The Global Connectivity Revolution

Skeletal System  Transportation
Highways, railways, bridges, tunnels, airports, seaports

Vascular System  Energy
Oil & gas pipelines and refineries, electricity grids and power plants

Nervous System  Communication
Internet cables, satellites, data centers

The Infrastructural Matrix: Exoskeleton on the Planetary Body
“What we build today will last centuries.” - Santiago Calatrava
From X-Ray to MRI

Topographically engineering the planet through mega-infrastructures
Mapping Reality: GPS and Geofusion, IoE and OSM, ArcGIS and Google Earth Pro

The Connectivity Atlas (https://atlas.developmentseed.org/)
Bridges to Everywhere: Infrastructure Growth

19th and early 20th Centuries
American phase: Industrial revolution to World War I

Rise of the East
Asian Tigers to China & Asian Infrastructure Investment Bank (AIIB)

Great Wars and Resurrection
European phase: Keynes to Wirtschaftswunder
From Westphalian World (1648) to Supply Chain World (1989)

End of the Cold War

Capital Market Expansion

Deregulation and Privatization

Infrastructure Build-out

Communications Revolution

Total Globalization

Treaty of Westphalia (1648) to Fall of the Berlin Wall (1989)

1989: World Wide Web (WWW)

Supply chains are the original World Wide Webs: Not things but a global system of transactions

Beyond “Hyper-globalization” versus “End of globalization”: Capacity > Volume
Roads to the Future: Infrastructure Spending

We will build more infrastructure in the next 40 years than in the past 4000.

We should spend $1 trillion on the basic infrastructure needs of every 1 billion people.
To keep pace with projected growth, the world needs to invest $3.3 trillion in economic infrastructure annually through 2030.

<table>
<thead>
<tr>
<th>Infrastructure Type</th>
<th>Average annual need, 2016–30, in constant 2015 dollars, $ trillion</th>
<th>Aggregate spending, 2016–30, $ trillion</th>
<th>Annual spending, % of GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td>14.7</td>
<td>14.7</td>
<td>3.8%</td>
</tr>
<tr>
<td>Roads</td>
<td>11.4</td>
<td>11.4</td>
<td>0.9%</td>
</tr>
<tr>
<td>Telecom</td>
<td>8.3</td>
<td>8.3</td>
<td>0.6%</td>
</tr>
<tr>
<td>Water</td>
<td>7.5</td>
<td>7.5</td>
<td>0.6%</td>
</tr>
<tr>
<td>Rail</td>
<td>5.1</td>
<td>5.1</td>
<td>0.4%</td>
</tr>
<tr>
<td>Airports</td>
<td>1.3</td>
<td>1.3</td>
<td>0.1%</td>
</tr>
<tr>
<td>Ports</td>
<td>0.9</td>
<td>0.9</td>
<td>0.1%</td>
</tr>
<tr>
<td>Total</td>
<td>$49.1 trillion</td>
<td></td>
<td>3.8%</td>
</tr>
</tbody>
</table>

No time like the present: New normal of ultra-low interest rates

US infrastructure investment = 0% (offset by capital depreciation)

The basics: Power, transport, utilities, telecoms

Source: McKinsey
<table>
<thead>
<tr>
<th>World’s Top Infrastructure Investors</th>
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<tbody>
<tr>
<td>Macquarie Infrastructure and Real Assets</td>
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<tr>
<td>Brookfield Asset Management</td>
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<tr>
<td>Global Infrastructure Partners</td>
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<tr>
<td>Energy Capital Partners</td>
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<td>IFM Investors</td>
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<td>Borealis Infrastructure</td>
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<td>Colonial First State Global Asset Management</td>
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<td>KIAMCO</td>
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<tr>
<td>Caixa Economica Federala</td>
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<tr>
<td>InfaRED Capital Partners</td>
</tr>
</tbody>
</table>

USD$ billions based on 5-year total fund formation
US Still Dominates Total Global Real Estate Investment

$72B in FDI (2015): Dominated by manufacturing, finance, insurance, trade, IT

CRE: Foreign Investment in Real Property Tax Act (FIRPTA) reform enables boost in Institutions and SWF investment beyond REITs into high-yield US industrial and commercial properties

Retail: Shopping mall investment rose 33% to $10.4B (2015); Hotels: Spike to $43.4B (2015)

New asset classes: Developers moving into “active adult communities” and “multi-generational living” (80m Baby Boomers)

Dems: Consistent with Obama’s real estate tax policies / Re却: “unleash” markets and ease regulations
The United City-States of America
Think Geology, not Nationality: From NAFTA to North American Union
Pax Latina

Lat-Am Beyond Brazil

- Mexico: Robust growth in manufacturing and construction; 100-year Euro-bond
- Pacific Alliance poised to reap TPP gains
Baltic Union: Shared infrastructure and governance services (Coming soon: Helsinki - Stockholm Hyperloop)

European energy grid: Integrated gas, electric and nuclear power

“Extrastatecraft” (Easterling): Utility takes priority

Europe-Russia: From singular dependence to reverse flows
Pax Aseana: How to Grow From Billions to Trillions
From Sykes-Picot to *Pax Arabia*

- A century of borders: Post-colonial collapse
- Connecting ancient cities: The new pan-Arabism
Africa: From Devolution to *Pax Africana*

- Aggregation in sub-regions: East Africa as the continent’s “Benalux”
- Pan-African connectivity: Continental infrastructure, free trade, open migration
The Asian Center of Gravity

POPULATION: Asia = 4 Billion > Americas (1 Billion) + Europe/Middle East/Africa (2 Billion)

There are more people living inside this circle than outside of it.
Connecting China: Highways and High-Speed Rail

- Connecting the West (Tibet / Xinjiang)
- Promote second-tier city manufacturing
- Accelerated urbanization drive (hukou reform)
- Improved labor productivity (WB)
- Social mobility amidst labor dislocation
- Promote logistics and e-commerce

Sources: CEIC, Jeffries, China NBS
China: Empire of Mega-Cities
East Meets West: Eurasia’s Iron Silk Roads
Fastening the Belt: Ensuring Inter-Connectivity

Harmonization of standards and practices
- Taxes / bankruptcy
- Trade facilitation / customs
- ESG standards (KPIs)
- Project management training
- Digitizing information exchange

Security:
- Counter-terrorism, crisis management, organized crime, cyber-security, political risk, leadership succession

Ensuring quality:
- Assessment (technical/environmental/social) should determine necessary resources before bidding

Overcoming national capacity constraints
- Preference for local capabilities and procurement
- International corporate JVs
- Encourage moving up the value chain (ports to SEZs)
- Digital platforms and payments to boost cross-border services economy

Project selection
- Mixing domestic and international priorities.
- Beyond power/utilities, ensure financing for non-monetizable projects.

First projects
- Pakistan: CPEC
- Indonesia: Housing
- Bangladesh: Power
- Tajikistan: Roads
Piraeus: China’s European Gateway

- Cosco and the Greeks: From fear to loyalty
- China’s upstream investment drive: finance, real estate
- Multi-modal European supply chain: Railway to Slovakia

Source: Mercator Group, Rhodium, Financial Times
Local anchors, global nodes: Connecting to supply chains, rising up the value chain

From exclaves to enclaves, catalytic not parasitic: Leapfrog to hybrid governance (SPVs)
India’s Smart Cities: Doing Smart Things in Cities

**Beyond the Big 5:** New Delhi, Mumbai, Chennai, Kolkata, Ahmedabad

Focus on building out capital cities and business/industrial centres, enhancing investment climate, improving quality of life and promoting sustainable environment

**Functional priorities:** capital cities, industrial centres, culture/tourism areas, ports, education, healthcare

**Services priorities:** water, power, sanitation, mobility, housing, IT

**Cutting red-tape:** Infrastructure PPPs; multi-stakeholder SPV governance

Source: Anil Wadghule/Flickr
The Arctic: Navigable and Livable

- Faster Arctic shipping connecting new northern ports
- Overlapping sovereignties to shared supply chain zone
- “Northism”: A new Arctic population and identity
Planetary Urbanization: Megacity Archipelagos Define Humanity
From Nations to Nodes: 50 Mega-Cities or 200 Countries?

- Now to 2030: More lights, same map
- Cities need countries more than vice-versa
What’s the next global city?

Top-ranked cities for flows:
- Goods
- Services
- Capital
- People
- Data
"Who Rules the Supply Chain, Rules the World"

War b/w systems (capitalism versus communism) → tug-of-war within the collective supply chain matrix

Mackinder Modified: War over Territory → War over Connectivity

TTIP and TPP vs RCEP

- Global trade is additive, not substitutive
- Trade/investment/supply chain nexus

Beyond Orwell’s 1984: Warring or fusing mega-continents?
The Great Supply Chain War

The Race to Complexity (Hausmann): Horizontal + Vertical = Diagonal

Supply chain alliances: national supply chain nexus (e.g. Toyota/Nagoya and Samsung/Seoul) versus stateless companies (e.g. GE w/o Ex-Im)

China’s German quest: From “Made in China” to “Made by China” (e.g. IT GVCs)

Attract investment, displace investors: Industrial policy at home (SEZs, IP theft, patent trolling, #MakeInIndia)

Capture global markets: Export credits; national champions
Global Evolution: From Connectivity to Resilience

**No more chokepoints:**

Competitive connectivity builds pathways for supply to meet demand

Ring-fencing volatility: Ukraine, Iraq, Libya, South China Sea

**Abundance and Stability:**

From “peak oil” to “gas glut”

US oil sales to China

**Toward Antifragility** *(Taleb)*

War is an event; networking building is a process
THANK YOU!

paragkhanna@gmail.com