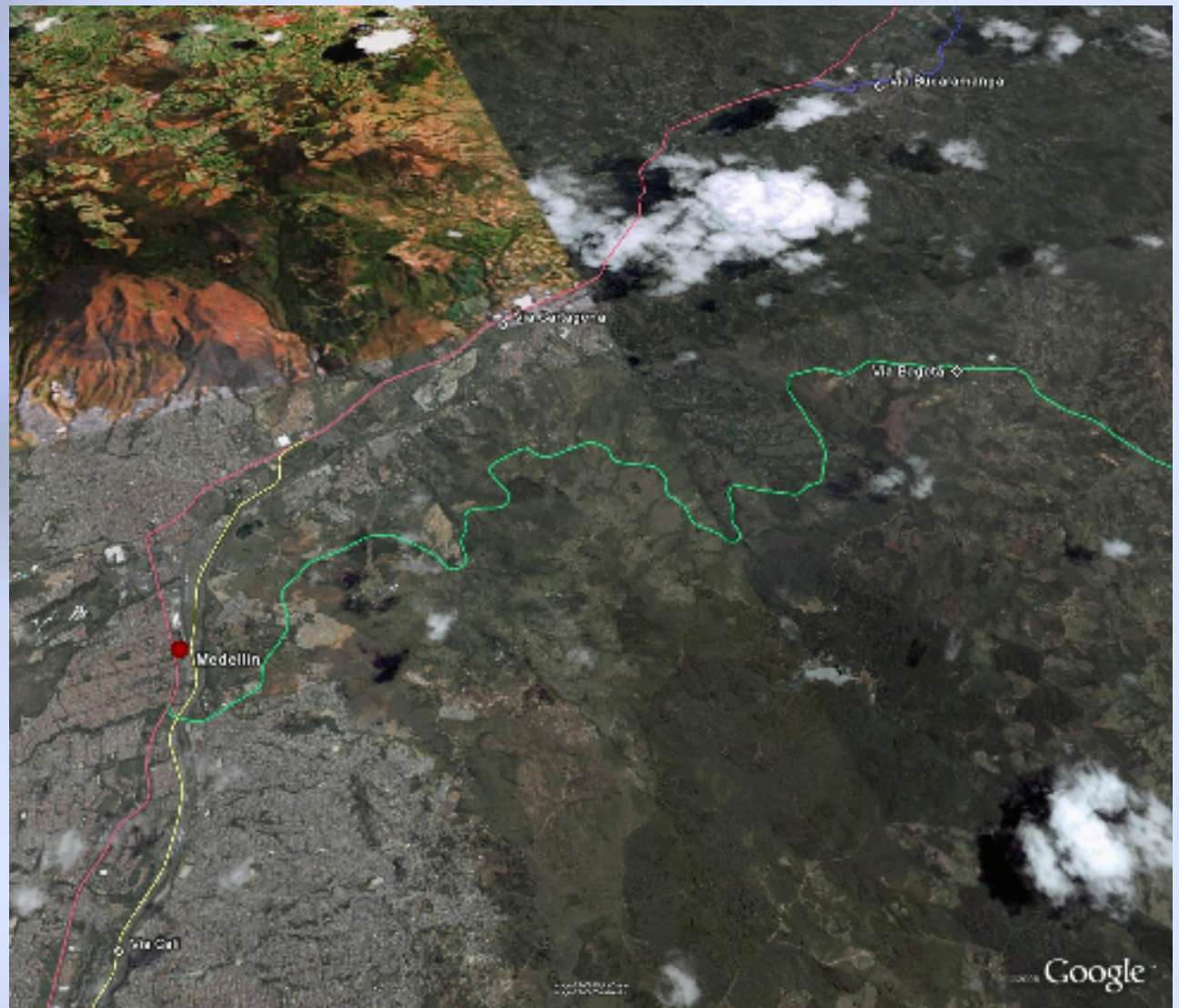
Components of Intelligent Logistics System

- Truck entry control system in port area
- Network of dry ports and truck staging areas
- Monitoring and control IT technologies
 - GPS/smart seals, data exchange technologies
- Services to trucks, cargo, and drivers

Freight Corridors Colombia



Medellin



Truck Staging Area / Dry Port





Services Offered at Truck Staging Areas and Dry Ports

- For the cargo
 - check in/dispatch
 - GPS monitoring/control
 - container storage
 - smart seals
 - Consolidation/deconsolidation
 - warehousing
 - customs clearance
- For the trucks
 - truck repair
 - environmental permits
 - sales – tires, fuel, spare parts
 - parking
 - GPS monitoring/control
- For the truck drivers
 - electronic bulletin boards for freight bookings
 - cafeteria
 - food store/pharmacy
 - hotel
 - communications center (internet/phone)
 - dispatch
- For the Shippers
 - Supply chain visibility
- Ancillary services
 - Banking
 - Offices for logistics services – freightforwarding, ships' agents, etc.



Benefits of Integrated Truck Staging Area/Dry Port Approach

- Reduces urban congestion
- Reduces fuel costs
- Reduces pollution
- Reduces equipment capacity requirements
- Increases equipment utilization rates
- Decreases freight costs
- Decreases traffic congestion on freight corridors
- Reduces road maintenance costs
- Enhances security of trucks, cargo, and drivers
- Enhances driving safety
- Reduces insurance costs
- Creates micro economies -- local employment opportunities
- Reduces total logistics costs
- Enhances global competitiveness



Analytics!

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