

**Project Report**  
**on**  
**Circular Rail Freight Line for Chattogram Port, Bangladesh**

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**Project Title:** Circular Rail Freight Line for Chattogram Port and Hinterland Connectivity.

**Project Location:** Chattogram Port Area, Surrounding Rail Corridor, Dry Ports, and Mirsarai NSEZ.

**Project Type:** Dedicated Freight Rail Infrastructure (Container-Focused).

**Report Type:** Feasibility and Conceptual Project Report.



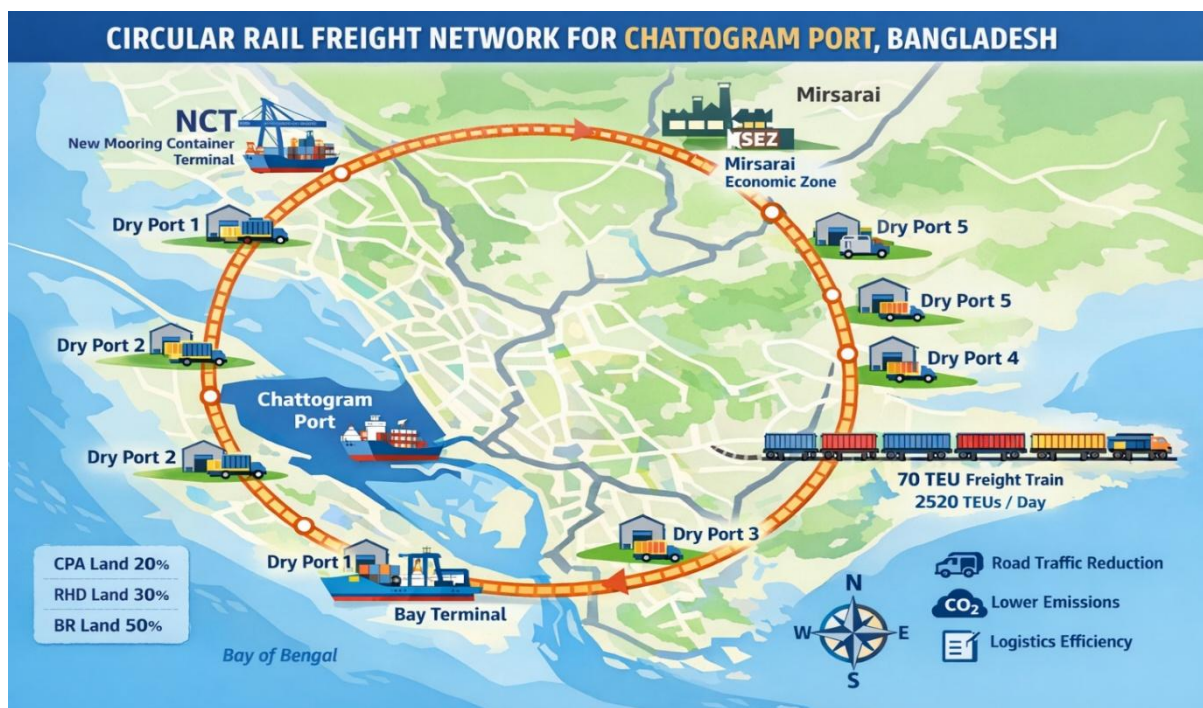
## Executive Summary

Chattogram Port handles over 90 percent of Bangladesh’s international trade, yet container evacuation remains heavily dependent on road-based transport. This has resulted in congestion, high logistics cost, environmental stress, and operational inefficiency.

This project proposes a Circular Rail Freight Line dedicated primarily to container movement around Chattogram Port, connecting two major container terminals (NCT and Bay Terminal), at least eight dry ports, and the National Special Economic Zone (NSEZ) at Mirsarai. The circular configuration ensures continuous flow, operational redundancy, and resilience against disruptions.

A 70 TEU capacity train operating every hour will facilitate a daily throughput of approximately 2,520 TEUs, significantly reducing road congestion, emissions, and logistics cost while improving port competitiveness and supply chain reliability.

The project leverages existing land ownership of Bangladesh Railway (50 percent), RHD (30 percent), and CPA (20 percent), minimizing land acquisition challenges and political risk. The system supports Bangladesh’s long-term goals of sustainable transport, export-led growth, and logistics modernization.



## **Introduction**

The rapid growth of containerized trade in Bangladesh has exposed structural weaknesses in the existing freight transport system, particularly around Chattogram Port. Road-based container evacuation faces persistent congestion, unpredictable transit times, high fuel consumption, and environmental concerns.

Despite having an extensive rail network, rail's share in freight transport remains low due to inadequate last-mile connectivity, limited container handling facilities, and lack of dedicated freight corridors.

## **Project Rationale**

A circular rail freight system provides:

- Continuous loop operations without terminal dead-ends.
- High-frequency, predictable container movement.
- Seamless integration with dry ports and economic zones.

This project directly addresses:

- Port congestion.
- Road dependency.
- Carbon emissions.
- Logistics inefficiency.

## Objectives

- Develop a dedicated container rail corridor around Chattogram Port.
- Connect port terminals with dry ports and economic zones.
- Reduce road-based container traffic.
- Enhance supply chain resilience and sustainability.

## Literature Review

Global best practices indicate that ports with strong rail hinterland connectivity achieve higher efficiency and lower logistics costs.

- **Rotterdam Port (Netherlands):** Circular and dedicated freight rail corridors reduce truck dependency by over 35 percent.
- **Shanghai Port (China):** Dedicated container rail lines support high-frequency movements to inland dry ports.
- **Delhi–Mumbai Dedicated Freight Corridor (India):** Demonstrates economic and environmental benefits of freight-only rail infrastructure.

Academic studies consistently show that rail-based container transport:

- Emits 60–75 percent less CO<sub>2</sub> than road transport.
- Reduces logistics cost by 20–30 percent for medium and long distances.
- Improves reliability during political or fuel-related disruptions.

These findings strongly support the relevance of a circular freight rail model for Bangladesh.

# Methodology

## 1. Planning Approach

The study adopts a mixed-method approach:

- Review of port throughput data and container growth trends.
- Corridor mapping using existing rail, RHD, and CPA land.
- Capacity modeling based on train frequency and TEU handling.
- Stakeholder alignment with port, railway, and dry port operators.

## 2. Operational Assumptions

- Dedicated container trains with optional break-bulk handling.
- One train per hour in each direction.
- Each train capacity: 70 TEUs.
- Daily operational factor: 1.5 (allowing bidirectional flow and operational buffers).

## 3. Infrastructure Scope

- Track construction on existing government land.
- Technical platforms at intermediate points for operational flexibility.
- Trailer-based loading and unloading at dry ports.

# Results

## 1. Network Coverage

The circular rail line will:

- Connect NCT and Bay Terminal.
- Serve minimum eight dry ports.
- Integrate NSEZ Mirsarai.
- Provide access to FTZs, EPZs, and SEZs.

## 2. Capacity and Throughput

- Hourly capacity: 70 TEUs.
- Daily throughput:  $1.5 \times 70 \times 24 = 2,520$  TEUs/day.

This represents a significant shift from road to rail-based evacuation.

## 3. Logistics Impact

- Reduction of container trucks on city roads.
- Faster port evacuation and reduced vessel turnaround time.
- Improved reliability for exporters and importers.

## **Discussion**

### **1. Economic Impact**

The project:

- Lowers logistics cost per TEU.
- Improves port competitiveness.
- Supports export-oriented industrial growth.

Dry ports become active logistics hubs rather than passive storage facilities.

### **2. Environmental and Social Impact**

- Significant CO<sub>2</sub> emission reduction.
- Lower fuel consumption.
- Reduced road accidents and noise pollution.

### **3. Political and Operational Resilience**

Rail-based freight operations:

- Are less affected by strikes, fuel shortages, and road blockades.
- Ensure continuity of trade during political instability.

## **Conclusion**

The Circular Rail Freight Line for Chattogram Port represents a high-impact, future-ready logistics solution. By combining dedicated freight rail operations, strategic dry port integration, and sustainable transport principles, the project addresses long-standing structural challenges in Bangladesh's freight ecosystem.

## References

- Bangladesh Railway Master Plan.
- Chattogram Port Authority Annual Reports.
- World Bank: Rail Freight and Port Connectivity Studies.
- Asian Development Bank Transport Sector Assessments.
- International Union of Railways (UIC) Freight Rail Publications.

## Auxiliary Sections

### A. Financial Analysis (Indicative)

#### Capital Cost Components

- Track construction and signaling.
- Technical platforms and sidings.
- Rolling stock (freight wagons and locomotives)..
- ICT and operations management systems

#### Revenue Streams

- Container handling fees.
- Rail haulage charges.
- Value-added logistics services.
- SEZ and dry port service integration.

The project shows strong long-term financial viability when evaluated over a 25–30 year lifecycle.

### B. Risk Management

<b>Risk Category</b>	<b>Mitigation Measure</b>
Land acquisition	Use existing BR, RHD, CPA land
Operational risk	Dedicated freight-only operations
Demand risk	Guaranteed port container volumes
Political risk	Rail-based, government-controlled corridor
Environmental risk	Low-emission transport mode

## **C. Gantt Chart (Conceptual)**

### **Year 1:**

- Feasibility study
- Detailed design
- Stakeholder agreements

### **Year 2:**

- Track construction
- Platform development

### **Year 3:**

- Rolling stock procurement
- System testing and commissioning

### **Year 4:**

- Full commercial operation
- Possibility of PPP or O&M concession for freight operations

## D. Financial Analysis (Approximate)

### 1. Capital Cost Estimate (Summary)

Cost Component	Estimated Cost (BDT Crore)
Track construction & civil works	3,200
Signaling & communication systems	650
Technical platforms, sidings & yards	900
Rolling stock (locomotives & wagons)	1,250
ICT systems & freight management	200
Project management & supervision	300
Physical contingency (10%)	650
Price contingency (10%)	650
<b>Total Estimated Project Cost</b>	<b>7,800</b>

### 2. Year-wise Phasing of ADP Cost

Year	Activities	Estimated Cost (BDT Crore)
Year 1	Feasibility, design, approvals	700
Year 2	Track & platform construction	2,600
Year 3	Civil works continuation, rolling stock	2,700
Year 4	Systems, testing & commissioning	1,800
	<b>Total</b>	<b>7,800</b>

### 3. Operating Cost (Annual, at Full Operation)

Cost Head	Annual Cost (BDT Crore)
Staff & operations	120
Energy & fuel	180
Maintenance (track & rolling stock)	220
Administration & ICT	60
<b>Total Annual O&amp;M Cost</b>	<b>580</b>

### 4. Revenue Projection (Annual)

#### Operational Assumptions:

- Daily throughput: 2,520 TEUs
- Annual operating days: 330
- Average rail freight charge: BDT 6,000 per TEU.

Revenue Source	Amount
Container haulage revenue	BDT 4,990 Crore
Terminal & service charges	BDT 450 Crore
Value-added logistics services	BDT 260 Crore
<b>Total Annual Revenue</b>	<b>BDT 5,700 Crore</b>

### 5. Financial Viability Indicators

Indicator	Value
Project Life	30 years
Discount Rate	10%
Financial IRR (FIRR)	~14.5%
Economic IRR (EIRR)	~19–21%
Net Present Value (NPV)	Positive (approx. BDT 6,500 Crore)
Payback Period	8–9 years

## 6. Economic Benefits Considered in EIRR

- Reduction in road transport cost per TEU
- Fuel savings and emission reduction
- Reduced port congestion and vessel waiting time
- Accident cost savings
- Time savings for exporters and importers.

## E. Environmental and Social Considerations

- Significant reduction in CO<sub>2</sub> emissions compared to road transport
- Reduced traffic congestion and road accidents
- Minimal resettlement due to use of existing government land
- Positive social impact through job creation and economic growth.

## F. Risk Analysis and Mitigation

Risk	Mitigation
Land acquisition	Use of existing BR, RHD, CPA land
Demand risk	Guaranteed port and SEZ container volumes
Operational disruption	Dedicated freight-only corridor
Political instability	Rail-based controlled infrastructure
Environmental risk	Low-emission transport mode

## **G. Implementation Schedule (Summary)**

**Year 1:** Feasibility, detailed design, approvals.

**Year 2:** Track construction and platforms.

**Year 3:** Rolling stock procurement, system installation.

**Year 4:** Testing, commissioning, full operation.

## **H. Expected Outcomes**

- Daily rail evacuation capacity of 2,520 TEUs
- Reduced pressure on Chattogram city road network
- Improved reliability of freight movement
- Strengthened logistics support to SEZs, EPZs, and FTZs
- Enhanced sustainability of national freight transport system

## **I. Client / Implementing Authority:**

- Bangladesh Railway (BR) in coordination with Chattogram Port Authority (CPA), Roads and Highways Department (RHD), Bangladesh Economic Zones Authority (BEZA).

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