



9th Railway Working Group Meeting

10–12 June 2025 • Bishkek, Kyrgyz Republic

9-е заседание Рабочей группы по железнодорожному транспорту

10–12 июня 2025 года • Бишкек, Кыргызская Республика



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Approaches to Investment Viability Assessments

Holger Eiletz

Managing Partner - Economist
MC Mobility Consultants GmbH

Way towards viable investments



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Context and Importance (1)

Rail Project Viability

Strategic Trade Corridors

Efficient trade for landlocked countries



Financial Self-Sustainability

Struggle to cover up-front costs



Limited Public Funds

Ensuring justified and sustainable projects

Maximize Investment Payoffs

Invest in projects with payoffs

Context and Importance (2)

Rail Project Viability Assessment

Economically Beneficial but Financially Challenged Project

Provides significant economic benefits but lacks financial sustainability.

Low Financial Viability

Non-Viable Project

Fails to deliver economic or financial returns.

High Economic Viability

Commercially Viable Rail Project

Generates sufficient revenue and economic benefits.

High Financial Viability

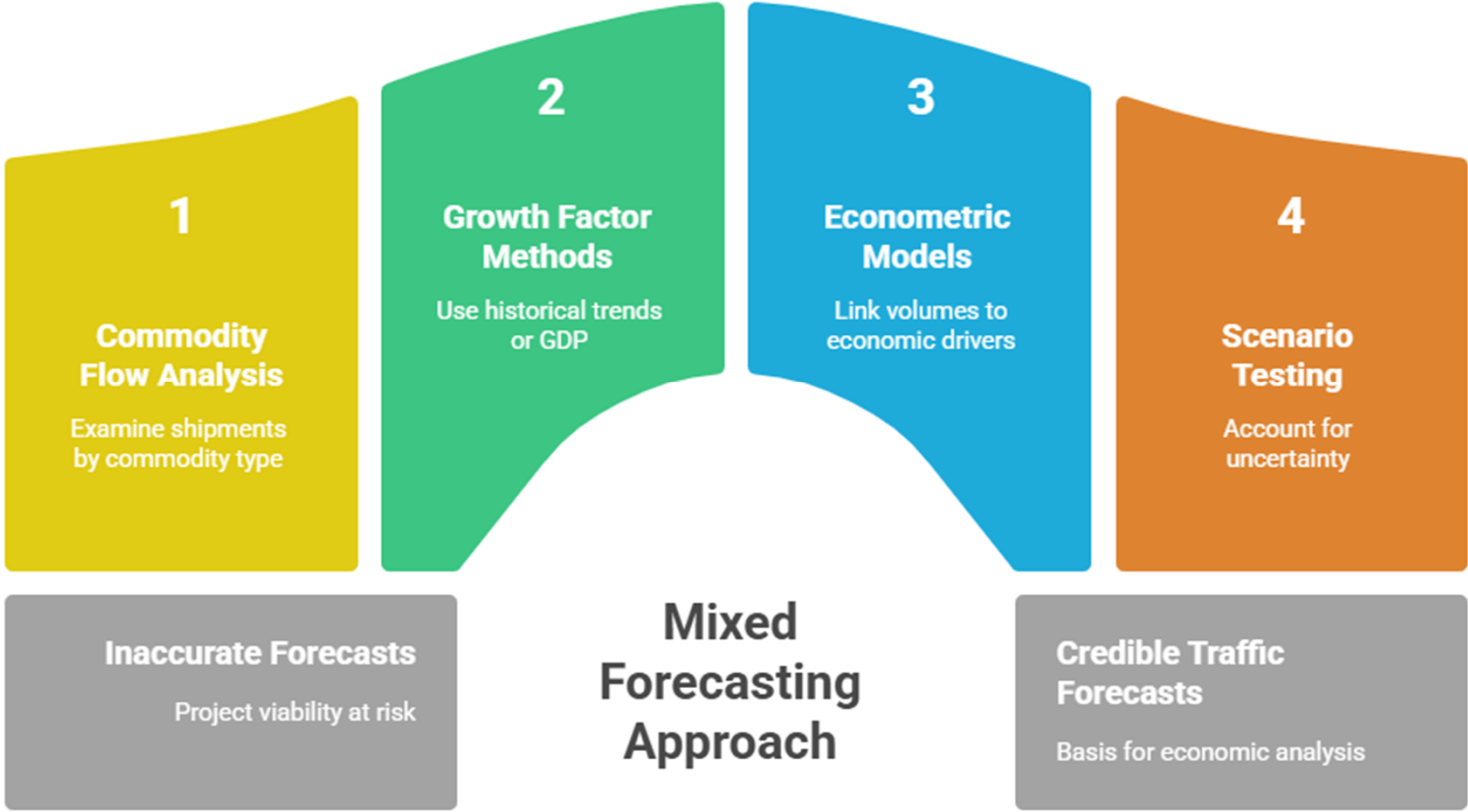
Financially Sound but Economically Weak Project

Achieves financial success but lacks broader economic impact.



Low Economic Viability

Improving Freight Demand Forecasting

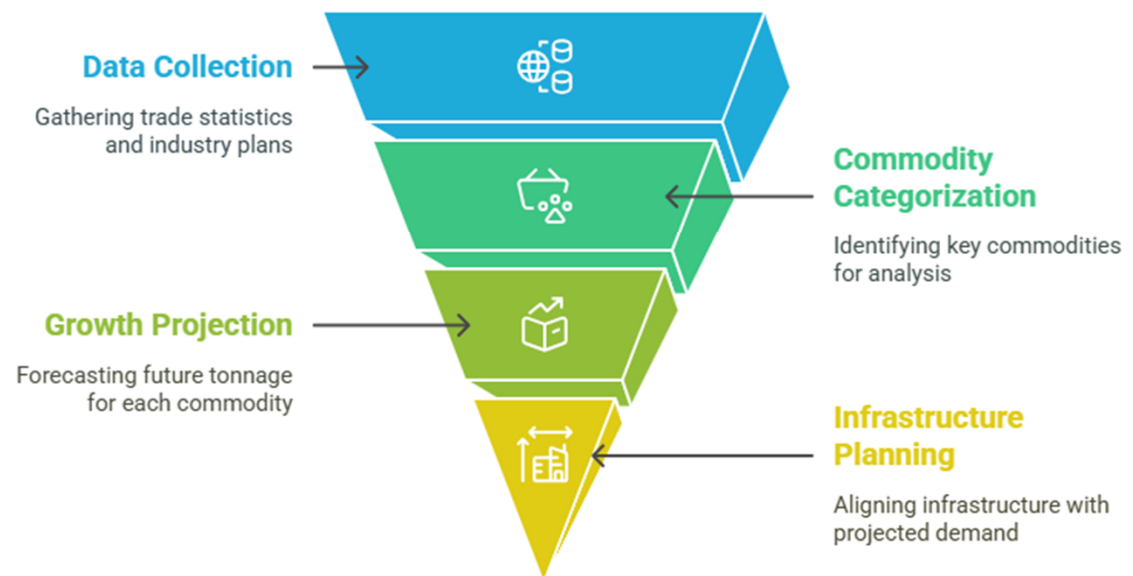


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Commodity Flow Analysis

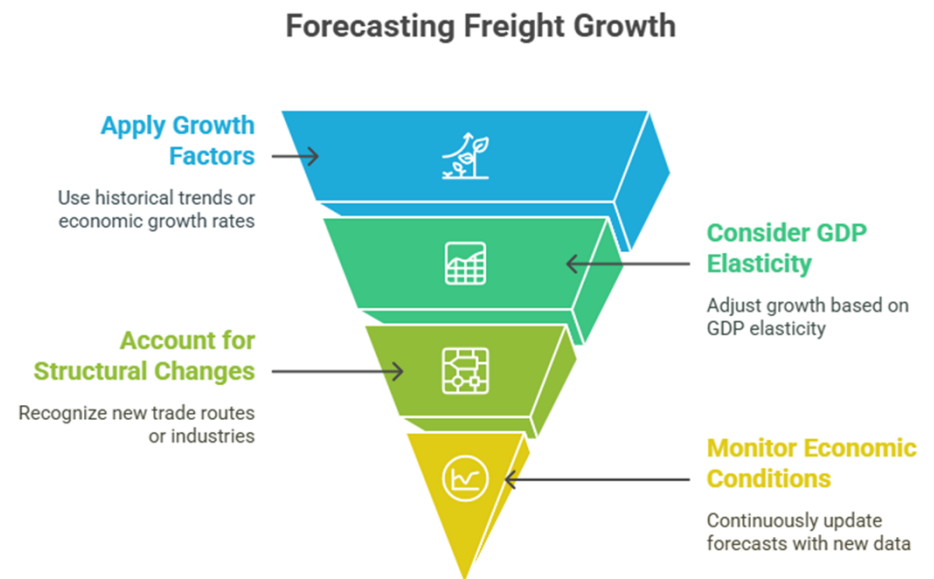
- **What It Is:** Forecasts freight by analyzing specific commodity flows (e.g., coal, grain, containers) on origin-destination routes.
- **Approach:** Uses existing freight flow data, trade statistics, and industry plans to project future tonnage for each commodity. Incorporates knowledge of specific sources like mines, farms, factories.
- **Strengths:** Granular and tailored; captures shifts in particular commodities and helps size infrastructure appropriately.
- **Challenges:** Data-intensive, requiring detailed trade and production data often scarce in CAREC countries; needs assumptions about each commodity's growth.

Commodity Flow Analysis Process



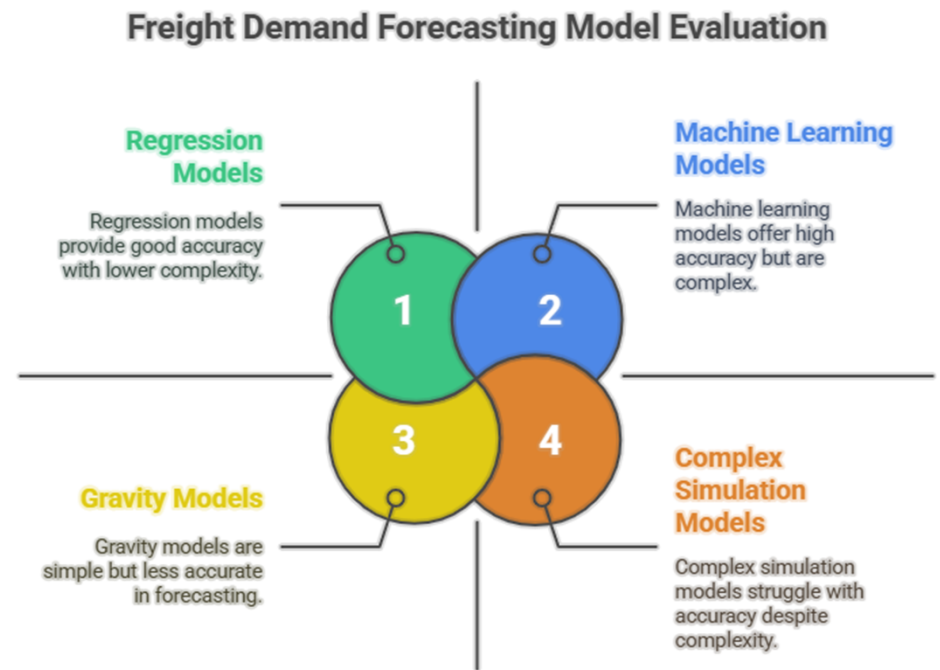
Growth Factor Methods

- **What It Is:** Simpler top-down forecasting using aggregate growth rates (often based on GDP or trade growth).
- **Approach:** Apply growth factors to current freight volumes, often using GDP elasticity of freight demand (percentage freight grows for 1% GDP growth).
- **Typical Assumptions:** Freight traffic often grows in line with GDP (elasticity ~ 1.0 , but can range 0.7-1.5 in developing countries).
- **Strengths & Limits:** Easy to apply, useful with limited data. Doesn't capture structural changes or shifts in commodity mix.



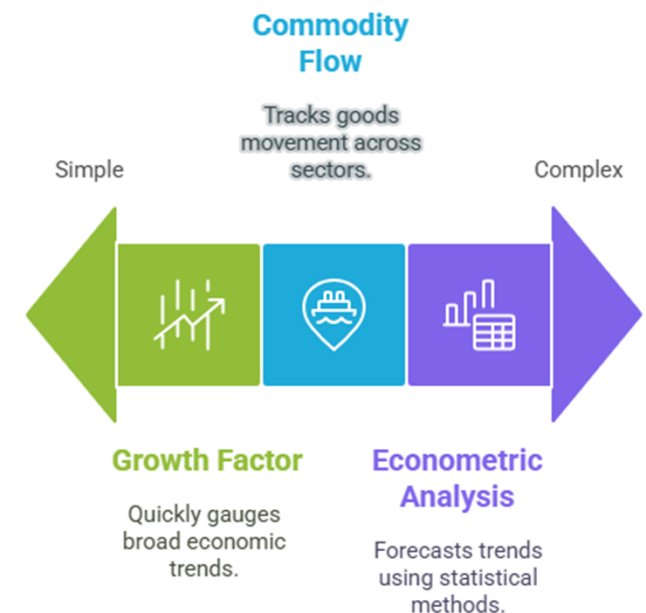
Econometric & Advanced Models

- **What They Are:** Statistical or simulation models that predict freight demand from multiple variables. Examples include regression models, gravity models for trade flows, or even machine learning approaches.
- **Approach:** Use historical data to find relationships between freight volume and factors like GDP, population, industrial output, trade values, transport costs.
- **Strengths:** Can incorporate cause-and-effect, helpful for scenario testing (e.g., impact of tariff changes), can improve precision with quality data.
- **Challenges:** Data-hungry and technically complex; results sensitive to model specification; harder to explain; may struggle with structural breaks (e.g., geopolitical shifts).



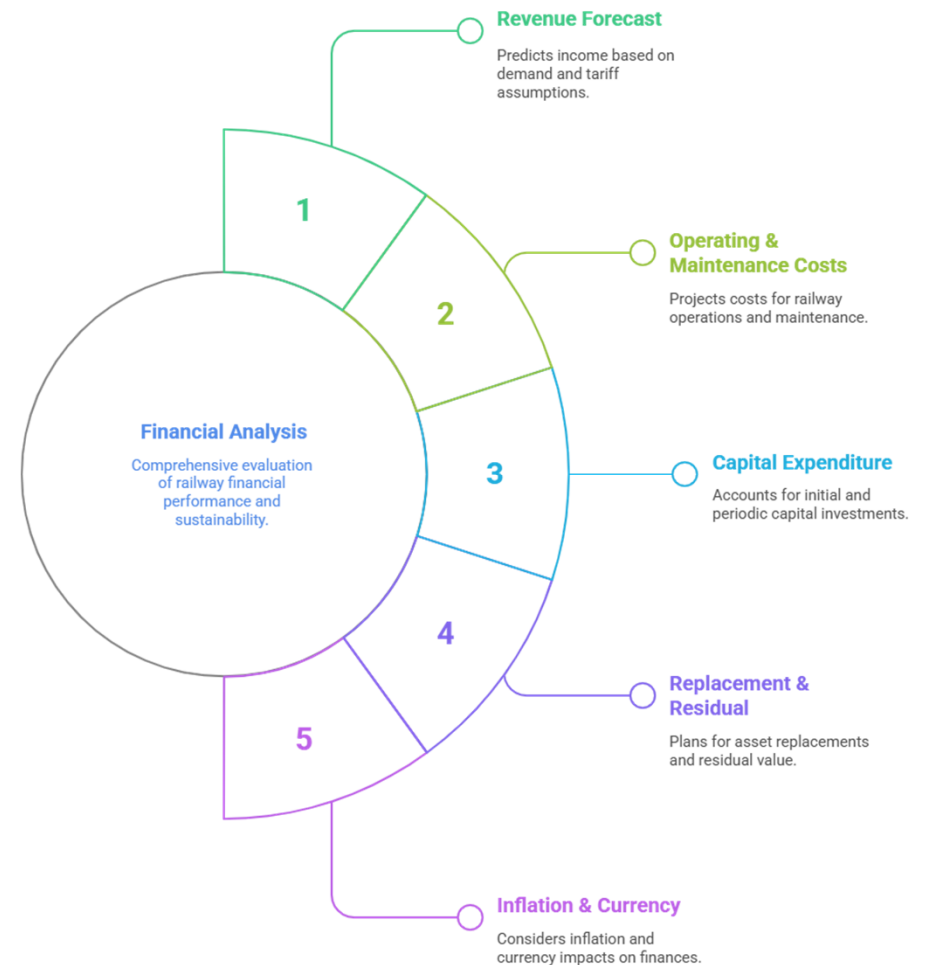
Forecasting Methods – Comparison

- **Commodity Flow:**
 - **Data Sources:** Government trade statistics, industry reports, and shipping data.
 - **Measurement:** Quantitative metrics such as volume, weight, and monetary value.
 - **Trends:** Seasonal variations, regional disparities, and shifts in consumer demand.
- **Growth Factor:**
 - **Indicators:** GDP growth rates, employment figures, and consumer spending.
 - **Simplicity:** Growth factors are often summarized in easy-to-understand metrics, making them accessible to a wider audience.
 - **Broad Trends:** They capture overarching economic conditions without delving into the minutiae of individual commodities.
- **Econometric:**
 - **Data Sensitivity:** Econometric models rely on high-quality data to produce reliable results, making data collection and validation critical.
 - **Policy Implications:** The insights gained from econometric analysis can significantly influence policy decisions, as they provide evidence-based recommendations.
 - **Complexity:** The models used can be intricate, incorporating various variables and interactions that reflect real-world economic relationships.



Financial Analysis: Revenue and Cost Estimates

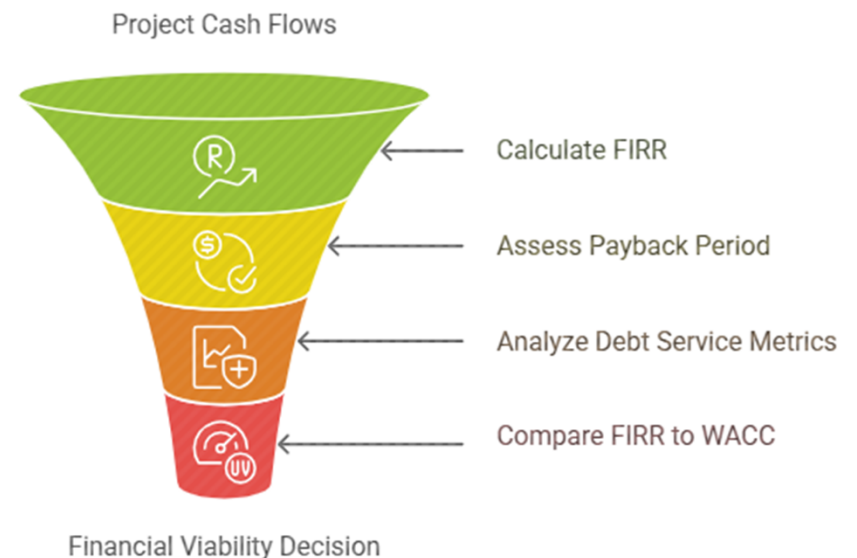
- **Purpose/Objective:** Determine the project's value to the project sponsor's viewpoint
- **Uses Cash Flow Analysis (CFA).**
- **Financial Costs:** All resource costs (construction, operation)



Financial Viability – Overview

- **Perspective:** Assesses project from investor's/operator's viewpoint, focusing on cash flows, revenues, profitability.
- **Financial vs. Economic:** Uses actual prices (taxes, subsidies, tariffs); only direct revenues/costs to project entity.
- **Key Outputs:**
 - Financial Internal Rate of Return (FIRR).
 - Payback Period.
 - Debt Service Metrics (e.g., Debt Service Coverage Ratio).
- **Viability Criterion:** $FIRR \geq \text{Weighted Average Cost of Capital (WACC)}$. Many rail projects struggle without subsidies.

Financial Viability Assessment Funnel





Financial Viability Metrics and Analysis (Financial Indicators – Sample Project)

- **Financial Internal Rate of Return (FIRR):** Calculated from net cash flow. Compared to WACC. ADB expects $FIRR \geq$ real WACC (otherwise subsidy needed).
- **NPV and Funding Gap:** Financial NPV at WACC. Negative NPV = funding gap (often government support/grants).
- **Payback Period:** When cumulative cash flow turns positive. Often long for rail (>15-20 years).
- **Sensitivity & Risk Analysis:** Test robustness (e.g., revenue -20%, costs +20%). Identify sensitivities and mitigation (guarantees, phased investments).
- **Financial Sustainability:** Ensure operating railway can cover operating costs (and ideally depreciation). Measured by operating ratio.

Economic Analysis: Economic Costs & Benefits

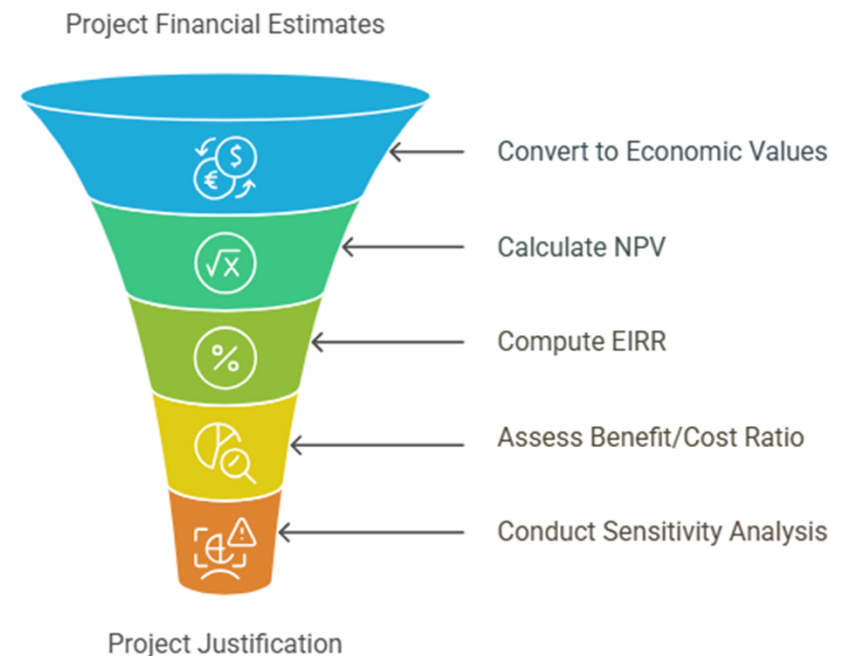
- **Purpose/Objective:** Determine the project's value to the overall economy (nation/region), not just to the railway operator.
- **Uses Cost-Benefit Analysis (CBA).**
- **Economic Costs:** All resource costs (construction, operation) adjusted to economic (shadow) prices (e.g., net of taxes, including externalities).



Economic Appraisal Framework

- **Net Present Value (NPV):** Present value of benefits minus costs. Positive NPV (at a given social discount rate) indicates net economic value.
- **Economic Internal Rate of Return (EIRR):** Discount rate at which $NPV=0$. ADB often requires $EIRR >$ hurdle rate (e.g., 9% real) for economic viability.
- **Benefit/Cost Ratio:** Ratio > 1 indicates benefits outweigh costs.
- **Methodology Snapshot:**
 - Convert financial costs to economic costs (Shadow Prices).
 - Quantify benefits monetarily (value of time, accident reduction, \$/ton CO₂).
 - Apply social discount rate.
 - Perform sensitivity analysis.

Economic Appraisal Process Funnel



Case Study: Afghanistan – Hairatan to Mazar-e-Sharif Rail

- **Project:** 75 km rail line (opened 2011, ADB support) connecting N. Afghanistan to Uzbekistan.
- **Economic Impact:** Handles ~6,000 tons/day, significantly lowered transport costs, improved trade reliability, vital regional link.
- **Viability Insights:**
 - Economically justified: Huge cost savings (road was only alternative).
 - Financially: Revenue covers operations, but major capital was grant-funded. Illustrates need for external funding when FIRR low but economic benefits high.
 - Ongoing viability depends on political stability and cross-border cooperation. Security remains key risk.



Picture: <https://www.alamy.com/>

Case Study: Pakistan - Railway Modernization

- **Context:** Pakistan Railways (PR) has a broad network but low freight market share (~5%) due to underinvestment and inefficiencies.
- **Proposed Investment:** ML-1 railway upgrade (Karachi-Peshawar) to increase speed/capacity.
- **Viability Insights:**
 - Economic case strong: Reduced road congestion, fuel savings.
 - Financially challenging: PR operated at a loss. FIRR on new investments remains low without tariff reforms and efficiency gains.
 - Lesson: Infrastructure investment must be coupled with policy/operational reforms (commercial management, private operators) to realize benefits and attract shippers.



Picture: Momentum building behind CPEC again - Business - DAWN.COM

Case Study: Central Asia - Transit Corridor Successes and Risks

- **Kazakhstan:**
 - Success: Investment (Khorgos dry port, new lines) made it a key China-Europe transit route. Surged container traffic.
 - Best Practice: KTZ's commercial approach (competitive tariffs, logistics) yielded significant transit revenues, improving financial viability.



Picture: Photo credit: Khorgosgateway.kz.

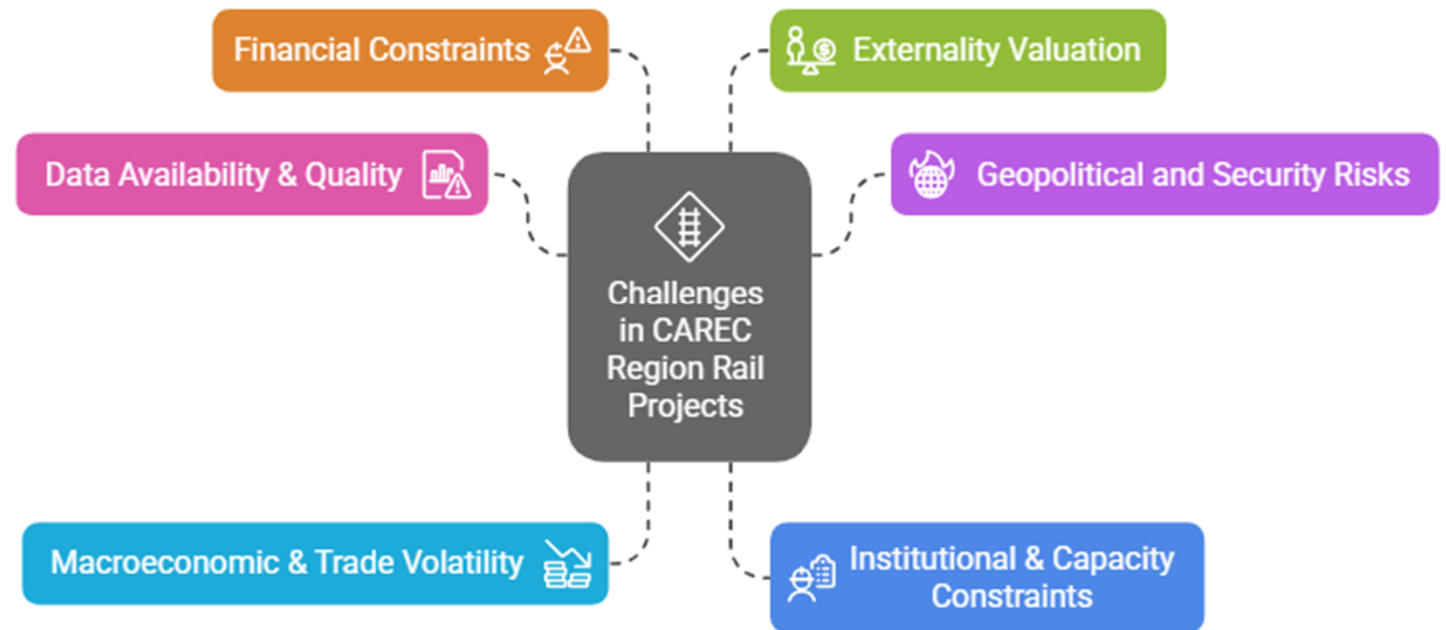
Case Study: Central Asia - Transit Corridor Successes and Risks

- **Middle Corridor (Trans-Caspian):**
 - Context: Multi-country initiative (KZ, AZ, GE, TR) avoiding Russia; demand spiked in 2022 due to geopolitics, exposing bottlenecks (Caspian ferry capacity).
 - Lesson: Flexibility, regional coordination crucial. Economic justification for capacity investments. Financial viability per segment depends on sustained traffic and cooperation (tariffs, revenue-sharing). Cautious, modular investments mitigate risk.
- **Uzbekistan:**
 - Example: Electrification of key corridors (e.g., Marakand-Karshi) improved efficiency.
 - Lesson: Upgrading existing lines can yield higher immediate financial returns by cutting operating costs and attracting traffic on proven routes.

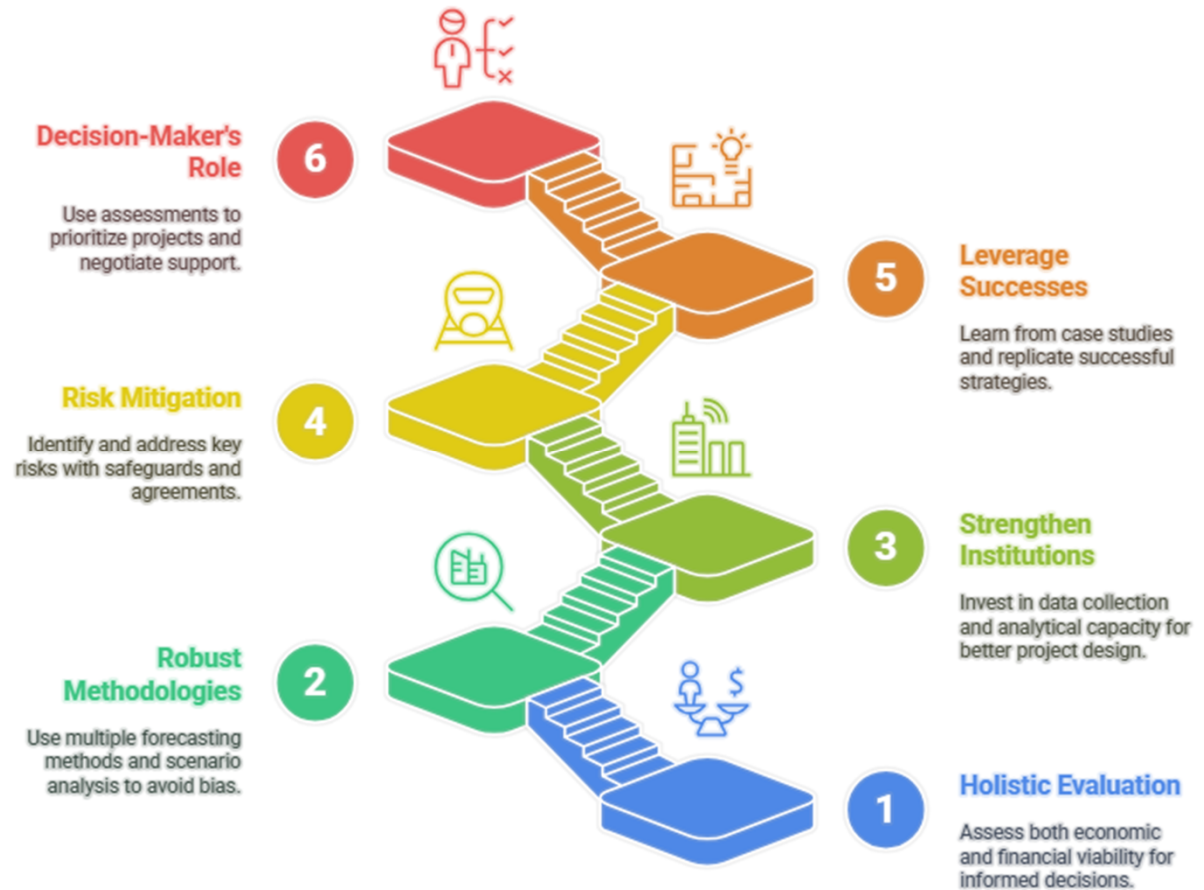


Picture: <https://www.carecprogram.org/?feature=marakand-karshi-railway-electrification-project>

Practical Challenges in CAREC Region



Achieving Sound Rail Investment Decisions





Q&A

Holger Eiletz

holger.eiletz@vienna-mc.com

"Thank you for your attention. I look forward to the discussion and any questions you have on these approaches."